



**Caltrans**<sup>®</sup>

**STATE OF CALIFORNIA  
DEPARTMENT OF TRANSPORTATION**

**NOTICE TO BIDDERS  
AND  
SPECIAL PROVISIONS**

**FOR CONSTRUCTION ON STATE HIGHWAY IN TEHAMA COUNTY IN AND NEAR  
RED BLUFF FROM 5.3 MILES SOUTH FROM ADOBE ROAD OVERCROSSING TO ADOBE  
ROAD OVERCROSSING**

**In District 02 On Route 5**

**Under**

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Bid book dated April 20, 2009

Standard Specifications dated 2006

Project Plans approved March 16, 2009

Standard Plans dated 2006

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**Identified by**

**Contract No. 02-2C50U4**

**02-Teh-5-R22.2/R27.5**

**Federal-Aid Project**

**SARRA-005-8(336)E**

Bids open Tuesday, June 2, 2009

Dated April 20, 2009

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# SPECIAL NOTICES

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- The Department moved the Amendments to the Standard Specifications to the back of the book titled "Notice to Bidders and Special Provisions."
- The Department retitled the "Proposal and Contract" book to "Bid" book and:
  1. Simplified the language
  2. Moved clauses and the contract form from the "Proposal and Contract" book into the Amendments to the Standard Specifications
  3. Standardized the forms
- The Department retitled the "Notice to Contractors" to "Notice to Bidders" and:
  1. Simplified the language
  2. Moved clauses from the "Notice to Contractors" into the Amendments to the Standard Specifications
  3. Standardized instructions for bidders' inquiries
- The Department incorporated boilerplate special provisions into the Amendments to the Standard Specifications.
- The Department is implementing new Disadvantaged Business Enterprise requirements for Underutilized Disadvantaged Business Enterprises (UDBE). Section 2, "Bidding," under subsection titled "Disadvantaged Business Enterprises" and Section 5, "General," under subsection titled "Performance of UDBEs" of these special provisions cover the UDBE requirements.
- The contract award period has been extended for this project.
- Attention is directed to Section 5, "Federal Requirements (American Recovery And Reinvestment Act)," of these special provisions.
- The Department is implementing new contract requirements for submittal of Monthly Employment Report forms. Refer to section titled "Monthly Employment Report (American Recovery and Reinvestment Act)" under Section 5, "General," of these special provisions.
- See Section 5 of the special provisions for new specifications regarding retentions.
- The Department is implementing new contract requirements for submittal of Small Business Utilization Report forms. See section titled "Small Business Utilization Report" of these special provisions and bid item list.
- For this contract, the trigger threshold for asphalt price fluctuations is reduced from 10 to 5 percent. See section titled "Compensation Adjustments for Price Index Fluctuations" in Section 5 of these special provisions.

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# STANDARD PLANS LIST

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| RS3       | Roadside Signs – Laminated Wood Box Post Typical Installation Details No. 3       |
| RS4       | Roadside Signs, Typical Installation Details No. 4                                |
| S1        | Overhead Signs – Truss, Instructions and Examples                                 |
| S2        | Overhead Signs – Truss, Single Post Type – Post Type II thru IX                   |
| S3        | Overhead Signs – Truss, Single Post Type – Base Plate and Anchorage Details       |
| S4        | Overhead Signs – Truss, Single Post Type – Structural Frame Members Details No. 1 |
| S5        | Overhead Signs – Truss, Single Post Type – Structural Frame Members Details No. 2 |
| S6        | Overhead Signs – Truss, Gusset Plate Details                                      |
| S7        | Overhead Signs – Truss, Single Post Type – Square Pedestal Pile Foundation        |
| S8        | Overhead Signs – Truss, Single Post Type – Round Pedestal Pile Foundation         |
| S9        | Overhead Signs – Truss, Two Post Type – Post Types I-S thru VII-S                 |
| S10       | Overhead Signs – Truss, Two Post Type – Base Plate and Anchorage Details          |
| S11       | Overhead Signs – Truss, Two Post Type – Structural Frame Members                  |
| S12       | Overhead Signs – Truss, Structural Frame Details                                  |
| S13       | Overhead Signs – Truss, Frame Juncture Details                                    |
| S14       | Overhead Signs – Truss, Two Post Type – Square Pedestal Foundation                |
| S15       | Overhead Signs – Truss, Two Post Type – Round Pedestal Foundation                 |
| S16       | Overhead Signs – Walkway Details No. 1  |
| S17       | Overhead Signs – Walkway Details No. 2  |
| S17A      | Overhead Signs – Walkway Details No. 3  |
| S18       | Overhead Signs – Walkway Safety Railing Details                                   |
| S19       | Overhead Signs – Truss, Sign Mounting Details – Laminated Panel – Type A          |
| S20       | Overhead Signs – Steel Frames – Removable Sign Panel Frames                       |
| S21       | Overhead Signs – Removable Sign Panel Frames Mounting Details                     |
| S22       | Overhead Signs – Truss, Removable Sign Panel Frames – 110" and 120" Sign Panels   |
| S81       | Overhead Laminated Sign – Single or Multiple Panel, Type A (1" Thick)             |
| S82       | Roadside Laminated Sign – Single or Multiple Panel, Type B (1" Thick)             |
| S83       | Roadside Laminated Sign – Single or Multiple Panel, Type B (2-1/2" Thick)         |
| S86       | Laminated Panel Details – Extrusions for Type A, B and H Panels                   |
| S89       | Roadside Sign – Formed Single Sheet Aluminum Panel                                |
| S90       | Channel and Bolt Hole Location, Overhead Formed Sign Panel                        |
| S91       | Overhead Sign – Formed Sign Panel, Type A-3 Mounting Hardware                     |
| S92       | Overhead Formed Sign Panel  |
| S93       | Framing Details for Framed Single Sheet Aluminum Signs, Rectangular Shape         |
| S94       | Roadside Framed Single Sheet Aluminum Signs, Rectangular Shape                    |

|            |  |
|------------|--|
| S95        | Roadside Single Sheet Aluminum Signs, Diamond Shape                                    |
| RSP ES-1A  | Electrical Systems (Symbols and Abbreviations)   |
| RSP ES-1B  | Electrical Systems (Symbols and Abbreviations)   |
| RSP ES-1C  | Electrical Systems (Symbols and Abbreviations)   |
| ES-2A      | Electrical Systems (Service Equipment)   |
| RSP ES-2C  | Electrical Systems (Service Equipment Notes, Type III Series)                          |
| RSP ES-2D  | Electrical Systems (Service Equipment and Typical Wiring Diagram, Type III – A Series) |
| ES-3C      | Electrical Systems (Controller Cabinet Details)  |
| RSP ES-3E  | Electrical Systems (Telephone Demarcation Cabinet, Type B)                             |
| RSP ES-5A  | Electrical Systems (Detectors)   |
| ES-5B      | Electrical Systems (Detectors)   |
| ES-5D      | Electrical Systems (Detectors)   |
| RSP ES-6E  | Electrical Systems (Lighting Standard, Types 30 and 31)                                |
| ES-6F      | Electrical Systems (Lighting Standard, Types 30 and 31, Slip Base Plate Details)       |
| ES-7M      | Electrical Systems (Signal and Lighting Standards – Details No. 1)                     |
| ES-7N      | Electrical Systems (Signal and Lighting Standards – Details No. 2)                     |
| ES-8       | Electrical Systems (Pull Box Details)  |
| ES-10      | Electrical Systems (Isofootcandle Diagrams)  |
| ES-11      | Electrical Systems (Foundation Installations)  |
| ES-13A     | Electrical Systems (Splicing Details)  |
| ES-13B     | Electrical Systems (Wiring Details and Fuse Ratings)                                   |
| ES-15A     | Electrical Systems (Sign Illumination Equipment)                                       |
| ES-15C     | Electrical Systems (Sign Illumination Equipment)                                       |
| RSP ES-15D | Electrical Systems (Lighting and Sign Illumination Control)                            |

# NOTICE TO BIDDERS

Bids open Tuesday, June 2, 2009

Dated April 20, 2009

General work description: Bridge deck maintenance and replace PCC pavement.

The Department will receive sealed bids for CONSTRUCTION ON STATE HIGHWAY IN TEHAMA COUNTY IN AND NEAR RED BLUFF FROM 5.3 MILES SOUTH FROM ADOBE ROAD OVERCROSSING TO ADOBE ROAD OVERCROSSING.

District-County-Route-Post Mile: 02-Teh-5-R22.2/R27.5

Contract No. 02-2C50U4

The Contractor must have either a Class A license or one of the following Class C licenses: C-8.

The UDBE Contract goal is 4 percent.

Federal-aid project no.:

SARRA-005-8(336)E

Bids must be on a unit price basis.

Complete the work within 180 working days.

The estimated cost of the project is \$34,000,000.

No prebid meeting is scheduled for this project.

The Department will receive bids until 2:00 p.m. on the bid open date at 1120 N Street, Room 0200, MS 26, Sacramento, CA 95814. Bids received after this time will not be accepted.

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

District office addresses are provided in the Standard Specifications.

Bidders' inquiries may be presented to the Department by following the instructions at:

[http://www.dot.ca.gov/hq/esc/oe/project\\_status/bid\\_inq.html](http://www.dot.ca.gov/hq/esc/oe/project_status/bid_inq.html)

The Department posts responses to the questions at the District Web sites.

Questions about alleged patent ambiguity of the plans, specifications, or estimate must be asked before bid opening. After bid opening, such questions will not be treated as bid protests.

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

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

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

If the minimum wage rates as determined by the United States Secretary of Labor differs from the general prevailing wage rates determined by the Director of the California Department of Industrial Relations for similar classifications of labor, the Contractor and subcontractors must not pay less than the higher wage rate. The Department does not accept lower State wage

rates not specifically included in the Federal minimum wage determinations. This includes helper, or other classifications based on hours of experience, or any other classification not appearing in the Federal wage determinations. Where Federal wage determinations do not contain the State wage rate determination otherwise available for use by the Contractor and subcontractors, the Contractor and subcontractors must not pay less than the Federal minimum wage rate that most closely approximates the duties of the employees in question.

DEPARTMENT OF TRANSPORTATION

WAT

**COPY OF BID ITEM LIST**

| Item No. | Item Code | Item Description                              | Unit of Measure | Estimated Quantity |
|----------|-----------|---|-----------------|--------------------|
| 1        | 070012    | PROGRESS SCHEDULE (CRITICAL PATH METHOD)      | LS              | LUMP SUM           |
| 2        | 070013    | SMALL BUSINESS UTILIZATION REPORT             | EA              | 4                  |
| 3        | 070018    | TIME-RELATED OVERHEAD                         | WDAY            | 180                |
| 4        | 071325    | TEMPORARY FENCE (TYPE ESA)                    | LF              | 7,150              |
| 5        | 074016    | CONSTRUCTION SITE MANAGEMENT                  | LS              | LUMP SUM           |
| 6        | 074019    | PREPARE STORM WATER POLLUTION PREVENTION PLAN | LS              | LUMP SUM           |
| 7        | 074028    | TEMPORARY FIBER ROLL                          | LF              | 500                |
| 8        | 074029    | TEMPORARY SILT FENCE                          | LF              | 1,300              |
| 9        | 074031    | TEMPORARY GRAVEL BAG BERM                     | LF              | 500                |
| 10       | 074038    | TEMPORARY DRAINAGE INLET PROTECTION           | EA              | 26                 |
| 11       | 074041    | STREET SWEEPING                               | LS              | LUMP SUM           |
| 12       | 074043    | TEMPORARY CONCRETE WASHOUT BIN                | EA              | 40                 |
| 13       | 120090    | CONSTRUCTION AREA SIGNS                       | LS              | LUMP SUM           |
| 14       | 120100    | TRAFFIC CONTROL SYSTEM                        | LS              | LUMP SUM           |
| 15       | 120102    | TRAFFIC CONTROL SURVEILLANCE                  | LS              | LUMP SUM           |
| 16       | 120159    | TEMPORARY TRAFFIC STRIPE (PAINT)              | LF              | 576,000            |
| 17       | 120165    | CHANNELIZER (SURFACE MOUNTED)                 | EA              | 1,030              |
| 18       | 120300    | TEMPORARY PAVEMENT MARKER                     | EA              | 6,400              |
| 19       | 128650    | PORTABLE CHANGEABLE MESSAGE SIGN              | LS              | LUMP SUM           |
| 20       | 016242    | PORTABLE RADAR TRAILER                        | LS              | LUMP SUM           |

| Item No. | Item Code | Item Description                                       | Unit of Measure | Estimated Quantity |
|----------|-----------|--|-----------------|--------------------|
| 21       | 129000    | TEMPORARY RAILING (TYPE K)                             | LF              | 59,800             |
| 22       | 129100    | TEMPORARY CRASH CUSHION MODULE                         | EA              | 230                |
| 23       | 150662    | REMOVE METAL BEAM GUARD RAILING                        | LF              | 4,920              |
| 24       | 150668    | REMOVE FLARED END SECTION                              | EA              | 6                  |
| 25       | 150704    | REMOVE YELLOW THERMOPLASTIC TRAFFIC STRIPE             | LF              | 13,000             |
| 26       | 150710    | REMOVE TRAFFIC STRIPE                                  | LF              | 101,000            |
| 27       | 041917    | REMOVE EPOXY GRIT POLYMER OVERLAY                      | SQFT            | 13,158             |
| 28       | 150722    | REMOVE PAVEMENT MARKER                                 | EA              | 1,480              |
| 29       | 150742    | REMOVE ROADSIDE SIGN                                   | EA              | 24                 |
| 30       | 150747    | REMOVE ROADSIDE SIGN (STRAP AND SADDLE BRACKET METHOD) | EA              | 2                  |
| 31       | 150760    | REMOVE SIGN STRUCTURE                                  | EA              | 2                  |
| 32       | 150805    | REMOVE CULVERT   | LF              | 160                |
| 33       | 150820    | REMOVE INLET   | EA              | 15                 |
| 34       | 150828    | REMOVE JUNCTION BOX                                    | EA              | 1                  |
| 35       | 152316    | RESET ROADSIDE SIGN (ONE POST)                         | EA              | 3                  |
| 36       | 152390    | RELOCATE ROADSIDE SIGN                                 | EA              | 2                  |
| 37       | 152430    | ADJUST INLET   | EA              | 2                  |
| 38       | 152604    | MODIFY INLET   | EA              | 1                  |
| 39       | 153223    | REMOVE UNSOUND CONCRETE                                | CF              | 986                |
| 40       | 153225    | PREPARE CONCRETE BRIDGE DECK SURFACE                   | SQFT            | 171,256            |

| Item No. | Item Code | Item Description                                   | Unit of Measure | Estimated Quantity |
|----------|-----------|--|-----------------|--------------------|
| 41       | 153235    | CLEAN BRIDGE DECK                                  | SQFT            | 7,144              |
| 42       | 156590    | REMOVE CRASH CUSHION (SAND FILLED)                 | LS              | LUMP SUM           |
| 43       | 157560    | BRIDGE REMOVAL (PORTION)                           | LS              | LUMP SUM           |
| 44       | 160101    | CLEARING AND GRUBBING                              | LS              | LUMP SUM           |
| 45       | 170101    | DEVELOP WATER SUPPLY                               | LS              | LUMP SUM           |
| 46       | 190101    | ROADWAY EXCAVATION                                 | CY              | 79,300             |
| 47       | 190110    | LEAD COMPLIANCE PLAN                               | LS              | LUMP SUM           |
| 48       | 200052    | PRUNE EXISTING PLANTS                              | LS              | LUMP SUM           |
| 49       | 203016    | EROSION CONTROL (TYPE D)                           | SQYD            | 65,400             |
| 50       | 204098    | MAINTAIN EXISTING PLANTS                           | LS              | LUMP SUM           |
| 51       | 208000    | IRRIGATION SYSTEM                                  | LS              | LUMP SUM           |
| 52       | 208906    | EXTEND 8" CONDUIT                                  | LF              | 180                |
| 53       | 260201    | CLASS 2 AGGREGATE BASE                             | CY              | 23,000             |
| 54       | 260210    | AGGREGATE BASE (APPROACH SLAB)                     | CY              | 59                 |
| 55       | 280000    | LEAN CONCRETE BASE                                 | CY              | 15,300             |
| 56       | 390132    | HOT MIX ASPHALT (TYPE A)                           | TON             | 30,000             |
| 57       | 394053    | SHOULDER RUMBLE STRIP (HMA,GROUND-IN INDENTATIONS) | STA             | 570                |
| 58       | 394074    | PLACE HOT MIX ASPHALT DIKE (TYPE C)                | LF              | 270                |
| 59       | 394075    | PLACE HOT MIX ASPHALT DIKE (TYPE D)                | LF              | 60                 |
| 60       | 394076    | PLACE HOT MIX ASPHALT DIKE (TYPE E)                | LF              | 27,100             |

| Item No. | Item Code | Item Description                                    | Unit of Measure | Estimated Quantity |
|----------|-----------|---|-----------------|--------------------|
| 61       | 394077    | PLACE HOT MIX ASPHALT DIKE (TYPE F)                 | LF              | 1,000              |
| 62       | 394090    | PLACE HOT MIX ASPHALT (MISCELLANEOUS AREA)          | SQYD            | 1,750              |
| 63       | 397005    | TACK COAT   | TON             | 33                 |
| 64       | 401000    | CONCRETE PAVEMENT                                   | CY              | 26,100             |
| 65       | 401082    | SHOULDER RUMBLE STRIP (PCC, GROUND-IN INDENTATIONS) | STA             | 180                |
| 66       | 401108    | REPLACE CONCRETE PAVEMENT (RAPID STRENGTH CONCRETE) | CY              | 18,900             |
| 67       | 404092    | SEAL PAVEMENT JOINT                                 | LF              | 104,000            |
| 68       | 404094    | SEAL LONGITUDINAL ISOLATION JOINT                   | LF              | 81,800             |
| 69       | 016243    | BASE (RAPID STRENGTH CONCRETE)                      | CY              | 10,500             |
| 70       | 420201    | GRIND EXISTING CONCRETE PAVEMENT                    | SQYD            | 167,000            |
| 71       | 510087    | STRUCTURAL CONCRETE, APPROACH SLAB (TYPE R)         | CY              | 585                |
| 72 (F)   | 510502    | MINOR CONCRETE (MINOR STRUCTURE)                    | CY              | 45.2               |
| 73       | 510526    | MINOR CONCRETE (BACKFILL)                           | CY              | 22                 |
| 74       | 510800    | PAVING NOTCH EXTENSION                              | CY              | 9                  |
| 75       | 511118    | CLEAN EXPANSION JOINT                               | LF              | 1,538              |
| 76       | 511124    | RAPID SETTING CONCRETE (PATCH)                      | CF              | 986                |
| 77       | 515041    | FURNISH POLYESTER CONCRETE OVERLAY                  | CF              | 12,833             |
| 78 (F)   | 515042    | PLACE POLYESTER CONCRETE OVERLAY                    | SQFT            | 171,256            |
| 79       | 041918    | CORE TREATED BRIDGE DECK                            | EA              | 8                  |
| 80       | 519081    | JOINT SEAL (MR 1/2")                                | LF              | 328                |

| Item No.  | Item Code | Item Description  | Unit of Measure | Estimated Quantity |
|-----------|-----------|---|-----------------|--------------------|
| 81        | 519088    | JOINT SEAL (MR 1")  | LF              | 909                |
| 82        | 519100    | JOINT SEAL (MR 2")  | LF              | 789                |
| 83<br>(F) | 540102    | TREAT BRIDGE DECK   | SQFT            | 7,144              |
| 84        | 540108    | FURNISH BRIDGE DECK TREATMENT MATERIAL                      | GAL             | 79                 |
| 85<br>(F) | 550102    | STRUCTURAL STEEL (BRIDGE)                                   | LB              | 75,500             |
| 86        | 041919    | REPAIR CRACK<br>(STEEL GIRDER WEB)                          | EA              | 190                |
| 87        | 560218    | FURNISH SIGN STRUCTURE (TRUSS)                              | LB              | 66,400             |
| 88        | 560219    | INSTALL SIGN STRUCTURE (TRUSS)                              | LB              | 66,400             |
| 89        | 560233    | FURNISH FORMED PANEL SIGN (OVERHEAD)                        | SQFT            | 440                |
| 90        | 560245    | FURNISH LAMINATED PANEL SIGN (1"-TYPE B)                    | SQFT            | 140                |
| 91        | 560246    | FURNISH LAMINATED PANEL SIGN (2 1/2"-TYPE B)                | SQFT            | 91                 |
| 92        | 560248    | FURNISH SINGLE SHEET ALUMINUM SIGN (0.063"-UNFRAMED)        | SQFT            | 130                |
| 93        | 560249    | FURNISH SINGLE SHEET ALUMINUM SIGN (0.080"-UNFRAMED)        | SQFT            | 18                 |
| 94        | 560252    | FURNISH SINGLE SHEET ALUMINUM SIGN (0.080"-FRAMED)          | SQFT            | 180                |
| 95        | 561016    | 60" CAST-IN-DRILLED-HOLE CONCRETE PILE<br>(SIGN FOUNDATION) | LF              | 90                 |
| 96        | 566011    | ROADSIDE SIGN - ONE POST                                    | EA              | 13                 |
| 97        | 566012    | ROADSIDE SIGN - TWO POST                                    | EA              | 4                  |
| 98        | 568001    | INSTALL SIGN (STRAP AND SADDLE BRACKET METHOD)              | EA              | 1                  |
| 99        | 568016    | INSTALL SIGN PANEL ON EXISTING FRAME                        | EA              | 2                  |
| 100       | 568023    | INSTALL ROADSIDE SIGN (LAMINATED WOOD BOX POST)             | EA              | 3                  |

| Item No. | Item Code | Item Description                             | Unit of Measure | Estimated Quantity |
|----------|-----------|--|-----------------|--------------------|
| 101      | 590106    | CLEAN STRUCTURAL STEEL (EXISTING BRIDGE)     | LS              | LUMP SUM           |
| 102      | 590111    | PAINT STRUCTURAL STEEL (EXISTING BRIDGE)     | LS              | LUMP SUM           |
| 103      | 590115    | CLEAN AND PAINT STRUCTURAL STEEL             | LS              | LUMP SUM           |
| 104      | 590135    | SPOT BLAST CLEAN AND PAINT UNDERCOAT         | SQFT            | 14,212             |
| 105      | 590301    | WORK AREA MONITORING                         | LS              | LUMP SUM           |
| 106      | 650014    | 18" REINFORCED CONCRETE PIPE                 | LF              | 44                 |
| 107      | 650018    | 24" REINFORCED CONCRETE PIPE                 | LF              | 72                 |
| 108      | 650026    | 36" REINFORCED CONCRETE PIPE                 | LF              | 24                 |
| 109      | 650030    | 42" REINFORCED CONCRETE PIPE                 | LF              | 20                 |
| 110      | 016244    | 23"X14" OVAL SHAPED REINFORCED CONCRETE PIPE | LF              | 18                 |
| 111      | 665018    | 18" CORRUGATED STEEL PIPE (.109" THICK)      | LF              | 16                 |
| 112      | 665024    | 24" CORRUGATED STEEL PIPE (.109" THICK)      | LF              | 16                 |
| 113      | 681113    | 6" PLASTIC PIPE (EDGE DRAIN OUTLET)          | LF              | 60                 |
| 114      | 707117    | 36" PRECAST CONCRETE PIPE INLET              | LF              | 48                 |
| 115      | 731501    | MINOR CONCRETE (CURB)                        | CY              | 18                 |
| 116      | 731507    | MINOR CONCRETE (GUTTER DEPRESSION)           | CY              | 2.4                |
| 117      | 731530    | MINOR CONCRETE (TEXTURED PAVING)             | SQFT            | 400                |
| 118 (F)  | 750001    | MISCELLANEOUS IRON AND STEEL                 | LB              | 8,821              |
| 119      | 016245    | GRATE LOCKING DEVICE                         | EA              | 8                  |
| 120 (F)  | 750501    | MISCELLANEOUS METAL (BRIDGE)                 | LB              | 2,160              |

| Item No.   | Item Code | Item Description                               | Unit of Measure | Estimated Quantity |
|------------|-----------|--|-----------------|--------------------|
| 121        | 820107    | DELINEATOR (CLASS 1)                           | EA              | 82                 |
| 122        | 820110    | MILEPOST MARKER                                | EA              | 20                 |
| 123        | 820112    | MARKER (CULVERT)                               | EA              | 23                 |
| 124        | 820151    | OBJECT MARKER (TYPE L-1)                       | EA              | 20                 |
| 125        | 832001    | METAL BEAM GUARD RAILING                       | LF              | 2,880              |
| 126        | 832070    | VEGETATION CONTROL (MINOR CONCRETE)            | SQYD            | 2,130              |
| 127<br>(F) | 041920    | CONCRETE BARRIER (EXTENTION)                   | LF              | 67                 |
| 128        | 839220    | DOUBLE METAL BEAM GUARD RAILING (WOOD POST)    | LF              | 930                |
| 129        | 839541    | TRANSITION RAILING (TYPE WB)                   | EA              | 30                 |
| 130        | 839581    | END ANCHOR ASSEMBLY (TYPE SFT)                 | EA              | 12                 |
| 131        | 839584    | ALTERNATIVE IN-LINE TERMINAL SYSTEM            | EA              | 4                  |
| 132        | 839585    | ALTERNATIVE FLARED TERMINAL SYSTEM             | EA              | 20                 |
| 133        | 016246    | ALTERNATIVE CRASH CUSHION                      | EA              | 14                 |
| 134        | 016247    | CONCRETE BARRIER (MODIFIED TYPE 60)            | LF              | 520                |
| 135        | 840504    | 4" THERMOPLASTIC TRAFFIC STRIPE                | LF              | 145,000            |
| 136        | 840506    | 8" THERMOPLASTIC TRAFFIC STRIPE                | LF              | 5,850              |
| 137        | 840508    | 8" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 12-3)  | LF              | 2,670              |
| 138        | 840525    | 4" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 36-12) | LF              | 63,800             |
| 139        | 840526    | 4" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 17-7)  | LF              | 1,730              |
| 140        | 850111    | PAVEMENT MARKER (RETROREFLECTIVE)              | EA              | 3,350              |

| Item No. | Item Code | Item Description  | Unit of Measure | Estimated Quantity |
|----------|-----------|---|-----------------|--------------------|
| 141      | 860090    | MAINTAINING EXISTING TRAFFIC MANAGEMENT SYSTEM ELEMENTS DURING CONSTRUCTION | LS              | LUMP SUM           |
| 142      | 860460    | LIGHTING AND SIGN ILLUMINATION  | LS              | LUMP SUM           |
| 143      | 860520    | HIGHWAY ADVISORY RADIO SYSTEM   | LS              | LUMP SUM           |
| 144      | 860930    | TRAFFIC MONITORING STATION  | LS              | LUMP SUM           |
| 145      | 999990    | MOBILIZATION  | LS              | LUMP SUM           |

# SPECIAL PROVISIONS

## SECTION 1. (BLANK)

## SECTION 2. BIDDING

### 2-1.01 DISADVANTAGED BUSINESS ENTERPRISES

The second paragraph in Section 2-1.05, "Disadvantaged Business Enterprises," of the Standard Specifications does not apply.

Take necessary and reasonable steps to ensure that DBEs have opportunity to participate in the contract (49 CFR 26).

To ensure there is equal participation of the DBE groups specified in 49 CFR 26.5, the Department specifies a goal for Underutilized Disadvantaged Business Enterprises (UDBEs). UDBE is a firm that meets the definition of DBE and is a member of one of the following groups:

1. Black Americans
2. Native Americans
3. Asian-Pacific Americans
4. Women

References to DBEs include UDBEs, but references to UDBEs do not include all DBEs.

Make work available to UDBEs and select work parts consistent with available UDBE subcontractors and suppliers.

Meet the UDBE goal shown in the Notice to Bidders or demonstrate that you made adequate good faith efforts to meet this goal.

It is your responsibility to verify that the UDBE firm is certified as DBE at date of bid opening. For a list of DBEs certified by the California Unified Certification Program, go to:

[http://www.dot.ca.gov/hq/bep/find\\_certified.htm](http://www.dot.ca.gov/hq/bep/find_certified.htm)

Only UDBE participation will count towards the UDBE goal. DBE participation will count towards the Department's federally mandated statewide overall DBE goal.

Credit for materials or supplies you purchase from UDBEs counts towards the goal in the following manner:

1. 100 percent counts if the materials or supplies are obtained from a UDBE manufacturer
2. 60 percent counts if the materials or supplies are obtained from a UDBE regular dealer
3. Only fees, commissions, and charges for assistance in the procurement and delivery of materials or supplies counts if obtained from a UDBE that is neither a manufacturer or regular dealer. 49 CFR 26.55 defines "manufacturer" and "regular dealer."

You receive credit towards the goal if you employ a UDBE trucking company that performs a commercially useful function as defined in 49 CFR 26.55.

### **UDBE Commitment Submittal**

Submit UDBE information on the Caltrans Bidder - UDBE - Commitment form included in the Bid book. If the form is not submitted with the bid, remove the forms from the Bid book before submitting your bid.

If the UDBE Commitment form is not submitted with the bid, the apparent low bidder, the 2nd low bidder, and the 3rd low bidder must complete and submit the UDBE Commitment form to Office Engineer. UDBE Commitment form must be received by the Department no later than 4:00 p.m. on the 4th business day after bid opening.

Other bidders do not need to submit the UDBE Commitment form unless the Department requests it. If the Department requests you to submit a UDBE Commitment form, submit the completed form within 4 business days of the request.

Submit written confirmation from each UDBE stating that it is participating in the contract. Include confirmation with the UDBE Commitment form. A copy of a UDBE's quote will serve as written confirmation that the UDBE is participating in the contract.

If you do not submit the UDBE Commitment form within the specified time, the Department finds your bid nonresponsive.

### **Good Faith Efforts Submittal**

If you have not met the UDBE goal, complete and submit the Good Faith Efforts Documentation form with the bid showing that you made adequate good faith efforts to meet the goal. Only good faith efforts directed towards obtaining participation by UDBEs will be considered. If good faith efforts documentation is not submitted with the bid, it must be received by the Department no later than 4:00 p.m. on the 4th business day after bid opening.

If your UDBE Commitment form shows that you have met the UDBE goal or if you are required to submit the UDBE Commitment form, you must also submit good faith efforts documentation within the specified time to protect your eligibility for award of the contract in the event the Department finds that the UDBE goal has not been met.

Good faith efforts documentation must include the following information and supporting documents, as necessary:

1. Items of work you have made available to UDBE firms. Identify those items of work you might otherwise perform with its own forces and those items that have been broken down into economically feasible units to facilitate UDBE participation. For each item listed, show the dollar value and percentage of the total contract. It is your responsibility to demonstrate that sufficient work to meet the goal was made available to UDBE firms.
2. Names of certified UDBEs and 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 UDBEs 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. You are reminded to solicit certified UDBEs through all reasonable and available means and provide sufficient time to allow UDBEs to respond.
3. Name of selected firm and its status as a UDBE for each item of work made available. Include name, address, and telephone number of each UDBE that provided a quote and their price quote. If the firm selected for the item is not a UDBE, provide the reasons for the selection.
4. Name and date of each publication in which you requested UDBE participation for the project. Attach copies of the published advertisements.
5. Names of agencies and dates on which they were contacted to provide assistance in contacting, recruiting, and using UDBE firms. If the agencies were contacted in writing, provide copies of supporting documents.
6. List of efforts made to provide interested UDBEs with adequate information about the plans, specifications, and requirements of the contract to assist them in responding to a solicitation. If you have provided information, identify the name of the UDBE assisted, the nature of the information provided, and date of contact. Provide copies of supporting documents, as appropriate.
7. List of efforts made to assist interested UDBEs in obtaining bonding, lines of credit, insurance, necessary equipment, supplies, and materials, excluding supplies and equipment that the UDBE subcontractor purchases or leases from the prime contractor or its affiliate. If such assistance is provided by you, identify the name of the UDBE assisted, nature of the assistance offered, and date. Provide copies of supporting documents, as appropriate.
8. Any additional data to support demonstration of good faith efforts.

### **SECTION 3. CONTRACT AWARD AND EXECUTION**

#### **3-1.01 CONTRACT AWARD**

If the Department awards the Contract, the award is made to the lowest responsible bidder within 60 days.

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

The 1st working day is the 45th day after contract approval.

Do not start work at the job site, except for measuring controlling field dimensions and locating utilities, until the Engineer approves your submittal for:

1. Baseline Progress Schedule (Critical Path Method)
2. Storm Water Pollution Prevention Plan (SWPPP)
3. Notification of Dispute Resolution Advisor (DRA) or Dispute Review Board (DRB) nominee and disclosure statement as specified in Section 5-1.15, "Dispute Resolution," of the Standard Specifications

In addition to the above submittals, do not start work at the job site, except for measuring controlling field dimensions and locating utilities, until you submit:

1. Notice of Materials To Be Used.
2. Contingency plan for reopening closures to public traffic.

3. Written statement from the vendor that the order for electrical material has been received and accepted by the vendor. The statement must show the dates that the materials will be shipped.
4. Written statement from the vendor that the order for structural steel has been received and accepted by the vendor. The statement must show the dates that the materials will be shipped.

You may start work at the job site before the 45th day after contract approval if:

1. You obtain required approval for each submittal before the 45th day
2. The Engineer authorizes it in writing

The Department grants a time extension if a delay is beyond your control and prevents you from starting work at the job site on the 1st working day.

Complete the work within 180 working days.

Liquidated damages are \$18,600 per day starting on the 1st day after exceeding 180 working days.

## **SECTION 5. GENERAL**

### **5-1.01 PERFORMANCE OF UDBeS**

UDBEs must perform work or supply materials as listed in the Caltrans Bidder - UDBE - Commitment form specified under Section 2, "Bidding," of these special provisions. Do not terminate a UDBE listed subcontractor for convenience and perform the work with your own forces or obtain materials from other sources without prior written authorization from the Department.

The Department grants authorization to use other forces or sources of materials for requests that show any of the following justifications:

1. Listed UDBE fails or refuses to execute a written contract based on plans and specifications for the project.
2. You stipulate a bond is a condition of executing the subcontract and the listed UDBE fails to meet your bond requirements.
3. Work requires a contractor's license and listed UDBE does not have a valid license under Contractors License Law.
4. Listed UDBE fails or refuses to perform the work or furnish the listed materials.
5. Listed UDBE's work is unsatisfactory and not in compliance with the contract.
6. Listed UDBE delays or disrupts the progress of the work.
7. Listed UDBE becomes bankrupt or insolvent.

If a listed UDBE subcontractor is terminated, you must make good faith efforts to find another UDBE subcontractor to substitute for the original UDBE. The substitute UDBE must perform at least the same amount of work as the original UDBE under the contract to the extent needed to meet the UDBE goal.

The substitute UDBE must be certified as a DBE at the time of request for substitution.

The Department does not pay for work or material unless it is performed or supplied by the listed UDBE.

### **5-1.02 PARTNERING DISPUTE RESOLUTION**

The Department encourages the project team to exhaust the use of partnering in dispute resolution before engagement of an objective third party. Comply with Section 5-1.102, "Partnering," of the Standard Specifications.

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

To afford the project team enough time to plan and hold the session, a maximum of 20 days may be added to the dispute review board (DRB) referral time following the Engineer's written response to a supplemental notice of potential claim as specified in Section 5-1.15, "Dispute Resolution," of the Standard Specifications.

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

If the session is not held, the DRB referral time remains in effect as specified in Section 5-1.15, "Dispute Resolution," of the Standard Specifications.

### **5-1.03 FEDERAL REQUIREMENTS (AMERICAN RECOVERY AND REINVESTMENT ACT)**

Under the American Recovery and Reinvestment Act (ARRA) of 2009, 9 USC § 902:

#### **SEC. 902. ACCESS OF GOVERNMENT ACCOUNTABILITY OFFICE.**

(a) ACCESS.—Each contract awarded using funds made available in this Act shall provide that the Comptroller General and his representatives are authorized—

- (1) to examine any records of the contractor or any of its subcontractors, or any State or local agency administering such contract, that directly pertain to, and involve transactions relating to, the contract or subcontract; and
- (2) to interview any officer or employee of the contractor or any of its subcontractors, or of any State or local government agency administering the contract, regarding such transactions.

(b) RELATIONSHIP TO EXISTING AUTHORITY.—Nothing in this section shall be interpreted to limit or restrict in any way any existing authority of the Comptroller General.

Under ARRA of 2009, 9 USC § 1515(a):

#### **SEC. 1515. ACCESS OF OFFICES OF INSPECTOR GENERAL TO CERTAIN RECORDS AND EMPLOYEES.**

(a) ACCESS.—With respect to each contract or grant awarded using covered funds, any representative of an appropriate inspector general appointed under section 3 or 8G of the Inspector General Act of 1978 (5 U.S.C. App.), is authorized—

- (1) to examine any records of the contractor or grantee, any of its subcontractors or subgrantees, or any State or local agency administering such contract, that pertain to, and involve transactions relating to, the contract, subcontract, grant, or subgrant; and
- (2) to interview any officer or employee of the contractor, grantee, subgrantee, or agency regarding such transactions.

(b) RELATIONSHIP TO EXISTING AUTHORITY.—Nothing in this section shall be interpreted to limit or restrict in any way any existing authority of an inspector general.

Immediately notify the Engineer if you have been contacted by the U.S. Comptroller, Inspector General, or their representatives.

### **5-1.04 MONTHLY EMPLOYMENT REPORT (AMERICAN RECOVERY AND REINVESTMENT ACT)**

For the purpose of complying with the American Recovery and Reinvestment Act of 2009, submit a completed Monthly Employment Report form by the 5th of each month for the previous month. For the form, go to:

<http://www.dot.ca.gov/hq/construc/forms.htm>

If you fail to submit a complete and accurate report, the Department withholds 2 percent of the monthly progress estimate. The Department does not withhold more than \$10,000 or less than \$1,000. The Department releases the withhold upon submission of the completed form.

### **5-1.05 RETENTION EXCLUSION**

The Department does not retain moneys from progress payments due to the Contractor for work performed (Pub Cont Code § 7202). The 3rd paragraph in Section 9-1.06, "Partial Payments," of the Standard Specifications does not apply.

**5-1.06 COMPENSATION ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS**

The provisions of this section shall apply only to the following contract items:

| ITEM CODE | ITEM                     |
|-----------|--------------------------|
| 390132    | HOT MIX ASPHALT (TYPE A) |
| 397005    | TACK COAT                |

The compensation payable for asphalt binder used in hot mix asphalt and tack coat will be increased or decreased in conformance with the provisions of this section for paving asphalt price fluctuations exceeding 5 percent (Iu/Ib is greater than 1.05 or less than 0.95) which occur during performance of the work.

The quantity of asphalt binder used in tack coat will be determined by multiplying the item quantity for tack coat included in a monthly estimate by the minimum percent residue specified in Section 94, "Asphaltic Emulsions," of the Standard Specifications. The asphaltic emulsion minimum percent residue will be based on the type of emulsion used by the Contractor.

At the Contractor's option, the Contractor may provide actual daily test results for asphalt binder residue for the tack coat used. Test results provided by the Contractor shall be from an independent testing laboratory that participates in the AASHTO Proficiency Sample Program. The Contractor shall take samples of asphaltic emulsion from the distributor truck at mid-load from a sampling tap or thief. Two separate 1/2 gallon samples shall be taken in the presence of the Engineer. The Contractor shall provide one sample to the Contractor's independent testing laboratory within 24 hours of sampling. The second sample shall be given to the Engineer. The test results from the Contractor's independent testing laboratory shall be delivered to the Engineer within 10 days from sample date.

The adjustment in compensation will be determined in conformance with the following formulae when the item of hot mix asphalt or tack coat or both are included in a monthly estimate:

- A. Total monthly adjustment = AQ
- B. For an increase in paving asphalt price index exceeding 5 percent:

$$A = 0.90 (Iu/Ib - 1.05) Ib$$

- C. For a decrease in paving asphalt price index exceeding 5 percent:

$$A = 0.90 (Iu/Ib - 0.95) Ib$$

- D. Where:

A = Adjustment in dollars per ton of paving asphalt used to produce hot mix asphalt and asphaltic emulsion residue used as tack coat rounded to the nearest \$0.01.

Iu = The California Statewide Paving Asphalt Price Index which is in effect on the first business day of the month within the pay period in which the quantity subject to adjustment was included in the estimate.

Ib = The California Statewide Paving Asphalt Price Index for the month in which the bid opening for the project occurred.

Q = Quantity in tons of asphalt binder that was used in producing the quantity of hot mix asphalt shown under "This Estimate" on the monthly estimate using the amount of asphalt binder determined by the Engineer plus the quantity in tons of asphalt binder that would have been used as residue in the tack coat shown under "This Estimate" on the monthly estimate.

The adjustment in compensation will also be subject to the following:

- A. The compensation adjustments provided herein will be shown separately on payment estimates. The Contractor shall be liable to the State for decreased compensation adjustments and the Department may deduct the amount thereof from moneys due or that may become due the Contractor.
- B. Compensation adjustments made under this section will be taken into account in making adjustments in conformance with the provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications.
- C. In the event of an overrun of contract time, adjustment in compensation for asphalt binder included in estimates during the overrun period will be determined using the California Statewide Paving Asphalt Price Index in effect on the first business day of the month within the pay period in which the overrun began.

The California Statewide Paving Asphalt Price Index is determined each month on the first business day of the month by the Department using the median of posted prices in effect as posted by Chevron, ExxonMobil, and Union 76 for the Buena Vista, Huntington Beach, and Midway Sunset fields.

In the event that the companies discontinue posting their prices for a field, the Department will determine an index from the remaining posted prices. The Department reserves the right to include in the index determination the posted prices of additional fields.

The California Statewide Paving Asphalt Price Index is available on the Division of Engineering Services website at:

[http://www.dot.ca.gov/hq/esc/oe/asphalt\\_index/astable.html](http://www.dot.ca.gov/hq/esc/oe/asphalt_index/astable.html)

#### **5-1.07 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 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.

Areas available for the exclusive use of the Contractor are designated on the plans. 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 these areas.

The Contractor shall obtain encroachment permits prior to occupying State-owned parcels outside the contract limits. The required encroachment permits may be obtained from the Department of Transportation, Permit Engineer, 1000 Center Street, Redding, CA 96001.

Residence trailers will not be allowed within the highway right of way, except that one trailer will be allowed for yard security purposes.

The Contractor shall remove equipment, materials, and rubbish from the work areas and other State-owned property which the Contractor occupies. The Contractor shall leave the areas in a presentable condition in conformance with the provisions in Section 4-1.02, "Final Cleaning Up," of the Standard Specifications.

The Contractor shall secure, at the Contractor's own expense, areas required for plant sites, storage of equipment or materials or for other purposes, if sufficient area is not available to the Contractor within the contract limits, or at the sites designated on the plans outside the contract limits.

#### **5-1.08 PAYMENTS**

No partial payment will be made for any materials on hand which are furnished but not incorporated in the work.

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. Joint Seal (Type B)
- B. Structural Steel (Bridge)
- C. Furnish Sign Structure (Truss)
- D. Reinforced Concrete Pipe
- E. 36" Precast Pipe Inlet
- F. Miscellaneous Iron and Steel
- G. Metal Beam Guard Railing
- H. Transition Railing (Type WB)
- I. End Anchor Assembly (Type SFT)
- J. Alternative Flared Terminal System
- K. Alternative In-Line Terminal System
- L. Alternative Crash Cushion

**5-1.09 SUPPLEMENTAL PROJECT INFORMATION**

The Department makes the following supplemental project information available:

| <b>Supplemental Project Information</b>                        |  |
|--|--|
| Means  | Description  |
| Included in the Information Handout                            | 1. National Marine Fisheries Service Consultation Agreement<br>2. US Fish and Wildlife Service Consultation Agreements<br>3. CAL-OSHA Mining and Tunneling Unit Classification |
| Available for inspection at 703 B Street, Marysville, CA 95901 | 1. Information Handout<br>2. Cross Sections  |
| Available as specified in the Standard Specifications          | Bridge as-built drawings   |

**5-1.10 BIRD PROTECTION**

The Department anticipates nesting or attempted nesting by migratory and nongame birds from February 15 to August 31.

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

| <b>Radii Exceptions</b>    |                            |
|----------------------------|----------------------------|
| Species                    | Work stoppage radii (feet) |
| Migratory or non-game bird | 1 foot                     |

**5-1.11 RELATIONS WITH CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD**

This project lies within the boundaries of the Central Valley Regional Water Quality Control Board (RWQCB).

The State Water Resources Control Board (SWRCB) has issued to the Department a permit that governs storm water and non-storm water discharges from the Department's properties, facilities, and activities. The Department's permit is entitled "Order No. 99 - 06 - DWQ, NPDES No. CAS000003, National Pollutant Discharge Elimination System (NPDES) Permit, Statewide Storm Water Permit and Waste Discharge Requirements (WDRs) for the State of California, Department of Transportation (Caltrans)." Copies of the Department's permit are available for review from the SWRCB, Storm Water Permit Unit, 1001 "I" Street, P.O. Box 1977, Sacramento, California 95812-1977, Telephone: (916) 341-5254, and may also be obtained at:

[http://www.waterboards.ca.gov/water\\_issues/programs/stormwater/](http://www.waterboards.ca.gov/water_issues/programs/stormwater/)

The Department's permit references and incorporates by reference the current statewide general permit issued by the SWRCB entitled "Order No. 99-08-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction Activity" that regulates discharges of storm water and non-storm water from construction activities disturbing one acre or more of soil in a common plan of development. Sampling and analysis requirements as specified in SWRCB Resolution No. 2001-46 are added to the statewide general permit. Copies of the statewide permit and modifications thereto are available for review from the SWRCB, Storm Water Permit Unit, 1001 "I" Street, P.O. Box 1977, Sacramento, California 95812-1977, Telephone: (916) 341-5254 and may also be obtained at:

[http://www.waterboards.ca.gov/water\\_issues/programs/stormwater/](http://www.waterboards.ca.gov/water_issues/programs/stormwater/)

The NPDES permits that regulate this project, as referenced above, are collectively referred to in this section as the "permits."

This project shall conform to the permits and modifications thereto. The Contractor shall maintain copies of the permits at the project site and shall make them available during construction.

The Contractor shall know and comply with provisions of Federal, State, and local regulations and requirements that govern the Contractor's operations and storm water and non-storm water discharges from 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," 7-1.11, "Preservation of Property," 7-1.12, "Indemnification and Insurance," and 9-1.055, "Penalty Withholds," of the Standard Specifications.

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 violation, enforcement actions, or proposed fines by regulatory agencies to the requesting regulatory agency.

**5-1.12 AIR QUALITY – BASIC NESHAP ASBESTOS NOTIFICATION**

In compliance with Standard Specifications Section 7-1.01F, the Contractor shall notify the following agencies as required by the National Emission Standards for Hazardous Air Pollutants (NESHAP) at 40 CFR Part 61, Subpart M, and California Health and Safety Code section 39658(b)(1). A copy of the notification form and attachments shall be provided to the Engineer prior to submittal. Notification shall take place a minimum of 10 working days prior to starting demolition or renovation activities as defined in the NESHAP regulations.

The Contractor shall mail the original notification form with any necessary attachments to:

U.S. EPA, Region IX  
 Asbestos NESHAP Notification  
 75 Hawthorne Street  
 San Francisco, CA 94105

The Contractor shall mail a copy, or send a fax, of the notification form and any necessary attachments, to:

California Air Resources Board  
 Enforcement Division  
 Asbestos NESHAP Notification  
 Post Office Box 2815  
 Sacramento, CA 95812  
 Facsimile: (916) 445-5745

The Contractor shall also notify other local permit agencies and utility companies prior to starting any demolition activities.

Full compensation for complying with requirements of this section shall be considered as included in the contract price paid for the items involved, and no additional compensation will be allowed therefor.

**5-1.13 ENVIRONMENTALLY SENSITIVE AREA**

An ESA exists on this project.

Take the management measures shown in the following table for the corresponding ESA shown. Any access to an ESA other than that shown is prohibited.

| <b>ESA Management</b> |                       |   |
|-----------------------|-----------------------|---|
| Identification        | Location              | Management measures   |
| ESA Areas             | As shown on the plans | Department will mark out the exact ESA boundaries on the ground<br>Before starting work, protect the ESA by installing temporary fence (Type ESA)   |
| ESA Areas             | As shown on the plans | Do not enter the ESA unless authorized. Vehicle access, storage or transport of materials or equipment, or other job related activities are prohibited within the boundaries of the ESA. Do not use any insecticides, herbicides, fertilizers, or other chemicals within 5 feet of the boundaries of the ESA. |

#### **5-1.14 NONHIGHWAY FACILITIES (INCLUDING UTILITIES)**

During the progress of the work under this Contract, the utility owner will be present to inspect any work within 50 feet of the high pressure gas line located at Station "A1" 576+00. Notify the Engineer at least 5 days before you work within the approximate location of this utility.

#### **5-1.15 TUNNEL SAFETY ORDERS**

The work to be performed at the following location, CIDH Piles for new sign structures, has been classified "Potentially Gassy" by the State Division of Occupational Safety and Health under Section 8422 of the Tunnel Safety Orders of the California Code of Regulations.

The Contractor's attention is directed to Section 7-1.06, "Safety and Health Provisions," of the Standard Specifications. A change to the work as a direct result of the Contractor's planned operations that would cause work activities to fall under the requirements of the Tunnel Safety Orders, and that has not been shown on the plans or specified in these special provisions shall be reason for suspension of the work. The Contractor shall notify the Engineer not less than 20 days prior to worker exposure to a facility meeting the definition of a tunnel or shaft as described in Sections 8403 or 8405 of the Tunnel Safety Orders. The Department will obtain additional location classifications as may be necessary to allow the work to proceed.

The Contractor shall prominently post a notice of the classification and any special orders, rules, special conditions, or regulations at the tunnel work site, and all personnel shall be informed of the classification.

At least 7 days prior to beginning work covered by these provisions, the Contractor shall submit the name of the person designated as the on-site Safety Representative to the Engineer along with proof of certification by the Division of Occupational Safety and Health as having met the requirements of Section 8406 of the Tunnel Safety Orders of the California Code of Regulations.

#### **SECTION 6. (BLANK)**

#### **SECTION 7. (BLANK)**

#### **SECTION 8. MATERIALS**

##### **SECTION 8-1. MISCELLANEOUS**

##### **8-1.01 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)**

1. Apex, Model 921AR (4" x 4")
2. Ennis Paint, Models C88 (4" x 4"), 911 (4" x 4") and C80FH
3. Ray-O-Lite, Models "AA" ARS (4" x 4") and ARC Round Shoulder (4" x 4")
4. 3M Series 290 (3.5" x 4")
5. 3M Series 290 PSA

6. Glowlite, Inc Model 988AR (4" x 4")

**Retroreflective With Abrasion Resistant Surface (ARS)**

(for recessed applications only)

1. Ennis Paint, Model 948 (2.3" x 4.7")
2. Ennis Paint, Model 944SB (2" x 4")\*
3. Ray-O-Lite, Model 2002 (2" x 4.6")
4. Ray-O-Lite, Model 2004 ARS (2" x 4")\*

\*For use only in 4.5 inch wide (older) recessed slots

**Non-Reflective, 4-inch Round**

1. Apex Universal (Ceramic)
2. Apex Universal, Models 929 (ABS) and 929PP (Polypropylene)
3. Glowlite, Inc. (Ceramic) and PP (Polypropylene)
4. Hi-Way Safety, Inc., Models P20-2000W and 2001Y (ABS)
5. Interstate Sales, "Diamond Back" (Polypropylene)
6. Novabrite Models Cdot (White) Cdot-y (Yellow), Ceramic
7. Novabrite Models Pdot-w (White) Pdot-y (Yellow), Polypropylene
8. Three D Traffic Works TD10000 (ABS), TD10500 (Polypropylene)

**PAVEMENT MARKERS, TEMPORARY TYPE**

**Temporary Markers For Long Term Day/Night Use (180 days or less)**

1. Vega Molded Products "Temporary Road Marker" (3" x 4")

**Temporary Markers For Short Term Day/Night Use (14 days or less)**

(For seal coat or chip seal applications, clear protective covers are required)

1. Apex Universal, Model 932
2. Filtrona Extrusion, Models T.O.M., T.R.P.M., and "HH" (High Heat)
3. Hi-Way Safety, Inc., Model 1280/1281
4. Glowlite, Inc., Model 932

**STRIPING AND PAVEMENT MARKING MATERIAL**

**Permanent Traffic Striping and Pavement Marking Tape**

1. Advanced Traffic Marking, Series 300 and 400
2. Brite-Line, Series 1000
3. Brite-Line, "DeltaLine XRP"
4. Swarco Industries, "Director 35" (For transverse application only)
5. Swarco Industries, "Director 60"
6. 3M, "Stamark" Series 380 and 5730
7. 3M, "Stamark" Series 420 (For transverse application only)

**Temporary (Removable) Striping and Pavement Marking Tape (180 days or less)**

1. Advanced Traffic Marking, Series 200
2. Brite-Line, Series 100
3. Garlock Rubber Technologies, Series 2000
4. P.B. Laminations, Aztec, Grade 102
5. Swarco Industries, "Director-2"
6. Trelleborg Industries, R140 Series
7. 3M Series 620 "CR", and Series A750
8. 3M Series A145, Removable Black Line Mask  
(Black Tape: for use only on Hot mix asphalt surfaces)
9. Advanced Traffic Marking Black "Hide-A-Line"  
(Black Tape: for use only on Hot mix asphalt surfaces)
10. Brite-Line "BTR" Black Removable Tape  
(Black Tape: for use only on Hot mix asphalt surfaces)

11. Trelleborg Industries, RB-140  
(Black Tape: for use only on Hot mix asphalt surfaces)

**Preformed Thermoplastic (Heated in place)**

1. Flint Trading Inc., "Hot Tape"
2. Flint Trading Inc., "Premark Plus"
3. Ennis Paint Inc., "Flametape"

**Ceramic Surfacing Laminate, 6" x 6"**

1. Highway Ceramics, Inc.

**CLASS 1 DELINEATORS**

**One Piece Driveable Flexible Type, 66-inch**

1. Filtrona Extrusion, "Flexi-Guide Models 400 and 566"
2. Carsonite, Curve-Flex CFRM-400
3. Carsonite, Roadmarker CRM-375
4. FlexStake, Model 654 TM
5. GreenLine Model CGD1-66

**Special Use Type, 66-inch**

1. Filtrona Extrusion, Model FG 560 (with 18-inch U-Channel base)
2. Carsonite, "Survivor" (with 18-inch U-Channel base)
3. Carsonite, Roadmarker CRM-375 (with 18-inch U-Channel base)
4. FlexStake, Model 604
5. GreenLine Model CGD (with 18-inch U-Channel base)
6. Impact Recovery Model D36, with #105 Driveable Base
7. Safe-Hit with 8-inch pavement anchor (SH248-GP1)
8. Safe-Hit with 15-inch soil anchor (SH248-GP2) and with 18-inch soil anchor (SH248-GP3)

**Surface Mount Type, 48-inch**

1. Bent Manufacturing Company, Masterflex Model MF-180EX-48
2. Carsonite, "Channelizer"
3. FlexStake, Models 704, 754 TM, and EB4
4. Impact Recovery Model D48, with #101 Fixed (Surface-Mount) Base
5. Three D Traffic Works "Channelflex" ID No. 522248W

**CHANNELIZERS**

**Surface Mount Type, 36-inch**

1. Bent Manufacturing Company, Masterflex Models MF-360-36 (Round) and MF-180-36 (Flat)
2. Filtrona Extrusion, Flexi-Guide Models FG300PE, FG300UR, and FG300EFX
3. Carsonite, "Super Duck" (Round SDR-336)
4. Carsonite, Model SDCF03601MB "Channelizer"
5. FlexStake, Models 703, 753 TM, and EB3
6. GreenLine, Model SMD-36
7. Hi-way Safety, Inc. "Channel Guide Channelizer" Model CGC36
8. Impact Recovery Model D36, with #101 Fixed (Surface-Mount) Base
9. Safe-Hit, Guide Post, Model SH236SMA and Dura-Post, Model SHL36SMA
10. Three D Traffic Works "Boomerang" 5200 Series

**Lane Separation System**

1. Filtrona Extrusion, "Flexi-Guide (FG) 300 Curb System"
2. Qwick Kurb, "Klemmfix Guide System"
3. Dura-Curb System
4. Tuff Curb

## **CONICAL DELINEATORS, 42-inch**

(For 28-inch Traffic Cones, see Standard Specifications)

1. Bent Manufacturing Company "T-Top"
2. Plastic Safety Systems "Navigator-42"
3. Traffix Devices "Grabber"
4. Three D Traffic Works "Ringtop" TD7000, ID No. 742143
5. Three D Traffic Works, TD7500
6. Work Area Protection Corp. C-42

## **OBJECT MARKERS**

### **Type "K", 18-inch**

1. Filtrona Extrusion, Model FG318PE
2. Carsonite, Model SMD 615
3. FlexStake, Model 701 KM
4. Safe-Hit, Model SH718SMA

### **Type "K-4" / "Q" Object Markers, 24-inch**

1. Bent Manufacturing "Masterflex" Model MF-360-24
2. Filtrona Extrusion, Model FG324PE
3. Carsonite, "Channelizer"
4. FlexStake, Model 701KM
5. Safe-Hit, Models SH824SMA\_WA and SH824GP3\_WA
6. Three D Traffic Works ID No. 531702W and TD 5200
7. Three D Traffic Works ID No. 520896W

## **CONCRETE BARRIER MARKERS AND TEMPORARY RAILING (TYPE K) REFLECTORS**

### **Impactable Type**

1. ARTUK, "FB"
2. Filtrona Extrusion, Models PCBM-12 and PCBM-T12
3. Duraflex Corp., "Flexx 2020" and "Electriflexx"
4. Hi-Way Safety, Inc., Model GMKRM100
5. Plastic Safety Systems "BAM" Models OM-BARR and OM-BWAR
6. Three D Traffic Works "Roadguide" Model TD 9304

### **Non-Impactable Type**

1. ARTUK, JD Series
2. Plastic Safety Systems "BAM" Models OM-BITARW and OM-BITARA
3. Vega Molded Products, Models GBM and JD
4. Plastic Vacuum Forming, "Cap-It C400"

## **METAL BEAM GUARD RAIL POST MARKERS**

(For use to the left of traffic)

1. Filtrona Extrusion, "Mini" (3" x 10")
2. Creative Building Products, "Dura-Bull, Model 11201"
3. Duraflex Corp., "Railrider"
4. Plastic Vacuum Forming, "Cap-It C300"

## **CONCRETE BARRIER DELINEATORS, 16-inch**

(For use to the right of traffic)

1. Filtrona Extrusion, Model PCBM T-16
2. Safe-Hit, Model SH216RBM

## **CONCRETE BARRIER-MOUNTED MINI-DRUM (10" x 14" x 22")**

1. Stinson Equipment Company "SaddleMarker"

## **GUARD RAILING DELINEATOR**

(Place top of reflective element at 48 inches above plane of roadway)

### **Wood Post Type, 27-inch**

1. Filtrona Extrusion, FG 427 and FG 527
2. Carsonite, Model 427
3. FlexStake, Model 102 GR
4. GreenLine GRD 27
5. Safe-Hit, Model SH227GRD
6. Three D Traffic Works "Guardflex" TD9100
7. New Directions Mfg, NDM27

### **Steel Post Type**

1. Carsonite, Model CFGR-327

## **RETROREFLECTIVE SHEETING**

### **Channelizers, Barrier Markers, and Delineators**

1. Avery Dennison T-6500 Series (For rigid substrate devices only)
2. Avery Dennison WR-7100 Series
3. Nippon Carbide Industries, Flexible Ultralite Grade (ULG) II
4. Reflexite, PC-1000 Metalized Polycarbonate
5. Reflexite, AC-1000 Acrylic
6. Reflexite, AP-1000 Metalized Polyester
7. Reflexite, Conformalight, AR-1000 Abrasion Resistant Coating
8. 3M, High Intensity

### **Traffic Cones, 4-inch and 6-inch Sleeves**

1. Nippon Carbide Industries, Flexible Ultralite Grade (ULG) II
2. Reflexite, Vinyl, "TR" (Semi-transparent) or "Conformalight"
3. 3M Series 3840
4. Avery Dennison S-9000C

### **Drums**

1. Avery Dennison WR-6100
2. Nippon Carbide Industries, Flexible Ultralite Grade (ULG) II
3. Reflexite, "Conformalight", "Super High Intensity" or "High Impact Drum Sheeting"
4. 3M Series 3810

### **Barricades: Type I, Medium-Intensity (Typically Enclosed Lens, Glass-Bead Element)**

1. Nippon Carbide Industries, CN8117
2. Avery Dennison, W 1100 series
3. 3M Series CW 44

### **Barricades: Type II, Medium-High-Intensity (Typically Enclosed Lens, Glass-Bead Element)**

1. Avery Dennison, W-2100 Series

### **Signs: Type II, Medium-High-Intensity (Typically Enclosed Lens, Glass-Bead Element)**

1. Avery Dennison, T-2500 Series
2. Nippon Carbide Industries, Nikkalite 18000

### **Signs: Type III, High-Intensity (Typically Encapsulated Glass-Bead Element)**

1. Avery Dennison, T-5500A and T-6500 Series
2. Nippon Carbide Industries, Nikkalite Brand Ultralite Grade II
3. 3M 3870 and 3930 Series

**Signs: Type IV, High-Intensity (Typically Unmetallized Microprismatic Element)**

1. Avery Dennison, T-6500 Series
2. Nippon Carbide Industries, Crystal Grade, 94000 Series
3. Nippon Carbide Industries, Model No. 94847 Fluorescent Orange
4. 3M Series 3930 and Series 3924S

**Signs: Type VI, Elastomeric (Roll-Up) High-Intensity, without Adhesive**

1. Avery Dennison, WU-6014
2. Novabrite LLC, "Econobrite"
3. Reflexite "Vinyl"
4. Reflexite "SuperBright"
5. Reflexite "Marathon"
6. 3M Series RS20

**Signs: Type VII, Super-High-Intensity (Typically Unmetallized Microprismatic Element)**

1. 3M Series 3924S, Fluorescent Orange
2. 3M LDP Series 3970

**Signs: Type VIII, Super-High-Intensity (Typically Unmetallized Microprismatic Element)**

1. Avery Dennison, T-7500 Series
2. Avery Dennison, T-7511 Fluorescent Yellow
3. Avery Dennison, T-7513 Fluorescent Yellow Green
4. Avery Dennison, W-7514 Fluorescent Orange
5. Nippon Carbide Industries, Nikkalite Crystal Grade Series 92800
6. Nippon Carbide Industries, Nikkalite Crystal Grade Model 92847 Fluorescent Orange

**Signs: Type IX, Very-High-Intensity (Typically Unmetallized Microprismatic Element)**

1. 3M VIP Series 3981 Diamond Grade Fluorescent Yellow
2. 3M VIP Series 3983 Diamond Grade Fluorescent Yellow/Green
3. 3M VIP Series 3990 Diamond Grade
4. Avery Dennison T-9500 Series
5. Avery Dennison, T9513, Fluorescent Yellow Green
6. Avery Dennison, W9514, Fluorescent Orange
7. Avery Dennison, T-9511 Fluorescent Yellow

**SPECIALTY SIGNS**

1. Reflexite "Endurance" Work Zone Sign (with Semi-Rigid Plastic Substrate)

**ALTERNATIVE SIGN SUBSTRATES**

**Fiberglass Reinforced Plastic (FRP) and Expanded Foam PVC**

1. Fiber-Brite (FRP)
2. Sequentia, "Polyplate" (FRP)
3. Intoplast Group "InteCel" (0.5 inch for Post-Mounted CZ Signs, 48-inch or less)(PVC)

**Aluminum Composite, Temporary Construction Signs and Permanent Signs up to 4 foot, 7 Inches**

1. Alcan Composites "Dibond Material, 80 mils"
2. Mitsubishi Chemical America, Alpolic 350

**8-1.02 STATE-FURNISHED MATERIALS**

The State furnishes you with:

- Laminated wood box posts with metal caps for roadside signs
- Components of battery backup system as follows:
  - Inverter/charger unit
  - Power transfer relay

- Manually-operated bypass switch
- Battery harness
- Utility interconnect wires
- Battery temperature probe
- Relay contact wires
- HAR Flashing Beacon Cabinet

## **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.

The Department maintains a list of sources of fine and coarse aggregate that have been approved for use with a reduced amount of supplementary cementitious material 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. Before the testing starts, 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:

1. 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 each test of the previous 2 sets of concrete samples.
2. 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:

1. 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
2. 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.

If the aggregates used in the concrete are on the Department's list, the minimum amount of supplementary cementitious material shall conform to the following:

1. If fly ash or natural pozzolan conforming to the provisions in Section 90-2.01C, "Required Use of Supplementary Cementitious Materials," of the Standard Specifications is used, the minimum amount of supplementary cementitious material shall be 15 percent by weight of the total cementitious material; or
2. If silica fume conforming to the provisions in Section 90-2.01C, "Required Use of Supplementary Cementitious Materials," of the Standard Specifications is used, the minimum amount of supplementary cementitious material shall be 7 percent by weight of the total cementitious material.

The limitation on tricalcium silicate (C<sub>3</sub>S) content in Type II cement specified in Section 90-2.01A, "Cement," of the Standard Specifications shall not apply.

## SECTION 8-3. WELDING

### 8-3.01 WELDING

#### GENERAL

Flux cored 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     | 2006             |
| D1.4     | 2005             |
| D1.5     | 2002             |
| D1.6     | 1999             |

Requirements of the AWS welding codes shall apply unless otherwise specified 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.

Unless otherwise specified, 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.

When any work is welded in conformance with the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications, not including Section 75-1.035, "Bridge Joint Restrainer Units," of the Standard Specifications, Section 6.1.4 of AWS D1.1 is replaced with the following:

The QC Inspector shall be responsible for quality control acceptance or rejection of materials and workmanship and shall be currently certified as an AWS CWI in conformance with the requirements in AWS QC1, "Standard for AWS Certification of Welding Inspectors," or as a Welding Inspector Specialist (WIS) in conformance with the requirements in AWS B5.2, "Specification for the Qualification of Welding Inspector Specialists and Welding Inspector Assistants."

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 shall 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 7.6.5 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. Except as provided for in these special provisions, additional NDT required by the Engineer, and associated repair work, will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications. Prior to release of welded material by the Engineer, if testing by NDT methods other than those originally specified discloses an attempt to defraud or reveals a gross nonconformance, all costs associated with the repair of the deficient area, including NDT of the weld and of the repair, and any delays caused by the repair, shall be at the Contractor's expense. A gross nonconformance is defined as the sum of planar type rejectable indications in more than 20 percent of the tested length.

When less than 100 percent of NDT is specified for any weld, it is expected that the entire length of weld meet the specified acceptance-rejection criteria. Should any welding deficiencies be discovered by additional NDT directed or performed by the Engineer that utilizes the same NDT method as that originally specified, 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 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.

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.

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 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.

In addition to the requirements of AWS D1.1, welding procedures qualification for work welded in conformance with that code shall conform to the following:

When a nonstandard weld joint is to be made using a combination of WPSs, a single test may be conducted combining the WPSs to be used in production, provided the essential variables, including weld bead placement, of each process are limited to those established in Table 4.5.

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 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, a minimum of two WPS qualification tests are required. The tests shall be conducted using both Figure 5.1 and Figure 5.3. The test conforming to Figure 5.1 shall be conducted in conformance with AWS D1.5, Section 5.12 or 5.13. The test

conforming to Figure 5.3 shall be conducted using the welding electrical parameters that were established for the test conducted conforming to Figure 5.1. The ranges of welding electrical parameters established during welding per Figure 5.1 in conformance with AWS D1.5, Section 5.12, shall be further restricted according to the limits in Table 5.3 during welding per Figure 5.3.

- C. Multiple zones within a weld joint may be qualified. The travel speed, amperage, and voltage values that are used for tests conducted per AWS D1.5 Section 5.13 shall be consistent for each pass in a weld joint, and shall in no case vary by more than  $\pm 10$  percent for travel speed,  $\pm 10$  percent for amperage, and  $\pm 7$  percent for voltage as measured from a predetermined target value or average within each weld pass or zone. The travel speed shall in no case vary by more than  $\pm 15$  percent when using submerged arc welding.
- 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. Macroetch tests are required for WPS qualification tests, and acceptance shall be per AWS D1.5 Section 5.19.3.
- F. When a nonstandard weld joint is to be made using a combination of WPSs, a test conforming to Figure 5.3 may be conducted combining the WPSs to be used in production, provided the essential variables, including weld bead placement, of each process are limited to those established in Table 5.3.
- G. Prior to preparing mechanical test specimens, the PQR welds shall be inspected by visual and radiographic tests. Backing bar shall be 3 inches 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 49, "Piling," Section 52, "Reinforcement," Section 55, "Steel Structures," or Section 75-1.035, "Bridge Joint Restrainer Units," of the Standard Specifications.

All welding will require inspection by the Engineer. The Contractor shall request inspection at least 3 business days prior to the beginning of welding for locations within California and 5 business days for locations outside of California. The Contractor shall request inspection at:

<http://www.dot.ca.gov/hq/esc/Translab/OSM/smbforms.htm>

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 does not lapse for a period exceeding 30 minutes.

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, shall be approved by the Engineer. The Contractor shall allow the Engineer 15 days 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 18 inches. 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.

The Engineer will witness all qualification tests for WPSs that were not previously approved by the Department. Unless otherwise specified, 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 an employee of the contractor performing the welding. The Contractor shall allow the Engineer 15 days 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 7 days 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.

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.

Unless the QCM is hired by a subcontractor providing only QC services, 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 that is certified under the AISC Quality Certification Program, Category Cbr, Major Steel Bridges and Fracture Critical endorsement F, when applicable.
- B. The work is welded in conformance with AWS D1.1 at a permanent pipe manufacturing or fabrication facility that maintains a QC program that is independent from production.

For welding performed at such facilities, the inspection personnel or NDT firms may be employed or compensated by the facility performing the welding provided the facility maintains a QC program that is independent from production.

Prior to submitting the Welding Quality Control Plan (WQCP) required herein, a prewelding 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 15 days 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 7 days 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 and at:

<http://www.dot.ca.gov/hq/esc/Translab/OSM/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 15 days following the performance of any welding:

- A. A daily production log.
- B. Reports of all visual weld inspections and NDT.
- C. Radiographs and radiographic reports, and other required NDT reports.
- D. A summary of welding and NDT activities that occurred during the reporting period.
- E. Reports of each application of heat straightening.
- F. A summarized log listing the rejected lengths of weld by welder, position, process, joint configuration, and piece number.
- G. Documentation that the Contractor has evaluated all radiographs and other nondestructive tests and corrected all rejectable deficiencies, and that all repaired welds have been reexamined using the required NDT and found acceptable.

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, report numbers, and station markers or views, as detailed in the WQCP. In addition, all interleaves shall have clearly written on them the part description and all included weld numbers and station markers or views, as detailed in the WQCP. A maximum of 2 pieces of film shall be used for each interleave.

Reports of all visual inspections and NDT shall be signed by the inspector or technician and submitted daily 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. Reports of all NDT, whether specified, additional, or informational, performed by the Contractor shall be submitted to the Engineer.

The Engineer will review the Welding Report to determine if the Contractor is in conformance with the WQCP. Except for steel pipe piling, the Engineer shall be allowed 15 days to review the report and respond in writing after the 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 the 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.

For steel pipe piling, including bar reinforcement in the piling, the Contractor shall allow the Engineer 2 business days to review the Welding Report and respond in writing after the required items have been received. No field welded steel pipe piling shall be installed, and no reinforcement in the piling shall be encased in concrete until the Engineer has approved the above requirements in writing.

In addition to the requirements in AWS D1.1 and AWS D1.5, second-time excavations of welds or base metal to repair unacceptable discontinuities, regardless of NDT method, and all repairs of cracks require approval of the Engineer.

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. For requests to perform second-time repairs or repairs of cracks, the Contractor shall include an engineering evaluation of the proposed repair. The engineering evaluation, at a minimum, shall address the following:

- A. What is causing each defect?
- B. Why the repair will not degrade the material properties?
- C. What steps are being taken to prevent similar defects from happening again?

The Contractor shall allow the Engineer 7 days 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.

### **WELDING FOR OVERHEAD SIGN AND POLE STRUCTURES**

The Contractor shall meet the following requirements for any work welded in conformance with the provisions in Section 56-1, "Overhead Sign Structures," or Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications.

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 when the welding is performed at a permanent fabrication or manufacturing facility which is certified under the AISC Quality Certification Program, Category Sbd, Conventional Steel Building Structures.

#### **Welding Qualification Audit**

Contractors or subcontractors performing welding operations for overhead sign and pole structures shall not deliver materials to the project without having successfully completed the Department's "Manufacturing Qualification Audit for Overhead Sign and Pole Structures," hereinafter referred to as the audit, not more than one year prior to the delivery of the materials. The Engineer will perform the audit. Copies of the audit form, and procedures for requesting and completing the audit, are available at the Transportation Laboratory or at:

<http://www.dot.ca.gov/hq/esc/Translab/OSM/smbresources.htm>

An audit that was approved by the Engineer no more than one year prior to the beginning of work on this contract will be acceptable for the entire period of this contract, provided the Engineer determines the audit was for the same type of work that is to be performed on this contract.

Successful completion of an audit shall not relieve the Contractor of the responsibility for furnishing materials or producing finished work of the quality specified in these special provisions and as shown on the plans.

#### **Welding Report**

For work welded in conformance with the provisions in Section 56-1, "Overhead Sign Structures," or Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, a Welding Report shall be submitted in conformance with the provisions in "Welding Quality Control" of 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 consists, in general, of replacing approaches with approach slabs, removing unsound concrete and repairing the bridge deck, preparing the bridge deck, overlaying the bridge deck with polyester concrete, replacing joint seals and extending the concrete barrier at the following structures:

CORNING CANAL BRIDGE  
(Bridge No. 08-0114 L/R)

RED BANK CREEK BRIDGE  
(Bridge No. 08-0108 R)

The bridge work to be done consists, in general, of removing unsound concrete and repairing the bridge deck, cleaning the bridge deck, treating the bridge deck with bridge treatment material and core the treated bridge deck at the following structure:

RIVERSIDE AVENUE OVERCROSSING  
(Bridge No. 08-0113)

The bridge work to be done consists, in general, of removing epoxy grid polymer overlay, replacing approaches with approach slabs, removing unsound concrete and repairing the bridge deck, preparing the bridge deck, overlaying the bridge deck with polyester concrete, replacing joint seals and extending the concrete barrier at the following structure:

RED BANK CREEK BRIDGE  
(Bridge No. 08-0108 L)

The bridge work to be done consists, in general, of removing unsound concrete and repairing the bridge deck, preparing the bridge deck, overlaying the bridge deck with polyester concrete, replacing joint seals and extending the concrete barrier at the following structure:

SACRAMENTO RIVER BRIDGE  
(Bridge No. 08-0095 L/R)

The bridge work to be done consists, in general, of removing existing cross frames, placing new cross frames, repairing cracks in existing steel girders, cleaning and painting the entire bridge, replacing existing concrete roadway and shoulder with approach slabs, removing unsound concrete and repairing the bridge deck, preparing the bridge deck, overlaying the bridge deck with polyester concrete, replacing joint seals and extending the concrete barrier at the following structure:

SACRAMENTO RIVER BRIDGE  
(Bridge No. 08-0096 L/R)

**SECTION 10. CONSTRUCTION DETAILS**

**SECTION 10-1. GENERAL**

**10-1.00 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, the 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 CONSTRUCTION  
BRIDGE 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.

### 10-1.01 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.

Stage construction as shown on the stage construction plans for stages 1 and 2 may be in place any time, including designated legal holidays and special days, only between April 1 and November 15. The full width of the existing travel way shall be available to public traffic between November 15 and April 1.

Attention is directed to "Supplemental Project Information" of these special provisions regarding the National Marine Fisheries Services Consultation Agreement and Fish and Wildlife Service Consultation Agreement included in the Information Handout. The consultation agreements allow the Contractor to perform work without requiring a permit. The Contractor must comply with the requirements and conditions set forth in the consultation agreements. Full compensation for construction and maintenance of required barriers beneath the bridge girders to prevent any debris from falling to the ground or entering the water below the work site shall be considered as included in the contract price paid for the operation needing the barrier and no separate payment/additional compensation will be made/allowed therefor.

Prior to welding operations under the bridge, lane closure must be in effect in the lane above.

At least 14 days before removing the northbound and southbound overhead sign structures, the Contractor shall submit to the Engineer a detailed contingency plan for reopening the closures to the traveling public.

The Contractor shall notify the Engineer 14 days before beginning work on the Highway Advisory Radio System.

The Contractor shall notify the Engineer no more than 2 days after the HAR flashing beacon cabinet work is complete and ready to turn on.

Before removing the cross frames on Bridge No. 08-0096L/R, the areas where the cross frames to be removed are in contact with the bridge shall be cleaned. Attention is directed "Bridge Removal (Portion)" and "Clean and Paint Existing Bridge" of these special provisions.

Joint seals shall be replaced after polyester concrete overlays have been completed.

Joint seals shall be replaced after methacrylate treatment has been placed.

Attention is directed to "Construction Area Signs" of these special provisions regarding the American Reinvestment and Recovery Act (ARRA) signs to be included in this project.

Attention is directed to "Jointed Plain Concrete Pavement" and "Replace Concrete Pavement (Rapid Strength Concrete)" of these special provisions in regards to providing Pre-Operation Conference and the Just-In-Time Training and furnishing tests and mix proportions for concrete to be used in concrete pavement prior to commencing pavement replacement operations.

Attention is directed to "Environmentally Sensitive Area" and "Temporary Fence (Type ESA)" of these special provisions. Prior to beginning work, the boundaries of the Environmentally Sensitive Areas (ESA) shall be clearly delineated in the field. The boundaries shall be delineated by the installation of temporary fence (Type ESA).

The first order of work shall be to place the order for the electrical equipment. The uppermost layer of new pavement shall not be placed until all underlying conduits and loop detectors have been installed.

Attention is directed to "Maintaining Traffic" and "Temporary Pavement Delineation" of these special provisions and to the stage construction sheets of the plans.

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.

The work shall be performed in conformance with the stages of construction shown on the plans. Nonconflicting work in subsequent stages may proceed concurrently with work in preceding stages, provided satisfactory progress is maintained in the preceding stages of construction.

In each stage, after completion of the preceding stage, the first order of work shall be the removal of existing pavement delineation as directed by the Engineer. 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, pavement markings, 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, including one- and 2-way barrier lines, limit lines, crosswalks and other pavement markings. 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.

Prior to applying hot mix asphalt, the Contractor shall cover all manholes, valve and monument covers, grates, or other exposed facilities located within the area of application, using a plastic or oil resistant construction paper secured to the facility being covered by tape or adhesive. The covered facilities shall be referenced by the Contractor, with a sufficient number of control points to relocate the facilities after the hot mix asphalt has been placed. After completion of the hot mix asphalt operation, all covers shall be removed and disposed of in a manner satisfactory to the Engineer. Full compensation

for covering manholes, valve and monument covers, grates, or other exposed facilities, referencing, and removing temporary cover shall be considered as included in the contract price paid per ton for hot mix asphalt, and no additional compensation will be allowed therefor.

At those locations exposed to public traffic where guard railings or barriers 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 or barrier posts installed without the blocks and rail elements assembled and mounted thereon.

At least 60 days before planting the plants, furnish the Engineer a statement from the vendor that the order for the plants required for this contract, including inspection plants, has been received and accepted by the vendor. The statement from the vendor must include the names, sizes, and quantities of plants ordered and the anticipated date of delivery.

At least 60 days before applying seeds, furnish the Engineer a statement from the vendor that the order for the seed required for this contract has been received and accepted by the vendor. The statement from the vendor must include the names and quantity of seed ordered and the anticipated date of delivery.

The Engineer designates ground locations of erosion control by directing the placing of stakes or other suitable markers before application of erosion control materials as specified under "Erosion Control (Type D), of these special provisions.

Locate existing irrigation water line crossovers and conduits before performing work on the irrigation system as specified under "Locate Existing Crossover and Conduits" of these special provisions.

Unless otherwise shown on the plans or specified in these special provisions, conduits to be jacked or drilled or installed by the open trench method for water line crossovers and sprinkler control crossovers must be installed before the installation of other pipe supply lines.

Do not perform clearing, grubbing, and earthwork operations in areas where existing irrigation facilities are to remain in place until existing irrigation facilities have been checked for proper operation as specified under "Existing Highway Irrigation Facilities" of these special provisions.

Locate existing conduits to be extended as specified under "Extend Irrigation Crossovers" of these special provisions before the start of other work in these areas.

## **10-1.02 WATER POLLUTION CONTROL**

### **GENERAL**

Water pollution control work shall conform to the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications, section of these special provisions entitled "Relations With California Regional Water Quality Control Board," and these special provisions.

The Contractor may obtain other National Pollutant Discharge Elimination System (NPDES) permits that apply to activities and mobile operations within or outside of the project limits including hot mix asphalt batch plants, material borrow areas, concrete plants, staging areas, storage yards, or access roads.

The Contractor shall perform water pollution control work in conformance with the requirements in the "Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual" and its addenda in effect on the day the Notice to Contractors is dated. This manual is referred to as the "Preparation Manual." Copies of the Preparation Manual may be obtained from:

State of California  
Department of Transportation  
Publication Distribution Unit  
1900 Royal Oaks Drive  
Sacramento, California 95815  
Telephone: (916) 445-3520

The Preparation Manual and other references for performing water pollution control work are available from the Department's Construction Storm Water and Water Pollution Control web site at:

<http://www.dot.ca.gov/hq/construc/stormwater/stormwater1.htm>

Before the start of job site activities, the Contractor shall provide training for project managers, supervisory personnel, and employees involved with water pollution control work. The training shall include:

- A. Rules and regulations
- B. Implementation and maintenance for:

1. Temporary Soil Stabilization
2. Temporary Sediment Control
3. Tracking Control
4. Wind Erosion Control

The Contractor shall designate in writing a Water Pollution Control Manager (WPCM). The Contractor shall submit a statement of qualifications describing the training, work history, and expertise of the proposed WPCM. The qualifications shall include either:

- A. A minimum of 24 hours of Department approved storm water management training described at Department's Construction Storm Water and Water Pollution Control web site.
- B. Certification as a Certified Professional in Erosion and Sediment Control (CPESC).

The WPCM shall be:

- A. Responsible for water pollution control work.
- B. The primary contact for water pollution control work.
- C. Have authority to mobilize crews to make immediate repairs to water pollution control practices.

The Contractor may designate one manager to prepare the SWPPP and a different manager to implement the plan. The WPCP preparer shall meet the training requirements for the WPCM.

### **STORM WATER POLLUTION PREVENTION PLAN**

The Contractor shall submit a Storm Water Pollution Prevention Plan (SWPPP) to the Engineer for approval. The SWPPP shall conform to the requirements in the Preparation Manual, the NPDES permit, and these special provisions. The SWPPP shall be submitted in place of the water pollution control program required by the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications.

The SWPPP shall include water pollution control practices:

- A. For storm water and non-storm water from areas outside of the job site related to construction activities for this contract such as:
  1. Staging areas.
  2. Storage yards.
  3. Access roads.
- B. Appropriate for each season as described in "Implementation Requirements" of these special provisions.
- C. For activities or mobile operations related to all NPDES permits.

The SWPPP shall include a schedule that:

- A. Describes when work activities that could cause water pollution will be performed.
- B. Identifies soil stabilization and sediment control practices for disturbed soil area.
- C. Includes dates when these practices will be 25, 50, and 100 percent complete.
- D. Shows 100 percent completion of these practices before the rainy season.

The SWPPP shall include the following temporary water pollution control practices and their associated contract items of work as shown on the plans or specified in these special provisions:

- A. Temporary Sediment Control
  1. Temporary Fiber Roll
  2. Temporary Silt Fence
  3. Temporary Gravel Bag Berm
  4. Temporary Drainage Inlet Protection
  5. Street Sweeping

- B. Non-Storm Water Management
  - 1. Construction Site Management
- C. Waste Management and Materials Pollution Control
  - 1. Temporary Concrete Washout Bin

The SWPPP shall include the following contract items of work for permanent water pollution control as shown on the plans or as specified in these special provisions:

A. Erosion Control (Type D)

Within 20 days after contract approval, the Contractor shall submit 3 copies of the SWPPP to the Engineer. The Contractor shall allow 20 days for the Engineer's review. If revisions are required, the Engineer will provide comments and specify the date that the review stopped. The Contractor shall revise and resubmit the SWPPP within 15 days of receipt of the Engineer's comments. The Engineer's review will resume when the complete SWPPP is resubmitted. When the Engineer approves the SWPPP, the Contractor shall submit 4 copies of the approved SWPPP to the Engineer. The Contractor may proceed with construction activities if the Engineer conditionally approves the SWPPP while minor revisions are being completed. If 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, the Contractor will be compensated for resulting losses, and an extension of time will be granted, as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The Contractor shall not perform work that may cause water pollution until the SWPPP has been approved by the Engineer. The Engineer's review and approval shall not waive any contract requirements and shall not relieve the Contractor from complying with Federal, State and local laws, regulations, and requirements.

If there is a change in construction schedule or activities, the Contractor shall prepare an amendment to the SWPPP to identify additional or revised water pollution control practices. The Contractor shall submit the amendment to the Engineer for review within a time agreed to by the Engineer not to exceed the number of days specified for the initial submittal of the SWPPP. The Engineer will review the amendment within the same time allotted for the review of the initial submittal of the SWPPP.

If directed by the Engineer or requested in writing by the Contractor and approved by the Engineer, changes to the water pollution control work specified in these special provisions will be allowed. Changes may include addition of new water pollution control practices. The Contractor shall incorporate these changes in the SWPPP. Additional water pollution control work will be paid for as extra work in accordance with Section 4-1.03D, "Extra Work," of the Standard Specifications.

The Contractor shall keep a copy of the approved SWPPP at the job site. The SWPPP shall be made available when requested 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 from the public shall be directed to the Engineer.

**SAMPLING AND ANALYSIS**

The Contractor shall include a Sampling and Analysis Plan (SAP) in the SWPPP to monitor the effectiveness of the water pollution control practices. The Contractor shall prepare the SAP in conformance with the Preparation Manual.

The Contractor shall designate trained personnel to collect water quality samples. The personnel and training shall be documented in the SAP. Training shall consist of the following elements:

- A. SAP review,
- B. Health and safety review, and
- C. Sampling simulations.

In the SAP the Contractor shall describe the following water quality sampling procedures:

- A. Sampling preparation,
- B. Collection,
- C. Quality assurance and quality control,
- D. Sample labeling,
- E. Collection documentation,

- F. Sample shipping,
- G. Chain of custody,
- H. Sample numbering, and
- I. Precautions from the construction site health and safety plan.

The Contractor shall document sample collection during precipitation.

Samples to be analyzed in the field shall be taken by the Contractor's designated sampling personnel using collection and analysis methods, and equipment calibration specified by the manufacturer of the sampling equipment. Samples to be analyzed by a laboratory, shall be sampled, preserved, and analyzed by a State-certified laboratory in conformance with the requirements in 40 CFR Part 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants." The Contractor shall identify the State-certified laboratory, sample containers, preservation requirements, holding times, and analysis method in the SAP. A list of State-certified laboratories that are approved by the Department is available at:

<http://www.dhs.ca.gov/ps/ls/ELAP/html/lablist.htm>

### **Non-Visible Pollutants**

This project has the potential to discharge non-visible pollutants in storm water from the construction site. The Contractor shall include in the SAP a description of the sampling and analysis strategy to be implemented on the project for monitoring non-visible pollutants.

In the SAP the Contractor shall identify potential non-visible pollutants that will be present on the construction site associated with the following:

- A. Construction materials and wastes;
- B. Existing contamination due to historical site usage; or
- C. Application of soil amendments, including soil stabilization products, with the potential to alter pH or contribute toxic pollutants to storm water.

The Contractor shall show the locations planned for storage and use of the potential non-visible pollutants on the SWPPP Water Pollution Control Drawings.

The Contractor shall include in the SAP the following list of conditions that require sampling when observed during a storm water inspection:

- A. Materials or wastes containing potential non-visible pollutants are not stored under watertight conditions.
- B. Materials or wastes containing potential non-visible pollutants are stored under watertight conditions, but:
  - 1. A breach, leakage, malfunction, or spill is observed;
  - 2. The leak or spill has not been cleaned up before precipitation; and
  - 3. There is the potential for discharge of non-visible pollutants to surface waters or drainage system.
- C. Construction activities; such as application of fertilizer, pesticide, herbicide, methyl methacrylate concrete sealant, or non-pigmented curing compound; have occurred during precipitation or within 24 hours preceding precipitation, and have the potential to discharge pollutants to surface waters or drainage system.
- D. Soil amendments, including soil stabilization products, with the potential to alter pH levels or contribute toxic pollutants to storm water runoff have been applied, and have the potential to discharge pollutants to surface waters or drainage system (unless independent test data are available that demonstrate acceptable concentrations of non-visible pollutants in the soil amendment).
- E. Storm water runoff from an area contaminated by historical usage of the site has the potential to discharge pollutants to surface waters or drainage system.

The Contractor shall describe in the SAP the schedule for collecting a sample downhill from each non-visible pollutant source and an uncontaminated control sample, during the first 2 hours of discharge from precipitation during daylight hours that result in enough discharge for sample collection. If discharge flows to the non-visible pollutant source, a sample shall be collected immediately downhill from where the discharge enters the Department's right of way. If precipitation occurs again after at least 72 hours of dry weather the Contractor shall take new samples.

In the SAP the Contractor shall identify sampling locations for collecting downstream and control samples, and the reason for their selection. The control sampling location shall be selected so the sample does not come into contact with materials, wastes or areas associated with potential non-visible pollutants or disturbed soil areas. The Contractor shall show non-visible pollutant sampling locations on the SWPPP Water Pollution Control Drawings.

The Contractor shall identify in the SAP the analytical method to be used for downhill and control samples for potential non-visible pollutants on the project.

### **Analytical Results and Evaluation**

The Contractor shall submit a hard copy and electronic copy of water quality analytical results, and quality assurance and quality control data to the Engineer within 5 days of sampling for field analyses, and within 30 days for laboratory analyses. The Contractor shall also provide an evaluation of whether the downhill samples show levels of the tested parameter higher than in the control sample. If downhill or downstream samples show increased levels, the Contractor will assess the water pollution control measures, site conditions, and surrounding influences to determine the probable cause for the increase. As determined by the assessment, the Contractor will repair or modify water pollution control measures to address increases and amend the SWPPP as necessary. Electronic results (in one of the following file formats: .xls, .txt, .csv, .dbs, or .mdb) shall have the following information:

- A. Sample identification number.
- B. Contract number.
- C. Constituent.
- D. Reported value.
- E. Analytical method.
- F. Method detection limit.
- G. Reported limit.

The Contractor shall maintain the water quality sampling documentation and analytical results with the SWPPP on the project site.

If construction activities or knowledge of site conditions change such that discharges or sampling locations change, the Contractor shall amend the SAP in conformance with this section, "Water Pollution Control."

### **IMPLEMENTATION REQUIREMENTS**

The Contractor's responsibility for SWPPP 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.

If the Contractor or the Engineer identifies a deficiency in the implementation of the approved SWPPP, the deficiency shall be corrected immediately, unless an agreed date for correction is approved in writing by the Engineer. The deficiency shall be corrected before the onset of precipitation. If the Contractor fails to correct the deficiency by the agreed date or before the onset of precipitation, the Department may correct the deficiency and deduct the cost of correcting deficiencies from payments.

If the Contractor fails to conform to the provisions of this section, "Water Pollution Control," the Engineer may order the suspension of work until the project complies with the requirements of this section.

### **Year-Round**

The Contractor shall monitor the National Weather Service weather forecast on a daily basis during the contract. The Contractor may use an alternative weather forecasting service if approved by the Engineer. Appropriate water pollution control practices shall be in place before precipitation.

The Contractor may discontinue earthwork operations for a disturbed area for up to 21 days and the disturbed soil area will still be considered active. When earthwork operations in the disturbed area have been completed, the Contractor shall implement appropriate water pollution control practices within 15 days, or before predicted precipitation, whichever occurs first.

### **Rainy Season**

The Contractor shall provide soil stabilization and sediment control practices during the rainy season between October 15 and April 15.

During the defined rainy season, the active disturbed soil area of the project site shall be not more than 5 acres. The Engineer may approve expansions of the active disturbed soil area limit if requested in writing. The Contractor shall maintain soil stabilization and sediment control materials on site to protect disturbed soil areas.

### **INSPECTION AND MAINTENANCE**

The WPCM shall inspect the water pollution control practices identified in the SWPPP as follows:

- A. Before a forecasted storm,
- B. After precipitation that causes site runoff,
- C. At 24-hour intervals during extended precipitation,
- D. On a predetermined schedule, a minimum of once every 2 weeks outside of the defined rainy season, and
- E. On a predetermined schedule, a minimum of once a week during the defined rainy season.

The WPCM shall oversee the maintenance of the water pollution control practices.

The WPCM shall use the Storm Water Quality Construction Site Inspection Checklist provided in the Preparation Manual or an alternative inspection checklist provided by the Engineer. A copy of the completed site inspection checklist shall be submitted to the Engineer within 24 hours of finishing the inspection.

### **REPORTING REQUIREMENTS**

If the Contractor identifies discharges into surface waters or drainage systems causing or potentially causing 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 7 days of the discharge, notice or order. The report shall include the following information:

- A. The date, time, location, and nature of the operation, type of discharge and quantity, and the cause of the notice or order.
- B. The water pollution control practices used before the discharge, or before receiving the notice or order.
- C. The date of placement and type of additional or altered water pollution control practices placed after the discharge, or after receiving the notice or order.
- D. A maintenance schedule for affected water pollution control practices.

### **Annual Certifications**

By June 15 of each year, the Contractor shall complete and submit to the Engineer an Annual Certification of Compliance, as contained in the Preparation Manual.

### **PAYMENT**

During each estimate period the Contractor fails to conform to the provisions in this section, "Water Pollution Control," or fails to implement the water pollution control practices shown on the plans or specified elsewhere in these special provisions as items of work, the Department will withhold 25 percent of the progress payment.

Withholds for failure to perform water pollution control work will be in addition to all other withholds provided for in the contract. The Department will return performance-failure withholds in the progress payment following the correction of noncompliance.

The contract lump sum price paid for prepare storm water pollution prevention plan shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in preparing, obtaining approval of, and amending the SWPPP and inspecting water pollution control practices as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Payments for prepare storm water pollution prevention plan will be made as follows:

- A. After the SWPPP has been approved by the Engineer, 50 percent of the contract item price for prepare storm water pollution prevention plan will be included in the monthly progress estimate.
- B. Forty percent of the contract item price for prepare storm water pollution prevention plan will be paid over the life of the contract.
- C. 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 10 percent of the contract item price for prepare storm water pollution prevention plan will be made in conformance with the provisions in Section 9-1.07A, "Payment Prior to Proposed Final Estimate."

Storm water sampling and analysis will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications. No payment will be made for the preparation, collection, analysis, and reporting of storm water samples where appropriate water pollution control practices are not implemented before precipitation or if a failure of a water pollution control practice is not corrected before precipitation.

Implementation of water pollution control practices in areas outside the highway right of way not specifically provided for in the SWPPP or in these special provisions will not be paid for.

Water pollution control practices for which there are separate contract items of work will be measured and paid for as those contract items of work.

### **10-1.03 CONSTRUCTION SITE MANAGEMENT**

Construction site management shall consist of controlling potential sources of water pollution before they come in contact with storm water systems or watercourses. The Contractor shall control material pollution and manage waste and non-storm water existing at the construction site by implementing effective handling, storage, use, and disposal practices.

Attention is directed to "Water Pollution Control" of these special provisions regarding the Contractor's appointment of a water pollution control manager (WPCM) for the project.

The Contractor shall train all employees and subcontractors regarding:

- A. Material pollution prevention and control;
- B. Waste management;
- C. Non-storm water management;
- D. Identifying and handling hazardous substances; and
- E. Potential dangers to humans and the environment from spills and leaks or exposure to toxic or hazardous substances.

Training shall take place before starting work on this project. New employees shall receive the complete training before starting work on this project. The Contractor shall have regular meetings to discuss and reinforce spill prevention and control; material delivery, storage, use, and disposal; waste management; and non-storm water management procedures.

Instructions for material and waste handling, storage, and spill reporting and cleanup shall be posted at all times in an open, conspicuous, and accessible location at the construction site.

Nonhazardous construction site waste and excess material shall be recycled when practical or disposed of in accordance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications, unless otherwise specified.

Vehicles and equipment at the construction site shall be inspected by the WPCM on a frequent, predetermined schedule, and by the operator each day of use. Leaks shall be repaired immediately, or the vehicle or equipment shall be removed from the construction site.

### **SPILL PREVENTION AND CONTROL**

The Contractor shall implement spill and leak prevention procedures when chemicals or hazardous substances are stored. Spills of petroleum products; substances listed under CFR Title 40, Parts 110, 117, and 302; and sanitary and septic waste shall be contained and cleaned up as soon as is safe.

Minor spills involve small quantities of oil, gasoline, paint, or other material that can be controlled by the first responder upon discovery of the spill. Cleanup of minor spills includes:

- A. Containing the spread of the spill,
- B. Recovering the spilled material using absorption,
- C. Cleaning the contaminated area, and
- D. Disposing of contaminated material promptly and properly.

Semi-significant spills are those that can be controlled by the first responder with the help of other personnel. Cleanup of semi-significant spills shall be immediate. Cleanup of semi-significant spills includes:

- A. Containing the spread of the spill;
- B. Recovering the spilled material using absorption if the spill occurs on paved or an impermeable surface;
- C. Containing the spill with an earthen dike and digging up contaminated soil for disposal if the spill occurs on dirt;
- D. Covering the spill with plastic or other material to prevent contaminating runoff if the spill occurs during precipitation; and
- E. Disposing of contaminated material promptly and properly.

Significant or hazardous spills are those that cannot be controlled by construction personnel. Notifications of these spills shall be immediate. The following steps shall be taken:

- A. Construction personnel shall not attempt to cleanup the spill until qualified staff have arrived;
- B. Notify the Engineer and follow up with a written report;
- C. Obtain the services of a spills contractor or hazardous material team immediately;

- D. Notify the local emergency response team by dialing 911 and county officials at the emergency phone numbers kept on the construction site;
- E. Notify the Governor's Office of Emergency Services Warning Center at (805) 852-7550;
- F. Notify the National Response Center at (800) 424-8802 regarding spills of Federal reportable quantities in conformance with CFR Title 40, Parts 110, 119, and 302;
- G. Notify other agencies as appropriate, including:
  - 1. Fire Department,
  - 2. Public Works Department,
  - 3. Coast Guard,
  - 4. Highway Patrol,
  - 5. City Police or County Sheriff Department,
  - 6. Department of Toxic Substances,
  - 7. California Division of Oil and Gas,
  - 8. Cal OSHA, or
  - 9. Regional Water Resources Control Board.

The WPCM shall oversee and enforce proper spill prevention and control measures. Minor, semi-significant, and significant spills shall be reported to the Contractor's WPCM who shall notify the Engineer immediately.

The Contractor shall prevent spills from entering storm water runoff before and during cleanup. Spills shall not be buried or washed with water.

The Contractor shall keep material or waste storage areas clean, well organized, and equipped with enough cleanup supplies for the material being stored. Plastic shall be placed under paving equipment when not in use to catch drips.

#### **MATERIAL MANAGEMENT**

Material shall be delivered, used, and stored for this contract in a manner that minimizes or eliminates discharge of material into the air, storm drain systems, or watercourses.

The Contractor shall implement the practices described in this section when taking delivery of, using, or storing the following materials:

- A. Hazardous chemicals including:

- 1. Acids,
- 2. Lime,
- 3. Glues,
- 4. Adhesives,
- 5. Paints,
- 6. Solvents, and
- 7. Curing compounds;

- B. Soil stabilizers and binders;

- C. Fertilizers;

- D. Detergents;

- E. Plaster;

- F. Petroleum products including:

- 1. Fuel,
- 2. Oil, and
- 3. Grease;

- G. Asphalt components and concrete components; and

- H. Pesticides and herbicides.

The Contractor shall supply the Material Safety Data Sheet to the Engineer for material used or stored. The Contractor shall keep an accurate inventory of material delivered and stored at the construction site.

Employees trained in emergency spill cleanup procedures shall be present when hazardous materials or chemicals are unloaded.

The Contractor shall use recycled or less hazardous products when practical.

## **Material Storage**

The Contractor shall store liquids, petroleum products, and substances listed in CFR Title 40, Parts 110, 117, and 302 in containers or drums approved by the United States Environmental Protection Agency, and place them in secondary containment facilities.

Secondary containment facilities shall be impervious to the materials stored there for a minimum contact time of 72 hours.

Throughout the rainy season secondary containment facilities shall be covered during non-working days and when precipitation is predicted. Secondary containment facilities shall be adequately ventilated.

The Contractor shall keep the secondary containment facility free of accumulated rainwater or spills. After precipitation, or in the event of spills or leaks, accumulated liquid shall be collected and placed into drums within 24 hours. These liquids shall be handled as hazardous waste in accordance with the provisions in "Hazardous Waste" of these special provisions, unless testing determines them to be nonhazardous.

Incompatible materials, such as chlorine and ammonia, shall not be stored in the same secondary containment facility.

Materials shall be stored in the original containers with the original product labels maintained in legible condition. Damaged or illegible labels shall be replaced immediately.

The secondary containment facility shall have the capacity to contain precipitation from a 24-hour-long, 25-year storm; and 10 percent of the aggregate volume of all containers, or all of the volume of the largest container within the facility, whichever is greater.

The Contractor shall store bagged or boxed material on pallets. Throughout the rainy season, bagged or boxed material shall be protected from wind and rain during non-working days and when precipitation is predicted.

The Contractor shall provide sufficient separation between stored containers to allow for spill cleanup or emergency response access. Storage areas shall be kept clean, well organized, and equipped with cleanup supplies appropriate for the materials being stored.

The Contractor shall repair or replace perimeter controls, containment structures, covers, and liners as needed. Storage areas shall be inspected before and after precipitation, and at least weekly during other times.

## **Stockpile Management**

The Contractor shall reduce or eliminate potential air and water pollution from stockpiled material including soil, paving material, or pressure treated wood. Stockpiles shall be located out of floodplains when possible, and at least 50 feet from concentrated flows of storm water, drainage courses, or inlets unless written approval is obtained from the Engineer.

The Contractor may discontinue adding or removing material for up to 21 days and a stockpile will still be considered active.

The Contractor shall protect active stockpiles with plastic or geotextile cover, soil stabilization measures, or with linear sediment barrier when precipitation is predicted. Active stockpiles of cold mix asphalt concrete shall be placed on an impervious surface and covered with plastic when precipitation is predicted.

The Contractor shall protect inactive soil stockpiles with a plastic or geotextile cover, or with soil stabilization measures at all times during the rainy season. A linear sediment barrier around the perimeter of the stockpile shall also be used. During the non-rainy season soil stockpiles shall be covered and protected with a linear sediment barrier when precipitation is predicted. The Contractor shall control wind erosion during dry weather as provided in Section 10, "Dust Control," of the Standard Specifications.

Stockpiles of portland cement concrete rubble, asphalt concrete (AC), hot mix asphalt (HMA), AC and HMA rubble, aggregate base, or aggregate subbase shall be covered with plastic or geotextile, or protected with a linear sediment barrier at all times during the rainy season, and when precipitation is predicted during the non-rainy season.

Stockpiles of cold mix asphalt concrete shall be placed on and covered with impermeable material at all times during the rainy season, and when precipitation is predicted during the non-rainy season.

Stockpiles of pressure treated wood shall be covered with impermeable material and placed on pallets at all times during the rainy season, and when precipitation is predicted during the non-rainy season.

The Contractor shall repair or replace linear sediment barriers and covers as needed or as directed by the Engineer to keep them functioning properly. Sediment shall be removed when it accumulates to 1/3 of the linear sediment barrier height.

## **WASTE MANAGEMENT**

### **Solid Waste**

The Contractor shall not allow litter or debris to accumulate anywhere on the construction site, including storm drain grates, trash racks, and ditch lines. The Contractor shall pick up and remove trash and debris from the construction site at least once a week. The WPCM shall monitor solid waste storage and disposal procedures on the construction site. The Contractor shall provide enough dumpsters of sufficient size to contain the solid waste generated by the project. Dumpsters

shall be emptied when refuse reaches the fill line. Dumpsters shall be watertight. The Contractor shall not wash out dumpsters on the construction site. The Contractor shall provide additional containers and more frequent pickup during the demolition phase of construction.

Solid waste includes:

- A. Brick,
- B. Mortar,
- C. Timber,
- D. Metal scraps,
- E. Sawdust,
- F. Pipe,
- G. Electrical cuttings,
- H. Non-hazardous equipment parts,
- I. Styrofoam and other packaging materials,
- J. Vegetative material and plant containers from highway planting, and
- K. Litter and smoking material, including litter generated randomly by the public.

Trash receptacles shall be provided and used in the Contractor's yard, field trailers, and locations where workers gather for lunch and breaks.

#### **Hazardous Waste**

The Contractor shall implement hazardous waste management practices when waste is generated on the construction site from the following substances:

- A. Petroleum products,
- B. Asphalt products,
- C. Concrete curing compound,
- D. Pesticides,
- E. Acids,
- F. Paints,
- G. Stains,
- H. Solvents,
- I. Wood preservatives,
- J. Roofing tar, and
- K. Materials classified as hazardous by California Code of Regulations, Title 22, Division 4.5; or listed in CFR Title 40, Parts 110, 117, 261, or 302.

Nothing in these special provisions shall relieve the Contractor of the responsibility for compliance with Federal, State, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.

Hazardous material existing on the construction site before mobilization shall be handled and disposed of in accordance with "Remove Traffic Stripe," "Material Containing Lead," "Treated Wood Waste," "Material Containing Lead from Sand Blast Residue," "Disposal of Portland Cement Concrete (PCC) Pavement Grooving and Grinding Residues," and "Air Quality – Basic NESHAP Asbestos Notification" of these special provisions.

The WPCM shall oversee and enforce hazardous waste management practices. Production of hazardous materials and hazardous waste on the construction site shall be kept to a minimum. Perimeter controls, containment structures, covers, and liners shall be repaired or replaced when damaged.

The Contractor shall have a laboratory certified by the Department of Health Services (DHS) sample and test waste when hazardous material levels are unknown to determine safe methods for storage and disposal.

The Contractor shall segregate potentially hazardous waste from nonhazardous waste at the construction site. Hazardous waste shall be handled, stored, and disposed of as required in California Code of Regulations, Title 22, Division 4.5, Section 66262.34; and in CFR Title 49, Parts 261, 262, and 263.

The Contractor shall store hazardous waste in sealed containers constructed and labeled with the contents and date accumulated as required in California Code of Regulations, Title 22, Division 4.5; and in CFR Title 49, Parts 172, 173, 178, and 179. Hazardous waste containers shall be kept in temporary containment facilities conforming to the provisions in "Material Storage" of these special provisions.

There shall be adequate storage volume and containers shall be conveniently located for hazardous waste collection. Containers of hazardous waste shall not be overfilled and hazardous wastes shall not be mixed. Containers of dry waste that

are not watertight shall be stored on pallets. The Contractor shall not allow potentially hazardous waste to accumulate on the ground. Hazardous waste shall be stored away from storm drains, watercourses, moving vehicles, and equipment.

The Contractor shall clean water based or oil based paint from brushes or equipment within a contained area and shall not contaminate soil, watercourses, or storm drain systems. Paints, thinners, solvents, residues, and sludges that cannot be recycled or reused shall be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths shall be disposed of as solid waste.

The Contractor shall dispose of hazardous waste within 90 days of being generated. Hazardous waste shall be disposed of by a licensed hazardous waste transporter using uniform hazardous waste manifest forms and taken to a Class I Disposal Site. A copy of the manifest shall be provided to the Engineer.

### **Contaminated Soil**

The Contractor shall identify contaminated soil from spills or leaks by noticing discoloration, odors, or differences in soil properties. Soil with evidence of contamination shall be sampled and tested by a laboratory certified by DHS. If levels of contamination are found to be hazardous, the soil shall be handled and disposed of as hazardous waste.

Contaminated soil existing on the construction site before mobilization shall be handled and disposed of in accordance with "Material Containing Lead" of these special provisions.

The Contractor shall prevent the flow of water, including ground water, from mixing with contaminated soil by using one or a combination of the following measures:

- A. Berms,
- B. Cofferdams,
- C. Grout curtains,
- D. Freeze walls, or
- E. Concrete seal course.

If water mixes with contaminated soil and becomes contaminated, the water shall be sampled and tested by a laboratory certified by the DHS. If levels of contamination are found to be hazardous, the water shall be handled and disposed of as hazardous waste.

### **Concrete Waste**

The Contractor shall implement practices to prevent the discharge of portland cement concrete, AC, or HMA waste into storm drain systems or watercourses.

Portland cement concrete, AC, or HMA waste shall be collected at the following locations and disposed of:

- A. Where concrete material, including grout, is used;
- B. Where concrete dust and debris result from demolition;
- C. Where sawcutting, coring, grinding, grooving, or hydro-concrete demolition of portland cement concrete, AC, or HMA creates a residue or slurry; or
- D. Where concrete trucks or other concrete-coated equipment is cleaned at the construction site.

### **Sanitary and Septic Waste**

Wastewater from sanitary or septic systems shall not be discharged or buried within the Department right of way. The WPCM shall inspect sanitary or septic waste storage and monitor disposal procedures at least weekly. Sanitary facilities that discharge to the sanitary sewer system shall be properly connected and free from leaks.

The Contractor shall obtain written approval from the local health agency, city, county, and sewer district before discharging from a sanitary or septic system directly into a sanitary sewer system, and provide a copy to the Engineer. The Contractor shall comply with local health agency requirements when using an on-site disposal system.

### **Liquid Waste**

The Contractor shall not allow construction site liquid waste, including the following, to enter storm drain systems or watercourses:

- A. Drilling slurries or fluids,
- B. Grease-free or oil-free wastewater or rinse water,
- C. Dredgings,
- D. Liquid waste running off a surface including wash or rinse water, or
- E. Other non-storm water liquids not covered by separate permits.

The Contractor shall hold liquid waste in structurally sound, leak proof containers such as:

- A. Sediment traps,
- B. Roll-off bins, or
- C. Portable tanks.

Liquid waste containers shall be of sufficient quantity and volume to prevent spills and leaks. The containers shall be stored at least 50 feet from storm drains, watercourses, moving vehicles, and equipment.

The Contractor shall remove and dispose of deposited solids from sediment traps as provided in "Solid Waste" of these special provisions, unless determined infeasible by the Engineer.

Liquid waste may require testing to determine hazardous material content before disposal.

Drilling fluids and residue shall be disposed of outside the highway right of way. If the Engineer determines that an appropriate location is available, fluids and residue exempt under California Code of Regulations, Title 23, Section 2511(g) may be dried by infiltration and evaporation in a leak proof container. The remaining solid waste may be disposed of as provided in "Solid Waste" of these special provisions.

## **NON-STORM WATER MANAGEMENT**

### **Water Control and Conservation**

The Contractor shall prevent erosion or the discharge of pollutants into storm drain systems or watercourses by managing the water used for construction operations. The Contractor shall obtain the Engineer's approval before washing anything on the construction site with water that could discharge into a storm drain system or watercourse. Discharges shall be reported to the Engineer immediately.

The Contractor shall implement water conservation practices when water is used on the construction site. Irrigation areas shall be inspected and watering schedules shall be adjusted to prevent erosion, excess watering, or runoff. The Contractor shall shut off the water source to broken lines, sprinklers, or valves, and they shall be repaired as soon as possible. When possible, water from waterline flushing shall be reused for landscape irrigation. Paved areas shall be swept and vacuumed, not washed with water.

Construction water runoff, including water from water line repair, shall be directed to areas to infiltrate into the ground and shall not be allowed to enter storm drain systems or watercourses. Spilled water shall not be allowed to escape water truck filling areas. When possible, the Contractor shall direct water from off-site sources around the construction site, or shall minimize contact with the construction site.

### **Illegal Connection and Discharge Detection and Reporting**

The Contractor shall inspect the construction site and the site perimeter before beginning work for evidence of illegal connections, discharges, or dumping. Subsequently, the construction site and perimeter shall be inspected on a frequent, predetermined schedule.

The Contractor shall immediately notify the Engineer when illegal connections, discharges, or dumping are discovered. The Contractor shall take no further action unless directed by the Engineer. Unlabeled or unidentifiable material shall be assumed to be hazardous.

The Contractor shall look for the following evidence of illegal connections, discharges, or dumping:

- A. Debris or trash piles,
- B. Staining or discoloration on pavement or soils,
- C. Pungent odors coming from drainage systems,
- D. Discoloration or oily sheen on water,
- E. Stains or residue in ditches, channels or drain boxes,
- F. Abnormal water flow during dry weather,
- G. Excessive sediment deposits,
- H. Nonstandard drainage junction structures, or
- I. Broken concrete or other disturbances near junction structures.

### **Vehicle and Equipment Cleaning**

The Contractor shall limit vehicle and equipment cleaning or washing on the construction site to that necessary to control vehicle tracking or hazardous waste. Vehicles and equipment shall not be cleaned on the construction site with soap, solvents, or steam until the Engineer has been notified. The resulting waste shall be contained and recycled, or disposed of as

provided in "Liquid Waste" or "Hazardous Waste" of these special provisions, whichever is applicable. The Contractor shall not use diesel to clean vehicles or equipment, and shall minimize the use of solvents.

The Contractor shall clean or wash vehicles and equipment in a structure equipped with disposal facilities. If using a structure is not possible, vehicles and equipment shall be cleaned or washed in an outside area with the following characteristics:

- A. Located at least 50 feet from storm drainage systems or watercourses,
- B. Paved with AC, HMA, or portland cement concrete,
- C. Surrounded by a containment berm, and
- D. Equipped with a sump to collect and dispose of wash water.

When washing vehicles or equipment with water, the Contractor shall use as little water as possible. Hoses shall be equipped with a positive shutoff valve.

Wash racks shall discharge to a recycle system or to another system approved by the Engineer. Sumps shall be inspected regularly, and liquids and sediments shall be removed as needed.

#### **Vehicle and Equipment Fueling and Maintenance**

The Contractor shall fuel or perform maintenance on vehicles and equipment off the construction site whenever practical. When fueling or maintenance must be done at the construction site, the Contractor shall designate a site, or sites, and obtain approval from the Engineer before using. The fueling or maintenance site shall be protected from storm water, shall be on level ground, and shall be located at least 50 feet from drainage inlets or watercourses. The WPCM shall inspect the fueling or maintenance site regularly. Mobile fueling or maintenance shall be kept to a minimum.

The Contractor shall use containment berms or dikes around the fueling and maintenance area. Adequate amounts of absorbent spill cleanup material and spill kits shall be kept in the fueling and maintenance area and on fueling trucks. Spill cleanup material and kits shall be disposed of immediately after use. Drip pans or absorbent pads shall be used during fueling or maintenance unless performed over an impermeable surface.

Fueling or maintenance operations shall not be left unattended. Fueling nozzles shall be equipped with an automatic shutoff control. Vapor recovery fueling nozzles shall be used where required by the Air Quality Management District. Nozzles shall be secured upright when not in use. Fuel tanks shall not be topped-off.

The Contractor shall recycle or properly dispose of used batteries and tires.

#### **Material and Equipment Used Over Water**

Drip pans and absorbent pads shall be placed under vehicles or equipment used over water, and an adequate supply of spill cleanup material shall be kept with the vehicle or equipment. Drip pans or plastic sheeting shall be placed under vehicles or equipment on docks, barges, or other surfaces over water when the vehicle or equipment will be idle for more than one hour.

The Contractor shall provide watertight curbs or toe boards on barges, platforms, docks, or other surfaces over water to contain material, debris, and tools. Material shall be secured to prevent spills or discharge into water due to wind.

#### **Structure Removal Over or Adjacent to Water**

The Contractor shall not allow demolished material to enter storm water systems or watercourses. The Contractor shall use covers and platforms approved by the Engineer to collect debris. Attachments shall be used on equipment to catch debris on small demolition operations. Debris catching devices shall be emptied regularly and debris shall be handled as provided in "Waste Management" of these special provisions.

The WPCM shall inspect demolition sites within 50 feet of storm water systems or watercourses every day.

#### **Paving, Sealing, Sawcutting, and Grinding Operations**

The Contractor shall prevent the following material from entering storm drain systems or water courses:

- A. Cementitious material,
- B. Asphaltic material,
- C. Aggregate or screenings,
- D. Grinding or sawcutting residue,
- E. Pavement chunks, or
- F. Shoulder backing.

The Contractor shall cover drainage inlets and use linear sediment barriers to protect downhill watercourses until paving, sealing, sawcutting, or grinding operations are completed and excess material has been removed. Drainage inlets and manholes shall be covered during the application of seal coat, tack coat, slurry seal, or fog seal.

During the rainy season or when precipitation is predicted, paving, sawcutting, and grinding operations shall be limited to places where runoff can be captured. Seal coat, tack coat, slurry seal, or fog seal operations shall not begin if precipitation is predicted for the application or the curing period. The Contractor shall not excavate material from existing roadways during precipitation.

The Contractor shall vacuum up slurry from sawcutting operations immediately after the slurry is produced. Slurry shall not be allowed to run onto lanes open to public traffic or off the pavement.

The Contractor shall collect residue from portland cement concrete grinding operations with a vacuum attachment on the grinding machine. The residue shall not be left on the pavement or allowed to flow across the pavement.

Material excavated from existing roadways may be stockpiled as provided in "Stockpile Management" of these special provisions if approved by the Engineer. AC or HMA chunks used in embankment shall be placed above the water table and covered by at least one foot of material.

Substances used to coat asphalt trucks and equipment shall not contain soap, foaming agents, or toxic chemicals.

### **Thermoplastic Striping and Pavement Markers**

Thermoplastic striping and preheating equipment shutoff valves shall work properly at all times when on the construction site. The Contractor shall not preheat, transfer, or load thermoplastic within 50 feet of drainage inlets or watercourses. The Contractor shall not fill the preheating container to more than 6 inches from the top. Truck beds shall be cleaned daily of scraps or melted thermoplastic.

The Contractor shall not unload, transfer, or load bituminous material for pavement markers within 50 feet of drainage inlets or watercourses. All pressure shall be released from melting tanks before removing the lid to fill or service. Melting tanks shall not be filled to more than 6 inches from the top.

The Contractor shall collect bituminous material from the roadway after marker removal.

### **Pile Driving**

The Contractor shall keep spill kits and cleanup material at pile driving locations. Pile driving equipment shall be parked over drip pans, absorbent pads, or plastic sheeting where possible. When not in use, pile driving equipment shall be stored at least 50 feet from concentrated flows of storm water, drainage courses, or inlets. The Contractor shall protect pile driving equipment by parking it on plywood and covering it with plastic when precipitation is predicted. The WPCM shall inspect the pile driving area every day for leaks and spills.

The Contractor shall use vegetable oil instead of hydraulic fluid when practical.

### **Concrete Curing**

The Contractor shall not overspray chemical curing compound. Drift shall be minimized by spraying as close to the concrete as possible. Drainage inlets shall be covered before applying curing compound.

The Contractor shall minimize the use and discharge of water by using wet blankets or similar methods to maintain moisture when curing concrete.

### **Concrete Finishing**

The Contractor shall collect and dispose of water and solid waste from high-pressure water blasting. Drainage inlets within 50 feet shall be covered before sandblasting. The nozzle shall be kept as close to the surface of the concrete as possible to minimize drift of dust and blast material. Blast residue may contain hazardous material.

Containment structures for concrete finishing operations shall be inspected for damage before each day of use and before predicted precipitation. Liquid and solid waste shall be removed from the containment structure after each work shift.

## **DEWATERING**

Dewatering shall consist of discharging accumulated storm water, ground water, or surface water from excavations or temporary containment facilities. The Contractor shall discharge water within the limits of the project.

Dewatering discharge shall not cause erosion, scour, or sedimentary deposits that impact natural bedding materials.

The Contractor shall conduct dewatering activities in accordance with the Field Guide for Construction Dewatering available at:

<http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm>

Before dewatering the Contractor shall submit a Dewatering and Discharge Plan to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications and "Water Pollution Control," of these special provisions. At a minimum, the Dewatering and Discharge Plan shall include the following:

- A. A title sheet and table of contents;
- B. A description of the dewatering and discharge operations detailing the locations, quantity of water, equipment, and discharge point;
- C. The estimated schedule for dewatering and discharge (begin and end dates, intermittent or continuous);
- D. Discharge alternatives such as dust control or percolation; and
- E. Visual monitoring procedures with inspection log.

The Contractor shall not discharge storm water or non-storm water that has an odor, discoloration other than sediment, an oily sheen, or foam on the surface and shall notify the Engineer immediately upon discovery.

If water cannot be discharged within the project limits due to site constraints it shall be disposed of in the same manner specified for material in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

### **PAYMENT**

The contract lump sum price paid for construction site management shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in spill prevention and control, material management, waste management, non-storm water management, and dewatering and identifying, sampling, testing, handling, and disposing of hazardous waste, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### **10-1.04 STREET SWEEPING**

#### **GENERAL**

##### **Summary**

This work includes street sweeping.

The SWPPP must describe and include the use of street sweeping as a water pollution control practice for sediment control and tracking control.

##### **Submittals**

At least 5 business days before starting clearing and grubbing, earthwork, or other activities with the potential for tracking sediment or debris, submit:

- 1. Number of sweepers described in the SWPPP
- 2. Type of sweeper technology

##### **Quality Control and Assurance**

Retain and submit records of street sweeping including:

- 1. Quantity of sweeping waste disposal
- 2. Sweeping times and locations

### **CONSTRUCTION**

#### **Street Sweepers**

Sweepers must use one of these technologies:

- 1. Mechanical sweeper followed by a vacuum-assisted sweeper
- 2. Vacuum-assisted dry (waterless) sweeper
- 3. Regenerative-air sweeper

#### **Operation**

Street sweeping must be done at:

- 1. Paved roads at job site entrance and exit locations

2. Paved areas within the job site that flow to storm drains or water bodies

Street sweeping must be done:

1. During clearing and grubbing activities
2. During earthwork activities
3. During trenching activities
4. During roadway structural section activities
5. When vehicles are entering and leaving the job site
6. After soil disturbing activities
7. After observing offsite tracking of material

Monitor paved areas and roadway within the jobsite. Street sweeping must be done:

1. Within 1 hour, if sediment or debris is observed during activities that require sweeping
2. Within 24 hours, if sediment or debris is observed during activities that do not require sweeping

At least 1 sweeper must be on the job site at all times when sweeping work is required. The sweeper must be in good working order.

Perform street sweeping to minimize dust. If dust generation is excessive or sediment pickup is ineffective, use water or a vacuum.

You may stockpile collected material on the jobsite according to the approved SWPPP. Dispose of collected material at least once per week.

Material collected during street sweeping must be removed and disposed of under Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Your WPCM must inspect paved roads at job site access points:

1. Daily if earthwork and other sediment or debris generating activities occur daily
2. Weekly if earthwork and other sediment or debris generating activities do not occur daily
3. When the National Weather Service predicts precipitation with a probability of at least 30 percent

## **MEASUREMENT AND PAYMENT**

The contract lump sum price paid for street sweeping includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in street sweeping, including disposal of collected material, as shown on the plans, as specified in the Standard Specifications, these special provisions, and as directed by the Engineer.

### **10-1.05 TEMPORARY CONCRETE WASHOUT BIN**

#### **GENERAL**

##### **Summary**

This work includes removal and disposal of concrete waste by furnishing, maintaining, and removing temporary concrete washout bins.

The SWPPP must describe and include the use of temporary concrete washout bins as a water pollution control practice for waste management and materials pollution control.

##### **Submittals**

At least 5 business days before concrete operations start, submit:

1. Location of the washout bins
2. Name and location of the off-site concrete waste disposal facility to receive concrete waste
3. Copy of the permit issued by RWQCB for the off-site commercial disposal facility
4. Copy of the license for the off-site commercial disposal facility
5. Copy of the permit issued by the state or local agency having jurisdiction over the disposal facility if the disposal site is located outside of the State of California

##### **Quality Control and Assurance**

Retain and submit records of disposed concrete waste including:

1. Weight tickets
2. Delivery and removal of concrete washout bins

## **MATERIALS**

### **Concrete Washout Bin**

Concrete washout bin must:

1. Be a commercially available watertight container
2. Have sufficient capacity to contain all liquid and concrete waste generated by washout operations without seepage or spills
3. Be not less than 5 cubic yards of capacity
4. Be a roll-off bin and may include folding steel ramps
5. Be labeled for the exclusive use as a concrete waste and washout facility

### **Concrete Washout Sign**

Concrete washout sign must:

1. Comply with the provisions in Section 12-3.06B, "Portable Signs" of the Standard Specifications
2. Be approved by the Engineer
3. Consist of a base, framework, and a sign panel
4. Be made out of plywood
5. Be a minimum size of 2 feet by 4 feet
6. Read "Concrete Washout" with black letters, 3 inches high, on a white background

## **CONSTRUCTION**

### **Placement**

Place concrete washout bins at the job site:

1. Before concrete placement activities begin
2. In the immediate area of the concrete work as approved by the Engineer
3. No closer than 50 feet from storm drain inlets, open drainage facilities, ESAs, or watercourses
4. Away from construction traffic or public access areas

Install a concrete washout sign adjacent to each temporary concrete washout bin location.

### **Operation**

Use concrete washout bins for:

1. Washout from concrete delivery trucks
2. Slurries containing portland cement concrete or hot mix asphalt from sawcutting, coring, grinding, grooving, and hydro-concrete demolition
3. Concrete waste from mortar mixing stations

Relocate concrete washout bins as needed for concrete construction work.

Replace concrete washout bins when filled to capacity. Do not fill higher than 6 inches below rim.

Your WPCM must inspect concrete washout bins:

1. Daily if concrete work occurs daily
2. Weekly if concrete work does not occur daily

### **Maintenance**

When relocating or transporting a concrete washout bin within the project site, secure the concrete washout bin to prevent spilling of concrete waste material. If any spilled material is observed, remove the spilled material and place it into the concrete washout bin.

## **Removal**

Dispose of concrete waste material at a facility specifically licensed to receive solid concrete waste, liquid concrete waste, or both. Remove and dispose of concrete waste within 2 days of the concrete washout bin becoming filled to capacity.

## **MEASUREMENT AND PAYMENT**

Temporary concrete washout bin is measured by the actual count of concrete washout bins in place.

The contract unit price paid for temporary concrete washout bin includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing, maintaining, and removing the concrete washout bin, including removal and disposal of concrete waste, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### **10-1.06 TEMPORARY FIBER ROLL**

#### **GENERAL**

##### **Summary**

This work includes constructing, maintaining, and removing temporary fiber roll.

The SWPPP must describe and include the use of temporary fiber roll as a water pollution control practice for sediment control.

##### **Submittals**

Submit a Certificate of Compliance as specified in Section 6-1.07, "Certificates of Compliance" of the Standard Specifications for fiber roll.

#### **MATERIALS**

##### **Fiber Roll**

Fiber roll must:

1. Last for at least one year after installation
2. Be Type 1 or Type 2

If specified, Type 1 fiber roll must be:

1. Made from an erosion control blanket:
  - 1.1. Classified by the Erosion Control Technology Council (ECTC) as ECTC 2D
  - 1.2. With a Universal Soil Loss Equation (USLE) C-Factor of not more than 0.20 at a 2:1 (horizontal:vertical) slope
  - 1.3. Capable to withstand a maximum shear stress of 1.75 pounds per square foot under ASTM D 6460
  - 1.4. With a minimum tensile strength of 75 pounds per foot under ASTM D 5035
  - 1.5. With top and bottom surfaces covered with extruded photodegradable plastic netting or lightweight non-synthetic netting
  - 1.6. That complies with one of the following:
    - 1.6.1. Double net straw and coconut blanket with 70 percent straw and 30 percent coconut fiber
    - 1.6.2. Double net excelsior blanket with 80 percent of the wood excelsior fibers being 6 inches or longer
2. Rolled along the width
3. Secured with natural fiber twine every 6 feet and 6 inches from each end
4. Finished to be either:
  - 4.1. From 8 to 10 inches in diameter, from 10 to 20 feet long, and at least 0.5 pounds per linear foot
  - 4.2. From 10 to 12 inches in diameter, at least 10 feet long, and at least 2 pounds per linear foot

If specified, Type 2 fiber roll must:

1. Be filled with rice or wheat straw, wood excelsior, or coconut fiber
2. Be covered with a photodegradable plastic netting or a biodegradable jute, sisal, or coir fiber netting

3. Have the netting secured tightly at each end
4. Be finished to be either:
  - 4.1. From 8 to 10 inches in diameter, from 10 to 20 feet long, and at least 1.1 pounds per linear foot
  - 4.2. From 10 to 12 inches in diameter, at least 10 feet long, and at least 3 pounds per linear foot

### **Wood Stakes**

Wood stakes must be:

1. Untreated fir, redwood, cedar, or pine and cut from sound timber
2. Straight and free of loose or unsound knots and other defects which would render the stakes unfit for use
3. Pointed on the end to be driven into the ground

For fiber roll, wood stakes must be at least:

1. 1" x 1" x 24" in size for Type 1 installation
2. 1" x 2" x 24" in size for Type 2 installation

### **Rope**

For Type 2 installation, rope must:

1. Be biodegradable, such as sisal or manila
2. Have a minimum diameter of 1/4 inch

## **CONSTRUCTION**

Before placing fiber roll, remove obstructions including rocks, clods, and debris greater than one inch in diameter from the ground.

If fiber roll is to be placed in the same area as erosion control blanket, install the blanket before placing the fiber roll. For other soil stabilization practices such as hydraulic mulch or compost, place the fiber roll and then apply the soil stabilization practice.

Place fiber roll on slopes at the following spacing unless the plans show a different spacing:

1. 10 feet apart for slopes steeper than 2:1 (horizontal:vertical)
2. 15 feet apart for slopes from 2:1 to 4:1 (horizontal:vertical)
3. 20 feet apart for slopes from 4:1 to 10:1 (horizontal:vertical)
4. 50 feet apart for slopes flatter than 10:1 (horizontal:vertical)

Place fiber roll approximately parallel to the slope contour. For any 20 foot section of fiber roll, do not allow the fiber roll to vary more than 5 percent from level.

Type 1 and Type 2 fiber roll may be installed using installation method Type 1, Type 2, or a combination:

For installation method Type 1, install fiber roll by:

1. Placing in a furrow that is from 2 to 4 inches deep
2. Securing with wood stakes every 4 feet along the length of the fiber roll
3. Securing the ends of the fiber roll by placing a stake 6 inches from the end of the roll
4. Driving the stakes into the soil so that the top of the stake is less than 2 inches above the top of the fiber roll

For installation method Type 2, install fiber roll by:

1. Securing with rope and notched wood stakes.
2. Driving stakes into the soil until the notch is even with the top of the fiber roll.
3. Lacing the rope between stakes and over the fiber roll. Knot the rope at each stake.
4. Tightening the fiber roll to the surface of the slope by driving the stakes further into the soil.

## **MAINTENANCE**

Maintain temporary fiber roll to provide sediment holding capacity and to reduce runoff velocities.

Remove sediment deposits, trash, and debris from temporary fiber roll as needed or when directed by the Engineer. If removed sediment is deposited within project limits, it must be stabilized and not subject to erosion by wind or water. Trash and debris must be removed and disposed of as specified in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Maintain temporary fiber roll by:

1. Removing sediment from behind the fiber roll when sediment is 1/3 the height of the fiber roll above ground
2. Repairing or adjusting the fiber roll when rills and other evidence of concentrated runoff occur beneath the fiber roll.
3. Repairing or replacing the fiber roll when they become split, torn, or unraveled
4. Adding stakes when the fiber roll slump or sag
5. Replacing broken or split wood stakes

Repair temporary fiber roll within 24 hours of discovering damage unless the Engineer approves a longer period.

If your vehicles, equipment, or activities disturb or displace temporary fiber roll, repair temporary fiber roll at your expense.

The Department does not pay maintenance costs for cleanup, repair, removal, disposal, or replacement due to improper installation or your negligence.

## **REMOVAL**

When the Engineer determines that temporary fiber roll is not required, they must be removed and disposed of under Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Ground disturbance, including holes and depressions, caused by the installation and removal of the temporary fiber roll must be backfilled and repaired under Section 15-1.02, "Preservation of Property," of the Standard Specifications.

## **MEASUREMENT AND PAYMENT**

Temporary fiber roll is measured by the linear foot along the centerline of the installed roll. Where temporary fiber roll is joined and overlapped, the overlap is measured as a single installed roll.

The contract price paid per linear foot for temporary fiber roll includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the temporary fiber roll, complete in place, including removal of materials, cleanup and disposal of retained sediment and debris, and backfilling and repairing holes, depressions and other ground disturbance, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The State and you share the cost of maintaining the temporary fiber roll. The State determines the maintenance cost under Section 9-1.03, "Force Account Payment," of the Standard Specifications and pays you one-half of that cost.

## **10-1.07 TEMPORARY SILT FENCE**

### **GENERAL**

#### **Summary**

This work includes installing, maintaining, and removing temporary silt fence.

The SWPPP must describe and include the use of temporary silt fence as a water pollution control practice for sediment control.

#### **Submittals**

Submit a Certificate of Compliance as specified in Section 6-1.07, "Certificates of Compliance" of the Standard Specifications for silt fence fabric.

### **MATERIALS**

#### **Silt Fence Fabric**

Geosynthetic fabric for temporary silt fence must consist of one of the following:

1. Polyester
2. Polypropylene
3. Combined polyester and polypropylene

Sample under ASTM D 4354, Procedure C.

Test under ASTM D 4759. All properties must be based on Minimum Average Roll Value (MARV).

Identify, store, and handle under ASTM D 4873.

Protect geosynthetics from moisture, sunlight, and damage during shipping and storage. Label each unit with the manufacturer's name, identifying information, and product identification.

Silt fence fabric must comply with:

| Property   | ASTM Designation | Specification |           |
|--|------------------|---------------|-----------|
|  |                  | Woven         | Non-woven |
| Grab breaking load<br>1-inch grip, lb, min. in each direction                                  | D 4632           | 120           | 120       |
| Apparent elongation<br>percent, min., in each direction  | D 4632           | 15            | 50        |
| Water Flow Rate<br>max. average roll value, gallons per minute/square foot                     | D 4491           | 10-50         | 100-150   |
| Permittivity<br>1/sec., min.   | D 4491           | 0.05          | 0.05      |
| Apparent opening size<br>max. average roll value, U.S. Standard sieve size                     | D 4751           | 30            | 30        |
| Ultraviolet Degradation<br>percent of original unexposed grab breaking load<br>500 hr, minimum | D 4595           | 70            |           |

### Posts

Posts must be wood or metal.

Wood posts must be:

1. Untreated fir, redwood, cedar, or pine and cut from sound timber
2. Straight and free of loose or unsound knots and other defects that would render the stakes unfit for use
3. Pointed on the end to be driven into the ground
4. At least 2" x 2" in size, and 4 feet long

Metal posts must:

1. Be made of steel.
2. Have a "U," "T," "L," or other cross sectional shape that can resist failure from lateral loads.
3. Be pointed on the end to be driven into the ground.
4. Weigh at least 0.75-pound per foot.
5. Be at least 4 feet long.
6. Have a safety cap attached to the exposed end. The safety cap must be orange or red plastic and fit snugly to the metal post.

### CONSTRUCTION

Silt fence must be:

1. Constructed with silt fence fabric, posts, and fasteners
2. Prefabricated or assembled at the job site

Silt fence fabric must be attached to posts using these methods:

1. If prefabricated silt fence is used, posts must be inserted into sewn pockets
2. If assembled on the job site:
  - 2.1. If wood posts are used, fasteners must be staples or nails
  - 2.2. If steel posts are used, fasteners must be tie wires or locking plastic fasteners
  - 2.3. Spacing of the fasteners must be no more than 8 inches apart

Place silt fence approximately parallel to the slope contour. For any 50 foot section of silt fence, do not allow the elevation at the base of the fence to vary more than 1/3 of the fence height.

Install silt fence by:

1. Placing the bottom of the fabric in a trench that is 6 inches deep
2. Securing with posts placed on the downhill side of the fabric
3. Backfilling the trench with soil and hand or mechanically tamping to secure the fabric in the trench

If you reinforce the silt fence fabric with wire or plastic mesh, you may increase the post spacing to a maximum of 10 feet. The field-assembled reinforced silt fence must be able to retain saturated sediment without collapsing.

Connect silt fence sections by:

1. Joining separate sections of silt fence to form reaches that are no more than 500 feet long
2. Securing the end posts of each section by wrapping the tops of the posts with at least two wraps of 16-gage diameter tie wire
3. Ensuring that each reach is a continuous run of silt fence from end to end or from an end to an opening, including joined panels

If you mechanically push the silt fence fabric vertically through the soil, you must demonstrate that the silt fence fabric will not be damaged and will not slip out of the soil, resulting in sediment passing under the silt fence fabric.

### **MAINTENANCE**

Maintain temporary silt fence to provide sediment holding capacity and to reduce runoff velocities.

Remove sediment deposits, trash, and debris from temporary silt fence as needed or when directed by the Engineer. If removed sediment is deposited within project limits, it must be stabilized and not subject to erosion by wind or water. Trash and debris must be removed and disposed of as specified in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Maintain temporary silt fence by:

1. Removing sediment from behind the silt fence when sediment is 1/3 the height of the silt fence above ground
2. Repairing or adjusting the silt fence when rills and other evidence of concentrated runoff occur beneath the silt fence fabric
3. Repairing or replacing the silt fence fabric when it become split, torn, or unraveled

Repair temporary silt fence within 24 hours of discovering damage unless the Engineer approves a longer period.

If your vehicles, equipment, or activities disturb or displace temporary silt fence, repair temporary silt fence at your expense.

The Department does not pay maintenance costs for cleanup, repair, removal, disposal, or replacement due to improper installation or your negligence.

### **REMOVAL**

When the Engineer determines that temporary silt fence is not required, remove and dispose of fence under Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Ground disturbance, including holes and depressions, caused by the installation and removal of the temporary silt fence must be backfilled and repaired under Section 15-1.02, "Preservation of Property," of the Standard Specifications.

### **MEASUREMENT AND PAYMENT**

Temporary silt fence is measured by the linear foot along the centerline of the installed fence.

The contract price paid per linear foot for temporary silt fence includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the temporary silt fence, complete in place, including removal of materials, cleanup and disposal of retained sediment and debris, and backfilling and repairing holes, depressions and other ground disturbance, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The State and you share the cost of maintaining the temporary silt fence. The State determines the maintenance cost under Section 9-1.03, "Force Account Payment," of the Standard Specifications and pays you one-half of that cost.

### **10-1.08 TEMPORARY FENCE (TYPE ESA)**

Temporary fence (Type ESA) shall be furnished, installed, maintained, and later removed in conformance with the details shown on the plans, as specified in these special provisions and as directed by the Engineer.

#### **MATERIALS**

Used materials may be installed provided the used materials conform to these special provisions.

##### **High Visibility Fabric**

High visibility fabric shall be machine produced, orange colored mesh manufactured from polypropylene or polyethylene. High visibility fabric may be made of recycled materials. Materials shall not contain biodegradable filler materials that can degrade the physical or chemical characteristics of the finished fabric. High visibility fabric shall be fully stabilized ultraviolet resistant, shall be a minimum of 4 feet in width with a maximum mesh opening of 2" x 2". High visibility fabric shall be furnished in one continuous width and shall not be spliced to conform to the specified width dimension.

##### **Posts**

Posts for temporary fence (Type ESA) shall be of one of the following:

- A. Wood posts shall be fir or pine, shall have a minimum cross section of 2" x 2", and a minimum length of 5.25 feet. The end of the post to be embedded in the soil shall be pointed. Wood posts shall not be treated with wood preservative.
- B. Steel posts shall have a "U," "T," "L," or other cross sectional shape that resists failure from lateral loads. Steel posts shall have a minimum weight of 0.75 pounds per linear foot and a minimum length of 5.25 feet. One end of the steel post shall be pointed and the other end shall have a high visibility colored top.

##### **Fasteners**

Fasteners for attaching high visibility fabric to the posts shall be as follows:

- A. The high visibility fabric shall be attached to wooden posts with commercial quality nails or staples, or as recommended by the manufacturer or supplier.
- B. Tie wire or locking plastic fasteners shall be used for attaching the high visibility fabric to steel posts. Maximum spacing of tie wire or fasteners shall be 24 inches along the length of the steel post.

##### **Signs**

The sign legend and dimensions shall be as shown on the plans. The sign shall be weatherproof and fade-proof and may include plastic laminated printed paper affixed to an inflexible weatherproof backer board. The sign panel shall be affixed to the high visibility fabric with tie wire or locking plastic fasteners. The top of the sign panel shall be flush with the top of the high visibility fabric. Sign panels shall be placed 50 feet apart along the length of the temporary fence (Type ESA), and at each end of the fence.

#### **INSTALLATION**

Temporary fence (Type ESA) shall be installed as follows:

- A. All fence construction activities shall be conducted from outside the ESA as shown on the plans or as staked.
- B. Posts shall be embedded in the soil a minimum of 16 inches. Post spacing shall be 8 feet maximum from center to center and shall at all times support the fence in a vertical position.
- C. Temporary fence (Type ESA) shall be constructed prior to clearing and grubbing work, shall enclose the foliage canopy (drip line) of protected plants, and shall not encroach upon visible roots of the plants.
- D. Temporary fence (Type ESA) shall be located so that it is visible, as determined by the Engineer.

When Type ESA temporary fence is no longer required, as determined by the Engineer, the temporary fence 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, except when reused as provided in this section.

Holes caused by the removal of temporary fence (Type ESA) shall be backfilled in conformance with the provisions in Section 15-1.02, "Preservation of Property," of the Standard Specifications.

## MAINTENANCE

Temporary fence (Type ESA) that is damaged during the progress of the work shall be repaired or replaced by the Contractor the same day the damage occurs.

## MEASUREMENT AND PAYMENT

Temporary fence (Type ESA) shall be measured and paid for in the same manner specified for fence (Type BW or WM, wood or metal posts) as provided in Section 80, "Fences," of the Standard Specifications.

Full compensation for maintaining, removing, and disposing of temporary fence (Type ESA) shall be considered as included in the contract price paid per linear foot for temporary fence (Type ESA) and no additional compensation will be allowed therefor.

## 10-1.09 TEMPORARY GRAVEL BAG BERM

### GENERAL

#### Summary

This work includes constructing, maintaining, and removing temporary gravel bag berm.

The SWPPP must describe and include the use of temporary gravel bag berm as a water pollution control practice for sediment control.

#### Submittals

Submit a Certificate of Compliance as specified in Section 6-1.07, "Certificates of Compliance" of the Standard Specifications for gravel-filled bag fabric.

### MATERIALS

#### Gravel-filled Bag Fabric

Geosynthetic fabric for temporary gravel bag berm must consist of one of the following:

1. Polyester
2. Polypropylene
3. Combined polyester and polypropylene

Sample under ASTM D 4354, Procedure C.

Test under ASTM D 4759. All properties must be based on Minimum Average Roll Value (MARV).

Identify, store, and handle under ASTM D 4873.

Protect geosynthetics from moisture, sunlight, and damage during shipping and storage. Label each unit with the manufacturer's name, identifying information, and product identification.

Gravel-filled bag fabric must comply with:

| Specification   | Requirements |
|---|--------------|
| Grab breaking load<br>1-inch grip, lb, min. in each direction                               | 205          |
| Apparent elongation<br>percent, min., in each direction                                     | 50           |
| Water Flow Rate<br>max. average roll value, gallons per minute/square foot                  | 80-150       |
| Permittivity<br>l/sec., min   | 1.2          |
| Apparent opening size<br>max. average roll value, U.S. Standard sieve size                  | 40-80        |
| Ultraviolet Degradation<br>percent of original unexposed grab breaking load 500 hr, minimum | 70           |

#### Gravel

Gravel for gravel-filled bags must be:

1. From 3/8 to 3/4 inch in diameter

2. Clean and free from clay balls, organic matter, and other deleterious materials

### **Gravel-filled Bags**

Gravel-filled bags must:

1. Be made from gravel-filled bag fabric.
2. Have inside dimensions from 24 to 32 inches in length, and from 16 to 20 inches in width.
3. Have the opening bound to retain the gravel. The opening must be sewn with yarn, bound with wire, or secured with a closure device.
4. Weigh from 30 to 50 pounds when filled with gravel.

### **CONSTRUCTION**

Before constructing temporary gravel bag berm, remove obstructions including rocks, clods, and debris greater than 1 inch in diameter from the ground.

Temporary gravel bag berm must:

1. Be placed as a single layer of gravel bags to create a linear sediment barrier
2. Be placed end-to-end to eliminate gaps
3. Be placed approximately parallel to the slope contour
4. Have the last 6 feet of the gravel bag berm angled up-slope

If you need to increase the height of the temporary gravel bag berm:

1. Increase height by adding rows of gravel-filled bags
2. Stack bags in a way that the bags in the top row overlap the joints in the lower row
3. Stabilize berm by adding rows at the bottom

If used within shoulder area, gravel-filled bags must be placed behind temporary railing (Type K).

### **MAINTENANCE**

Maintain temporary gravel bag berm to provide sediment holding capacity and to reduce runoff velocities.

Remove sediment deposits, trash, and debris from temporary gravel bag berm as needed or when directed by the Engineer. If removed sediment is deposited within project limits, it must be stabilized and not subject to erosion by wind or water. Trash and debris must be removed and disposed of as specified in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Maintain temporary gravel bag berm by:

1. Removing sediment from behind the gravel bag berm when sediment is 1/3 the height of the gravel bag berm above ground
2. Repairing or adjusting the gravel-filled bags when rills and other evidence of concentrated runoff occur beneath the gravel-filled bags
3. Repairing or replacing the gravel-filled bags when they become split, torn, or unraveled

Repair temporary gravel bag berm within 24 hours of discovering damage unless the Engineer approves a longer period.

If your vehicles, equipment, or activities disturb or displace temporary gravel bag berm, repair temporary gravel bag berm at your expense.

The Department does not pay maintenance costs for cleanup, repair, removal, disposal, or replacement due to improper installation or your negligence.

### **REMOVAL**

When the Engineer determines that temporary gravel bag berm is not required, they must be removed and disposed of under Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Ground disturbance, including holes and depressions, caused by the installation and removal of the temporary gravel bag berm must be backfilled and repaired under Section 15-1.02, "Preservation of Property," of the Standard Specifications.

## **MEASUREMENT AND PAYMENT**

Temporary gravel bag berm is measured by the linear foot along the centerline of the installed berm.

The contract price paid per linear foot for temporary gravel bag berm includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the temporary gravel bag berm, complete in place, including removal of materials, cleanup and disposal of retained sediment and debris, and backfilling and repairing holes, depressions and other ground disturbance, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The State and you share the cost of maintaining the temporary gravel bag berm. The State determines the maintenance cost under Section 9-1.03, "Force Account Payment," of the Standard Specifications and pays you one-half of that cost.

### **10-1.10 TEMPORARY DRAINAGE INLET PROTECTION**

#### **GENERAL**

##### **Summary**

This work includes constructing, maintaining, and removing temporary drainage inlet protection. Drainage inlet protection settles and filters sediment before stormwater runoff discharges into storm drainage systems.

The SWPPP must describe and include the use of temporary drainage inlet protection as a water pollution control practice for sediment control.

Provide temporary drainage inlet protection to meet the changing conditions around the drainage inlet. Temporary drainage inlet protection must be:

1. Appropriate type to meet the conditions around the drainage inlet
2. Type 1, Type 2, Type 3A, Type 3B, Type 4, Type 4B, Type 5, Type 6A, Type 6B, or a combination

##### **Submittals**

Submit a Certificate of Compliance as specified in Section 6-1.07, "Certificates of Compliance" of the Standard Specifications for:

1. Erosion control blanket
2. Fiber rolls
3. Safety cap for metal posts
4. Silt fence fabric
5. Sediment filter bag
6. Foam barrier
7. Rigid plastic barrier
8. Gravel-filled bag fabric

If you substitute the steel wire staple with an alternative attachment device, submit a sample of the device for approval at least 5 business days before installation.

#### **MATERIALS**

##### **Geosynthetic Fabrics**

Geosynthetic fabrics for temporary drainage inlet protection must consist of one of the following:

1. Polyester
2. Polypropylene
3. Combined polyester and polypropylene

Geosynthetic fabrics for temporary drainage inlet must comply with the specifications for water pollution control in Section 88-1.05, "Water Pollution Control," of the Standard Specifications.

Foam barrier must comply with:

**Foam Barrier**

| Property  | ASTM Designation | Specification |
|---|------------------|---------------|
| Grab breaking load<br>1-inch grip, lb, min. in each direction                                     | D 4632           | 200           |
| Apparent elongation<br>percent, min., in each direction   | D 4632           | 15            |
| Water Flow Rate<br>max. average roll value,<br>gallons per minute/square foot                     | D 4491           | 100-150       |
| Permittivity<br>1/sec., min.  | D 4491           | 0.05          |
| Apparent opening size<br>max. average roll value,<br>U.S. Standard sieve size                     | D 4751           | 40            |
| Ultraviolet Degradation<br>percent of original<br>unexposed grab breaking<br>load 500 hr, minimum | D 4595           | 70            |

Sample under ASTM D 4354, Procedure C.

Test under ASTM D 4759. All properties are based on Minimum Average Roll Value (MARV).

Identify, store, and handle under ASTM D 4873.

**Erosion Control Blanket**

Erosion control blanket must be:

1. Described as a rolled erosion control product (RECP)
2. Classified as temporary and degradable or long-term and non-degradable
3. Machine-made mats
4. Provided in rolled strips
5. Classified by the Erosion Control Technology Council (ECTC)

Erosion control blanket classified as temporary and degradable must be one of the following:

1. Double net excelsior blanket:
  - 1.1. Classified as ECTC Type 2D
  - 1.2. Classified as an erosion control blanket
  - 1.3. Designed to last for at least one year after installation
  - 1.4. With a Universal Soil Loss Equation (USLE) C-Factor of not more than 0.20 at a 2:1 (horizontal:vertical) slope
  - 1.5. With 80 percent of the wood excelsior fibers being 6 inches or longer
  - 1.6. Capable to withstand a maximum shear stress of 1.75 pounds per square foot under ASTM D 6460
  - 1.7. With a minimum tensile strength of 75 pounds per foot under ASTM D 5035
  - 1.8. With top and bottom surfaces covered with extruded photodegradable plastic netting or lightweight non-synthetic netting

2. Double net straw and coconut blanket:
  - 2.1. Classified as ECTC Type 2D
  - 2.2. Classified as an erosion control blanket
  - 2.3. Designed to last for at least one year after installation
  - 2.4. With a USLE C-Factor of not more than 0.20 at a 2:1 (horizontal:vertical) slope
  - 2.5. Comprised of 70 percent straw and 30 percent coconut fiber
  - 2.6. Capable to withstand a maximum shear stress of 1.75 pounds per square foot under ASTM D 6460
  - 2.7. With a minimum tensile strength of 75 pounds per foot under ASTM D 5035
  - 2.8. With top and bottom surfaces covered with extruded photodegradable plastic netting or lightweight non-synthetic netting
  
3. Jute netting:
  - 3.1. Classified as ECTC Type 3B
  - 3.2. Classified as an open weave textile and have from 14 to 20 strands per foot in each direction
  - 3.3. Designed to last for at least one year after installation
  - 3.4. With a USLE C-Factor of not more than 0.25 at a 1.5:1 (horizontal:vertical) slope
  - 3.5. Comprised of 100 percent unbleached and undyed spun yarn made of jute fiber
  - 3.6. With an average open area from 63 to 70 percent
  - 3.7. From 48 to 72 inches in width
  - 3.8. Capable to withstand a maximum shear stress of 2.0 pounds per square foot under ASTM D 6460
  - 3.9. With a minimum tensile strength of 100 pounds per foot under ASTM D 5035
  - 3.10. From 0.90 to 1.20 pounds per square yard in weight
  
4. Coir netting:
  - 4.1. Classified as ECTC Type 4
  - 4.2. Classified as an open weave textile and from 13 to 18 strands per foot in each direction
  - 4.3. Designed to last for at least three years after installation
  - 4.4. With a USLE C-Factor of not more than 0.25 at a 1:1 (horizontal:vertical) slope
  - 4.5. Comprised of 100 percent unbleached and undyed spun coir yarn made of coconut fiber
  - 4.6. With an average open area from 63 to 70 percent
  - 4.7. From 72 to 158 inches in width
  - 4.8. Capable to withstand a maximum shear stress of 2.25 pounds per square foot under ASTM D6460
  - 4.9. With a minimum tensile strength of 125 pounds per foot under ASTM D 5035
  - 4.10. From 1.20 to 1.67 pounds per square yard in weight

Erosion control blanket classified as long-term and non-degradable must:

1. Be a geosynthetic fabric
2. Comply with the specifications for rock slope protection fabric (Class 8) in Section 88-1.06, "Channel and Shore Protection," of the Standard Specifications

#### **Staples**

You may use an alternative attachment device such as a geosynthetic pins or plastic pegs to install erosion control blanket.

#### **Rock**

Rock must comply with:

1. Requirements under Section 72-2.02, "Materials," of the Standard Specifications
2. Following sizes:

| Square Screen Size<br>(inch) | Percentage Passing | Percentage Retained |
|------------------------------|--------------------|---------------------|
| 6                            | 100                | 0                   |
| 3                            | 0                  | 100                 |

**Rope**

Rope for fiber rolls must be:

1. Biodegradable, such as sisal or manila
2. At least 1/4 inch in diameter

**Fiber Rolls**

Fiber rolls must:

1. Last for at least one year after installation
2. Be Type 1 or Type 2

For Type 1, fiber rolls must be:

1. Made from an erosion control blanket classified as temporary and degradable
2. Rolled along the width
3. Secured with natural fiber twine every 6'-6" from each end
4. Finished to be either:
  - 4.1. From 8 to 10 inches in diameter, from 10 to 20 feet long, and at least 0.5 pounds per linear foot
  - 4.2. From 10 to 12 inches in diameter, at least 10 feet long, and at least 2 pounds per linear foot

For Type 2, fiber rolls must:

1. Be filled with rice or wheat straw, wood excelsior, or coconut fiber
2. Be covered with photodegradable plastic netting, biodegradable jute, sisal, or coir fiber netting
3. Have netting secured tightly at each end
4. Be finished to be either:
  - 4.1. From 8 to 10 inches in diameter, from 10 to 20 feet long, and at least 1.1 pounds per linear foot
  - 4.2. From 10 to 12 inches in diameter, at least 10 feet long, and at least 3 pounds per linear foot

**Wood Stakes**

Wood stakes must be:

1. Untreated fir, redwood, cedar, or pine and cut from sound timber
2. Straight and free of loose or unsound knots and other defects which would render the stakes unfit for use
3. Pointed on the end to be driven into the ground

For fiber rolls, wood stakes must be at least:

1. 1" x 1" x 24" in size for Type 1 installation
2. 1" x 2" x 24" in size for Type 2 installation

**Posts**

Posts must be wood or metal.

Wood posts must be:

1. Untreated fir, redwood, cedar, or pine and cut from sound timber
2. Straight and free of loose or unsound knots and other defects that would render the stakes unfit for use
3. Pointed on the end to be driven into the ground

4. At least 2" x 2" in size, and 4 feet long

Metal posts must:

1. Be made of steel.
2. Have a "U," "T," "L," or other cross sectional shape that can resist failure from lateral loads.
3. Be pointed on the end to be driven into the ground.
4. Weigh at least 0.75-pound per foot.
5. Be at least 4 feet long.
6. Have a safety cap attached to the exposed end. The safety cap must be orange or red plastic and fit snugly to the metal post.

#### **Silt Fence**

Silt fence must be:

1. Constructed with silt fence fabric, posts, and fasteners
2. Prefabricated or assembled at the job site

Silt fence fabric must be attached to posts using these methods:

1. If prefabricated silt fence is used, posts must be inserted into sewn pockets
2. If assembled on the job site:
  - 2.1. If wood posts are used, fasteners must be staples or nails
  - 2.2. If steel posts are used, fasteners must be tie wires or locking plastic fasteners
  - 2.3. Spacing of the fasteners must be at least 8 inches

#### **Gravel-filled Bags**

Gravel-filled bags must:

1. Be made from fabric.
2. Have inside dimensions from 24 to 32 inches in length, and from 16 to 20 inches in width.
3. Have the opening bound to retain the gravel. The opening must be sewn with yarn, bound with wire, or secured with a closure device.
4. Weigh from 30 to 50 pounds when filled with gravel.

Gravel for gravel-filled bags must be:

1. From 3/8 to 3/4 inch in diameter
2. Clean and free from clay balls, organic matter, and other deleterious materials

#### **Sediment Filter Bag**

Sediment filter bag must:

1. Be made of fabric
2. Be sized to fit the catch basin or drainage inlet
3. Include a high-flow bypass

Sediment filter bag may include a metal frame. Sediment filter bags that do not have a metal frame and are deeper than 18 inches must:

1. Include lifting loops and dump straps
2. Include a restraint cord to keep the sides of the bag away from the walls of the catch basin

**Foam Barriers**

Foam barriers must:

1. Be filled with a urethane foam core
2. Have a geosynthetic fabric cover and flap
3. Have a triangular, circular, or square shaped cross section
4. Have a vertical height of at least 5 inches after installation
5. Have a horizontal flap of at least 8 inches in width
6. Have a length of at least 4 feet per unit
7. Have the ability to interlock separate units into a longer barrier so that water does not flow between the units
8. Be secured to:
  - 8.1. Pavement with 1-inch concrete nails with 1-inch washers and solvent-free adhesive
  - 8.2. Soil with 6-inch nails with 1-inch washers

**Rigid Plastic Barriers**

Rigid plastic barriers must:

1. Have an integrated filter
2. Have a formed outer jacket of perforated high density polyethylene (HDPE) or polyethylene terephthalate (PET)
3. Have a flattened tubular shaped cross section
4. Be made from virgin or recycled materials
5. Be free from biodegradable filler materials that degrade the physical or chemical characteristics of the finished filter core or outer jacket
6. Have a length of at least 4 feet per unit
7. Have the ability to interlock separate units into a longer barrier so that water does not flow between the units
8. Be secured to:
  - 8.1 Pavement with 1-inch concrete nails with 1-inch washers and solvent-free adhesive, with gravel-filled bags, or a combination
  - 8.2 Soil with 6-inch nails with 1-inch washers and wood stakes
9. Comply with the following properties:

| Specification   | Requirements         |
|---|----------------------|
| Grab tensile strength of outer jacket material, pounds/square inch, min. in each direction<br>ASTM D 4632*  | 4000                 |
| Break strength of outer jacket, pounds/square inch<br>ASTM D 4632*  | 1300                 |
| Permittivity of filter core, l/sec., min.<br>ASTM D 4491  | 0.38                 |
| Flow rate of filter core, gallons per minute per square foot,<br>ASTM D 4491  | 100 min.<br>200 max. |
| Filter core aperture size, max., Average Opening Size (AOS), microns  | 425                  |
| Ultraviolet stability (outer jacket & filter core), percent tensile strength retained after 500 hours, min.<br>ASTM D 4355 (xenon-arc lamp and water spray weathering method) | 90                   |

\* or appropriate test method for specific polymer

If used at a curb inlet without a grate, rigid plastic barriers must:

1. Have a horizontal flap of at least 6 inches with an under-seal gasket to prevent underflows
2. Include a high-flow bypass
3. Have a vertical height of at least 7 inches after installation
4. Be sized to fit the catch basin or drainage inlet

If used at a grated catch basin without a curb inlet, rigid plastic barriers must:

1. Cover the grate by at least 2 inches on each side and have an under-seal gasket to prevent underflows
2. Include a high-flow bypass
3. Have a vertical height of at least 1.5 inches after installation
4. Be sized to fit the catch basin or drainage inlet

If used at a curb inlet with a grate, rigid plastic barriers must:

1. Have a horizontal flap that covers the grate by at least 2 inches on the 3 sides away from the curb opening and have an under-seal gasket to prevent underflows
2. Include a high-flow bypass
3. Have a vertical section that covers the curb opening by at least 5 inches after installation
4. Be sized to fit the catch basin or drainage inlet

If used as a linear sediment barrier, rigid plastic barriers:

1. Must have an installed height of at least 6 inches
2. May have a horizontal flap of at least 4 inches

#### **Linear Sediment Barrier**

Linear sediment barriers must consist of one or more of the following:

1. Silt fence
2. Gravel-filled bags
3. Fiber roll
4. Rigid plastic barrier
5. Foam barrier

#### **Flexible Sediment Barrier**

Flexible sediment barriers consist of one or more of the following:

1. Rigid plastic barrier
2. Foam barrier

### **CONSTRUCTION**

For drainage inlet protection at drainage inlets in paved and unpaved areas:

1. Prevent ponded runoff from encroaching on the traveled way or overtopping the curb or dike. Use linear sediment barriers to redirect runoff and control ponding.
2. Clear the area around each drainage inlet of obstructions including rocks, clods, and debris greater than one inch in diameter before installing the drainage inlet protection.
3. Install a linear sediment barrier up-slope of the existing drainage inlet and parallel with the curb, dike, or flow line to prevent sediment from entering the drainage inlet.

#### **Erosion Control Blanket**

To install erosion control blanket and geosynthetic fabric:

1. Secure blanket or fabric to the surface of the excavated sediment trap with staples and embed in a trench adjacent to the drainage inlet
2. Anchor the perimeter edge of the erosion control blanket in a trench

#### **Silt Fence**

If silt fence is used as a linear sediment barrier:

1. Place fence along the perimeter of the erosion control blanket, with the posts facing the drainage inlet

2. Install fence with the bottom edge of the silt fence fabric in a trench. Backfill the trench with soil and compact manually

### **Gravel Bag Berm**

If gravel bag berm is used as a linear sediment barrier:

1. Place gravel-filled bags end-to-end to eliminate gaps
2. Stack bags in a way that the bags in the top row overlap the joints in the lower row

If gravel bag berms are used for Type 3A and Type 3B:

1. Place gravel-filled bags end-to-end to eliminate gaps
2. Stack bags in a way that the bags in the top row overlap the joints in the lower row
3. Arrange bags to create a spillway by removing one or more gravel-filled bags from the upper layer

If used within shoulder area, place gravel-filled bags behind temporary railing (Type K).

### **Fiber Rolls**

If fiber rolls are used as a linear sediment barrier:

1. Place fiber rolls in a furrow.
2. Secure fiber rolls with stakes installed along the length of the fiber rolls. Stakes must be installed from 6 to 12 inches from the end of the rolls.

If fiber rolls are used as a linear sediment barrier for Type 4A, place them over the erosion control blanket.

### **Foam Barriers**

If foam barriers are used as a linear sediment barrier:

1. Install barriers with the horizontal flap in a 3 inch deep trench and secured with nails and washers placed no more than 4 feet apart
2. Secure barriers with 2 nails at the connection points where separate units overlap
3. Place barriers without nails or stakes piercing the core

### **Flexible Sediment Barriers**

If flexible sediment barriers are used:

1. Secure barriers to the pavement with nails and adhesive, gravel-filled bags, or a combination
2. Install barriers flush against the sides of concrete, asphalt concrete, or hot mix asphalt curbs or dikes
3. Place barriers to provide a tight joint with the curb or dike and anchored in a way that runoff cannot flow behind the barrier

If flexible sediment barriers are used for Type 4B:

1. Secure barriers to the pavement according to the angle and spacing shown on the plans
2. Place barriers to provide a tight joint with the curb or dike. Cut the cover fabric or jacket to ensure a tight fit

### **Rigid Sediment Barriers**

If rigid sediment barriers are used at a grated catch basin without a curb inlet:

1. Place barriers using the gasket to prevent runoff from flowing under the barrier
2. Secure barriers to the pavement with nails and adhesive, gravel-filled bags, or a combination

If rigid sediment barriers are used for linear sediment barriers:

1. Install barriers in a trench. Backfill the trench with soil and compact manually
2. Place barrier with separate units overlapping at least 4 inches

3. Reinforce barriers with a wood stake at each overlap
4. Fasten barriers to the wood stakes with steel screws, 16 gauge galvanized steel wire, or with UV stabilized cable ties that are from 5 to 7 inches in length

### **Sediment Filter Bags**

Install sediment filter bags for Type 5 by:

1. Removing the drainage inlet grate
2. Placing the sediment bag in the opening
3. Replacing the grate to secure the sediment filter bag in place

### **MAINTENANCE**

Maintain temporary drainage inlet protection to provide sediment holding capacity and to reduce runoff velocities.

Remove sediment deposits, trash, and debris from temporary drainage inlet protection as needed or when directed by the Engineer. If removed sediment is deposited within project limits, it must be stabilized and not subject to erosion by wind or water. Trash and debris must be removed and disposed of as specified in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Maintain temporary drainage inlet protection by removing sediment from:

1. Behind flexible sediment barriers when sediment exceeds 1 inch in depth
2. Surface of the erosion control blanket when sediment exceeds 1 inch in depth
3. Sediment trap for Type 2 when the volume has been reduced by approximately one-half
4. Behind silt fence when the sediment is 1/3 the height of the silt fence fabric above ground
5. Sediment filter bags when filled or when the restraint cords are no longer visible

If rills and other evidence of concentrated runoff occur beneath the linear sediment barrier, repair or adjust the barrier.

If silt fence fabric becomes split, torn, or unraveled, repair or replace silt fence.

If geosynthetic fabric becomes split, torn, or unraveled, repair or replace foam barriers.

Repair or replace sagging or slumping linear sediment barriers with additional stakes. Replace broken or split wood stakes.

Reattach foam barriers and rigid plastic barriers that become detached or dislodged from the pavement.

Repair split or torn rigid plastic barriers with 16 gauge galvanized steel wire or UV stabilized cable ties that are from 5 to 7 inches in length.

For sediment filter bags without metal frames, empty by placing one inch steel reinforcing bars through the lifting loops and then lift the filled bag from the drainage inlet. For sediment filter bags with metal frames, empty by lifting the metal frame from the drainage inlet. Rinse before replacing in the drainage inlet. When rinsing the sediment filter bags, do not allow the rinse water to enter a drain inlet or waterway.

Repair temporary drainage inlet protection within 24 hours of discovering damage unless the Engineer approves a longer period.

If your vehicles, equipment, or activities disturb or displace temporary drainage inlet protection, repair temporary drainage inlet protection at your expense.

The Department does not pay maintenance costs for cleanup, repair, removal, disposal, or replacement due to improper installation or your negligence.

### **REMOVAL**

When the Engineer determines that the temporary drainage inlet protection is not required, it must be removed and disposed of under Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Ground disturbance, including holes and depressions, caused by the installation and removal of the temporary drainage inlet protection must be backfilled and repaired under Section 15-1.02, "Preservation of Property," of the Standard Specifications.

### **MEASUREMENT AND PAYMENT**

Quantities of temporary drainage inlet protection will be determined from actual count in place. The protection will be measured one time only and no additional measurement will be recognized.

The contract unit price paid for temporary drainage inlet protection includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the temporary drainage inlet protection, complete in place, including removal of materials, cleanup and disposal of retained sediment and debris, and

backfilling and repairing holes, depressions and other ground disturbance, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

No additional compensation will be made if the temporary drainage inlet protection is relocated during the course of construction.

The State and you share the cost of maintaining the temporary drainage inlet protection. The State determines the maintenance cost under Section 9-1.03, "Force Account Payment," of the Standard Specifications and pays you one-half of that cost.

### 10-1.11 SCAFFOLDING

Scaffolding shall be defined in accordance with and shall conform to the Construction Safety Orders of the Division of Occupational Safety and Health and these special provisions.

If scaffolding is constructed for this project over or adjacent to traffic, or suspended from the traveled way, the Contractor shall submit to the Engineer working drawings for scaffolding systems in conformance with Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, and these special provisions.

Scaffolding working drawings shall include the following:

- A. Descriptions, calculations, and values for all loads anticipated during the erection, use, and removal of scaffolding.
- B. Methods and equipment for erecting, moving, and removing scaffolding.
- C. Design details including bolt layouts, welding details, and any connections to existing structures.
- D. Stress sheets including a summary of computed stresses in the (1) scaffolding, (2) connections between scaffolding and any existing structures, and (3) existing load supporting members. The computed stresses shall include the effects of erection, movement, and removal of the scaffolding.

If manufactured scaffolding is used, the manufacturer's name, address, and phone number shall be shown on the working drawings.

The working drawings shall be stamped and signed by an engineer who is registered as a Civil Engineer. In addition, prior to submitting the working drawings to the Engineer, the working drawings shall be stamped and signed by an independent reviewer who is registered as a Civil Engineer in the State of California. The independent reviewer shall not be employed by the same entity preparing the working drawings.

The Contractor shall allow 7 days for the review of a complete submittal for scaffolding working drawings. 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.

Welding for the manufacturing and erection of scaffolding shall conform to the requirements in AWS D1.1 or AWS D1.2 for steel or aluminum construction respectively.

Full compensation for conforming to the above requirements shall be considered as included in the contract prices paid for the various contract items of work, and no additional compensation will be allowed therefor.

### 10-1.12 COOPERATION

It is anticipated that work by another contractor may be in progress adjacent to or within the limits of this project during progress of the work on this contract. The following table lists contracts anticipated to be in progress during this contract.

| Contract No. | Co-Rte-PM         | Location  | Type of Work                  |
|--------------|-------------------|-----------|-------------------------------|
| 02-1E9704    | TEH-5-R24.3/R25.4 | Red Bluff | SB ON & OFF Ramp Construction |

Comply with Section 7-1.14, "Cooperation," of the Standard Specifications.

### 10-1.13 PROGRESS SCHEDULE (CRITICAL PATH METHOD)

#### GENERAL

##### Summary

Critical path method (CPM) progress schedules are required for this project. Whenever the term "schedule" is used in this section, it means CPM progress schedule.

The provisions in Section 8-1.04, "Progress Schedule," of the Standard Specifications do not apply.

## Definitions

The following definitions apply to this section:

**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.

**baseline schedule:** The initial schedule showing the original work plan beginning on the date of contract approval. This schedule shows no completed work to date and no negative float or negative lag to any activity.

**contract completion date:** The current extended date for completion of the contract shown on the weekly statement of working days furnished by the Engineer as specified in Section 8-1.06, "Time of Completion," of the Standard Specifications.

**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.

**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.

**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."

**early completion time:** The difference in time between an early scheduled completion date and the contract completion date.

**float:** The difference between the earliest and latest allowable start or finish times for an activity.

**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.

**narrative report:** A document submitted with each schedule that discusses topics related to project progress and scheduling.

**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.

**scheduled completion date:** The planned project finish date shown on the current accepted schedule.

**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.

**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.

**time-scaled network diagram:** A graphic depiction of a CPM schedule comprised of activity bars with relationships for each activity represented by arrows. The tail of each arrow connects to the activity bar for the predecessor and points to the successor.

**total float:** The amount of time that an activity or chain of activities can be delayed before extending the scheduled completion date.

**updated schedule:** A current schedule developed from the baseline or subsequent schedule through regular monthly review to incorporate as-built progress and any planned changes.

## Submittals

### General Requirements

Submit to the Engineer baseline, monthly updated, and final updated schedules, each consistent in all respects with the time and order of work requirements of the contract. Work must be executed in the sequence indicated on the current accepted schedule.

Schedules must show the order in which you propose to prosecute the work with logical links between time-scaled work activities and calculations made using the critical path method to determine the controlling activities. You are responsible for assuring that all activity sequences are logical and that each schedule shows a coordinated plan for complete performance of the work.

Produce schedules using computer software and submit compatible software for the Engineer's exclusive possession and use. Submit network diagrams and schedule data as parts of each schedule submittal.

Schedule activities must include the following:

1. Project characteristics, salient features, or interfaces, including those with outside entities, that could affect time of completion
2. Project start date, scheduled completion date, and other milestones
3. Work performed by you, your subcontractors, and suppliers
4. Submittal development, delivery, review, and approval, including those from you, your subcontractors, and suppliers
5. Procurement, delivery, installation, and testing of materials, plants, and equipment

6. Testing and settlement periods
7. Utility notification and relocation
8. Erection and removal of falsework and shoring
9. Major traffic stage switches
10. Finishing roadway and final cleanup
11. State-owned float as the predecessor activity to the scheduled completion date

Schedules must have not less than 50 and not more than 500 activities, unless otherwise authorized by the Engineer. The number of activities must 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 must include the following:

1. A clear and legible description.
2. Start and finish dates.
3. 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.
4. At least one predecessor and one successor activity, except for project start and finish milestones.
5. Required constraints. Constraints other than those required by the special provisions may be included only if authorized by the Engineer.
6. Codes for responsibility, stage, work shifts, location, and contract pay item numbers.

You may show early completion time on any schedule provided that the requirements of the contract are met. Early completion time is considered a resource for your exclusive use. You 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. You may also submit for approval a cost reduction incentive proposal as specified in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications that will reduce time of construction.

You may show a scheduled completion date that is later than the contract completion date on an update schedule, after the baseline schedule is accepted. Provide an explanation for a late scheduled completion date in the narrative report that is included with the schedule.

State-owned float is 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. Prepare a time impact analysis, when requested by the Engineer, to determine the effect of the action as specified in "Time Impact Analysis." The Engineer documents State-owned float by directing you to update the State-owned float activity on the next updated schedule. 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 as specified in Section 4-1.03, "Changes," of the Standard Specifications. Prepare a time impact analysis to determine the effect of the change as specified in "Time Impact Analysis" and include the impacts acceptable to the Engineer in the next updated 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 does not waive any contract requirements and does not relieve you of any obligation or responsibility for submitting complete and accurate information. Correct rejected schedules and resubmit corrected schedules to the Engineer within 7 days of notification by the Engineer, at which time a new review period of 7 days will begin.

Errors or omissions on schedules do not relieve you 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 you or the Engineer discover that any aspect of the schedule has an error or omission, you must correct it on the next updated schedule.

### **Computer Software**

Submit to the Engineer for review a description of proposed schedule software to be used. After the Engineer accepts the proposed software, submit schedule software and all original software instruction manuals. All software must be compatible with the current version of the Windows operating system in use by the Engineer. The schedule software must include:

1. Latest version of Primavera SureTrak Project Manager for Windows, or equivalent

2. Latest version of schedule-comparing HST SureChange, or equivalent

If a schedule software equivalent to SureTrak is proposed, it must be capable of generating files that can be imported into SureTrak. The schedule-comparing software must be compatible with schedule software submitted and must be able to compare two schedules and provide reports of changes in activity ID, activity description, constraints, calendar assignments, durations, and logic ties.

The schedule software and schedule-comparing software will be returned to you before the final estimate. The Department will compensate you as specified in Section 4-1.03, "Extra Work," of the Standard Specifications for replacement of software or manuals damaged, lost, or stolen after delivery to the Engineer.

Instruct the Engineer in the use of the software and provide software support until the contract is accepted. Within 15 days of contract approval, 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 you 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 schedule software other than SureTrak is submitted, then the training session must be a total of 16-hours for each Department employee.

### **Network Diagrams, Reports, and Data**

Include the following with each schedule submittal:

1. Two sets of originally plotted, time-scaled network diagrams
2. Two copies of a narrative report
3. One read-only compact disk or floppy diskette containing the schedule data

The time-scaled network diagrams must conform to the following:

1. Show a continuous flow of information from left to right
2. Be based on early start and early finish dates of activities
3. Clearly show the primary paths of criticality using graphical presentation
4. Be prepared on 34" x 44"
5. Include a title block and a timeline on each page

The narrative report must be organized in the following sequence with all applicable documents included:

1. Transmittal letter
2. Work completed during the period
3. 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
4. Description of the current critical path
5. Changes to the critical path and scheduled completion date since the last schedule submittal
6. Description of problem areas
7. Current and anticipated delays:
  - 7.1. Cause of delay
  - 7.2. Impact of delay on other activities, milestones, and completion dates
  - 7.3. Corrective action and schedule adjustments to correct the delay
8. Pending items and status thereof:
  - 8.1. Permits
  - 8.2. Change orders
  - 8.3. Time adjustments
  - 8.4. Noncompliance notices
9. Reasons for an early or late scheduled completion date in comparison to the contract completion date

Schedule submittals will only be considered complete when all documents and data have been submitted as described above.

### **Preconstruction Scheduling Conference**

Schedule a preconstruction scheduling conference with your project manager and the Engineer within 15 days after contract approval. The Engineer will conduct the meeting and review the requirements of this section with you.

Submit a general time-scaled logic diagram displaying the major activities and sequence of planned operations and be prepared to discuss the proposed work plan and schedule methodology that comply with the requirements of this section. If you propose deviations to the construction staging, then the general time-scaled logic diagram must also display the deviations and resulting time impacts. Be prepared to discuss the proposal.

At this meeting, also submit the alphanumeric coding structure and activity identification system for labeling work activities. To easily identify relationships, each activity description must 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 reviews the logic diagram, coding structure, and activity identification system, and provide any required baseline schedule changes to you for implementation.

### **Baseline Schedule**

Beginning the week following the preconstruction scheduling conference, meet with the Engineer weekly to discuss schedule development and resolve schedule issues until the baseline schedule is accepted.

Submit to the Engineer a baseline schedule within 20 days of approval of the contract. Allow 20 days for the Engineer's review after the baseline schedule and all support data are submitted. In addition, the baseline schedule submittal is not considered complete until the computer software is delivered and installed for use in review of the schedule.

The baseline schedule must include the entire scope of work and how you plan to complete all work contemplated. The baseline schedule must show the activities that define the critical path. Multiple critical paths and near-critical paths must be kept to a minimum. A total of not more than 50 percent of the baseline schedule activities must be critical or near critical, unless otherwise authorized by the Engineer.

The baseline schedule must not extend beyond the number of contract working days. The baseline schedule must have a data date of contract approval. If you start work before contract approval, the baseline schedule must have a data date of the 1st day you performed work at the job site.

If you submit an early completion baseline schedule that shows contract completion in less than 85 percent of the contract working days, the baseline schedule must be supplemented with resource allocations for every task activity and include time-scaled resource histograms. The resource allocations must be shown to a level of detail that facilitates report generation based on labor crafts and equipment classes for you and your subcontractors. Use average composite crews to display the labor loading of on-site construction activities. 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 must show labor crafts and equipment classes to be used. The Engineer may review the baseline schedule activity resource allocations using Means Productivity Standards or equivalent to determine if the schedule is practicable.

### **Updated Schedule**

Submit an updated schedule and meet with the Engineer to review contract progress, on or before the 1st day of each month, beginning one month after the baseline schedule is accepted. Allow 15 days for the Engineer's review after the updated schedule and all support data are submitted, except that the review period will not start until the previous month's required schedule is accepted. Updated schedules that are not accepted or rejected within the review period are considered accepted by the Engineer.

The updated schedule must have a data date of the 21st day of the month or other date established by the Engineer. The updated schedule must 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 must be shown as applicable. Durations for work that has been completed must be shown on the updated schedule as the work actually occurred, including Engineer submittal review and your resubmittal times.

You 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. Justify 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 submit a time impact analysis as specified in this section.

### **Time Impact Analysis**

Submit a written time impact analysis (TIA) to the Engineer with each request for adjustment of contract time, or when you or the Engineer considers that an approved or anticipated change may impact the critical path or contract progress.

The TIA must illustrate the impacts of each change or delay on the current scheduled completion date or internal milestone, as appropriate. The analysis must use the accepted schedule that has a data date closest to and before the event. If the Engineer determines that the accepted schedule used does not appropriately represent the conditions before the event, the accepted schedule must be updated to the day before the event being analyzed. The TIA must 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 must be equal to the adjustment of contract time. The Engineer may construct and use an appropriate project schedule or other recognized method to determine adjustments in contract time until you provide the TIA.

Submit 2 copies of your TIA within 20 days of receiving a written request for a TIA from the Engineer. Allow the Engineer 15 days after receipt to review the submitted TIA. All approved TIA schedule changes must be shown on the next updated schedule.

If a TIA you submit is rejected, meet with the Engineer to discuss and resolve issues related to the TIA. If agreement is not reached, you are allowed 15 days from the meeting with the Engineer to give notice as specified in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications. Only show actual as-built work, not unapproved changes related to the TIA, in subsequent updated schedules. If agreement is reached at a later date, approved TIA schedule changes must be shown on the next updated schedule. The Engineer withholds remaining payment on the schedule contract item if a TIA is requested and not submitted within 20 days. The schedule item payment resumes on the next estimate after the requested TIA is submitted. No other contract payment is withheld regarding TIA submittals.

### **Final Updated Schedule**

Submit a final update, as-built schedule with actual start and finish dates for the activities, within 30 days after completion of contract work. Provide a written certificate with this submittal signed by your project manager or 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.

### **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) includes 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:

1. 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:
  - 1.1. Completion of 5 percent of all contract item work.
  - 1.2. Acceptance of all schedules and approval of all TIAs required to the time when 5 percent of all contract item work is complete.
  - 1.3. Delivery of schedule software to the Engineer.
  - 1.4. Completion of required schedule software training.
2. 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 approval of all TIAs required to the time when 25 percent of all contract item work is complete.
3. 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 approval of all TIAs required to the time when 50 percent of all contract item work is complete.
4. 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 approval of all TIAs required to the time when all contract item work is complete, and submittal of the certified final update schedule.

If you fail to complete any of the work or provide any of the schedules required by this section, the Engineer makes an adjustment in compensation as specified 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 submitting schedules.

#### **10-1.14 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 an accepted VECP under Section 4-1.035B, "Value Engineering Change Proposal," 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 verified Bid Item List, 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 verified Bid Item List, 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 verified Bid Item List 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.

A delay to the controlling operation may be concurrent and any of the following:

- 1. Nonexcusable: A nonexcusable delay is caused by the fault, nonperformance, or deficiency of the Contractor, subcontractors of any tier, or suppliers. No extension of contract time or additional compensation of loss is allowed.
- 2. Excusable: An excusable delay is caused by factors beyond the control and without the fault of the State or the Contractor. Only an extension of contract time is allowed.
- 3. Compensable: A compensable delay is caused solely by the fault, deficiency, error, or omission of the State. An extension of contract time and compensation for the actual cost without markup or profit are allowed.

A concurrent delay occurs when 2 separate delays overlap partially or entirely. A nonexcusable delay concurrent with either an excusable or a compensable delay is a nonexcusable delay. An excusable delay concurrent with a compensable delay is an excusable delay.

The quantity of time-related overhead is only adjusted as a result of a compensable delay and is not adjusted as a result of either a nonexcusable or an excusable delay.

An approved time impact analysis submitted as specified in "Progress Schedule (Critical Path Method)" of these special provisions is used to determine the type and duration of a delay.

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.

#### **10-1.15 SMALL BUSINESS UTILIZATION REPORT**

Submit a completed Small Business Utilization Report form on or before the following dates for the prior reporting period:

1. January 15th
2. April 15th
3. July 15th
4. October 15th

Submit a completed final Small Business Utilization Report form within 30 days after contract acceptance.

The Department pays \$250 for each report submitted. The contract unit price paid for small business utilization report includes full compensation for doing all the work involved in submitting the completed Small Business Utilization Report form. If you fail to submit a completed form by the specified time, you will not receive payment for that report.

The Department does not adjust payment for an increase or decrease in the quantity of small business utilization reports submitted. Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications does not apply.

The work to complete the final Small Business Utilization Report contract item is excluded from Section 7-1.17, "Acceptance of Contract," of the Standard Specifications.

Failure to submit the Small Business Utilization Report is not considered a performance failure. Section 9-1.053, "Performance Failure Withholds," of the Standard Specifications does not apply.

#### **10-1.16 CONSTRUCTION AREA TRAFFIC CONTROL DEVICES**

Flagging, signs, and temporary 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 temporary traffic control devices are defined as small and lightweight (less than 100 pounds) devices. These devices shall be certified as crashworthy by crash testing, crash testing of similar devices, or years of demonstrable safe performance. Category 1 temporary 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 temporary traffic control devices at least 5 days before beginning any work using the devices or within 2 days after the request if the devices are already in use. Self-certification shall be provided by the manufacturer or Contractor and shall include the following:

- A. Date,
- B. Federal Aid number (if applicable),
- C. Contract number, district, county, route and post mile of project limits,
- D. Company name of certifying vendor, street address, city, state and zip code,
- E. Printed name, signature and title of certifying person; and
- F. Category 1 temporary traffic control devices that will be used on the project.

The Contractor may obtain a standard form for self-certification from the Engineer.

Category 2 temporary traffic control devices are defined as small and lightweight (less than 100 pounds) devices that are not expected to produce significant vehicular velocity change, but may cause potential harm to impacting vehicles. Category 2 temporary traffic control devices include barricades and portable sign supports.

Category 2 temporary traffic control devices shall be on the Federal Highway Administration's (FHWA) list of Acceptable Crashworthy Category 2 Hardware for Work Zones. This list is maintained by FHWA and can be located at:

[http://safety.fhwa.dot.gov/roadway\\_dept/road\\_hardware/listing.cfm?code=workzone](http://safety.fhwa.dot.gov/roadway_dept/road_hardware/listing.cfm?code=workzone)

The Department also maintains this list at:

<http://www.dot.ca.gov/hq/traffops/signtech/signdel/pdf/Category2.pdf>

Category 2 temporary traffic control devices that have not received FHWA acceptance shall not be used. Category 2 temporary traffic control devices in use that have received FHWA acceptance shall be labeled with the FHWA acceptance letter number and the name of the manufacturer. The label shall be readable and permanently affixed by the manufacturer. Category 2 temporary traffic control devices without a label shall not be used.

If requested by the Engineer, the Contractor shall provide a written list of Category 2 temporary traffic control devices to be used on the project at least 5 days before beginning any work using the devices or within 2 days after the request if the devices are already in use.

Category 3 temporary traffic control devices consist of temporary traffic-handling equipment and devices that weigh 100 pounds or more and are expected to produce significant vehicular velocity change to impacting vehicles. Temporary traffic-handling equipment and devices include crash cushions, truck-mounted attenuators, temporary railing, temporary barrier, and end treatments for temporary railing and barrier.

Type III barricades may be used as sign supports if the barricades have been successfully crash tested, meeting the NCHRP Report 350 criteria, as one unit with a construction area sign attached.

Category 3 temporary traffic control devices shall be shown on the plans or on the Department's Highway Safety Features list. This list is maintained by the Division of Engineering Services and can be found at:

[http://www.dot.ca.gov/hq/esc/approved\\_products\\_list/HighwaySafe.htm](http://www.dot.ca.gov/hq/esc/approved_products_list/HighwaySafe.htm)

Category 3 temporary traffic control devices that are not shown on the plans or not listed on the Department's Highway Safety Features list shall not be used.

Full compensation for providing self-certification for crashworthiness of Category 1 temporary traffic control devices and for providing a list of Category 2 temporary traffic control devices used on the project shall be considered as included in the prices paid for the various items of work requiring the use of the Category 1 or Category 2 temporary traffic control devices and no additional compensation will be allowed therefor.

### **10-1.17 CONSTRUCTION AREA SIGNS**

Construction area signs for temporary traffic control 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 "Furnish Sign" of these special provisions.

Attention is directed to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. Type II retroreflective sheeting shall not be used on construction area sign panels. Type III, IV, 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.

The Contractor shall furnish and install two 10-ft by 9-ft American Reinvestment and Recovery Act (ARRA) signs at locations designated by the Engineer before starting major construction activities visible to highway users. Upon completion of the project, the Contractor shall remove and dispose of ARRA signs. Manufacturing details for ARRA signs are available at:

<http://www.dot.ca.gov/hq/traffops/signtech/signdel/bondfundspecs.htm>

Unless otherwise shown on the plans or specified in these special provisions, the color of construction area warning and guide signs shall have black legend and border on orange background, except W10-1 or W47(CA) (Highway-Rail Grade Crossing Advance Warning) sign shall have black legend and border on yellow background.

Orange background on construction area signs shall be fluorescent orange.

Repair to construction area sign panels will not be allowed, except when approved by the Engineer. At nighttime under vehicular headlight illumination, sign panels that exhibit irregular luminance, shadowing or dark blotches shall be immediately replaced at the Contractor's expense.

The Contractor shall notify the appropriate regional notification center for operators of subsurface installations at least 2 business days, but not more than 14 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 | 811              |

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 4 inches greater than the longer dimension of the post cross section.

Construction area signs placed within 15 feet 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 shall maintain accurate information on construction area signs. Signs that are no longer required shall be immediately covered or removed. Signs that convey inaccurate information shall be immediately replaced or the information shall be corrected. Covers shall be replaced when they no longer cover the signs properly. The Contractor shall immediately restore to the original position and location any sign that is displaced or overturned, from any cause, during the progress of work.

#### **PAYMENT**

Full compensation for furnishing and installing ARRA signs, including removal and disposal upon project completion, is included in the contract lump sum price paid for Construction Area Signs, and no separate payment will be allowed therefor.

#### **10-1.18 MAINTAINING TRAFFIC**

Maintaining traffic shall conform to the provisions in Sections 7-1.08, "Public Convenience," Section 7-1.09, "Public Safety," and Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications, "Public Safety" of these special provisions and these special provisions.

Closure is defined as the closure of a traffic lane or lanes, including shoulder, or ramp lane, within a single traffic control system.

Closures shall conform to the provisions in "Traffic Control System for Lane Closure" of these special provisions.

Closures are only allowed during the hours shown in the lane requirement charts included in this section "Maintaining Traffic," except for work required under Sections 7-1.08, "Public Convenience," and Section 7-1.09, "Public Safety."

For the Riverside Avenue OC only, the full width of the traveled way shall be open for use by public traffic on Saturdays, Sundays, Special Days, designated legal holidays as shown in the table "Lane Closure Restriction for Designated Legal Holidays and Special Days" included in this section "Maintaining Traffic," after 3:00 p.m. on Fridays and when construction operations are not actively in progress.

For Riverside Avenue OC, under one-way reversing traffic control operations, public traffic may be stopped in one direction for periods not to exceed 4 minutes. After each stoppage, all accumulated traffic for that direction shall pass through the work before another stoppage is made. The Contractor shall conduct operations so that the delay to public traffic does not exceed 5 minutes.

Delay is defined as the difference between the time it takes traffic to travel through the project when no work is in progress, at the posted speed limit, and the time it takes traffic to travel through the project when the Contractor's operations are in progress.

C43(CA) (FRESH CONCRETE) sign shall be used at the beginning of the pavement slab replacement work area. The sign shall be in place during the entire curing period.

SC6-3(CA) (RAMP CLOSED) sign shall be used to inform motorists of the temporary closing of a connector, entrance ramp or exit ramp for one business day.

SC6-4(CA) (RAMP CLOSED) sign shall be used to inform motorists of the temporary closing of a connector, entrance ramp or exit ramp for more than one business day.

The SC6-3(CA) or SC6-4(CA) signs shall be installed at least 7 days before closing the connector or ramp, but not more than 14 days before the connector or ramp closure. The Contractor shall notify the Engineer at least 2 business days before installing the SC6-3(CA) or SC6-4(CA) signs. The SC6-3(CA) or SC6-4(CA) signs shall be placed at locations shown on the plans and as directed by the Engineer.

Accurate information shall be maintained on the SC6-3(CA) or SC6-4(CA) signs. The SC6-3(CA) or SC6-4(CA) signs, when no longer required, shall be immediately covered or removed.

Personal vehicles of the Contractor's employees shall not be parked on the traveled way or shoulders including sections closed to public traffic.

When work vehicles or equipment are parked within 6 feet of a traffic lane, the shoulder area shall be closed as shown on the plans.

For Riverside Avenue OC only, a minimum of one paved traffic lane, not less than 12 feet wide, shall be open for use by public traffic.

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 as follows:

| Event                                     | Date (to be confirmed by the Engineer)           |
|---|--|
| Round-Up Parade                           | 3rd Saturday in April                            |
| Annual Red Bluff River Car Show           | 3 <sup>rd</sup> Sunday in May                    |
| Streets of Fire Drag Boat Show & Shine    | 4 <sup>th</sup> Friday Night in May              |
| Nitro National Drag Boat Festival         | 4 <sup>th</sup> Weekend in May                   |
| Red Bluff Art & Wine Festival             | 2 <sup>nd</sup> Saturday in June                 |
| Red Bluff Fireworks                       | July 4 <sup>th</sup>                             |
| California Extreme Summer Cross Nationals | 1 <sup>st</sup> Friday through Sunday in August  |
| Tehama District Fair                      | Last Thursday through Sunday in September        |
| West Coast Monster Truck Nationals        | 1 <sup>st</sup> Friday through Sunday in October |

Full compensation for furnishing, erecting, maintaining, and removing and disposing of the C43(CA), SC6-3(CA), SC6-4(CA), W20-1, W21-5b, and C24(CA) 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.

| Lane Closure Restriction for Designated Legal Holidays and Special Days |                                     |                 |                 |                 |                 |                 |                 |     |     |     |
|---|-------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----|-----|-----|
| Thu   | Fri                                 | Sat             | Sun             | Mon             | Tues            | Wed             | Thu             | Fri | Sat | Sun |
| xx  | <b>H</b><br>xx                      | xx              | xx              |                 |                 |                 |                 |     |     |     |
|   | <b>SD</b><br>x                      | xx              | xx              |                 |                 |                 |                 |     |     |     |
| xx  | xx                                  | <b>H</b><br>xx  | xx              |                 |                 |                 |                 |     |     |     |
|   | x                                   | <b>SD</b><br>xx | xx              |                 |                 |                 |                 |     |     |     |
| x   | xx                                  | xx              | <b>H</b><br>xx  | xx              |                 |                 |                 |     |     |     |
|   |                                     | xx              | <b>SD</b><br>xx |                 |                 |                 |                 |     |     |     |
|   | xx                                  | xx              | xx              | <b>H</b><br>xx  | xx              |                 |                 |     |     |     |
|   | x                                   | xx              | xx              | <b>SD</b><br>xx |                 |                 |                 |     |     |     |
|   |                                     |                 |                 | x               | <b>H</b><br>xx  |                 |                 |     |     |     |
|   |                                     |                 |                 | x               | <b>SD</b><br>xx |                 |                 |     |     |     |
|   |                                     |                 |                 |                 | x               | <b>H</b><br>xx  |                 |     |     |     |
|   |                                     |                 |                 |                 |                 | <b>SD</b><br>xx |                 |     |     |     |
|   |                                     |                 |                 |                 |                 | xx              | <b>H</b><br>xx  | xx  | xx  | xx  |
|   |                                     |                 |                 |                 |                 |                 | <b>SD</b><br>xx | xx  | xx  | xx  |
| Legends:  |                                     |                 |                 |                 |                 |                 |                 |     |     |     |
|   | Refer to lane closure charts        |                 |                 |                 |                 |                 |                 |     |     |     |
| x   | No closures are allowed after 3 pm. |                 |                 |                 |                 |                 |                 |     |     |     |
| xx  | No closures are allowed.            |                 |                 |                 |                 |                 |                 |     |     |     |
| <b>H</b>  | Designated Legal Holiday            |                 |                 |                 |                 |                 |                 |     |     |     |
| <b>SD</b>   | Special Day                         |                 |                 |                 |                 |                 |                 |     |     |     |

**Chart No. 1  
Freeway Lane Requirements  
September 1 through May 31**

|  |                             |                    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|--|-----------------------------|--------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| County: TEHAMA   | Route/Direction: Route 5/NB | PM: R22.2 to R24.5 |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Closure Limits: Beginning of Project to So Main Street OC (3-lane Segment) |                             |                    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FROM HOUR TO HOUR  | 24                          | 1                  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Mondays through Wednesdays   | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Thursdays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1  | 1  | 1  | T  | T  | T  | T  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Fridays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1  | 1  | T  | T  | T  | 2  | 2  | 2  | 2  | 1  | 1  | 1  | 1  | 1  | 1  |
| Saturdays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1  | 1  | T  | T  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Sundays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1  | 1  | 1  | T  | T  | T  | T  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |

Legend:

- |   |  |
|---|--|
| 1 | Provide at least one through freeway lane not less than 12 ft wide plus the contiguous paved shoulder open in direction of travel.   |
| 2 | Provide at least two adjacent through freeway lanes not less than 12 ft wide each plus the contiguous paved shoulder open in direction of travel.  |
| T | Provide at least one through freeway lane not less than 12 ft wide plus the contiguous paved shoulder open in the direction of travel. Traffic control surveillance shall be provided (see remarks). |

REMARKS:

- This chart applies to Std Plan T-10 lane closures only.
- The maximum length of a lane closure that reduces traffic to a single lane shall be 2.0 miles.
- Only one closure in each direction of travel is allowed at any one time.
- See "Lane Closure Restriction for Designated Legal Holidays and Special Days" table in "Maintaining Traffic" of these special provisions for additional closure restrictions.
- Shoulder closures allowed at any time except designated legal holidays and Special Days.
- Traffic control surveillance shall be provided until traffic is moving at a free flow condition (traffic backup has dissipated), which can be as many as 2 hours past the times "T" are shown on the chart.
- When any operations require lane closures between PM R22.2 and R24.7, northbound or southbound, no more than two lanes shall be open for public traffic within the entire three-lane section (PM R22.2-R24.5).

**Chart No. 2  
Freeway Lane Requirements  
September 1 through May 31**

|  |                             |                    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|--|-----------------------------|--------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| County: TEHAMA   | Route/Direction: Route 5/SB | PM: R22.2 to R24.5 |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Closure Limits: Beginning of Project to So Main Street OC (3-lane Segment) |                             |                    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FROM HOUR TO HOUR  | 24                          | 1                  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Mondays through Wednesdays   | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Thursdays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1  | 1  | T  | T  | T  | T  | T  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Fridays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1  | 1  | T  | 2  | 2  | 2  | 2  | 2  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Saturdays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1  | 1  | 1  | 1  | 1  | T  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Sundays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1  | 1  | T  | T  | T  | 2  | 2  | 2  | 2  | 2  | 1  | 1  | 1  | 1  | 1  |

Legend:

- 1 Provide at least one through freeway lane not less than 12 ft wide plus the contiguous paved shoulder open in direction of travel.
- 2 Provide at least two adjacent through freeway lanes not less than 12 ft wide each plus the contiguous paved shoulder open in direction of travel.
- T Provide at least one through freeway lane not less than 12 ft wide plus the contiguous paved shoulder open in the direction of travel. Traffic control surveillance shall be provided (see remarks).

REMARKS:

- This chart applies to Std Plan T-10 lane closures only.
- The maximum length of a lane closure that reduces traffic to a single lane shall be 2.0 miles.
- Only one closure in each direction of travel is allowed at any one time.
- See "Lane Closure Restriction for Designated Legal Holidays and Special Days" table in "Maintaining Traffic" of these special provisions for additional closure restrictions.
- Shoulder closures allowed at any time except designated legal holidays and Special Days.
- Traffic control surveillance shall be provided until traffic is moving at a free flow condition (traffic backup has dissipated), which can be as many as 2 hours past the times "T" are shown on the chart.
- When any operations require lane closures between PM R22.2 and R24.7, northbound or southbound, no more than two lanes shall be open for public traffic within the entire three-lane section (PM R22.2-R24.5).

**Chart No. 3  
Freeway Lane Requirements  
June 1 through August 31**

|  |                             |                    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|--|-----------------------------|--------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| County: TEHAMA   | Route/Direction: Route 5/NB | PM: R22.2 to R24.5 |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Closure Limits: Beginning of Project to So Main Street OC (3-lane Segment) |                             |                    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FROM HOUR TO HOUR  | 24                          | 1                  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Mondays through Wednesdays   | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1  | T  | T  | T  | T  | T  | T  | T  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Thursdays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | T  | T  | T  | T  | 2  | 2  | 2  | 2  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Fridays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | T | T  | T  | 2  | 2  | 2  | 2  | 2  | T  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Saturdays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | T | T  | 2  | 2  | 2  | 2  | 2  | 2  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Sundays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1  | T  | T  | T  | T  | T  | T  | T  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |

Legend:

- 1 Provide at least one through freeway lane not less than 12 ft wide plus the contiguous paved shoulder open in direction of travel.
- 2 Provide at least two adjacent through freeway lanes not less than 12 ft wide each plus the contiguous paved shoulder open in direction of travel.
- T Provide at least one through freeway lane not less than 12 ft wide plus the contiguous paved shoulder open in the direction of travel. Traffic control surveillance shall be provided (see remarks).

REMARKS:

- This chart applies to Std Plan T-10 lane closures only.
- The maximum length of a lane closure that reduces traffic to a single lane shall be 2.0 miles.
- Only one closure in each direction of travel is allowed at any one time.
- See "Lane Closure Restriction for Designated Legal Holidays and Special Days" table in "Maintaining Traffic" of these special provisions for additional closure restrictions.
- Shoulder closures allowed at any time except designated legal holidays and Special Days.
- Traffic control surveillance shall be provided until traffic is moving at a free flow condition (traffic backup has dissipated), which can be as many as 2 hours past the times "T" are shown on the chart.
- When any operations require lane closures between PM R22.2 and R24.7, northbound or southbound, no more than two lanes shall be open for public traffic within the entire three-lane section (PM R22.2-R24.5).

**Chart No. 4  
Freeway Lane Requirements  
June 1 through August 31**

|  |                             |                    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|--|-----------------------------|--------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| County: TEHAMA   | Route/Direction: Route 5/SB | PM: R22.2 to R24.5 |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Closure Limits: Beginning of Project to So Main Street OC (3-lane Segment) |                             |                    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FROM HOUR TO HOUR  | 24                          | 1                  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Mondays through Thursdays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1  | T  | T  | T  | T  | 2  | 2  | 2  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Fridays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | T  | T  | T  | 2  | 2  | 2  | 2  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Saturdays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | T  | T  | T  | 2  | 2  | 2  | 2  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| Sundays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | T  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 1  | 1  | 1  | 1  | 1  | 1  |

Legend:

- 1 Provide at least one through freeway lane not less than 12 ft wide plus the contiguous paved shoulder open in direction of travel.
- 2 Provide at least two adjacent through freeway lanes not less than 12 ft wide each plus the contiguous paved shoulder open in direction of travel.
- T Provide at least one through freeway lane not less than 12 ft wide plus the contiguous paved shoulder open in the direction of travel. Traffic control surveillance shall be provided (see remarks).

REMARKS:

- This chart applies to Std Plan T-10 lane closures only.
- The maximum length of a lane closure that reduces traffic to a single lane shall be 2.0 miles.
- Only one closure in each direction of travel is allowed at any one time.
- See "Lane Closure Restriction for Designated Legal Holidays and Special Days" table in "Maintaining Traffic" of these special provisions for additional closure restrictions.
- Shoulder closures allowed at any time except designated legal holidays and Special Days.
- Traffic control surveillance shall be provided until traffic is moving at a free flow condition (traffic backup has dissipated), which can be as many as 2 hours past the times "T" are shown on the chart.
- When any operations require lane closures between PM R22.2 and R24.7, northbound or southbound, no more than two lanes shall be open for public traffic within the entire three-lane section (PM R22.2-R24.5).

**Chart No. 5  
Freeway Lane Requirements  
September 1 through May 31**

|  |                             |                    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|--|-----------------------------|--------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| County: TEHAMA   | Route/Direction: Route 5/NB | PM: R24.5 to R27.5 |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Closure Limits: So Main Street OC to Sacramento River Bridge 8-96 (2-lane Segment) |                             |                    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FROM HOUR TO HOUR  | 24                          | 1                  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Mondays through Wednesdays   | 1                           | 1                  | 1 | 1 | 1 | 1 | T | T | T |   |    |    |    |    |    |    |    |    |    | 1  | 1  | 1  | 1  | 1  | 1  |
| Thursdays and Fridays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | T | T | T |    |    |    |    |    |    |    |    |    |    | T  | 1  | 1  | 1  | 1  |
| Saturdays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |    |    |    |    |    |    |    |    |    | T  | 1  | 1  | 1  | 1  | 1  |
| Sundays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | T  |    |    |    |    |    |    |    |    |    | 1  | 1  | 1  | 1  | 1  |

Legend:

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| 1 |
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 Provide at least one through freeway lane not less than 12 ft wide plus the contiguous paved shoulder open in direction of travel.
- |   |
|---|
| T |
|---|

 Provide at least one through freeway lane not less than 12 ft wide plus the contiguous paved shoulder open in the direction of travel. Traffic control surveillance shall be provided (see remarks).
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 Work permitted within project right of way where lane closure is not required.

REMARKS:

- This chart applies to Std Plan T-10 lane closures only.
- The maximum length of a lane closure that reduces traffic to a single lane shall be 1.0 mile.
- Only one closure in each direction of travel is allowed at any one time.
- See "Lane Closure Restriction for Designated Legal Holidays and Special Days" table in "Maintaining Traffic" of these special provisions for additional closure restrictions.
- Shoulder closures allowed at any time except designated legal holidays and Special Days.
- Traffic control surveillance shall be provided until traffic is moving at a free flow condition (traffic backup has dissipated), which can be as many as 2 hours past the times "T" are shown on the chart.
- When any operations require lane closures between PM R22.2 and R24.7, northbound or southbound, no more than two lanes shall be open for public traffic within the entire three-lane section (PM R22.2-R24.5).

**Chart No. 6  
Freeway Lane Requirements  
September 1 through May 31**

|  |                             |                    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|--|-----------------------------|--------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| County: TEHAMA   | Route/Direction: Route 5/SB | PM: R24.5 to R27.5 |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Closure Limits: So Main Street OC to Sacramento River Bridge 8-96 (2-lane Segment) |                             |                    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FROM HOUR TO HOUR  | 24                          | 1                  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Mondays through Wednesdays   | 1                           | 1                  | 1 | 1 | 1 | 1 | T | T | T |   |    |    |    |    |    |    |    |    |    | T  | 1  | 1  | 1  | 1  | 1  |
| Thursdays and Fridays  | 1                           | 1                  | 1 | 1 | 1 | 1 | T | T | T | T |    |    |    |    |    |    |    |    |    |    | 1  | 1  | 1  | 1  | 1  |
| Saturdays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 |   |    |    |    |    |    |    |    |    |    |    | 1  | 1  | 1  | 1  | 1  |
| Sundays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | T  |    |    |    |    |    |    |    |    |    | T  | 1  | 1  | 1  | 1  |

Legend:

- |   |
|---|
| 1 |
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 Provide at least one through freeway lane not less than 12 ft wide plus the contiguous paved shoulder open in direction of travel.
- |   |
|---|
| T |
|---|

 Provide at least one through freeway lane not less than 12 ft wide plus the contiguous paved shoulder open in the direction of travel. Traffic control surveillance shall be provided (see remarks).
- |  |
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 Work permitted within project right of way where lane closure is not required.

REMARKS:

- This chart applies to Std Plan T-10 lane closures only.
- The maximum length of a lane closure that reduces traffic to a single lane shall be 1.0 mile.
- Only one closure in each direction of travel is allowed at any one time.
- See "Lane Closure Restriction for Designated Legal Holidays and Special Days" table in "Maintaining Traffic" of these special provisions for additional closure restrictions.
- Shoulder closures allowed at any time except designated legal holidays and Special Days.
- Traffic control surveillance shall be provided until traffic is moving at a free flow condition (traffic backup has dissipated), which can be as many as 2 hours past the times "T" are shown on the chart.
- When any operations require lane closures between PM R22.2 and R24.7, northbound or southbound, no more than two lanes shall be open for public traffic within the entire three-lane section (PM R22.2-R24.5).

**Chart No. 7  
Freeway Lane Requirements  
June 1 through August 31**

|  |                             |                    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|--|-----------------------------|--------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| County: TEHAMA   | Route/Direction: Route 5/NB | PM: R24.5 to R27.5 |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Closure Limits: So Main Street OC to Sacramento River Bridge 8-96 (2-lane Segment) |                             |                    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FROM HOUR TO HOUR  | 24                          | 1                  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Mondays through Wednesdays   | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | T | T |    |    |    |    |    |    |    |    |    | T  | 1  | 1  | 1  | 1  | 1  |
| Thursdays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | T | T | T  |    |    |    |    |    |    |    |    | T  | 1  | 1  | 1  | 1  | 1  |
| Fridays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | T | T |    |    |    |    |    |    |    |    |    |    |    | 1  | 1  | 1  | 1  |
| Saturdays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | T |    |    |    |    |    |    |    |    |    | T  | 1  | 1  | 1  | 1  | 1  |
| Sundays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | T  |    |    |    |    |    |    |    |    | 1  | 1  | 1  | 1  | 1  | 1  |

Legend:

- 1
 Provide at least one through freeway lane not less than 12 ft wide plus the contiguous paved shoulder open in direction of travel.
  
- T
 Provide at least one through freeway lane not less than 12 ft wide plus the contiguous paved shoulder open in the direction of travel. Traffic control surveillance shall be provided (see remarks).
  
- 
 Work permitted within project right of way where lane closure is not required.

REMARKS:

- This chart applies to Std Plan T-10 lane closures only.
- The maximum length of a lane closure that reduces traffic to a single lane shall be 1.0 mile.
- Only one closure in each direction of travel is allowed at any one time.
- See "Lane Closure Restriction for Designated Legal Holidays and Special Days" table in "Maintaining Traffic" of these special provisions for additional closure restrictions.
- Shoulder closures allowed at any time except designated legal holidays and Special Days.
- Traffic control surveillance shall be provided until traffic is moving at a free flow condition (traffic backup has dissipated), which can be as many as 2 hours past the times "T" are shown on the chart.
- When any operations require lane closures between PM R22.2 and R24.7, northbound or southbound, no more than two lanes shall be open for public traffic within the entire three-lane section (PM R22.2-R24.5).

**Chart No. 8  
Freeway Lane Requirements  
June 1 through August 31**

|  |                             |                    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|--|-----------------------------|--------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| County: TEHAMA   | Route/Direction: Route 5/SB | PM: R24.5 to R27.5 |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Closure Limits: So Main Street OC to Sacramento River Bridge 8-96 (2-lane Segment) |                             |                    |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FROM HOUR TO HOUR  | 24                          | 1                  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Mondays through Thursdays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | T | T | T |    |    |    |    |    |    |    |    |    | T  | 1  | 1  | 1  | 1  | 1  |
| Fridays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | T | T | T |    |    |    |    |    |    |    |    |    |    | 1  | 1  | 1  | 1  | 1  |
| Saturdays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | T |    |    |    |    |    |    |    |    |    | T  | 1  | 1  | 1  | 1  | 1  |
| Sundays  | 1                           | 1                  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | T |    |    |    |    |    |    |    |    |    |    |    | T  | 1  | 1  | 1  |

Legend:

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

 Provide at least one through freeway lane not less than 12 ft wide plus the contiguous paved shoulder open in direction of travel.
- |   |
|---|
| T |
|---|

 Provide at least one through freeway lane not less than 12 ft wide plus the contiguous paved shoulder open in the direction of travel. Traffic control surveillance shall be provided (see remarks).
- |  |
|--|
|  |
|--|

 Work permitted within project right of way where lane closure is not required.

REMARKS:

- This chart applies to Std Plan T-10 lane closures only.
- The maximum length of a lane closure that reduces traffic to a single lane shall be 1.0 mile.
- Only one closure in each direction of travel is allowed at any one time.
- See "Lane Closure Restriction for Designated Legal Holidays and Special Days" table in "Maintaining Traffic" of these special provisions for additional closure restrictions.
- Shoulder closures allowed at any time except designated legal holidays and Special Days.
- Traffic control surveillance shall be provided until traffic is moving at a free flow condition (traffic backup has dissipated), which can be as many as 2 hours past the times "T" are shown on the chart.
- When any operations require lane closures between PM R22.2 and R24.7, northbound or southbound, no more than two lanes shall be open for public traffic within the entire three-lane section (PM R22.2-R24.5).

**Chart No. 9  
Complete Ramp Closure Hours**

|                |                          |  |
|----------------|--------------------------|--|
| County: TEHAMA | Route/Direction: Route 5 | PM: R24.473, R24.565, R24.828, R26.572 |
|----------------|--------------------------|--|

Closure Limits: Northbound off-ramp to South Main Street  
 Southbound on-ramp from South Main Street  
 Southbound off-ramp to South Main Street  
 Southbound on-ramp from westbound Route 36

| FROM HOUR TO HOUR         | 24 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---------------------------|----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Mondays through Thursdays | C  | C | C | C | C | C | C | C | C | C | C  |    |    |    |    |    |    |    |    | C  | C  | C  | C  | C  | C  |
| 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  | 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 Ramp may be closed completely and traffic detoured as shown on the plans.

No ramp closures are allowed.

**REMARKS:**

- Only one ramp may be closed at one time.
- Temporary detour signing as shown on the plans shall be in place prior to closure of the ramp.
- See "Lane Closure Restriction for Designated Legal Holidays and Special Days" table in "Maintaining Traffic" of these special provisions for additional closure restrictions.
- Shoulder closures allowed anytime except designated legal holidays and special days.

| Chart No. 10<br>Complete Ramp Closure Hours   |  |  |  |  |                          |   |   |   |   |   |   |   |   |   |  |   |   |   |   |   |   |   |   |   |   |
|---|--|--|--|--|--------------------------|---|---|---|---|---|---|---|---|---|--|---|---|---|---|---|---|---|---|---|---|
| County: TEHAMA  |  |  |  |  | Route/Direction: Route 5 |   |   |   |   |   |   |   |   |   | PM: R25.116, R25.147, R26.366, R26.488 |   |   |   |   |   |   |   |   |   |   |
| Closure Limits: Northbound on-ramp from Diamond Ave<br>Southbound off-ramp to Diamond Ave<br>Southbound on-ramp from eastbound Route 36<br>Northbound on-ramp from eastbound Route 36   |  |  |  |  |                          |   |   |   |   |   |   |   |   |   |  |   |   |   |   |   |   |   |   |   |   |
| FROM HOUR TO HOUR 24 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24   |  |  |  |  |                          |   |   |   |   |   |   |   |   |   |  |   |   |   |   |   |   |   |   |   |   |
| Mondays through Thursdays   |  |  |  |  | C                        | C | C | C | C | C | C | C | C | C | C                                      | C | C | C | C | C | C | C | C | C | C |
| Fridays   |  |  |  |  | C                        | C | C | C | C | C | C | C | C | C | C                                      | C | C | C | C | C | C | C | C | C | C |
| Saturdays   |  |  |  |  | C                        | C | C | C | C | C | C | C | C | C | C                                      | C | C | C | C | C | C | C | C | C | C |
| Sundays   |  |  |  |  | C                        | C | C | C | C | C | C | C | C | C | C                                      | C | C | C | C | C | C | C | C | C | C |
| Legend:   |  |  |  |  |                          |   |   |   |   |   |   |   |   |   |  |   |   |   |   |   |   |   |   |   |   |
| <input type="checkbox"/> C Ramp may be closed completely and traffic detoured as shown on the plans.  |  |  |  |  |                          |   |   |   |   |   |   |   |   |   |  |   |   |   |   |   |   |   |   |   |   |
| REMARKS:  |  |  |  |  |                          |   |   |   |   |   |   |   |   |   |  |   |   |   |   |   |   |   |   |   |   |
| <ul style="list-style-type: none"> <li>• Only one ramp may be closed at one time.</li> <li>• These ramps may be closed no more than two times for up to 96 consecutive hours each time. After a 96 hour closure, the ramp shall be opened to public traffic for at least 24 consecutive hours before another closure is made.</li> <li>• Temporary detour signing as shown on the plans shall be in place prior to closure of the ramp.</li> <li>• See "Lane Closure Restriction for Designated Legal Holidays and Special Days" table in "Maintaining Traffic" of these special provisions for additional closure restrictions.</li> <li>• Shoulder closures allowed anytime except designated legal holidays and special days.</li> </ul> |  |  |  |  |                          |   |   |   |   |   |   |   |   |   |  |   |   |   |   |   |   |   |   |   |   |

| Chart No. 11<br>Complete Ramp Closure Hours   |  |  |  |  |                          |   |   |   |   |   |   |   |   |  |                              |  |  |  |  |  |  |  |  |   |   |   |   |   |
|---|--|--|--|--|--------------------------|---|---|---|---|---|---|---|---|--|------------------------------|--|--|--|--|--|--|--|--|---|---|---|---|---|
| County: TEHAMA  |  |  |  |  | Route/Direction: Route 5 |   |   |   |   |   |   |   |   |  | PM: 26.328, R26.712, R26.717 |  |  |  |  |  |  |  |  |   |   |   |   |   |
| Closure Limits: Northbound off-ramp to Route 36<br>Northbound on-ramp from westbound Route 36<br>Southbound off-ramp to Route 36  |  |  |  |  |                          |   |   |   |   |   |   |   |   |  |                              |  |  |  |  |  |  |  |  |   |   |   |   |   |
| FROM HOUR TO HOUR 24 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24   |  |  |  |  |                          |   |   |   |   |   |   |   |   |  |                              |  |  |  |  |  |  |  |  |   |   |   |   |   |
| Mondays through Fridays   |  |  |  |  | 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:   |  |  |  |  |                          |   |   |   |   |   |   |   |   |  |                              |  |  |  |  |  |  |  |  |   |   |   |   |   |
| <input type="checkbox"/> C Ramp may be closed completely and traffic detoured as shown on the plans.  |  |  |  |  |                          |   |   |   |   |   |   |   |   |  |                              |  |  |  |  |  |  |  |  |   |   |   |   |   |
| <input type="checkbox"/> No ramp closures are allowed.  |  |  |  |  |                          |   |   |   |   |   |   |   |   |  |                              |  |  |  |  |  |  |  |  |   |   |   |   |   |
| REMARKS:  |  |  |  |  |                          |   |   |   |   |   |   |   |   |  |                              |  |  |  |  |  |  |  |  |   |   |   |   |   |
| <ul style="list-style-type: none"> <li>• Only one ramp may be closed at one time.</li> <li>• Temporary detour signing as shown on the plans shall be in place prior to closure of the ramp.</li> <li>• See "Lane Closure Restriction for Designated Legal Holidays and Special Days" table in "Maintaining Traffic" of these special provisions for additional closure restrictions.</li> <li>• Shoulder closures allowed anytime except designated legal holidays and special days.</li> </ul> |  |  |  |  |                          |   |   |   |   |   |   |   |   |  |                              |  |  |  |  |  |  |  |  |   |   |   |   |   |

| Chart No. 12<br>Complete Ramp Closure Hours   |    |   |   |   |   |   |   |                          |   |   |    |    |    |    |    |            |    |    |    |    |    |    |    |    |    |
|---|----|---|---|---|---|---|---|--------------------------|---|---|----|----|----|----|----|------------|----|----|----|----|----|----|----|----|----|
| County: TEHAMA  |    |   |   |   |   |   |   | Route/Direction: Route 5 |   |   |    |    |    |    |    | PM: 24.712 |    |    |    |    |    |    |    |    |    |
| Closure Limits: Northbound on-ramp from South Main Street   |    |   |   |   |   |   |   |                          |   |   |    |    |    |    |    |            |    |    |    |    |    |    |    |    |    |
| FROM HOUR TO HOUR   | 24 | 1 | 2 | 3 | 4 | 5 | 6 | 7                        | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15         | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Mondays through Fridays   | C  | C | C | C | C | C | C |                          |   |   |    |    |    |    |    |            |    |    |    | C  | C  | C  | C  | C  | C  |
| Saturdays   | C  | C | C | C | C | C | C | C                        | C | C | C  | C  | C  | C  | C  | C          | C  | C  | C  | C  | C  | C  | C  | C  | C  |
| Sundays   | C  | C | C | C | C | C | C | C                        | C | C | C  | C  | C  | C  | C  | C          | C  | C  | C  | C  | C  | C  | C  | C  | C  |
| Legend:   |    |   |   |   |   |   |   |                          |   |   |    |    |    |    |    |            |    |    |    |    |    |    |    |    |    |
| C Ramp may be closed completely and traffic detoured as shown on the plans.   |    |   |   |   |   |   |   |                          |   |   |    |    |    |    |    |            |    |    |    |    |    |    |    |    |    |
| No ramp closures are allowed.   |    |   |   |   |   |   |   |                          |   |   |    |    |    |    |    |            |    |    |    |    |    |    |    |    |    |
| REMARKS:  |    |   |   |   |   |   |   |                          |   |   |    |    |    |    |    |            |    |    |    |    |    |    |    |    |    |
| <ul style="list-style-type: none"> <li>Only one ramp may be closed at one time.</li> <li>Temporary detour signing as shown on the plans shall be in place prior to closure of the ramp.</li> <li>See "Lane Closure Restriction for Designated Legal Holidays and Special Days" table in "Maintaining Traffic" of these special provisions for additional closure restrictions.</li> <li>Shoulder closures allowed anytime except designated legal holidays and special days.</li> </ul> |    |   |   |   |   |   |   |                          |   |   |    |    |    |    |    |            |    |    |    |    |    |    |    |    |    |

During falsework erection and removal, public traffic in the lanes over which falsework is being erected or removed shall be detoured or stopped as specified in this section, "Maintaining Traffic." Falsework erection shall include adjustments or removal of components that contribute to the horizontal stability of the falsework system. Falsework removal shall include lowering falsework, blowing sand from sand jacks, turning screws on screw jacks, and removing wedges.

The Contractor shall have necessary materials and equipment on the site to erect or remove falsework before detouring or stopping public traffic.

**10-1.19 CLOSURE REQUIREMENTS AND CONDITIONS**

Closures shall conform to the provisions in "Maintaining Traffic" of these special provisions and these special provisions.

**CLOSURE SCHEDULE**

By noon Monday, the Contractor shall submit a written schedule of planned closures for the following week period, defined as Sunday through the following Saturday. Ramp closures or closures involving work (temporary barrier placement and paving operations) that will reduce horizontal clearances, traveled way inclusive of shoulders, to 2 lanes or less shall be submitted not less than 25 days and not more than 125 days before the anticipated start of operation. Closures involving work (pavement overlay, overhead sign installation, falsework and girder erection) that will reduce the vertical clearances available to the public, shall be submitted not less than 25 days and not more than 125 days before the anticipated start of operation.

The Closure Schedule shall show the locations and times of the proposed closures. The Closure Schedule request forms furnished by the Engineer shall be used. Closure Schedules submitted to the Engineer with incomplete or inaccurate information will be rejected and 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.

Closure Schedule amendments, including adding additional closures, shall be submitted by noon to the Engineer, in writing, at least 3 business days in advance of a planned closure. Approval of Closure Schedule amendments will be at the discretion of the Engineer.

The Engineer shall be notified of cancelled closures 2 business days before the date of closure. Closures that are cancelled due to unsuitable weather may be rescheduled at the discretion of the Engineer.

**CONTINGENCY PLAN**

A detailed contingency plan shall be prepared for reopening closures to public traffic. If required by "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions, the contingency plan shall be submitted to

the Engineer before work at the job site begins. Otherwise, the contingency plan shall be submitted to the Engineer within one business day of the Engineer's request except for the overhead sign structures.

### **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. No further closures are to be made 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 business days to accept or reject the Contractor's proposed work plan. The Contractor will not be entitled to compensation for the suspension of work resulting from the late reopening of closures.

### **COMPENSATION**

The Engineer shall be notified of delays 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 and will be compensated in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications:

1. 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 compensation for amendments to the Closure Schedule that are not approved.
2. The Contractor is denied a confirmed closure.

Should the Engineer direct the Contractor to remove a closure before the time designated in the approved Closure Schedule, delay to the Contractor's schedule due to removal of the closure will be considered a right of way delay and compensation for the delay will be determined in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

In addition to the signs shown on the plans, the following described signs shall be furnished and placed:

- A. A portable 48" x 48" C23 (Road Work Ahead) sign shall be furnished and placed at locations where traffic approaches a bridge that has work underway. The signs shall conform to the provisions in Section 12-3.06, "Construction Area Signs," of the Standard Specifications. An orange, fluorescent orange, or red flag, not less than 16 inches square, shall be attached to each sign. The exact location of the signs will be determined by the Engineer. The signs shall be maintained in place when cleaning and painting operations are being performed and shall be removed at the end of each day's work.
- B. Separate individual signs, each approximately 4 feet square with the words "CLEANING AND PAINTING OPERATIONS" in black letters approximately 4 inches high and the Contractor's name, address, and telephone number, on an orange background, shall be furnished and placed. The signs shall be in place when cleaning and painting operations are under way and shall be placed near each of the C23 (Road Work Ahead) signs.

Full compensation for furnishing, placing, maintaining, and removing the signs as specified in the preceding paragraph shall be considered as included in the prices paid for the various contract items of work and no separate payment will be made therefor.

The Contractor may occupy one 12-foot width of the bridge roadway, adjacent to the curb, during the time cleaning and painting is being performed. Occupancy of the roadway shall be limited to one side of the bridge at a time.

The Contractor shall close the lane in conformance with the provisions in "Traffic Control System" of these special provisions before occupying the portion of the bridge roadway.

At the close of each day's work when operations are not in progress, obstructions shall be removed and the roadway left clear and unobstructed for the free passage of public traffic. Loose blasting material shall be removed from the traveled way before the area is opened to public traffic.

Supply lines may be laid along the top of curbs adjacent to railing posts, provided the supply lines do not interfere with public traffic. These lines shall be removed when work is not in progress.

## 10-1.20 IMPACT ATTENUATOR VEHICLE

### GENERAL

#### Summary

Work includes protecting traffic and workers by using impact attenuator vehicle as a shadow vehicle when placing and removing components of a traffic control system, and when performing a moving lane closure. The impact attenuator vehicle is required only for lane closures on Route 5.

Comply with Section 12-3.03, "Flashing Arrow Signs," of the Standard Specifications.

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

1. Test level 3 for pre-construction posted speed limit of 50 mph or more
2. Test levels 2 or 3 for pre-construction posted speed limit of 45 mph or less

Comply with the attenuator manufacturer's recommendations for:

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

#### Definitions

**impact attenuator vehicle:** Support truck towing a deployed attenuator mounted to a trailer or support truck with a deployed attenuator mounted to the support truck.

#### Submittals

Upon request, submit a Certificate of Compliance for attenuator to the Engineer under Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

#### Quality Control and Assurance

Attenuator must be a brand listed on the Department's pre-approved list at:

[http://www.dot.ca.gov/hq/esc/approved\\_products\\_list/HighwaySafe.htm](http://www.dot.ca.gov/hq/esc/approved_products_list/HighwaySafe.htm)

### MATERIALS

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

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

Each impact attenuator vehicle must:

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

### CONSTRUCTION

Use impact attenuator vehicle to follow behind equipment and workers who are placing and removing components of a traffic control system for a lane closure or a ramp closure. Flashing arrow sign must be operating in arrow mode during this activity. Follow at a distance to prevent intrusion into the workspace from passing traffic.

After placing components of a traffic control system for a lane closure or a ramp closure you shall use impact attenuator vehicle in the closed lane in advance of a work area to protect traffic and workers.

Use impact attenuator vehicle as a shadow vehicle under traffic control for a moving lane closure.

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

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

### **MEASUREMENT AND PAYMENT**

Full compensation for furnishing and operating impact attenuator vehicle is included in the contract lump sum price paid for traffic control system, and no additional compensation will be allowed therefor.

#### **10-1.21 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.

#### **MOVING LANE CLOSURE**

Shadow vehicle for moving lane closures shall comply with "Impact Attenuator Vehicle" of these special provisions.

#### **PAYMENT**

The contract lump sum price paid for traffic control system shall include full compensation for furnishing all labor (except for flagging costs), 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. Flagging costs will be paid for as provided in Section 12-2.02, "Flagging Costs," of the Standard Specifications.

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.

### **10-1.22 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 California MUTCD or as relieving the Contractor from the responsibilities specified in Section 7-1.09, "Public Safety," of the Standard Specifications.

#### **GENERAL**

When the work causes obliteration of pavement delineation, temporary or permanent pavement delineation shall be in place before opening the traveled way to public traffic. Laneline or centerline pavement delineation shall be provided for traveled ways open to public traffic. On multilane roadways (freeways and expressways) edgeline delineation shall be provided for traveled ways open to public traffic.

The Contractor shall perform the work necessary to establish the alignment of temporary pavement delineation, including required lines or markers. Surfaces to receive application of paint or removable traffic tape 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, or as determined by the Engineer.

Temporary pavement markers, including underlying adhesive, and removable traffic tape that are applied to the final layer of surfacing or existing pavement to remain in place or that conflicts with a subsequent or new traffic pattern for the area shall be removed when no longer required for the direction of public traffic, as determined by the Engineer.

#### **TEMPORARY LANELINE AND CENTERLINE DELINEATION**

When lanelines or centerlines are obliterated and temporary pavement delineation to replace the lines is not shown on the plans, the minimum laneline and centerline delineation to be provided for that area shall be temporary pavement markers placed at longitudinal intervals of not more than 24 feet. The temporary pavement markers shall be the same color as the laneline or centerline the pavement markers replace. Temporary 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 (180 days or less) in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. The temporary pavement markers shall be placed in conformance with the manufacturer's instructions. Temporary pavement markers for long term day/night use (180 days or less) shall be cemented to the surfacing with the adhesive recommended by the manufacturer, except epoxy adhesive shall not be used to place the temporary pavement markers in areas where removal of the temporary pavement markers will be required.

Temporary laneline or centerline delineation consisting entirely of temporary pavement markers listed for short term day/night use (14 days or less), shall be placed on longitudinal intervals of not more than 24 feet and shall be used for a maximum of 14 days on lanes opened to public traffic. Before 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, the Contractor shall replace the temporary pavement markers and provide additional temporary pavement delineation and shall bear the cost thereof. 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.

#### **TEMPORARY EDGELINE DELINEATION**

On multilane roadways (freeways and expressways), when edgelines are obliterated and temporary pavement delineation to replace those edgelines is not shown on the plans, the edgeline delineation to be provided for those areas adjacent to lanes open to public traffic shall be as follows:

1. Temporary pavement delineation for right edgelines shall, at the option of the Contractor, consist of either a solid 4-inch wide traffic stripe tape of the same color as the stripe it replaces, traffic cones, portable delineators or channelizers placed at longitudinal intervals not to exceed 100 feet.
2. Temporary pavement delineation for left edgelines shall, at the option of the Contractor, consist of either solid 4-inch wide traffic stripe tape of the same color as the stripe it replaces, traffic cones, portable delineators or channelizers placed at longitudinal intervals not to exceed 100 feet or temporary pavement markers placed at longitudinal intervals of not more than 6 feet.

Where removal of the 4-inch wide traffic stripe will not be required, painted traffic stripe conforming to the provisions of "Temporary Traffic Stripe (Paint)" of these special provisions may be used.

The lateral offset for traffic cones, portable delineators or channelizers used for temporary edgeline delineation shall be as determined by the Engineer. If traffic cones or portable delineators are used as temporary pavement delineation for

edgelines, the Contractor shall provide personnel to remain at the project site to maintain the cones or delineators during the hours of the day that the portable delineators are in use.

Channelizers used for temporary edgeline delineation shall be the surface mounted type and shall be orange in color. Channelizer bases shall be cemented to the pavement in the same manner provided for cementing pavement markers to pavement in "Pavement Markers" of these special provisions, except epoxy adhesive shall not be used to place channelizers on the top layer of pavement. Channelizers shall be, at the Contractor's option, one of the surface mount types (36 inch) listed in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Temporary edgeline delineation shall be removed when no longer required for the direction of public traffic as determined by the Engineer.

### **TEMPORARY TRAFFIC STRIPE (PAINT)**

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

Temporary painted traffic stripe shall conform to the provisions in Section 84-3, "Painted Traffic Stripes and Pavement Markings," of the Standard Specifications, except for payment. At the option of the Contractor, either one or 2 coats shall be applied regardless of whether on new or existing pavement.

### **TEMPORARY PAVEMENT MARKERS**

Temporary pavement markers shall be applied complete in place before opening the traveled way to public traffic.

Temporary pavement markers shall be, at the option of the Contractor, one of the temporary pavement markers for long term day/night use (180 days or less) listed in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Temporary 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 in areas where removal of the pavement markers will be required.

Retroreflective pavement markers conforming to the provisions in "Pavement Markers" of these special provisions may be used in place of temporary pavement markers for long term day/night use (180 days or less) except to simulate patterns of broken traffic stripe. Placement of the retroreflective pavement markers used for temporary pavement markers shall conform to the provisions in "Pavement Markers" of these special provisions except the waiting period provisions before placing the pavement markers on new hot mix asphalt surfacing as specified in Section 85-1.06, "Placement," of the Standard Specifications shall not apply and epoxy adhesive shall not be used to place pavement markers in areas where removal of the pavement markers will be required.

### **MEASUREMENT AND PAYMENT**

Temporary traffic stripe shown on the plans will be measured and paid for in the same manner specified for paint traffic stripe and paint pavement marking in Section 84-3.06, "Measurement," and Section 84-3.07, "Payment," of the Standard Specifications.

Temporary pavement markers shown on the plans will be measured and paid for by the unit in the same manner specified for retroreflective pavement markers in Section 85-1.08, "Measurement," and Section 85-1.09, "Payment," of the Standard Specifications.

Full compensation for furnishing, placing, maintaining, and removing the temporary pavement markers (including underlying adhesive, layout (dribble) lines to establish alignment of temporary pavement markers or used for temporary laneline and centerline delineation) for those areas where temporary laneline and centerline delineation is not shown on the plans and for providing equivalent patterns of permanent traffic lines for those areas when required, shall be considered as included in the contract prices paid for the items of work that obliterated the laneline and centerline pavement delineation and no separate payment will be made therefor.

Full compensation for removing temporary stripe shall be considered as included in the contract price paid per linear foot for temporary stripe and no separate payment/additional compensation will be made/allowed therefor.

Full compensation for furnishing, placing, maintaining, and removing temporary edgeline delineation not shown on the plans 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. The quantity of channelizers used as temporary edgeline delineation will not be included in the quantity of channelizer (surface mounted) to be paid for.

## **10-1.23 PORTABLE CHANGEABLE MESSAGE SIGNS**

### **GENERAL**

#### **Summary**

Work includes furnishing, placing, operating, maintaining, and removing portable changeable message signs. Comply with Section 12-3.12 "Portable Changeable Message Signs," of the Standard Specifications.

#### **Definitions**

**useable shoulder area:** Paved or unpaved contiguous surface adjacent to the traveled way with:

1. Sufficient weight bearing capacity to support portable changeable message sign
2. Slope not greater than 6:1 (horizontal:vertical)

#### **Submittals**

Upon request, submit a Certificate of Compliance for each portable changeable message sign under Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

#### **Quality Control and Assurance**

Comply with the manufacturer's operating instructions for portable changeable message sign.

Approaching drivers must be able to read the entire message for all phases at least twice at the posted speed limit before passing portable changeable message sign. You may use more than 1 portable changeable message sign to meet this requirement.

Only display the message shown on the plans or ordered by the Engineer or specified in these special provisions.

### **MATERIALS**

The text of the message displayed on portable changeable message sign must not scroll, or travel horizontally or vertically across the face of the message panel.

### **CONSTRUCTION**

Continuously repeat the entire message in no more than 2 phases of at least 3 seconds per phase.

If useable shoulder area is at least 12 feet wide, the displayed message on portable changeable message sign must be minimum 18-inch character height. If useable shoulder area is less than 12 feet wide, you may use a smaller message panel with minimum 12-inch character height to prevent encroachment in the traveled way.

You or your representative must be available by cell phone for operations that require portable changeable message signs. Give the Engineer your cell phone number. When the Engineer contacts you, immediately comply with the Engineer's request to modify the displayed message.

Start displaying the message on portable changeable message sign 15 minutes before closing the lane.

Place portable changeable message sign:

1. In advance of the first warning sign for each stationary lane closure on Route 5
2. For each ramp closure as shown on the plans
3. For each speed reduction zone as shown on the plans

One portable changeable message sign shall be placed in advance of the temporary railing (Type K) for each direction of travel during stage one and two of construction operations and display the message, "Trucks Use Right Lane Only," "Next XX Miles."

Two portable message signs shall be available on stand-by throughout the duration of the project.

Place portable changeable message sign as far from the traveled way as practicable where it is legible to traffic and does not encroach on the traveled way. Place portable changeable sign before or at the crest of vertical roadway curvature where it is visible to approaching traffic. Avoid placing portable changeable message sign within or immediately after horizontal roadway curvature. Where possible, place portable changeable message sign behind guardrail or temporary railing (Type K).

Except where placed behind guardrail or temporary railing (Type K) use traffic control for shoulder closure to delineate portable changeable message sign.

Remove portable changeable message sign when not in use.

**MEASUREMENT AND PAYMENT**

The contract lump sum price paid for portable changeable message signs includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing, placing, operating, modifying messages, maintaining portable changeable message signs, complete in place, including transporting from location to location, removing, and repairing or replacing defective or damaged portable changeable message signs, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Portable changeable message signs ordered by the Engineer in excess of the number shown on the plans or specified in these special provisions will be paid for as extra work under Section 4-1.03D, "Extra Work," of the Standard Specifications.

**10-1.24 PORTABLE RADAR TRAILER**

One portable radar trailer for each direction of travel, shall be furnished, placed, operated, and maintained during all work that requires a speed reduction at locations directed by the Engineer.

The portable radar trailer shall consist of a traffic type radar, a controller unit, a power supply with backup, speed display, and a structural support system all mounted on the trailer. The unit shall be assembled to form a complete self-contained portable radar trailer that can be delivered to the site of the work and placed in immediate operation. The trailer shall be equipped so that it can be leveled and plumbed.

The radar shall be capable of determining the speed of approaching vehicles to within 2 mph, and shall display that speed within 1 second so it is legible from a distance of 500 feet, at noon on a cloudless day, by a person with vision corrected to 20/20.

After initial placement, and if directed by the Engineer, the portable radar trailers shall be moved from location to location.

Portable radar trailers will be measured and paid for on a lump sum basis.

The contract lump sum price paid for portable radar trailer shall include 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, and removing portable radar trailers, complete in place, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

**10-1.25 TRAFFIC CONTROL SURVEILLANCE**

Attention is directed to 7-1.09, "Public Safety," of the Standard Specifications and to "Traffic Control Systems for Lane Closure," of these special provisions. Nothing in these special provisions shall be construed as relieving the Contractor from responsibilities specified in Sections 7-1.09.

Prior to commencing work, the Contractor shall provide to the Engineer a per hour cost breakdown for traffic control surveillance.

The vehicles provided shall not be the vehicles used to set up or remove lane and ramp closures

The Contractor shall provide traffic control surveillance during the times shown on the Lane Closure Charts only if the Contractor chooses to start a lane closure early or end it late as indicated by a "T" and during the times shown in the following table if stage one or two per the stage construction plans are in place:

| Dates               | Times           | Traffic Control Surveillance                  | Direction |
|---------------------|-----------------|---|-----------|
| 2009                |                 |   |           |
| Friday, July 3      | 11 am to 6 pm   | 1 Rover Unit<br>1 Que Warning Unit (for NB)   | NB        |
| Friday, September 4 | 3 pm to 6 pm    | 1 Rover Unit<br>1 Que Warning Unit (for NB)   | NB        |
| 2010                |                 |   |           |
| Friday, May 28      | 3 pm to 6 pm    | 1 Rover Unit<br>1 Queue Warning Unit (for NB) | NB        |
| Monday, May 31      | 12 noon to 6 pm | 1 Rover Unit<br>1 Queue Warning Unit (for SB) | SB        |
| Friday, July 2      | 11 am to 6 pm   | 1 Rover Unit<br>1 Queue Warning Unit (for NB) | NB        |
| Monday, July 5      | 11 am to 6 pm   | 1 Rover Unit<br>1 Queue Warning Unit (for SB) | SB        |
| Friday, September 3 | 3 pm to 6 pm    | 1 Rover Unit<br>1 Queue Warning Unit (for NB) | NB        |
| Monday, September 6 | 12 noon to 6 pm | 1 Rover Unit<br>1 Queue Warning Unit (for SB) | SB        |

Traffic control surveillance during the times shown in the table above shall consist of providing one employee as a rover with a pickup truck and one employee as a queue warning unit with a pickup truck with a truck-mounted portable changeable message sign (PCMS).

Traffic control surveillance during the times shown in the Lane Closure Charts shall consist of providing one employee as a queue warning unit with a pickup truck with a truck-mounted portable changeable message sign (PCMS).

The rover unit shall keep the roadway clear of any obstruction and maintain continuous traffic surveillance including patrolling the project looking for any traffic related incident within the job limits that may delay public traffic. Traffic handling devices damaged or destroyed shall immediately be temporarily replaced with flashers, flares, reflective devices or any other suitable means necessary to protect the traveling public until a replacement device can be put in place.

When traffic on Route 5 slows to 45 mph or less the queue warning unit shall activate the truck-mounted PCMS to warn motorists of "TRAFFIC STOPPED AHEAD". The truck-mounted PCMS shall be located and periodically moved as necessary, to a position no more than 1,500 feet and no less than 1,000 feet before the end of the queue. The queue warning unit shall notify the Engineer within 10 minutes of any traffic slowing to 45 mph or less.

The rover pickup truck (minimum 2,000 lb rating) shall be equipped with rotary warning light, arrow board, front bumper push bar with rubber face, cellular phone, winch rated at minimum of 8,000 lb, trailer hitch and balls 1-3/4 inch and 2.0 inch, two-way radios, and "CAUTION" sign attached to the tailgate, and any other items necessary to preserve and maintain traffic. The pickup shall have less than 50,000 miles on the odometer. Other items carried on the pickup truck shall include 5 gallons of unleaded gasoline, 5 gallons of diesel fuel, funnel-flexible spout, first aid kit, fire extinguisher aggregate rating of at least 4-B, C units, pry bar 3 feet or longer, 5 gallons of water, 2-foot wide push broom, square point shovel, fuses (highway flares - 15 minutes), cones, hydraulic jack - 2 ton floor, wood blocks, four-way lug wrench (metric and standard), flashlight and spare batteries, booster cables, programmable scanners for scanning Caltrans and CHP, hydraulic jack - trolley type, heavy duty 60 amp battery, mechanic's tool kit, 5 gallon can with lid filled with absorbent material, and external speaker and address system.

The provisions in this section will not relieve the Contractor from his responsibility to provide additional devices or take such measures as may be necessary to comply with the provisions in section 7-1.09, "Public Safety," of the Standard Specifications and "Traffic Control System for Lane Closure" elsewhere in these special provisions.

The contract lump sum price paid for traffic control surveillance shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals (including cellular phones and radios) and for doing all the work involved in providing traffic control surveillance as specified in these special provisions and as directed by the Engineer.

#### **10-1.26 CHANNELIZER**

Channelizers shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Channelizers shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

When no longer required for the work as determined by the Engineer, channelizers and underlying adhesive used to cement the channelizer bases to the pavement shall be removed. Removed channelizers and adhesive shall become the property of the Contractor and shall be removed from the site of work.

#### **10-1.27 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.

Temporary crash cushions shall be secured in place prior to commencing work for which the temporary crash cushions are required.

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 15 feet 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.

Sand filled temporary crash cushion modules shall be one of the following, or equal, and be manufactured after March 31, 1997:

1. Energite III and Fitch Inertial Modules, manufactured by Energy Absorption Systems, Inc., 35 East Wacker Drive, Suite 1100, Chicago, IL 60601:
  - 1.1. Northern California: Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, telephone (800) 884-8274, FAX (916) 387-9734
  - 1.2. Southern California: Traffic Control Service, Inc., 1818 E. Orangethorpe, Fullerton, CA 92831-5324, telephone (800) 222-8274, FAX (714) 526-9501
2. Traffix Sand Barrels, manufactured by Traffix Devices, Inc., 220 Calle Pintoresco, San Clemente, CA 92672, telephone (949) 361-5663, FAX (949) 361-9205
  - 2.1. Northern California: United Rentals, Inc., 1533 Berger Drive, San Jose, CA 95112, telephone (408) 287-4303, FAX (408) 287-1929
  - 2.2. Southern California: Statewide Safety & Sign, Inc., P.O. Box 1440, Pismo Beach, CA 93448, telephone (800) 559-7080, FAX (805) 929-5786
3. CrashGard Model CC-48 Sand Barrels, manufactured by Plastic Safety Systems, Inc., 2444 Baldwin Road, Cleveland, OH 44104:
  - 3.1. Northern California:
    - 3.1.1. Capitol Barricade Safety & Sign, 6329 Elvas Ave, Sacramento, CA 95819, telephone (888) 868-5021, FAX (916) 451-5388
    - 3.1.2. Sierra Safety, Inc., 9093 Old State Highway, New Castle, CA 95658, telephone (916) 663-2026, FAX (916) 663-1858
  - 3.2. Southern California: Hi Way Safety Inc., 13310 5th Street, Chino, CA 91710, telephone (909) 591-1781, FAX (909) 627-0999

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 pounds 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 may be placed on movable pallets or frames. Comply with 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 12 feet 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 will be measured by the unit as determined from the actual count of modules used in the work or ordered by the Engineer at each location. Temporary crash cushion modules placed in conformance with Section 7-1.09, "Public Safety," of the Standard Specifications and modules placed in excess of the number specified or shown will not be measured nor paid for.

Repairing modules damaged by public traffic will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. Modules damaged beyond repair by public traffic, when ordered by the Engineer, shall be removed and replaced immediately by the Contractor. Modules replaced due to damage by public traffic will be measured and paid for as temporary crash cushion module.

If the Engineer orders a lateral move of the sand filled temporary crash cushions and the repositioning is not shown on the plans, moving the sand filled temporary crash cushion will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications and these temporary crash cushion modules will not be counted for payment in the new position.

The contract unit price paid for temporary crash cushion module shall include full compensation for furnishing all labor, materials (including sand, pallets or frames and marker panels), tools, equipment, and incidentals, and for doing all the work involved in furnishing, installing, maintaining, moving, and resetting during a work period for access to the work, and removing from the site of the work when no longer required (including those damaged by public traffic) sand filled temporary crash cushion modules, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.28 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.

#### **EXISTING PAINT SYSTEMS**

The existing paint systems on Bridge Number 08-0096 consist of lead containing paint. Any work that disturbs the existing paint system will expose workers to health hazards and will (1) produce debris containing heavy metal in amounts that exceed the thresholds established in Titles 8 and 22 of the California Code of Regulations or (2) produce toxic fumes when heated. All debris produced when the existing paint system is disturbed shall be contained.

#### **Debris Containment and Collection Program**

Prior to starting work, the Contractor shall submit a debris containment and collection program to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, for debris produced when the existing paint system is disturbed. The program shall identify materials, equipment, and methods to be used when the existing paint system is disturbed and shall include working drawings of containment systems, loads applied to the bridge by containment structures, and provisions for ventilation and air movement for visibility and worker safety.

If the measures being taken by the Contractor are inadequate to provide for the containment and collection of debris produced when the existing paint system is disturbed, the Engineer will direct the Contractor to revise the operations and the debris containment and collection program. The directions will be in writing and will specify the items of work for which the Contractor's debris containment and collection program is inadequate. No further work shall be performed on the items until the debris containment and collection program is adequate and, if required, a revised program has been approved for the containment and collection of debris produced when the existing paint system is disturbed.

The Engineer will notify the Contractor of the approval or rejection of the submitted or revised debris containment and collection program within 2 weeks of submittal of the Contractor's program or revised program.

The State will not be liable to the Contractor for failure to approve all or any portion of an originally submitted or revised debris containment and collection program, nor for delays to the work due to the Contractor's failure to submit an acceptable program.

Full compensation for the debris containment and collection program shall be considered as included in the contract price paid for the item of work causing the existing paint system to be disturbed, and no additional compensation will be allowed therefor.

#### **Safety and Health Provisions**

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 Code of Regulations, Title 8, Construction Safety Orders, including Section 1532.1, "Lead."

The Contractor shall furnish the Engineer a written Code of Safe Practices and shall implement an Injury and Illness Prevention Program and a Hazard Communication Program in conformance with the requirements of Construction Safety Orders, Sections 1509 and 1510.

The Contractor shall prepare a project specific Lead Compliance Plan to prevent or minimize worker exposure to lead while handling lead containing paint in conformance with the provisions in "Material Containing Lead" of these special provisions.

Full compensation for furnishing the Engineer with the submittals and for implementing the programs required by this safety and health section shall be considered as included in the contract price paid for the item of work causing the existing paint system to be disturbed, and no additional compensation will be allowed therefor.

### **Debris Handling**

Debris produced when the existing paint system is disturbed shall not be temporarily stored on the ground. Debris accumulated inside the containment system shall be removed before the end of each work shift. Debris shall be stored in approved, leakproof containers and shall be handled in such a manner that no spillage will occur.

Disposal of debris produced when the existing paint system is disturbed shall be performed in conformance with all applicable Federal, State, and Local hazardous waste laws. Laws that govern this work include:

- A. Health and Safety Code, Division 20, Chapter 6.5 (California Hazardous Waste Control Act).
- B. Title 22; California Code of Regulations, Division 4.5, (Environmental Health Standards for the Management of Hazardous Waste).
- C. Title 8, California Code of Regulations.

Except as otherwise provided herein, debris produced when the existing paint system is disturbed shall be disposed of by the Contractor at an approved Class 1 disposal facility in conformance with the requirements of the disposal facility operator. The debris shall be hauled by a transporter currently registered with the California Department of Toxic Substances Control using correct manifesting procedures and vehicles displaying current certification of compliance. The Contractor shall make all arrangements with the operator of the disposal facility and perform any testing of the debris required by the operator.

At the option of the Contractor, the debris produced when the existing paint system is disturbed may be disposed of by the Contractor at a facility equipped to recycle the debris, subject to the following requirements:

- A. Copper slag abrasive blended by the supplier with a calcium silicate compound shall be used for blast cleaning.
- B. The debris produced when the existing paint system is disturbed shall be tested by the Contractor to confirm that the solubility of the heavy metals is below regulatory limits and that the debris may be transported to the recycling facility as a non-hazardous waste.
- C. The Contractor shall make all arrangements with the operator of the recycling facility and perform any testing of the debris produced when the existing paint system is disturbed that is required by the operator.

Full compensation for debris handling and disposal shall be considered as included in the contract price paid for the item of work causing the existing paint system to be disturbed, and no additional compensation will be allowed therefor.

### **Work Area Monitoring**

The Contractor shall perform work area monitoring of the ambient air around the work area at the bridge site to verify the effectiveness of the containment system. The work area monitoring shall consist of collecting, analyzing, and reporting air test results and recommending the required corrective action when specified exposure levels are exceeded. The work area monitoring shall be carried out under the direction of a CIH. The samples shall be collected at locations designated by the Engineer.

Air samples shall be collected and analyzed in conformance with National Institute for Occupational Safety and Health (NIOSH) methods. Air samples for lead detection shall be collected and analyzed in conformance with NIOSH Method 7082, with a limit of detection of at least  $0.5 \mu\text{g}/\text{m}^3$ . Air samples for detection of other metals shall be collected and analyzed in conformance with NIOSH Method 7300, with a limit of detection of at least one percent of the appropriate Permissible Exposure Limits (PELs) specified by the California/Occupational Safety and Health Administration (Cal/OSHA). Alternative methods of sample collection and analysis, with equivalent limits of detection, may be used at the option of the Contractor.

The airborne metals exposure, outside either the containment system or work areas, shall not exceed the lower of either: (1) 10 percent of the Action Level specified for lead by Section 1532.1, "Lead," of the Construction Safety Orders, or (2) 10 percent of the appropriate PELs specified for other metals by Cal/OSHA.

The air samples shall be collected at least once per week during progress of work that disturbs the existing paint system. All air samples shall be analyzed within 48 hours at a facility accredited by the Environmental Lead Laboratory Accreditation Program of the American Industrial Hygiene Association (AIHA). When corrective action is recommended by the CIH, additional samples may be required by the Engineer to be taken, at the Contractor's expense.

In areas where there is no exposed soil, there shall be no visible increase in the concentrations of heavy metal on the area affected when the existing paint system is disturbed. Any visible increase in the concentrations of heavy metal, after completion of work that disturbs the existing paint system, shall be removed at the Contractor's expense.

Air sample laboratory analysis results, including results of additional samples taken after corrective action as recommended by the CIH, shall be submitted to the Engineer. The results shall be submitted both verbally within 48 hours after sampling and in writing with a copy to the Contractor, within 5 days after sampling. Sample analysis reports shall be prepared by the CIH as follows:

- A. For air sample laboratory analysis results, the date and location of sample collection, sample number, contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Kilometer Post will be required.
- B. For air sample laboratory analysis results, the following will be required:
  - 1. List of emission control measures in place when air samples were taken.
  - 2. Air sample results shall be compared to the appropriate PELs.
  - 3. Chain of custody forms.
  - 4. Corrective action recommended by the CIH to ensure airborne metals exposure, outside either the containment system or work areas, is within specified limits.

The contract lump sum price paid for work area monitoring shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in collecting and analyzing samples of ambient air for heavy metals, complete in place, including reporting the test results, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### **Containment System**

At the option of the Contractor, the containment system shall consist of either (1) a ventilated containment structure, (2) vacuum shrouded surface preparation equipment and drapes, tarps, or other materials, or (3) an equivalent containment system. The containment system shall contain all water, resulting debris, and visible dust produced when the existing paint system is disturbed.

For bridges over water, the containment system shall include a skimming boom consisting of a float with a skirt to collect floating debris.

The containment system shall provide the clearances specified under "Maintaining Traffic" of these special provisions, except that when no clearances are specified a vertical clearance of 4.6 m and a horizontal clearance of 9.8 m shall be provided for the passage of public traffic.

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

The ventilated containment structure shall conform to the provisions for falsework in Section 51-1.06, "Falsework," of the Standard Specifications.

The minimum total design load of the ventilated containment structure shall consist of the sum of the dead and live vertical loads. Dead load shall consist of the actual load of the ventilated containment structure. Live loads shall consist of a uniform load of not less than 2160 Pa, which includes 960 Pa of sand load, applied over the area supported, and in addition, a moving 4.5 kN concentrated load shall be applied to produce maximum stress in the main supporting elements. Assumed horizontal loads need not be included in the design of the ventilated containment structure.

The ventilated containment structure shall be supported with either rigid or flexible supports. The rigid or flexible containment materials on the containment structure shall retain airborne particles but may allow airflow through the containment materials. Flexible materials shall be supported and fastened to prevent escape of abrasive and blast materials due to whipping from traffic or wind and to maintain clearances.

All mating joints between the ventilated containment structure and the bridge shall be sealed. Sealing may be by overlapping of seams when using flexible materials or by using tape, caulking, or other sealing measures.

Multiple flap overlapping door tarps shall be used at entry ways to the ventilated containment structure to prevent dust or debris from escaping.

Baffles, louvers, flapper seals, or ducts shall be used at make-up air entry points to the ventilated containment structure to prevent escape of abrasives and resulting surface preparation debris.

The ventilated containment structure shall be properly maintained while work is in progress and shall not be changed from the approved working drawings without prior approval of the Engineer.

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

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

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

Full compensation for the containment system shall be considered as included in the contract price paid for the item of work causing the existing paint system to be disturbed, and no additional compensation will be allowed therefor.

### **Protective Work Clothing and Hygiene Facilities**

Wherever there is exposure or possible exposure to heavy metals or silica dust at the bridge site, the Contractor shall, for State personnel: (1) furnish, clean, and replace protective work clothing and (2) provide access to hygiene facilities. The furnishing, cleaning, and replacement of protective work clothing and providing access to hygiene facilities shall conform to the provisions of subsections (g), "Protective work clothing and equipment," and (i), "Hygiene facilities and practices," of Section 1532.1, "Lead," of the Construction Safety Orders, and will be required for no more than 3 people.

The protective work clothing and access to hygiene facilities shall be provided during exposure or possible exposure to heavy metals or silica dust at the bridge site and during the application of the undercoats of paint.

Protective work clothing and hygiene facilities shall be inspected and approved by the Engineer before being used by State personnel.

The protective work clothing shall remain the property of the Contractor at the completion of the contract.

Full compensation for protective work clothing and access to hygiene facilities for State personnel shall be considered as included in the contract price paid for the item of work causing the existing paint system to be disturbed, and no additional compensation will be allowed therefor.

### **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 linear foot for remove metal beam guard railing and no separate payment will be made therefor.

Full compensation for removing cable anchor assemblies, terminal anchor assemblies or steel foundation tubes shall be considered as included in the contract price paid per linear foot for remove metal beam guard railing and no separate payment will be made therefor.

### **TREATED WOOD WASTE**

This work includes handling, storing, transporting, and disposing treated wood waste.

Wood removed from metal beam guard railing and roadside signs is treated with creosote, pentachlorophenol, copper azole, copper boron azole, chromated copper arsenate, ammoniacal copper zinc arsenate, copper naphthenate, alkaline copper quaternary, or acid copper chromate. Treated wood waste must be disposed in an approved treated wood waste facility. A list of currently approved treated wood waste facilities may be viewed at:

[http://www.dtsc.ca.gov/HazardousWaste/upload/TWW\\_Confirmed\\_Landfill\\_List.pdf](http://www.dtsc.ca.gov/HazardousWaste/upload/TWW_Confirmed_Landfill_List.pdf)

Manage treated wood waste under Title 22 CA Code of Regulations, Division 4.5, Chapter 34.

Provide water-resistant labels to clearly mark and identify treated wood waste. Labels on treated wood waste and accumulation areas must comply with Title 22 CA Code of Regulations, Division 4.5, Chapter 34, § 67386.5. The label must include:

1. In treated wood waste handler area:
  - 1.1. Caltrans, District number, Construction, contract number
  - 1.2. District office address
  - 1.3. Engineer's name, address, and telephone number
  - 1.4. Contractor's contact name and telephone number

Store treated wood waste before disposal using any of the following methods:

1. Elevated on blocks above a reasonably foreseeable run-on elevation and protected from precipitation
2. Placed in water-resistant containers designed for shipping or solid waste collection
3. Placed on a containment surface protected from run-on and precipitation

Prevent unauthorized access to treated wood waste using a secured enclosure such as a locked chain link fenced area or a lockable shipping container. The enclosure must be located within the project limits.

Dispose of treated wood waste within:

1. 90 days of generation if stored on blocks
2. 90 days of filling a container if containerized
3. 180 days of generation if stored on a containment surface

Before transporting treated wood waste, obtain agreement from the receiving facility that the treated wood waste will be accepted. Protect shipments of treated wood waste from loss and exposure to precipitation. Request a generator identification number from the Engineer at least 5 days before the first shipment. Each shipment must be accompanied by a shipping record such as manifest, bill of lading or invoice document that includes:

1. Caltrans, District number, Construction, contract number, generator identification number
2. District office address
3. Engineer name, address, and telephone number
4. Contractor contact name and telephone number
5. Receiving facility name and address
6. Waste description: Treated Wood Waste
7. Estimated quantity of shipment by weight or volume
8. Date of transport
9. Date of receipt
10. Weight of shipment as measured by the receiving treated wood waste facility

The shipping document must be at least a 4-part carbon or carbonless 8-1/2" x 11" form to allow retention of copies by the Engineer, transporter, and disposal facility. Submit a copy of each completed shipping record and weight receipt to the Engineer.

Resizing or segregating treated wood waste must be done at a location where debris from the operation including sawdust and chips can be contained. The debris must be collected and managed as treated wood waste.

Personnel who handle treated wood waste or may contact treated wood waste must receive training that includes:

1. All applicable requirements of Title 8 CA Code of Regulations
2. Procedures for identifying and segregating treated wood waste
3. Safe handling practices
4. Requirements of Title 22 CA Code of Regulations, Division 4.5, Chapter 34
5. Proper disposal methods

Full compensation for handling, storing, transporting, and disposing of treated wood waste, including personnel training, is included in the contract price paid for remove metal beam guard railing and remove roadside signs and no additional compensation will be allowed therefor.

### **REMOVE SIGN STRUCTURE**

Existing sign structures, where shown on the plans to be removed, shall be removed and disposed of.

Overhead sign structure removal shall consist of removing posts, frames, portions of foundations, sign panels, walkways with safety railings, and sign lighting electrical equipment.

A sign structure shall not be removed until the structure is no longer required for the direction of public traffic.

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

Electrical wiring shall be removed to the nearest pull box. Fuses within spliced connections in the pull box shall be removed and disposed of.

### **REMOVE TRAFFIC STRIPE**

Traffic stripe shall be removed at the locations shown on the plans and as directed by the Engineer.

Attention is directed to "Water Pollution Control" of these special provisions.

Waste from removal of yellow thermoplastic stripe contains lead chromate in average concentrations greater than or equal to 5 mg/L Soluble Lead or 1000 mg/kg Total Lead. Yellow thermoplastic traffic stripe exists as shown on the plans.

Residue produced from the removal of yellow thermoplastic contains heavy metals in concentrations that exceed thresholds established by the California Health and Safety Code and Title 22 of the California Code of Regulations. The Contractor shall assume that the residue is not regulated under the Federal Resource Conservation and Recovery Act (RCRA). Yellow thermoplastic may produce toxic fumes when heated.

Waste from removal of white thermoplastic and white painted traffic stripe contains lead chromate in average concentrations less than 5 mg/L Soluble Lead or 1000 mg/kg Total Lead. White thermoplastic and white paint traffic stripe exists as shown on the plans. The Contractor shall assume that the residue does not contain heavy metals in concentrations that exceed thresholds established by the California Health and Safety Code and Title 22 of the California Code of Regulations and is not regulated under the Federal Resource Conservation and Recovery Act (RCRA). White thermoplastic and white paint may produce toxic fumes when heated.

The removed yellow thermoplastic and yellow paint shall be disposed of at a Class 1 disposal facility in conformance with the requirements of the disposal facility operator within 90 days after accumulating 220 pounds of residue and dust. The Contractor shall make necessary arrangements to test the yellow thermoplastic and yellow paint residue as required by the disposal facility and these special provisions. Testing shall include, at a minimum, (1) Total Lead by EPA Method 6010B and Chromium by EPA Method 7000 series, (2) Soluble Lead and Chromium by California Waste Extraction Test, and (3) Soluble Lead and Chromium by Toxicity Characteristic Leaching Procedure. From the first 222 gallons of waste, or portion thereof if less than 222 gallons of waste are produced, a minimum of four randomly selected samples shall be taken and analyzed individually. Samples shall not be composited. From each additional 888 gallons of waste, or portion thereof if less than 888 gallons are produced, a minimum of one additional random sample shall be taken and analyzed. Each sample shall be homogenized prior to analysis by the laboratory performing the analyses. A sample aliquot sufficient to cover the amount necessary for the total and the soluble analyses shall then be taken. This aliquot shall be homogenized a second time and the total and soluble (if necessary) run on this aliquot. The homogenization process shall not include grinding of the samples. The Contractor shall submit the name and location of the disposal facility and analytical laboratory along with the testing requirements to the Engineer not less than 5 days prior to the start of removal of yellow thermoplastic and yellow painted traffic stripe. The analytical laboratory shall be certified by the Department of Health Services Environmental Laboratory Accreditation Program for all analyses to be performed. Test results shall be provided to the Engineer for review prior to signing a waste profile as requested by the disposal facility, prior to issuing an EPA identification number, and prior to allowing removal of the waste from the site.

Where grinding or other methods approved by the Engineer are used to remove yellow and white thermoplastic and yellow and white painted traffic stripe, the removed residue, including dust, shall be contained and collected immediately. Collection shall be by a high efficiency particulate air (HEPA) filter equipped vacuum attachment operated concurrently with the removal operations or other equally effective methods approved by the Engineer. The Contractor shall submit a written work plan for the removal, storage, and disposal of yellow and white thermoplastic and yellow and white painted traffic stripe to the Engineer for approval not less than 15 days prior to the start of the removal operations. Removal operations shall not be started until the Engineer has approved the work plan.

The removed yellow thermoplastic and yellow painted traffic stripe residue shall be stored and labeled in covered containers. Labels shall conform to the provisions of Title 22, California Code of Regulations, Sections 66262.31 and 66262.32. Labels shall be marked with date when the waste is generated, the words "Hazardous Waste," composition and physical state of the waste (for example, asphalt grindings with thermoplastic or paint), the word "Toxic," the name and address of the Engineer, the Engineer's telephone number, contract number, and Contractor or subcontractor. The containers shall be a type approved by the United States Department of Transportation for the transportation and temporary storage of the removed residue. The containers shall be handled so that no spillage will occur. The containers shall be stored in a secured fenced enclosure at a location within the project limits until disposal, as approved by the Engineer.

If the yellow thermoplastic and yellow painted traffic stripe residue is transported to a Class 1 disposal facility as a hazardous waste, a manifest shall be used, and the transporter shall be registered with the California Department of Toxic Substance Control. The Contractor shall submit a written request for the United States Environmental Protection Agency Identification Number (US EPA ID Number) to the Engineer. The Engineer will obtain the US EPA ID Number and sign all manifests as the generator within 2 working days of receiving sample test results, approving the test methods, and receiving the written request for the US EPA ID Number from the Contractor. The Contractor shall submit receiving landfill documentation of proper disposal to the Engineer.

Nothing in these special provisions shall relieve the Contractor of the Contractor's responsibilities as specified in Section 7-1.09, "Public Safety," of the Standard Specifications.

Attention is directed to "Materials Containing Lead" of these special provisions regarding payment for the Lead Compliance Plan. One Lead Compliance Plan shall be prepared that addresses exposure to lead from:

1. Aerially deposited lead containing soil adjacent to the existing roadway
2. Materials containing lead from sand blast residue under the existing Bridge Number 06-0096

3. Existing paint system on Bridge Number 06-0096 consisting of lead containing paint
4. Traffic stripe

Full compensation for providing a written work plan for the removal, storage, and disposal of yellow and white thermoplastic traffic stripe and for providing receiving landfill documentation of proper disposal of yellow and white thermoplastic traffic stripe shall be considered as included in the contract prices paid per linear foot for remove yellow thermoplastic traffic stripe and remove traffic stripe and no separate payment will be made therefor.

#### **RESET ROADSIDE SIGN**

Existing roadside signs, where shown on the plans to be reset, shall be removed and reset.

Each roadside sign shall be reset on the same day that the sign is removed.

Two holes shall be drilled in each existing post as required to provide the breakaway feature shown on the plans.

#### **RELOCATE ROADSIDE SIGN**

Existing roadside signs shall be removed and relocated to the new locations shown on the plans.

Each roadside sign shall be installed at the new location on the same day that the sign is removed from its original location.

Two holes shall be drilled in each existing post as required to provide the breakaway feature shown on the plans.

#### **REMOVE DRAINAGE FACILITY**

Existing culverts, inlets, junction boxes, and flared end sections, where any portion of these structures is within 3 feet of the grading plane in excavation areas, or within one foot of original ground in embankment areas, or where shown on the plans to be removed, shall be completely removed and disposed of.

#### **REMOVE ROADSIDE SIGN**

Existing roadside signs, at those locations shown on the plans to be removed, shall be removed and disposed of.

Sign panels shown on the plans shall be salvaged.

Existing roadside signs shall not be removed until replacement signs have been installed or until the existing signs are no longer required for the direction of public traffic, unless otherwise directed by the Engineer.

Full compensation for salvaging sign panels shall be considered as included in the contract unit price paid for remove roadside sign and no separate payment will be made therefor.

#### **ADJUST INLET**

Existing concrete drainage inlets shall be adjusted as shown on the plans.

Concrete shall be minor concrete conforming to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications. The concrete shall contain not less than 590 pounds of cementitious material per cubic yard.

Where inlets are located in areas to be paved or surfaced, no individual structure shall be constructed to final grade until the paving or surfacing has been completed immediately adjacent to the structure.

#### **MODIFY INLET**

Existing concrete drainage inlets shall be modified as shown on the plans.

Concrete shall be minor concrete conforming to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications. The concrete shall contain not less than 590 pounds of cementitious material per cubic yard.

Where inlets are located in areas to be paved or surfaced, no individual structure shall be constructed to final grade until the paving or surfacing has been completed immediately adjacent to the structure.

## EXISTING LOOP DETECTORS

Existing inductive loop detectors shown in the table below shall remain in place.

| Postmile | Monitoring Station Number | General Location              | Station Type | Number of Loops |
|----------|---------------------------|-------------------------------|--------------|-----------------|
| R24.57   | R152                      | SB on-ramp from South Main St | Ramp         | 1               |
| R26.435  | R157                      | NB off-ramp to SR36           | Ramp         | 2               |
| R26.509  | R158                      | SB on-ramp from EB 36         | Ramp         | 1               |
| R26.514  | R160                      | NB on-ramp from EB SR36       | Ramp         | 1               |
| R26.532  | R162                      | SB on-ramp from WB SR36       | Ramp         | 1               |
| R26.535  | R163                      | NB on-ramp From WB SR36       | Ramp         | 1               |
| R26.598  | R164                      | SB off-ramp to SR36           | Ramp         | 2               |

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 within two weeks of the damage at the Contractor's expense. Adjacent loops damaged during the replacement shall also be replaced.

## EXISTING HIGHWAY IRRIGATION FACILITIES

Existing irrigation facilities within the limits of work shall remain in place. Irrigation facilities that are damaged by the Contractor's operation shall be reported immediately to the Engineer.

Water shall be maintained in conformance with the provisions in Section 20-5.025, "Maintain Existing Water Supply," of the Standard Specifications.

## BRIDGE REMOVAL (PORTION)

Removing bridges or portions of bridges shall conform to the provisions in Section 15-4, "Bridge Removal," of the Standard Specifications and these special provisions.

The bridge removal (portion) work involves removal of existing cross frames as shown on the plans for the following structure:

### SACRAMENTO RIVER BRIDGE Bridge No. 08-0096 L/R

Removed materials that are not to be salvaged or used in the reconstruction 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.

The Contractor shall submit a complete bridge removal plan to the Engineer for each bridge listed above, detailing procedures, sequences, and all features required to perform the removal in a safe and controlled manner.

The bridge removal plan shall include, but not be limited to the following:

- A. The removal sequence, including staging of removal operations.
- B. Equipment locations on the structure during removal operations.
- C. Temporary support shoring or temporary bracing.
- D. Details, locations, and types of protective covers to be used.
- E. Measures to assure that people, property, utilities, and improvements will not be endangered.

When protective covers are required for removal of portions of a bridge, or when superstructure removal work on bridges is involved, the Contractor shall submit working drawings, with design calculations, to the Engineer for the proposed bridge removal plan, and the bridge removal plan shall be prepared and signed by an engineer who is registered as a Civil Engineer in the State of California. The design calculations shall be adequate to demonstrate the stability of the structure during all stages of the removal operations. Calculations shall be provided for each stage of bridge removal and shall include dead and live load values assumed in the design of protective covers. At a minimum, a stage will be considered to be removal of the deck, the soffit, or the girders, in any span; or walls, bent caps, or columns at support locations.

Temporary support shoring, temporary bracing, and protective covers, as required, shall be designed and constructed in conformance with the provisions in Section 51-1.06, "Falsework," of the Standard Specifications and these special provisions.

The assumed horizontal load to be resisted by the temporary support shoring and temporary bracing, for removal operations only, shall be the sum of the actual horizontal loads due to equipment, construction sequence or other causes, and an allowance for wind, but in no case shall the assumed horizontal load to be resisted in any direction be less than 5 percent of the total dead load of the structure to be removed.

The bridge removal plan shall conform to the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The number of sets of drawings, design calculations, and the time for reviewing bridge removal plans shall be the same as specified for falsework working drawings in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications.

For bridge removal that requires the Contractor's registered engineer to prepare and sign the bridge removal plan, the Contractor's registered engineer shall be present at all times when bridge removal operations are in progress. The Contractor's registered engineer shall inspect the bridge removal operation and report in writing on a daily basis the progress of the operation and the status of the remaining structure. A copy of the daily report shall be available at the site of the work at all times. Should an unplanned event occur or the bridge operation deviate from the approved bridge removal plan, the Contractor's registered engineer shall submit immediately to the Engineer for approval, the procedure of operation proposed to correct or remedy the occurrence.

### **CLEAN BRIDGE DECK**

This work includes abrasive blast cleaning the portland cement concrete bridge deck.

#### **General**

Traffic stripes and pavement markers must be removed as described under "Remove Traffic Stripe" of these special provisions before cleaning the deck surface.

#### **Construction**

Abrasive blast clean the deck surface. Sweep the deck surface clean. Blow loose material from cracks using high-pressure air.

The deck surface must be dry when abrasive blast cleaning is performed. Laitance, surface contaminants, and foreign material must be removed from the bridge deck surface.

Remove dust and residue from abrasive blast cleaning using a vacuum attachment operating concurrently with blasting equipment when abrasive blast cleaning within 10 feet of public traffic.

If the deck surface becomes contaminated before placing methacrylate resin, abrasive blast clean the contaminated area and sweep the deck clean.

Dispose of removed materials under Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

#### **Measurement and Payment**

Clean bridge deck will be measured and paid for by the square foot of deck surface cleaned.

The contract price paid per square foot for clean bridge deck includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in cleaning the bridge deck, including removing contrast treatment except slurry or chip seal contrast treatment, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Removal of epoxy grit polymer overlay will be paid for separately as specified in "Remove Epoxy Grit Polymer Overlay" in these special provisions.

### **PREPARE CONCRETE BRIDGE DECK SURFACE**

This work includes abrasive blast cleaning the concrete deck surface with steel shot and blowing the deck surface clean.

#### **Materials**

Steel shot must comply with SSPC-AB3. Recycled steel shot must comply with SSPC-AB2.

#### **Construction**

Abrasive blast clean the deck surface with steel shot. Sweep the deck surface. Blow the deck surface clean using high-pressure air.

The deck must be dry when abrasive blast cleaning is performed. Removal of unsound concrete under "Remove Unsound Concrete" of these special provisions must be performed before abrasive blast cleaning.

Laitance, surface contaminants, and foreign material must be removed from the concrete deck surface.

If the deck surface becomes contaminated before placing the overlay, abrasive blast clean the contaminated area and sweep the deck clean.

Residue from abrasive blasting must be removed by a vacuum attachment operating concurrently with blasting equipment when abrasive blasting within 10 feet of public traffic.

Dispose of removed materials under Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

### **Measurement and Payment**

Prepare concrete bridge deck surface will be measured and paid for by the square foot of deck surface prepared.

The contract price paid per square foot for prepare concrete bridge deck surface shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in preparing the concrete bridge deck surface, except removal of slurry or chip seal contrast treatment, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Removal of epoxy grit polymer overlay will be paid for separately as specified in "Remove Epoxy Grit Polymer Overlay" in these special provisions.

### **REMOVE EPOXY GRIT POLYMER OVERLAY**

Existing epoxy grit polymer overlay on bridge deck shall be removed by grinding as shown on the plans and in accordance with these special provisions.

Grinding shall conform to the provisions in Section 42-2, "Grinding," of the Standard Specifications and these special provisions.

No more than 1/8-inch of the portland cement concrete deck surface shall be removed during the epoxy grit polymer overlay removal operation.

All removed materials shall become property of the Contractor and shall be disposed of in accordance with Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Remove epoxy grit polymer overlay will be measured by the square foot.

The contract price paid per square foot for remove epoxy grit polymer overlay shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in removing the epoxy grit polymer overlay and disposing of residue, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### **REMOVE UNSOUND CONCRETE**

This work shall consist of the removal and disposal of unsound portland cement concrete, unsound epoxy concrete patches, and all asphalt concrete patches from the decks, curbs, and railings of bridges. Unsound concrete shall be removed as shown on the plans and to the limits designated by the Engineer.

Unsound concrete is generally that concrete that emits a relatively dead or hollow sound when a chain is dragged over its surface or its surface is tapped with a metal tool. Concrete encasing corroded reinforcing steel beyond the limits identified by the sound may be considered unsound concrete. The Engineer will determine the concrete soundness.

Equipment and tools shall not be used to remove unsound concrete that, in the opinion of the Engineer, cause the removal of excess quantities of sound concrete along with the unsound concrete. Equipment shall be fitted with suitable traps, filters, drip pans, or other devices to prevent oil or other deleterious matter from being deposited on the deck.

After the removal of unsound concrete has been completed, any existing reinforcing steel that has been exposed shall be restored to position and blocked and tied in conformance with the provisions in Section 52, "Reinforcement," of the Standard Specifications.

Reinforcing steel that has been damaged and rendered useless by the Contractor's operations shall be repaired or replaced by the Contractor at the Contractor's expense.

Removing unsound concrete will be paid for at the contract price per cubic foot for remove unsound concrete.

When the voids created by the removal of unsound concrete are filled with rapid setting concrete patches, the pay quantities for remove unsound concrete, in cubic feet, shall be the same as the pay quantities in cubic feet determined for rapid setting concrete (patch) as specified in "Rapid Setting Concrete Patches" of these special provisions. No deduction in pay quantities for remove unsound concrete will be made for concrete used to fill spalls that existed prior to the start of the work.

Pay quantities determined by the methods of measurement specified in this section will not necessarily be equal to the quantities computed from the actual dimensions of the concrete actually removed. No allowance will be made in the event that the pay quantities do not equal the volume of concrete actually removed.

The contract price paid per cubic foot for remove unsound concrete shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in removing unsound concrete in

conformance with the details shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.29 CLEARING AND GRUBBING**

Clearing and grubbing shall conform to the provisions in Section 16, "Clearing and Grubbing," of the Standard Specifications and these special provisions.

Vegetation shall be cleared and grubbed only within the excavation and embankment slope lines.

Vegetation that has grown close to Bridge No. 08-0096 must be trimmed to facilitate bridge inspection and repair work. No trimming will be allowed from the ground at this location. All personnel and equipment used to trim vegetation must conduct the operation from the bridge deck.

Payment for trimming vegetation is included in payment for clearing and grubbing.

#### **10-1.30 EARTHWORK**

Earthwork shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

Attention is directed to "Material Containing Lead" of these special provisions.

When portland cement concrete pavement is to be placed on the grading plane, the grading plane shall not extend above the grade established by the Engineer.

When portland cement concrete base is to be placed on the grading plane, the grading plane shall not extend above the grade established by the Engineer.

Surplus excavated material 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.

Where a portion of the existing surfacing is to be removed, the outline of the area to be removed shall be cut on a neat line with a power-driven saw to a minimum depth of 0.17-foot before removing the surfacing. Full compensation for cutting the existing surfacing shall be considered as included in the contract price paid per cubic yard for roadway excavation and no additional compensation will be allowed therefor.

Reinforcement or metal attached to reinforced concrete rubble placed in embankments shall not protrude above the grading plane. Prior to placement within 2 feet below the grading plane of embankments, reinforcement or metal shall be trimmed to no greater than 3/4 inch from the face of reinforced concrete rubble. Full compensation for trimming reinforcement or metal shall be considered as included in the contract prices paid per cubic yard for the types of excavation shown in the Engineer's estimate, or the contract prices paid for furnishing and placing imported borrow or embankment material, as the case may be, and no additional compensation will be allowed therefor.

#### **10-1.31 CONTROLLED LOW STRENGTH MATERIAL**

Controlled low strength material shall consist of a workable mixture of aggregate, cementitious materials, and water and shall conform to the provisions for slurry cement backfill in Section 19-3.062, "Slurry Cement Backfill," of the Standard Specifications and these special provisions.

At the option of the Contractor, controlled low strength material may be used as structure backfill for pipe culverts, except that controlled low strength material shall not be used as structure backfill for culverts having a diameter or span greater than 20 feet.

When controlled low strength material is used for structure backfill, the width of the excavation shown on the plans may be reduced so that the clear distance between the outside of the pipe and the side of the excavation, on each side of the pipe, is a minimum of 12 inches. This minimum may be reduced to 6 inches when the height of cover is less than or equal to 20 feet or the pipe diameter or span is less than 42 inches.

Controlled low strength material in new construction shall not be permanently placed higher than the basement soil. For trenches in existing pavements, permanent placement shall be no higher than the bottom of the existing pavement permeable drainage layer. If a drainage layer does not exist, permanent placement in existing pavements shall be no higher than one inch below the bottom of the existing asphalt concrete surfacing or no higher than the top of base below the existing portland cement concrete pavement. The minimum height that controlled low strength material shall be placed, relative to the culvert invert, is 0.5 diameter or 0.5 height for rigid culverts and 0.7 diameter or 0.7 height for flexible culverts.

When controlled low strength material is proposed for use, the Contractor shall submit a mix design and test data to the Engineer for approval prior to excavating the trench for which controlled low strength material is proposed for use. The test data and mix design shall provide for the following:

- A. A 28-day compressive strength between 50 pounds per square inch and 100 pounds per square inch for pipe culverts having a height of cover of 20 feet or less and a minimum 28-day compressive strength of 100 pounds per square

inch for pipe culverts having a height of cover greater than 20 feet. Compressive strength shall be determined in conformance with the requirements in ASTM Designation: D 4832.

- B. Cement shall be any type of portland cement conforming to the requirements in ASTM Designation: C 150; or any type of blended hydraulic cement conforming to the requirements in ASTM Designation: C 595M or the physical requirements in ASTM Designation: C 1157M. Testing of cement will not be required.
- C. Admixtures may be used in conformance with the provisions in Section 90-4, "Admixtures," of the Standard Specifications. Chemical admixtures containing chlorides as Cl in excess of one percent by weight of admixture, as determined in conformance with the requirements of California Test 415, shall not be used. If an air-entraining admixture is used, the maximum air content shall be limited to 20 percent. Mineral admixtures shall be used at the Contractor's option.

Materials for controlled low strength material shall be thoroughly machine-mixed in a pugmill, rotary drum or other approved mixer. Mixing shall continue until the cementitious material and water are thoroughly dispersed throughout the material. Controlled low strength material shall be placed in the work within 3 hours after introduction of the cement to the aggregates.

When controlled low strength material is to be placed within the traveled way or otherwise to be covered by paving or embankment materials, the material shall achieve a maximum indentation diameter of 3 inches prior to covering and opening to public traffic. Penetration resistance shall be measured in conformance with the requirements in ASTM Designation: D 6024.

Controlled low strength material used as structure backfill for pipe culverts will be considered structure backfill for compensation purposes.

### **10-1.32 MATERIAL CONTAINING LEAD**

This work shall consist of handling material containing lead in conformance with the Standard Specifications and these special provisions. Four separate material types contain lead within the project:

- 1. aerially deposited lead containing soil adjacent to the existing roadway
- 2. materials containing lead from sand blast residue is present under the existing bridge
- 3. existing paint system on Bridge Number 08-0096 consists of lead containing paint
- 4. traffic stripe and pavement marking

#### **Lead in Soil**

Lead has been detected within the top 2 ft of material in unpaved areas within the highway right of way, except for the soil directly under Bridge Number 08-0096. Levels of lead found within the project limits range from less than 5 to 142 mg/kg total lead with an average concentration of 72.1 mg/kg total lead, as analyzed by EPA Test Method 6010 or EPA Test Method 7000 series. Material containing lead is not a hazardous waste and does not require special disposal.

#### **Material Containing Lead from Sand Blast Residue**

Lead in average concentrations greater than or equal to 5.0 mg/L Soluble Lead and greater than 1000 mg/kg Total Lead, as tested using the California Waste Extraction Test exist under Bridge No. 06-0096 from approximately 10 ft outside of the bridge "dripline" extending to approximately 10 ft beyond the opposite "dripline" from a depth of 0 feet to 1 ft below existing grade, or as shown on the plans. These materials are hazardous waste regulated by the State of California and shall be transported to and disposed of at a Class 1 Disposal Site. Materials excavated from these areas shall be transported by a hazardous waste transporter registered with the Department of Toxic Substances Control using the required procedures for creating a manifest of materials. The vehicles used to transport the hazardous materials shall conform to the current certifications of compliance of the Department of Toxic Substances Control.

#### **Paint System on Existing Bridge Number 06-0096 Consisting of Lead Containing Paint**

Lead in average concentrations greater than 5.0 mg/L Soluble Lead, as tested using the United States Environmental Protection Agency Toxicity Characteristic Leaching Procedure exists in the existing paint system. These materials are Federally regulated hazardous waste and shall be transported to and disposed of at a Class 1 Disposal Site. Lead containing paint which is removed from the existing Bridge No. 06-0096 shall be transported by a hazardous waste transporter registered with the Department of Toxic Substances Control using the required procedures for creating a manifest of materials. The vehicles used to transport the hazardous materials shall conform to the current certifications of compliance of the Department of Toxic Substances Control.

## **Traffic Stripe**

Waste from removal of yellow thermoplastic traffic stripe contains lead chromate in average concentrations greater than or equal to 5 mg/L Soluble Lead or 1000 mg/kg Total Lead. Yellow thermoplastic traffic stripe exist as shown on the plans. Residue produced from the removal of yellow thermoplastic contains heavy metals in concentrations that exceed thresholds established by the California Health and Safety Code and Title 22 of the California Code of Regulations. The Contractor shall assume that the residue is not regulated under the Federal Resource Conservation and Recovery Act (RCRA). Yellow thermoplastic may produce toxic fumes when heated.

Waste from removal of white thermoplastic traffic stripe contains lead chromate in average concentrations less than 5 mg/L Soluble Lead or 1000 mg/kg Total Lead. White thermoplastic traffic stripe as shown on the plans. The Contractor shall assume that the residue does not contain heavy metals in concentrations that exceed thresholds established by the California Health and Safety Code and Title 22 of the California Code of Regulations and is not regulated under the Federal Resource Conservation and Recovery Act (RCRA). White thermoplastic may produce toxic fumes when heated.

After the Contractor has completed handling materials containing 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 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 Central Regional Water Quality Control Board, Region 5R – Central Valley

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 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) and (e)(2)(C). 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 15 days prior to beginning work in areas containing lead. Copies of all air monitoring or jobsite inspection reports made by or under the direction of the Industrial Hygienist in conformance with Section 1532.1, "Lead," shall be furnished to the Engineer within 10 days after the date of monitoring or inspection.

The Engineer will notify the Contractor of acceptance or rejection of the submitted or revised Lead Compliance Plan not more than 10 days after submittal of the plan.

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 8.

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.

### **10-1.33 MATERIAL CONTAINING LEAD FROM SAND BLAST RESIDUE**

Earthwork involving materials containing lead from sand blast residue shall conform to the provisions in "Earthwork" and this section "Material Containing Lead from Sand Blast Residue" of these special provisions.

Attention is directed to "Material Containing Lead" and "Lead from Sand Blast Residue" of these special provisions.

Material containing lead in average concentrations greater than or equal to 5.0 mg/L Soluble Lead and greater than 1000 mg/kg Total Lead, as tested using the California Waste Extraction Test exists under Bridge No. 06-0096 from approximately 10 ft outside of the bridge "dripline" extending to approximately 10 ft beyond the opposite "dripline" from a depth of 0 ft to 1.0 ft below existing grade, or as shown on the plans. These materials are hazardous waste regulated by the State of California and shall be transported to and disposed of at a Class 1 Disposal Site. Materials excavated from these areas shall be transported by a hazardous waste transporter registered with the Department of Toxic Substances Control using

the required procedures for creating a manifest of materials. The vehicles used to transport the hazardous materials shall conform to the current certifications of compliance of the Department of Toxic Substances Control.

### **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 lead from sand blast residue in conformance with the provisions in "Material Containing Lead" of these special provisions.

The Contractor shall not work in areas containing lead from sand blast residue within the project limits, unless authorized in writing by the Engineer, until the Engineer has accepted the Lead Compliance Plan.

### **EXCAVATION AND TRANSPORTATION PLAN**

Within 15 days after approval of the contract, the Contractor shall submit 3 copies of the Excavation and Transportation Plan to the Engineer. The Engineer will have 5 days to review the Excavation and Transportation Plan. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the Excavation and Transportation Plan within 5 days of receipt of the Engineer's comments. The Engineer will have 5 days to review the revisions. Upon the Engineer's approval of the Excavation and Transportation Plan, 3 additional copies of the Excavation and Transportation Plan incorporating the required changes shall be submitted to the Engineer. Minor changes or clarifications to the initial submittal may be made and attached as amendments to the Excavation and Transportation Plan. In order to allow construction to proceed, the Engineer may conditionally approve the Excavation and Transportation Plan while minor revisions or amendments to the Plan are being completed.

The Contractor shall prepare a written, project specific Excavation and Transportation Plan establishing the procedures the Contractor will use to comply with requirements for excavating, transporting, and placing (or disposing) of material containing lead from sand blast residue. The Excavation and Transportation Plan shall conform to the regulations of the Department of Toxic Substance Control and the California Division of Occupational Safety and Health Administration (Cal-OSHA). The sampling and analysis plans shall meet the requirements for the design and development of the sampling plan, statistical analysis, and reporting of test results contained in USEPA, SW 846, "Test Methods for Evaluating Solid Waste," Volume II: Field Manual Physical/Chemical, Chapter Nine, Section 9.1. The plan shall contain, but not be limited to the following elements:

- A. Excavation schedule (by location and date)
- B. Temporary locations of stockpiled material
- C. Sampling and analysis plans for areas after removal of a stockpile
  - 1. Location and number of samples
  - 2. Analytical laboratory
- D. Sampling and analysis plan for post excavation as shown on the plans.
- E. Dust control measures
- F. Air monitoring
  - 1. Location and type of equipment
  - 2. Sampling frequency
  - 3. Analytical laboratory
- G. Transportation equipment and routes
- H. Method for preventing spills and tracking material onto public roads
- I. Truck waiting and staging areas
- J. Site for disposal of waste
- K. Spill Contingency Plan for material containing lead from sand blast residue

### **DUST CONTROL**

Excavation, transportation, placement, and handling of materials containing lead from sand blast residue shall result in no visible dust migration. The Contractor shall have a water truck or tank on the job site at all times while clearing and grubbing and performing earthwork operations in work areas containing lead from sand blast residue.

Stockpiles of material containing lead from sand blast residue shall not be placed where affected by surface run-on or run-off. Stockpiles shall be covered with plastic sheeting 13 mils minimum thickness or 1 foot of nonhazardous material. Stockpiles shall not be placed in environmentally sensitive areas. Stockpiled material shall not enter storm drains, inlets, or waters of the State.

## **MATERIAL TRANSPORTATION**

Prior to traveling on public roads, loose and extraneous material shall be removed from surfaces outside the cargo areas of the transporting vehicles and the cargo shall be covered with tarpaulins, or other cover, as outlined in the approved Excavation and Transportation Plan. The Contractor shall be responsible for costs due to spillage of material containing lead during transport. The Department will not consider the Contractor a generator of these hazardous materials, and the Contractor will not be obligated for further cleanup, removal, or remedial action for such materials handled or disposed of in conformance with the requirements specified in these special provisions and the appropriate State and Federal laws and regulations and county and municipal ordinances and regulations regarding hazardous waste.

## **DISPOSAL**

Surplus materials whose lead content is not known shall be analyzed for lead from sand blast residue by the Contractor prior to removing the materials from within the project limits. The Contractor shall submit a sampling and analysis plan and the name of the analytical laboratory to the Engineer at least 15 days prior to beginning sampling or analysis. The Contractor shall use a laboratory certified by the California Department of Health Services. Sampling shall be at a minimum rate of one sample for each 200 cubic yards of surplus material and tested for lead using EPA Method 6010 or 7000 series.

Sampling, analyses, and reporting of results for surplus materials not previously sampled will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

Materials containing lead from sand blast residue shall be disposed of within California. The disposal site shall be operating under a permit issued by the California Environmental Protection Agency (Cal-EPA) Boards.

The Engineer will obtain the Environmental Protection Agency (EPA) Generator Identification Number for hazardous material disposal. The Engineer will sign all hazardous waste manifests. The Contractor shall notify the Engineer five days before the manifests are to be signed.

Sampling, analyzing, transporting, and disposing of materials containing lead from sand blast residue excavated outside the pay limits of excavation will be at the Contractor's expense.

## **MEASUREMENT AND PAYMENT**

Full compensation for structure excavation of material containing lead from sand blast residue, preparing an approved Excavation and Transportation Plan, and for transporting and disposing of material containing lead from sand blast residue shall be considered as included in the contract lump sum price paid for bridge construction and no separate payment will be made therefor.

Roadway excavation of material containing lead from sand blast residue will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

No payment for stockpiling of material containing lead from sand blast residue will be made, unless the stockpiling is ordered by the Engineer.

### **10-1.34 EXTEND IRRIGATION CROSSOVERS**

Extend existing irrigation crossovers shall conform to the provisions in Section 20-5, "Irrigation Systems," of the Standard Specifications and these special provisions.

Extend irrigation crossovers shall include conduit, water line crossover, and sprinkler control crossover extensions and appurtenances, locating existing irrigation crossovers and pressure testing existing and new water line crossovers. The sizes of conduit, water line crossover, and sprinkler control crossover extensions shall be as shown on the plans.

Before work is started in an area where an existing irrigation crossover conduit is to be extended, the existing conduit shall be located by the Contractor. When exploratory holes are used to locate the existing conduit, the exploratory holes shall be excavated in conformance with the provisions in Section 20-5.03B, "Conduit for Irrigation Crossovers," of the Standard Specifications.

If debris is encountered in the ends of conduits to be extended, the debris shall be removed prior to extending conduits. Removal of debris within the 3 feet in the conduits shall be included in the price of extend conduit. If debris is encountered in the conduit more than 3 feet from the ends of the conduits to be extended, the additional debris shall be removed as directed by the Engineer and will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

Prior to installation of water line crossover extensions, the existing water lines shall be pressure tested for leakage in conformance with the provisions in Section 20-5.03H, "Pressure Testing," of the Standard Specifications. Repairs to the existing water line crossover, when ordered by the Engineer, will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

Conduit extensions shall be corrugated high density polyethylene (CHDPE) pipe.

Water line crossover extensions shall be plastic pipe (PR 315) (supply line).

Sprinkler control crossover extensions shall be Type 3 electrical conduit.

Conductors shall be removed from existing sprinkler control crossovers to be extended.

After installation of the sprinkler control crossover extensions, new conductors shall be installed without splices in existing and extended sprinkler control crossovers. New conductors shall match the removed conductors in color and size and shall be spliced to the existing conductors in adjacent pull boxes. After the new conductors are installed, the conductors shall be tested in the same manner specified for traffic signal, sign illumination, and lighting circuits in conformance with the provisions in Section 86-2.14B, "Field Testing," of the Standard Specifications.

After water line crossover extensions have been installed, existing and extended water line crossovers shall be retested for leakage in conformance with the provisions in Section 20-5.03H, "Pressure Testing," of the Standard Specifications. Leaks that develop shall be repaired at the Contractor's expense and the water line crossovers shall be retested until a satisfactory pressure test is achieved.

#### **10-1.35 EROSION CONTROL (TYPE D)**

Erosion control (Type D) includes applying erosion control materials to embankment and excavation slopes and other areas disturbed by construction activities. Erosion control (Type D) must comply with Section 20-3, "Erosion Control," of the Standard Specifications and these special provisions.

If the slope on which the erosion control to be placed is finished during the rainy season as specified under "Water Pollution Control" of these special provisions, apply erosion control to the slope immediately.

Before applying erosion control materials, prepare soil surface under Section 19-2.05, "Slopes," of the Standard Specifications, except that rills and gullies exceeding 2 inches in depth or width must be leveled. Remove vegetative growth, temporary erosion control materials, and other debris from areas to receive erosion control.

Before applying erosion control materials, the Engineer designates the ground location of erosion control (Type D) in increments of one acre or smaller for smaller areas. Place stakes or other suitable markers at the locations designated by the Engineer. Furnish all tools, labor and materials required to adequately indicate the various locations.

#### **MATERIALS**

Materials must comply with Section 20-2, "Materials," of the Standard Specifications and these special provisions.

#### **Seed**

Seed must comply with Section 20-2.10, "Seed," of the Standard Specifications. Seed not required to be labeled under the California Food and Agricultural Code shall be tested for purity and germination by a seed laboratory certified by the Association of Official Seed Analysts or by a seed technologist certified by the Society of Commercial Seed Technologists. Measure and mix individual seed species in the presence of the Engineer.

Seed must contain at most 1.0 percent total weed seed by weight.

Deliver seed to the job site in unopened separate containers with the seed tag attached. Containers without a seed tag attached are not accepted. The Engineer takes a sample of approximately one ounce or 0.25 cup-of seed for each seed lot greater than 2 pounds.

Seed must comply with the following:

| Seed   |                                  |   |
|--|----------------------------------|---|
| Botanical Name<br>(Common Name)                | Percent Germination<br>(Minimum) | Pounds Pure Live Seed Per Acre<br>(Slope Measurement) |
| Eschscholzia californica<br>(California poppy) | 60%                              | 2   |
| Linaria maroccana<br>(Toadflax)                | 60%                              | 10  |
| Lasthenia glabrata<br>(Goldfields)             | 60%                              | 10  |
| Layia platyglossa<br>(Tidy-Tips)               | 60%                              | 5   |
| Lupinus nanus<br>(Dwarf Lupine)                | 70%                              | 10  |
| Trifolium hirtium<br>(Rose Clover)             | 80%                              | 28  |

#### **Seed Sampling Supplies**

At the time of seed sampling, provide the Engineer a glassine lined bag and custody seal tag for each seed lot sample.

### Commercial Fertilizer

Commercial fertilizer must comply with Section 20-2.02, "Commercial Fertilizer," of the Standard Specifications and have a guaranteed chemical analysis within 2 percent of 15 percent nitrogen, 15 percent phosphoric acid and 15 percent water soluble potash.

#### APPLICATION

Apply erosion control materials in separate applications in the following sequence:

1. Apply the following mixture with hydroseeding equipment at the rates indicated within 60 minutes after the seed has been added to the mixture:

| Material              | Pounds Per Acre<br>(Slope Measurement) |
|-----------------------|--|
| Seed                  | 65                                     |
| Fiber                 | 2,000                                  |
| Commercial Fertilizer | 150                                    |

The Engineer may change the rates of erosion control materials to meet field conditions.

#### MEASUREMENT AND PAYMENT

Erosion control (Type D) will be measured by the square yard or by the acre, whichever is designated in the Engineer's Estimate. The area will be calculated on the basis of actual or computed slope measurements.

The contract price paid per the square yard or by the acre for erosion control (Type D) includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying erosion control (Type D) complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### 10-1.36 AGGREGATE BASE

Aggregate base must comply with Section 26, "Aggregate Bases," of the Standard Specifications and these special provisions.

Aggregate base must be Class 2.

Do not store reclaimed asphalt concrete or aggregate base with reclaimed asphalt concrete within 100 feet measured horizontally of any culvert, watercourse, or bridge.

#### 10-1.37 LEAN CONCRETE BASE

Lean concrete base shall conform to the provisions in Section 28, "Lean Concrete Base," of the Standard Specifications and these special provisions.

The finished surface of lean concrete base shall not be above the grade established by the Engineer, or more than 0.05-foot below the grade established by the Engineer.

#### 10-1.38 HOT MIX ASPHALT

##### GENERAL

##### Summary

This work includes producing and placing hot mix asphalt (HMA) Type A using the Standard process. Comply with Section 39, "Hot Mix Asphalt," of the Standard Specifications.

##### Submittals

With the job mix formula (JMF) submittal, submit:

1. California Test 204 plasticity index results
2. California Test 371 tensile strength ratio results for treated and untreated HMA

On the first production day and when you sample during production of the first 5,000 tons thereafter, submit samples split from your HMA production sample for California Test 371 to the Engineer and the Transportation Laboratory, Attention: Moisture Test.

At JMF submittal, production start up and every 5,000 tons submit the California Test 371 test results to the Engineer and electronically to:

Moisture\_Tests@dot.ca.gov

**Quality Control and Assurance**

For the mix design, determine the plasticity index of the aggregate blend under California Test 204. If the plasticity index is greater than 10, do not use that aggregate blend.

If the results from California Test 371 show the minimum tensile strength ratio of the lime-treated HMA is less than 80, the Engineer rejects your JMF submittal.

On the first production day, sample HMA and test under California Test 371.

The Department does not use California Test 371 test results for production to determine specification compliance.

Perform sampling and testing at the specified frequency and location for the following additional quality characteristics:

**Minimum Quality Control**

| Quality Characteristic                        | Test Method | Minimum Sampling and Testing Frequency                                | Requirement | Location of Sampling   | Minimum Reporting Time Allowance |
|---|-------------|---|-------------|------------------------|----------------------------------|
| Los Angeles Rattler (% max loss at 500 rev)   | CT 211      | 1 per 3,000 tons during production but not less than 1 per paving day | 25          | Stockpile <sup>a</sup> | 48 hours                         |
| Fine durability index (D <sub>f</sub> ) (min) | CT 229      |   | 50          |                        |                                  |

Note:

<sup>a</sup> Before lime treatment.

The Engineer samples aggregate for acceptance testing and tests for the following additional quality characteristics:

**HMA Acceptance**

| Quality Characteristic                        | Test Method | Specification | Sampling Location      |
|---|-------------|---------------|------------------------|
| Los Angeles Rattler (% max loss at 500 rev)   | CT 211      | 25            | Stockpile <sup>a</sup> |
| Fine durability index (D <sub>f</sub> ) (min) | CT 229      | 50            |                        |

Note:

<sup>a</sup> Before lime treatment.

**MATERIALS**

**Asphalt Binder**

The grade of asphalt binder mixed with aggregate for HMA Type A must be PG 64-28 PM.

**Tack Coat**

For tack coat, use CRS2, CQS1, asphalt binder, or PMCRS2 asphaltic emulsion.

**Aggregate**

The aggregate for HMA Type A must comply with the 3/4 inch grading.

Before adding asphalt binder, aggregate must comply with the following additional quality characteristics:

### **Aggregate Quality**

| Quality Characteristic                         | Test Method | Specification |
|--|-------------|---------------|
| Los Angeles Rattler<br>(% max loss at 500 rev) | CT 211      | 25            |
| Fine durability index (D <sub>f</sub> ) (min)  | CT 229      | 50            |

#### **Antistrip Treatment**

Treat aggregate with lime slurry under "Lime Treatment of Hot Mix Asphalt Aggregates - Slurry Method." For the mix design, use Lab Procedure LP-7.

#### **CONSTRUCTION**

##### **Material Transfer Vehicle**

When the atmospheric temperature during paving is below 70 °F or when the time from discharge to truck at the HMA plant until transfer to the paver's hopper is 90 minutes or greater, use a material transfer vehicle (MTV). The MTV must:

1. Receive HMA directly from the truck without depositing the HMA on the roadway surface
2. Transfer HMA directly into the paver's receiving hopper or feed system
3. Remix the HMA, with augurs, before loading the paver
4. Have sufficient capacity to prevent stopping the paver

##### **Rumble Strips**

Construct shoulder rumble strips in the top layer of new HMA surfacing.

##### **Vertical Joints**

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

Place HMA on adjacent traveled way lanes so that at the end of each work shift, the distance between the ends of HMA layers on adjacent lanes is between 5 feet and 10 feet. Place additional HMA along the transverse edge at each lane's end and along the exposed longitudinal edges between adjacent lanes. Hand rake and compact the additional HMA to form temporary conforms. You may place Kraft paper or another approved bond breaker under the conform tapers to facilitate the taper removal when paving operations resume.

#### **10-1.39 HOT MIX ASPHALT (MISCELLANEOUS AREAS)**

##### **GENERAL**

###### **Summary**

This work includes producing hot mix asphalt (HMA) and placing it on miscellaneous areas. Comply with Section 39, "Hot Mix Asphalt," of the Standard Specifications.

##### **CONSTRUCTION**

Increase the amount of asphalt binder used in miscellaneous areas 1 percent by weight of the aggregate over the amount of asphalt binder determined for use in HMA placed on the traveled way.

##### **MEASUREMENT AND PAYMENT**

If there is a contract item for place hot mix asphalt (miscellaneous area) paid for by the square yard, this item is limited to the areas listed on the plans and is in addition to the contract items for the materials involved.

Full compensation for tack coat for miscellaneous areas is considered as included in the contract price paid per ton for the hot mix asphalt used in miscellaneous areas and no separate payment will be made therefor.

#### **10-1.40 HOT MIX ASPHALT AGGREGATE LIME TREATMENT - SLURRY METHOD**

##### **GENERAL**

###### **Summary**

This work includes treating hot mix asphalt (HMA) aggregate with lime using the slurry method and placing it in stockpiles to marinate.

Treat aggregate for HMA Type A with lime slurry.

**Submittals**

Determine the exact lime proportions for fine and coarse virgin aggregate and submit them as part of the proposed job mix formula (JMF) under Section 39, "Hot Mix Asphalt," of the Standard Specifications.

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

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

1. Treatment date
2. Time of day the data is captured
3. Aggregate size being treated
4. Wet aggregate flow rate collected directly from the aggregate weigh belt
5. Moisture content of the aggregate just before treatment, expressed as a percent of the dry aggregate weight
6. Dry aggregate flow rate calculated from the wet aggregate flow rate
7. Lime slurry flow rate measured by the slurry meter
8. Dry lime flow rate calculated from the slurry meter output
9. Approved lime ratio for each aggregate size being treated
10. Actual lime ratio calculated from the aggregate weigh belt and the slurry meter output, expressed as a percent of the dry aggregate weight
11. Calculated difference between the approved lime ratio and the actual lime ratio
12. Dry lime and water proportions at the slurry treatment time

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

**Quality Control and Assurance**

The quality control plan (QCP) specified in Section 39-2, "Standard," of the Standard Specifications must include aggregate quality control sampling and testing during aggregate lime treatment. Perform sampling and testing in compliance with:

**Aggregate Quality Control During Lime Treatment**

| Quality Characteristic       | Test Method            | Minimum sampling and testing frequency             |
|------------------------------|------------------------|--|
| Sand Equivalent              | CT 217                 | Once per 1,000 tons of aggregate treated with lime |
|                              |                        | 1 per 3,000 tons of aggregate treated with lime    |
| Fine durability index (Df)   | CT 229                 | As necessary and as designated in the QCP          |
| Percent of crushed particles | CT 205                 |  |
| Los Angeles Rattler          | CT 211                 |  |
| Fine aggregate angularity    | AASHTO T 304, Method A |  |
| Flat and elongated particles | ASTM D 4791            |  |

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

The Engineer orders proportioning operations stopped for any of the following if you:

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

7. Use malfunctioning or failed proportioning devices.

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

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

## **MATERIALS**

High-calcium hydrated lime and water must comply with Section 24-1.02, "Materials," of the Standard Specifications.

Before aggregate is treated, it must comply with the aggregate quality specifications in Section 39, "Hot Mix Asphalt," of the Standard Specifications. Do not test treated aggregate for quality control except for gradation. The Engineer does not test treated aggregate for acceptance except for gradation.

The Engineer determines the combined aggregate gradation during HMA production after you have treated aggregate.

Treated aggregate must not have lime balls or clods.

## **CONSTRUCTION**

### **General**

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

Treat aggregate separate from HMA production.

Do not treat reclaimed asphalt pavement.

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

Lime treat and marinate coarse and fine aggregates separately.

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

Treat aggregate and stockpile for marination only once.

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

Lime ratio ranges are:

| Aggregate Gradation | Lime Ratio |
|---------------------|------------|
| Coarse              | 0.4 to 1.0 |
| Fine                | 1.5 to 2.0 |
| Combined            | 1.0 to 1.5 |

The lime ratio for fine and coarse aggregate must be within  $\pm 0.2$  percent of the lime ratio in the accepted JMF. The lime ratio must be within  $\pm 0.2$  percent of the approved lime ratio when you combine the individual aggregate sizes in the JMF proportions.

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

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

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

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

### **Lime Slurry Proportioning**

Proportion lime and water with a continuous or batch operation.

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

### **Proportioning and Mixing Lime Slurry Treated Aggregate**

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

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

## **MEASUREMENT AND PAYMENT**

Full compensation for lime slurry treated aggregates shall be considered as included in the contract price paid per ton for HMA as designated in the Engineer's Estimate and no separate payment will be made therefor.

### **10-1.41 JOINTED PLAIN CONCRETE PAVEMENT**

#### **GENERAL**

Jointed plain concrete pavement shall be constructed in conformance with the provisions in Section 40, "Portland Cement Concrete Pavement," of the Standard Specifications and these special provisions, and as shown on the plans.

Insert method for forming joints in pavement shall not be used.

#### **PREPAVING CONFERENCE**

Supervisory personnel of the Contractor and subcontractors who are to be involved in the concrete paving work shall meet with the Engineer at a prepping conference, at a mutually agreed time, to discuss methods of accomplishing the paving work.

The Contractor shall provide a facility for the prepping conference within 3 miles of the construction site or at a nearby location agreed to by the Engineer. Attendance at the prepping conference is mandatory for the Contractor's project superintendent, paving construction foreman, subcontractor's workers, including foremen and personnel performing saw cutting, joint sealing, concrete plant manager, and concrete plant operator. Conference attendees shall sign an attendance sheet provided by the Engineer. Production and placement shall not begin nor proceed unless the above-mentioned personnel have attended the mandatory prepping conference.

#### **JUST-IN-TIME TRAINING**

Attending a 4-hour Just-In-Time Training (JITT) shall be mandatory, and consist of a formal joint training class on portland cement concrete and paving techniques. Construction operations for portland cement concrete paving 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 prepping conference as well as the Engineer's representatives shall attend JITT. JITT shall be in addition to the prepping conference.

The JITT class will be conducted for not less than 4 hours on portland cement concrete pavement and paving techniques. The training class may be an extension of the prepping conference and shall be conducted at a project field location convenient for both the Contractor and the Engineer. The JITT class shall be completed at least 15 days, not including Saturdays or holidays, prior to the start of portland cement concrete paving operations. 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 construction of portland cement concrete pavement 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 course syllabus, handouts, and presentation material shall be submitted to the Engineer at least 7 days before the day of the training. The Contractor and the Engineer shall mutually agree to course instructor, the course content, and training site. The instructor shall issue a certificate of completion to the participants upon completion of the class. The certificate of completion shall include the course title, date and location of the class, the name of the participant, instructor's name, location and telephone number.

The Contractor's or Engineer's personnel involved with portland cement concrete paving operations will not be required to attend JITT if they have completed equivalent 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 class. The Engineer will provide the final determination for exclusion of staff member's participation. Attendees of the JITT shall complete, and submit to the Engineer, an evaluation of the training. The Engineer will provide the course evaluation form.

Just-In-Time Training shall not relieve the Contractor of responsibility under the contract for the successful completion of the work in conformance with the requirements of the plans and specifications.

#### **TEST STRIP**

At the beginning of paving operations, the Contractor shall construct a test strip of concrete pavement from 650 feet to 1,000 feet in length. The paving width for the test strip shall be the same as that intended by the Contractor for production work. The Contractor shall use the same equipment to construct the test strip for the remainder of the paving operations, except as specified in this section. The Contractor shall not begin paving operations until the test strip has been evaluated in

conformance with the provisions in Section 40-1.10, "Final Finishing," of the Standard Specifications regarding surface straight edge requirements, and "Profile Index" in this section; for dowel and tie bar alignment verification; concrete quality (except modulus of rupture); and pavement thickness. Additional test strips will be required when:

1. A portion of a test strip fails to conform to the provisions in Section 40-1.10, "Final Finishing," of the Standard Specifications for straight edge requirements;
2. A portion of the test strip fails to conform to profile requirements;
3. The Contractor proposes different paving equipment, including a batch plant, paver, dowel bar inserter, tie bar inserter, tining, or curing equipment;
4. The dowel bar tolerances are not met;
5. The pavement thickness deficiency is greater than 1/2 inch after grinding; or
6. A change in concrete mix proportions has occurred.

The Contractor shall perform coring of the test strips as part of the dowel and tie bar placement tolerance verification, and pavement thickness verification. The Engineer will select a minimum of six dowel bars that will be cored for each test strip. The Engineer will have the option of selecting up to 6 tie bars that will be cored for each test strip. After removal of cores, voids in concrete pavement shall be cleaned and filled with hydraulic cement grout conforming to the provisions in "Core Drilling for Dowel Placement Assurance Testing" in this section.

Before mechanical dowel bar inserters are used, the Contractor shall demonstrate that the insertion equipment will not leave surface irregularities such as depressions, dips, or high areas adjacent to the dowel bar insertion point, or voids or segregation around dowel bars.

Before placement of the test strip, the Contractor shall submit a written procedure to locate transverse weakened plane joints that will coincide with the center of the dowel bars being placed and locating the tie bars along the longitudinal joints. This procedure shall be submitted prior to the prepaving conference, and shall describe the control of inadvertent covering of paint markings after applying curing compound, excessive paint spray producing too large a paint dot marking for the accuracy required, misalignment by transferring marking spots, and inadequate staking of joints.

Construction of concrete pavement shall not proceed until the Engineer has completed an evaluation of the test strip. The Engineer shall be allowed 3 business days to evaluate the test strip. If, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the Engineer not completing the evaluation of the test strip within the time specified, 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. Test strips failing to conform to the specifications for concrete pavement shall be removed. Additional test strips shall be constructed until the Contractor constructs a test strip that conforms to the specifications for concrete pavement. Additional test strips shall conform to the requirements in this section, except the test strip shall be 650 feet in length.

Prior to constructing additional test strips, the Contractor shall change methods or equipment to construct a test strip that conforms to the provisions in Section 40-1.10, "Final Finishing," of the Standard Specifications, "Profile Index" of this section, and dowel bar alignment verification, without grinding or other corrective work.

The Engineer may waive the initial test strip if the Contractor proposes to use a batch plant mixer and paving equipment with the same personnel that were satisfactorily used on a Department project within the preceding 12 months. The personnel shall be individuals listed in the prepaving conference used on a preceding Department project.

Materials resulting from the construction and removal of rejected test strips 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.

## **MATERIALS**

### **Concrete**

Attention is directed to Section 90, "Portland Cement Concrete," of the Standard Specifications, regarding mix proportions for concrete being determined by the Contractor.

Primary aggregate gradings shall conform to the gradation requirements of Section 90-3, "Aggregate Gradings," of the Standard Specifications. When combined in the proportions determined by the Contractor, the percent passing the 3/8-inch sieve and retained on the No. 8 sieve shall not be less than 16 percent of the total aggregate.

The cementitious material content shall not exceed 675 pounds per cubic yard.

### **Tie Bars**

Tie bars shall be deformed reinforcing steel bars conforming to the requirements of ASTM Designation: A 615/A 615M, Grade 40 or 60, A 996/A 996M, Grade 50 or 60, or A 706/A 706M. Tie bars shall be epoxy-coated in conformance with the requirements in ASTM Designation: A 934/A 934M or A 775/A 775M and the provisions in Section 52-1.02B, "Epoxy-

coated Reinforcement," of the Standard Specifications, except the epoxy-coating thickness after curing shall be between 7 mils to 16 mils. Fabrication, sampling and jobsite 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 the 2 samples shall be 30 inches long. Epoxy-coated tie bars shall not be bent.

### **Epoxy (Drill and Bond)**

Epoxy for bonding tie bars and dowel bars to portland cement concrete shall be a two-component, epoxy-resin, conforming to the requirements of ASTM Designation: C 881, Type V, Grade 3 (Non-Sagging), Class A, B or C. The class used shall be dependent on the internal temperature of the hardened concrete at the time the epoxy is to be applied. Class A shall be used when the internal temperature is below 40 °F, but not lower than recommended by the manufacturer. Class B shall be used when the internal temperature is from 40 °F to 60 °F. Class C shall be used when the internal temperature is above 60 °F, but not higher than recommended by the manufacturer. A Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished with the epoxy. 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. Epoxy shall be applied in conformance with the manufacturer's recommendations.

### **Dowel Bars**

Dowel bars shall be plain round smooth, epoxy-coated steel conforming to the requirements in ASTM Designation: A 615/A 615M, Grade 40 or 60, 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 18 inches 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.

### **Bond Breaker**

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 gallon per 15 square yards.

### **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 or Type 2 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 lean concrete base, hot mix asphalt used as 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, or hot mix asphalt used as base. Concrete fasteners shall conform to the requirements of ASTM Designation: F 1667. Concrete nails used as fasteners on lean concrete base or hot mix asphalt used as base shall have a minimum shank diameter of 5/32 inch with a minimum shank length of 2-1/2 inches. Concrete nails used as fasteners on asphalt treated or cement treated permeable base shall have a minimum shank diameter of 5/32 inch with a minimum shank length of 4-3/4 inches. Shank length shall be the distance from the point to the bottom of the nail head. 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 0.2-mil.

### **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.

Concrete fasteners shall be used for anchoring tie bar baskets to lean concrete base, hot mix asphalt used as 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, or hot mix asphalt used as base. Concrete fasteners shall conform to the requirements of ASTM Designation: F 1667. Concrete nails used as fasteners on lean concrete base or hot mix asphalt used as base shall have a minimum shank diameter of 5/32 inch with a minimum shank length of 2-1/2 inches. Concrete nails used as fasteners on asphalt treated or cement treated permeable base shall have a minimum shank diameter of 5/32 inch with a minimum shank length of 4-3/4 inches. Shank length shall be the distance from the point to the bottom of the nail head. Clips and washers shall be commercial quality manufactured for use with tie bar baskets. The surface of concrete fasteners, clips, and washers shall be either zinc electroplated or galvanized with a minimum coating thickness of 0.2-mil.

### **Reinforcement**

Reinforcement shall be epoxy coated and shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications.

### **Asphalt Rubber Joint Sealant**

Asphalt rubber joint sealant shall conform to the requirements of ASTM Designation: D 6690 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 No. 8 sieve. The mixture shall contain not less than 22 percent ground rubber, by weight. Modifiers may be used to facilitate blending.
2. The asphalt rubber sealant shall have a Ring and Ball softening point of 135° F 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 400° F.

The penetration requirement of Section 7.2 of ASTM Designation: D 6690 shall not apply. The required penetration shall not exceed 90, at 77° F, 5 ounces, 5 seconds.

The resilience requirement of Section 7.6 of ASTM Designation: D 6690 shall not apply. The required resilience shall be a minimum of 50 percent recovery, when tested at 77° F.

Each lot of asphalt rubber joint sealant shipped to the job site, whether as specified herein or conforming to the requirements of ASTM Designation: D 6690, as modified herein, 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 shall 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. The Certificate and accompanying test report shall be provided for each lot of sealant prior to use on the project.

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 the

preparing conference. Asphalt rubber joint-sealant materials shall not be placed when the pavement surface temperature is below 50° F.

### **Foam Backer Rods**

Foam backer rods shall be Type 1, conforming to the requirements of ASTM Designation: D 5249. Foam backer rods shall have a diameter prior to placement at least 25 percent greater than the width of the sawcut and shall be expanded, crosslinked, closed-cell polyethylene foam that is compatible with the joint sealant so that no bond or adverse reaction occurs between the rod and sealant. Hot applied sealant that will melt the foam backer rod shall not be used. The Contractor shall submit a manufacturer's data sheet verifying that the foam backer rod is compatible with the sealant to be used.

### **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 weight 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 |
|------------|--------------------|
| 1/2 inch   | 100                |
| 3/8 inch   | 85 - 100           |
| No. 4      | 10 - 30            |
| No. 8      | 0 - 10             |
| No. 16     | 0 - 5              |

## **PAVEMENT CONCRETE MIX PROPORTIONS**

The Contractor shall determine the mix proportions for pavement concrete. The laboratory used to develop the mix proportions shall meet the requirements of ASTM Designation: C 1077, and shall have current AASHTO accreditation for test methods AASHTO Designation: T 97 or ASTM Designation: C 78, and AASHTO Designation: T 126 or ASTM Designation: C 192.

The minimum cementitious materials content or the maximum water to cementitious materials ratio shall be determined in conformance with the requirements in California Test 559. Trial mixtures shall be made no more than 24 months before field qualification. The minimum cementitious materials content or the maximum water to cementitious materials ratio shall be that determined from the trial mixtures curve to produce a minimum modulus of rupture of 560 pounds per square inch at 28 days age and 650 pounds per square inch at 42 days age. To account for variances in materials, production of concrete, and modulus of rupture testing, the Contractor shall include as part of the proposed mix proportions an increase to the cementitious material content or a decrease to the water to cementitious materials ratio, determined from trial mixtures, to ensure that portland cement concrete produced during paving operations conforms to the requirements in "Modulus of Rupture," in this section.

At least 15 days prior to field qualification, the Contractor shall submit the proposed pavement concrete mix proportions with laboratory test reports. Laboratory test reports shall include modulus of rupture determined for each trial mixture at ages of 10, 21, 28 and 42 days in conformance with the applicable portions of California Test 559.

### **Field Qualification**

Field qualification of proposed mix proportions will be required prior to placement of pavement concrete. The Contractor shall perform field qualification and submit certified test data to the Engineer. Field qualification data shall be based upon the proposed use of materials, mix proportions, mixing equipment, procedures and size of batch.

Proposed concrete mix proportions will be field qualified when the test results of five beams from a single batch of concrete indicate the average modulus of rupture is at least 560 pounds per square inch with no single beam lower than 550 pounds per square inch at an age of the Contractor's choice but not later than 28 days. Beams shall be tested for modulus of rupture at a minimum of 10, 21, and 28 days of age. Test specimens shall be made and tested in conformance with the requirements in California Test 523.

The certified field qualification test data reports shall include the following:

1. Date of mixing,
2. Mixing equipment and procedures used,
3. Volume of batch in cubic yards and the weight or volume,
4. Type and source of ingredients used,
5. Penetration and slump of the concrete,
6. The air content of the concrete, and
7. The age at time of testing and strength of concrete specimens tested.

Field qualification test data reports shall be signed by a certified representative in charge of the laboratory that performed the tests.

If the Contractor changes a source of supply or proportions, the Contractor shall submit a new proposed mix design and furnish samples from the new source, or sources, at least 60 days prior to their intended use. The new mix proportions shall be trial batched and field qualified, unless, the Engineer determines the change is not substantive. No extension of contract time will be allowed for the time required to perform the sampling, testing, preparing and qualifying new mix proportions for new aggregate sources proposed by the Contractor.

### **MODULUS OF RUPTURE**

The Engineer will test portland cement concrete pavement for modulus of rupture in conformance with the requirements in California Test 523. Acceptance will be on a lot basis. Each lot shall not to exceed 1,000 cubic yards of concrete pavement. The Engineer will determine sample locations. A minimum of six beam specimens shall be made from each sample. Beam specimens will be tested for modulus of rupture at 10, 21, and 28 days. The modulus of rupture for each lot will be calculated by averaging the results of two beams representing that lot tested at 28 days of age. The difference in modulus of rupture between each individual beam result shall not exceed 65 pounds per square inch.

The Contractor shall perform sampling and testing of beam specimens to determine if concrete pavement has achieved a modulus of rupture of 350 pounds per square inch when requesting early use of concrete pavement in conformance with the provisions in Section 90-8.03, "Protecting Concrete Pavement," of the Standard Specifications. Beam specimens shall be made and tested in conformance with the requirements in California Test 523.

### **INSTALLING TIE BARS**

Tie bars shall be installed at longitudinal contact joints and longitudinal weakened plane joints as shown on the plans. Contiguous width of new portland cement concrete pavement tied together with tie bars shall not exceed 50 feet. Tie bars shall not be installed at joints between portland cement concrete and hot mix asphalt pavements.

Tie bars shall be installed at longitudinal joints by one of the following methods:

1. Drilling and bonding tie bars with two-component, epoxy-resin that conforms to this section. 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. Tie bars will be rotated 180° while being inserted into the epoxy filled holes. 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 the epoxy has cured as specified by the manufacturer instructions. Tie bars that are improperly placed or bonded, as determined by the Engineer, will be rejected. If rejected, new holes shall be drilled and new tie bars shall be placed and securely bonded to the concrete. Rejected tie bars shall be cut flush with the joint face. Exposed ends of tie bars shall be epoxy coated. The center of the new holes shall be offset 3 inches horizontally from the center of the rejected hole to maintain the minimum clearance to the dowel bar. Work necessary to correct improperly bonded tie bars shall be performed at the Contractor's expense.
2. Inserting tie bars into the plastic slipformed concrete before finishing the concrete. Inserted tie bars shall have full contact between the bar and the concrete. When tie bars are inserted through the pavement surface, the concrete over the tie bars shall be reworked and refinished so that there is no evidence on the surface of the completed pavement that there has been an insertion performed. Loose tie bars shall be replaced by drilling and bonding as described in A above, at the Contractor's expense.

3. Using threaded dowel splice couplers fabricated from deformed bar reinforcement material, free of external welding or machining. Threaded dowel splice couplers 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 installation instructions. Installation of threaded dowel splice couplers shall conform to the requirements of the manufacturer's recommendations.
4. Using tie bar baskets that conform to these special provisions

Tie bars shall be oriented perpendicular to the pavement joint and parallel with the surface of the pavement at mid-slab depth. Tie bar alignment tolerances shall conform to the requirements for dowel bars except embedment length tolerance shall be  $\pm 2$  inches.

If tie bar baskets are used, they shall be anchored to the base to hold the tie 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 basket (4 per lower runner wire). Temporary spacer wires shall be cut or removed after the baskets are anchored into position before concrete placement. Concrete pavement shall not be placed if the baskets are not in place at least 200 feet in advance of the concrete placement operation. The Engineer may waive this requirement upon written request by the Contractor in areas where access is restricted or other construction limitations are encountered. The Contractor shall demonstrate that the baskets are anchored and shall not shift during concrete placement. The Contractor shall provide longer concrete nails than the minimum lengths for the varying bases beneath the portland cement concrete when baskets demonstrate movement.

Full compensation for providing longer concrete nails shall be considered as included in the contract unit price paid per cubic yard for concrete pavement and no additional compensation will be allowed therefor.

### **DOWEL PLACEMENT**

Dowel bars shall be centered on the joint within a tolerance of  $\pm 2$  inches 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 at transverse weakened plane joints within shoulder areas except at drainage inlets.

Dowel bars shall be placed at longitudinal joints as shown on the plans.

Dowel bars shall be placed as shown on the plans by using dowel bar baskets or by mechanical insertion.

When dowel bars are placed by mechanical insertion, the concrete over the dowel bars shall be reworked and refinished so that there is no evidence on the surface of the completed pavement that there has been any insertion performed. When drill and bonding of dowel bars is performed at contact joints, a grout retention ring shall be used.

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 12-foot dowel bar basket (4 per lower runner wire). At least 10 concrete fasteners shall be used for basket sections greater than 12 feet and less than or equal to 16 feet. 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. Paving shall be suspended when dowel bar baskets are not in place at least 200 feet in advance of the concrete placement operation. The Engineer may waive this requirement upon written request by the Contractor, in areas, where access is restricted, or other construction limitations are encountered. 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 portland cement 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 per cubic yard for concrete pavement and no additional compensation will be allowed therefor.

| Dowel bar placement at transverse and longitudinal weakened plane joints |   |
|--|---|
| Horizontal offset  | $\pm 1$ inch  |
| Longitudinal translation   | $\pm 2$ inches  |
| Horizontal skew  | 3/8 inch  |
| Vertical skew  | 3/8 inch  |
| Vertical depth   | ( $d/3 + 1/2$ inch) from pavement surface to top of dowel bar or 5/8 inch below planned placement |

Note: d = pavement thickness in inches

## **CORE DRILLING FOR DOWEL BAR AND TIE BAR PLACEMENT ALIGNMENT ASSURANCE TESTING**

Coring to confirm dowel bar and tie 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 2,000 square yards of doweled pavement or fraction thereof and one test for tie bar placement and position for every 4,000 square yards of pavement with tie bars. 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 5 inches. If the cores indicate that dowel bars or tie bars are not within the allowable tolerances or if air voids exist surrounding the dowel bars or tie 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 1,000 parts per million of chlorides as CL, nor more than 1,300 parts per million of sulfates as SO<sub>4</sub>, 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 and tie 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 3 feet, 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 1/8 inch 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 3 inches, horizontally from the tie bar location. Holes for dowel bars to be placed along the longitudinal joint shall be drilled, not more than 1/8 inch 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  $\pm 2$  inches but less than  $\pm 3$  inches 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 \$27.00 per square yard 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 incorrect tie bar alignment or improper concrete consolidation around tie 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.

Tie bars which are not within the specified tolerance for placement and position, as determined from inspection and measurements of cores, may remain in place when requested by the Contractor and approved by the Engineer. The Contractor shall pay to the State the amount of \$20 per square yard for the quantity of concrete pavement panels represented by the cores indicating incorrect tie bar alignment or improper concrete consolidation around tie bars. 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 tie bar alignment or improper concrete consolidation around tie bars. 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.

### **LIQUID JOINT SEALANT INSTALLATION**

The joint sealant detail for transverse and longitudinal joints, as shown on the plans, shall apply only to weakened plane joints. Weakened plane joints shall be constructed by the sawing method. Should grinding or grooving be required over or adjacent to joints after sealant has been placed, the joint materials 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, and replaced at the Contractor's expense. Immediately after sawing, a water wash using less than 100 pounds per square inch of pressure shall be used to remove the slurry from the sawing operation.

Transverse weakened plane joints shall be Type A1 or B as shown on the plans. Longitudinal weakened plane joints shall be Type A2 or B as shown on the plans.

Seven days after the concrete pavement placement and not more than 4 hours before placing backer rods and joint sealant materials, 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. Sand blasting shall be performed in at least 2 passes, one for each side of the joint, with the nozzle held at an angle to the joint within one inch to 2 inches of the pavement. 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 2 inches 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 1/4 inch  $\pm$  1/32 inch and a minimum pressure of 90 pounds per square inch.

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 40 °F 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 rod that leave a residue or film on joint walls shall not be used.

Immediately after placement of the backer rod, joint sealant shall be placed in the clean, dry, prepared joints as shown on the plans. The joint sealant shall be applied using a mechanical device with a nozzle shaped to fit inside the joint to introduce the sealant from inside the joint. Adequate pressure shall be applied to the sealant to ensure that the sealant material is extruded evenly and that full continuous contact is made with the joint walls. After application of the sealant, the surface of the sealant shall be recessed as shown on the plans.

Failure of the joint material in either adhesion or cohesion will be cause for rejection of the joint. The finished surface of joint sealant shall conform to the dimensions and allowable tolerances shown on the plans. Rejected joint materials or joint material whose finished surface does not conform to the dimensions shown on the plans, as determined by the Engineer, shall be repaired or replaced, at the Contractor's expense, with joint material that conforms to the requirements.

After each joint is sealed, surplus joint sealer on the pavement surface shall be removed. Traffic shall not be permitted over the sealed joints until the sealant is tack free and set sufficiently to prevent embedment of roadway debris into the sealant.

### **CONSTRUCTING TRANSVERSE CONTACT JOINTS**

A transverse contact (construction) joint shall be constructed, including dowel bars, at the end of each day's work or where concrete placement is interrupted for more than 30 minutes, to coincide with the next weakened plane joint location.

If sufficient concrete has not been mixed to form a slab to match the next weakened plane joint, when an interruption occurs, the excess concrete shall be removed and disposed of back to the last preceding joint. The cost of removing and disposing of excess concrete shall be at the Contractor's expense. Excess material 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.

A metal or wooden bulkhead (header) shall be used to form the joint. The bulkhead shall be designed to accommodate the installation of dowel bars.

### **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. The edge of the existing pavement shall be saw cut a width 1/8 inch and to the full depth of the existing concrete pavement to produce a flat vertical face. 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 asphalt rubber and placed in conformance with the requirements for liquid joint sealant installation as specified above, except references to backer rods shall not apply.

### **CONSTRUCTING TRANSVERSE JOINT CONNECTIONS AND ANCHORS**

Concrete pavement joints at transitions to hot mix asphalt 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 hot mix asphalt pavement will contact. Paint binder shall be applied in conformance with the provisions in Section 39, "Hot Mix Asphalt," 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 yard from and parallel with each lane line.

Profiled pavement shall conform to the following Profile Index requirements:

1. Pavement on tangent alignment and pavement on horizontal curves having a centerline radius of curve 2,000 feet or more shall have a Profile Index of 40 inches per mile or less.
2. Pavement on horizontal curves having a centerline radius of curve 1,000 feet or more but less than 2,000 feet and pavement within the superelevation transition of those curves shall have a Profile Index of 80 inches per mile or less.

Concrete shoulders shall be profiled. Two profiles shall be made within the shoulder, one yard from and parallel with each edge of the shoulder. Concrete shoulders profiled shall conform to the Profile Index requirements in this section.

Individual high points in excess of 5/16 inch, 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 5/16 inch.

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 550 pounds per square inch.

### **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 0.12-inch 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 30 inches between tie bars, then the tie bars shall be equally spaced so that a minimum spacing of 15 inches to a maximum spacing of 30 inches is maintained between tie bars. Additional tie bars shall be considered as included in the contract price paid per cubic yard for concrete pavement and no additional compensation will be allowed therefor.

If dowel bars are specified along longitudinal joint for short radius curves, then dowel bars shall conform to the requirements of this special provision for tie bars spacing and tolerance.

## **MEASUREMENT AND PAYMENT**

Sealing longitudinal and transverse weakened plane joints, and longitudinal isolation joints in portland cement concrete pavement will be measured by the foot. When a test strip conforms to the specifications for concrete pavement and remains a part of the project paving surface, the sealed pavement joints will be measured and paid for as seal pavement joint.

The contract price paid per foot 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 backer rod, 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 foot 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.

Concrete pavement will be measured by the cubic yard in conformance with the provisions in Section 40-1.13, "Measurement," of the Standard Specifications. 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. When a test strip conforms to the specifications for concrete pavement and remains a part of the project paving surface, the concrete will be measured and paid for as concrete pavement.

The contract price paid per cubic yard for concrete pavement shall include full compensation for furnishing all labor, materials (including cementitious material in the amount determined by the Contractor), tools, equipment, and incidentals, and for doing all the work involved in constructing the portland cement concrete pavement complete in place, including furnishing and placing epoxy-coated dowel bars, epoxy-coated tie bars and, when used, any tie bar baskets and dowel bar baskets with fasteners, submittal to the Engineer all test data for determination of mix proportions of concrete for concrete pavement and for providing the facility, Contractor personnel and all the work involved in arranging and holding the prepaving conference, for constructing and repairing all joints; for performing all profile checks for Profile Index and furnishing final profilograms to the Engineer; for grooving and grinding required for final finishing; and for removing, and replacing pavement for deficient thickness, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for drilling holes and bonding tie bars with epoxy resin shall be considered as included in the contract price paid per cubic yard for concrete pavement and no additional compensation will be allowed therefor.

Costs for providing JITT will be determined 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.

Full compensation for core drilling for dowel bar or tie bar alignment and backfilling with hydraulic cement grout shall be considered as included in the contract price per cubic yard for concrete pavement and no additional compensation will be allowed therefor.

If the initial cores show that dowel bars or tie bars are out of alignment tolerances and the Engineer orders additional dowel bar or tie bar coring, full compensation for drilling the additional cores shall be considered as included in the contract price per cubic yard for concrete pavement and no additional compensation will be allowed therefor.

If the initial cores show that dowel bars or tie 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.

Full compensation for drilling holes and bonding dowel bars with epoxy resin shall be considered as included in the contract price paid per cubic yard for concrete pavement and no additional compensation will be allowed therefor.

Full compensation for furnishing and placing epoxy coated reinforcement for transition end panel shall be considered as included in the contract price paid per cubic yard for concrete pavement and no additional compensation will be allowed therefor.

Full compensation for furnishing and placing paint binder (tack coat) for transition end panel shall be considered as included in the contract price paid per cubic yard for concrete pavement and no additional compensation will be allowed therefor.

### **10-1.42 REPLACE CONCRETE PAVEMENT (RAPID STRENGTH CONCRETE)**

Replace concrete pavement (Rapid Strength Concrete) shall consist of removing existing portland cement concrete pavement and underlying 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.

### **DEFINITIONS**

The following definitions shall apply to this section:

1. EARLY AGE. – A time less than 10 times the final set time of the concrete.
2. FINAL SET TIME. – The elapsed time after initial contact of cement and water, or accelerator, if used, at which a specific penetration resistance of 4,000 pounds per square inch is achieved in conformance with the requirements in ASTM Designation: C 403.
3. 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, quality control manager, foremen, subcontractors, field staff, 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. 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. 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 5 business 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. 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 and base material to be replaced are as shown on the plans.

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 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.

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 18 inches 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**

Hot mix asphalt 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 3 1/2-inch thick hot mix asphalt 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 3/4-inch maximum grading specified in Section 26-1.02A, "Class 2 Aggregate Base," of the Standard Specifications.

Hot mix asphalt for temporary roadway structural section shall be produced from commercial quality aggregates and asphalt binder. Grading of aggregate shall conform to the 3/4-inch grading for Type B hot mix asphalt in Section 39-1.02E, "Aggregate," of the Standard Specifications and asphalt binder shall conform to requirements for liquid asphalt MC-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 in conformance with the requirements in California Test 367.

Aggregate base and hot mix asphalt 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. Hot mix asphalt may be spread and compacted in one layer. Finished surface of hot mix asphalt shall not vary more than 0.05-foot from the lower edge of a 12-foot 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 40-1.05, "Proportioning," and 90-1.01, "Description," of the Standard Specifications shall not apply.

Combined aggregate grading used in RSC shall be either the 1-1/2-inch maximum grading, or one-inch 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                      | 2,500 psi     |

\* 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 No. 50 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 Cement Laboratory at the Transportation Laboratory. 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.

Non-Chloride Type C accelerating chemical admixtures and Type E, accelerating and water reducing 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 10 days prior to use in the trial slab, the Contractor shall submit a mix design for RSC that shall include the following:

1. Opening age
2. Proposed aggregate gradings
3. Mix proportions of hydraulic cement and aggregate
4. Types and amounts of chemical admixtures
5. Maximum time allowed between batching RSC and placing roadway pavement
6. Range of ambient temperatures over which the mix design is effective (18° F maximum range)
7. Final set time of the concrete
8. 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 18° F. 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 600 pounds per square inch 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 524. 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 yards, whichever is less.

When modulus of rupture at early age is determined using beam specimens, beam specimens shall be cured under atmospheric conditions and at a temperature within 5° F of the pavement. Modulus of rupture at other ages will be determined using beams cured and tested in conformance with California Test 524 except beams will be placed into sand between 5 times 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:

1. Replace concrete pavement (Rapid Strength Concrete) with modulus of rupture of 400 pounds per square inch or greater before the lane is opened to the traffic and 7-day modulus of rupture of 600 pounds per square inch or greater will be paid for at the contract price per cubic yard for replace concrete pavement (Rapid Strength Concrete).
2. Replace concrete pavement (Rapid Strength Concrete) with a 7-day modulus of rupture of less than 500 pounds per square inch 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.
3. Replace concrete pavement (Rapid Strength Concrete) with modulus of rupture of 350 pounds per square inch or greater before the lane is opened to traffic and a 7-day modulus of rupture of equal to or greater than 500 pounds per square inch will be paid for at a percentage of the contract price per cubic yard for replace concrete pavement (Rapid Strength Concrete) in conformance with the percentages in the pay table below.
4. Replace concrete pavement (Rapid Strength Concrete) with modulus of rupture of less than 350 pounds per square inch 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 (psi) at opening to traffic | 7-Day Modulus of Rupture (psi) |  |  |
|--|--------------------------------|--|--|
|  | Greater than or equal to 600   | Less than 600 and greater than or equal to 550 | Less than 550 and greater than or equal to 500 |
| Greater than or equal to 400                   | 100%                           | 95%  | 90%  |
| Less than 400 and greater than or equal to 350 | 95%                            | 95%  | 90%  |
| Less than 350                                  | 0%*                            | 0%*  | 0%*  |

\* Any replacement panels that develops one or more transverse cracks or full depth random cracks within 21 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. A transverse crack is defined as a crack running from one longitudinal edge of the panel to the other.

**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.

Weighing equipment shall be insulated against vibration or movement of other operating equipment. When the plant is in operation, the weight of each draft of material shall not vary from the designated weight 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 weight of the aggregate. Equipment for the separate weighing of the cement shall have a zero tolerance of ±0.5 percent of its designated individual batch draft. Equipment for measuring water shall have a zero tolerance of ±0.5 percent of its designated weight or volume.

The weight 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 weight           |
| Cement    | ±0.5 percent of designated batch weight           |
| Water     | ±1.5 percent of designated batch weight or volume |

Proportioning shall consist of dividing the aggregates into the specified sizes, each stored in a separate bin, and combining them with cement and water as provided in these special provisions. Dry ingredients shall be proportioned by weight. Liquid ingredients shall be proportioned by weight 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 weight.

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 and cement 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 yard or more, proportioning equipment shall conform to one of the following methods:

1. 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.
2. 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.
3. 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 2.75 tons with a maximum graduation size of one pound. 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.
4. Cement, water, and aggregate shall be proportioned volumetrically in conformance with these special provisions.

In order to check the accuracy of batch weights, the gross weight and tare weight of truck mixers shall be determined when ordered by the Engineer. The equipment shall be weighed 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 weight 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 weight 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 weight of the cement used in the load.

## **Volumetric Proportioning**

When RSC is proportioned by volume, the method shall conform to requirements specified herein.

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.

Batch-mixer trucks shall be equipped to proportion cement, water, aggregate and additives by volume. Aggregate feeders shall be connected directly to the drive on the cement vane feeder. The cement feed rate shall be tied directly to the feed rate for the aggregate and other ingredients. Any change in the ratio of cement to aggregate shall be accomplished by changing the gate opening for the aggregate feed. The drive shaft of the aggregate feeder shall be equipped with a revolution counter reading to the nearest full or partial revolution of the aggregate delivery belt.

Aggregate shall be proportioned using a belt feeder operated with an adjustable cutoff gate delineated to the nearest quarter increment. Height of the gate opening shall be readily determinable. Cement shall be proportioned by a method that conforms to the accuracy requirements of these special provisions. Water shall be proportioned by a meter conforming to the provisions in Section 9-1.01, "Measurement and Payment," of the Standard Specifications and these special provisions.

Delivery rate of aggregate and cement per revolution of the aggregate feeder shall be calibrated at appropriate gate settings for each batch-mixer truck used on the project and for each aggregate source. Batch-mixer trucks shall be calibrated at 3 different aggregate gate settings that are commensurate with production needs. Two or more calibration runs shall be required at each of the different aggregate gate openings. The actual weight of material delivered for aggregate proportioning device calibrations shall be determined by a platform scale as specified in these special provisions.

Aggregate belt feeder shall deliver aggregate to the mixer with volumetric consistency so that deviation for any individual aggregate delivery rate check-run shall not exceed 1.0 percent of the mathematical average of all runs for the same gate opening and aggregate type. Each test run shall be at least 1,000 pounds. Fine aggregate used for calibration shall not be reused for device calibration.

At the time of batching, aggregates shall be dried or drained sufficiently to result in stable moisture content, so that no visible separation of water from aggregate takes 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 weight.

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 another supply.

Rotating and reciprocating equipment on batch-mixer trucks shall be covered with metal guards.

The cement proportioning system shall deliver cement to the mixer with a volumetric consistency so that the deviation for any individual delivery rate check-run shall not exceed 1.0 percent of the mathematical average of 3 runs of at least 1,000 pounds each. Cement used for calibration shall not be reused for device calibration.

Water meter accuracy shall be such that, when operating between 50 percent and 100 percent of production capacity, the difference between the indicated weight of water delivered and the actual weight delivered shall not exceed 1.5 percent of the actual weight for each of two individual runs of 300 gallons. The water meter shall be calibrated in conformance with the requirements of California Test 109 and shall be equipped with a resettable totalizer and display the operating rate.

Calibration tests for aggregate, cement and water proportioning devices shall be conducted with a platform scale located at the calibration site. Weighing of test run calibration material shall be performed on a platform scale having a maximum capacity not exceeding 2.75 tons with maximum graduations of one pound. The platform scale shall be error tested within 8 hours of calibration of batch-mixer truck proportioning devices. Error testing shall be performed with test weights conforming to California Test 109 and shall produce a witness scale that is within 2 graduations of the test weight load. The scale shall be available for use at the production site throughout the production period. Equipment needed for the calibration of proportioning systems shall remain available at the production site throughout the production period. A Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," shall be furnished with each delivery of aggregate, cement, and admixtures used for calibration tests and shall be submitted to the Engineer with certified copies of the weight of each delivery. The Certificate of Compliance shall state that the source of materials used for the calibration tests is from the same source as to be used for the planned work. The Certificate of Compliance shall state that the material supplied conforms to the Standard Specifications and these Special Provisions and shall be signed by an authorized representative who shall have the authority to represent and act for the Contractor.

The batch-mixer truck shall be equipped so that an accuracy check can be made prior to the first operation for the project and at any other time as directed by the Engineer. Further calibration of proportioning devices shall be required every 30 days after production begins or when the source or type of any ingredient is changed. A spot calibration shall consist of calibration of the cement proportioning system only. A two run spot re-calibration of the cement proportioning system shall be performed each time 55 tons of cement has passed through the batch-mixer truck. Should the spot re-calibration of the cement proportioning system fall outside the limitations specified herein, a full calibration of the cement proportioning system shall be completed before the resumption of production.

Liquid admixtures shall be proportioned by a meter.

Cement storage shall be located immediately before the cement feeder and shall be equipped with a device that will automatically shut down the power to the cement feeder and aggregate belt feeder when the cement storage level is lowered to a point where less than 20 percent of the total volume is left in storage.

The Contractor shall furnish aggregate moisture determinations, made in conformance with the requirements of California Test 223, at least every 2 hours during proportioning and mixing operations. Moisture determinations shall be recorded and presented to the Engineer at the end of the production shift.

Each aggregate bin shall be equipped with a device that will automatically shut down the power to the cement feeder and aggregate belt feeder when the aggregate discharge rate is less than 95 percent of the scheduled discharge rate of any bin.

Indicators specified herein shall be in working order prior to commencing proportioning and mixing operations and shall be visible when standing near the batch-mixer truck.

Identifying numbers of batch-mixer trucks shall be at least 3 inches in height, and be located on the front and rear of the vehicles.

Volumetric proportioned RSC shall be mixed in a mechanically operated mixer of adequate size and power for the type of RSC to be placed. Mixers may be of the auger type and shall be operated uniformly at the mixing speed recommended by the manufacturer. Mixers that have an accumulation of hard concrete or mortar shall be removed from service until cleaned. Other types of mixers may be used provided mixing quality will meet the requirements of these special provisions.

Charge or rate of feed to the mixer shall not exceed that which will permit complete mixing of the materials. Dead areas in the mixer, where material does not move or is not sufficiently agitated, shall be corrected by a reduction in the volume of material or by other adjustments. The mixer shall be designed to provide sufficient mixing action and movement to produce properly mixed RSC. Mixing shall continue until a homogeneous mixture is produced at discharge from the mixer. There shall be no lumps or evidence of non-dispersed cement at discharge from the mixer. No water shall be added to the RSC after discharge from the mixer.

Equipment having components made of aluminum or magnesium alloys, which may have contact with plastic concrete during mixing or transporting of RSC, shall not be used.

Uniformity of concrete mixtures will be determined by differences in penetration measurement made in conformance with the requirements in California Test 533. 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 5/8 inch. The Contractor shall furnish samples of freshly mixed concrete and provide facilities for obtaining the samples. Sampling facilities shall be safe, accessible, clean and produce a sample which is representative of production. Sample devices and sampling methods shall also conform to the requirements of California Test 125.

Ice shall not be used to cool RSC directly. When ice is used to cool water used in the mix, all of the ice shall be melted before entering the mixer.

Cement shall be proportioned and charged into the mixer by means that will result in no losses of cement due to wind, or due to accumulation on equipment, or other conditions which will vary the required quantity of cement.

Each mixer shall have a metal plate or plates, prominently attached, on which the following information is provided:

1. Uses for which the equipment is designed
2. Manufacturer's guaranteed capacity of the mixer in terms of the volume of mixed concrete
3. Speed of rotation of the mixer

Consistency and workability of mixed concrete when discharged at the delivery point shall be suitable for placement and consolidation.

Information generated by volumetric devices will not be used for payment calculations.

The device that controls the proportioning of cement, aggregate and water shall produce a log of production data. The log of production data shall consist of a series of snapshots captured at 15-minute intervals throughout the period of daily production. Each snapshot of production data shall be a register of production activity at that time and not a summation of the data over the preceding 15 minutes. The amount of material represented by each snapshot shall be the amount produced in the period of time from 7.5 minutes before to 7.5 minutes after the capture time. The daily log shall be submitted to the Engineer, in electronic or printed media, at the end of each production shift or as requested by the Engineer, and shall include the following:

1. Weight of cement per revolution count
2. Weight of each aggregate size per revolution count
3. Gate openings for each aggregate size being used
4. Weight of water added to the concrete per revolution count
5. Moisture content of each aggregate size being used
6. Individual volume of all other admixtures per revolution count
7. Time of day
8. Day of week
9. Production start and stop times
10. Batch-mixer truck identification
11. Name of supplier
12. Specific type, size, or designation of concrete being produced
13. Source of the individual aggregate sizes being used
14. Source, brand and type of cement being used
15. Source, brand and type of individual admixtures being used
16. Name and signature of operator

Required report items may be input by hand into a pre-printed form or captured and printed by the proportioning device. Electronic media containing recorded production data shall be presented in a tab delimited format on a 3.5-inch diskette with a capacity of at least 1.4 megabytes. Each snapshot of the continuous production shall be followed by a line-feed carriage-return with allowances for sufficient fields to satisfy the amount of data required by these specifications. The reported data shall be in the above order and shall include data titles at least once per report.

### **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 as 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 replaced pavement and new base replacement layer. Bond breaker shall be one of the following:

1. Curing paper conforming to the requirements in ASTM Designation: C 171, white.
2. Polyethylene film conforming to the requirements in ASTM Designation: C 171, except that the minimum thickness shall be 6 mils, white opaque.
3. Paving asphalt, Grade PG 64-10, conforming to the provisions in Section 92, "Asphalts," of the Standard Specifications.
4. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class A, containing a minimum of 22 percent nonvolatile vehicles consisting of at least 50 percent paraffin wax.

When curing paper or polyethylene film is used, material shall be placed in a wrinkle free manner. Adjacent sheets shall be overlapped a minimum of 6 inches.

When curing compound or paving asphalt is used, all foreign and loose materials remaining from slab removal shall be removed prior to application.

When paving asphalt is used, no water shall be added before applying asphalt to the surface of the base. The paving asphalt shall be applied in one even application at a rate of 0.02-gallon to 0.10-gallon per square yard over the entire base surface area. Concrete pavement shall not be placed until the paving asphalt has cured.

When curing compound is used, the curing compound shall be applied in two separate applications. Each application shall be applied evenly at a rate of 0.07-gallon to 0.11-gallon per square yard over the entire base surface area.

### **Spreading, Compacting and Shaping**

Metal or wood side forms may be used. Wood side forms shall not be less than 1-1/2 inches 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 weight 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.

### **Tie Bars**

Tie bars shall be deformed reinforcing steel bars conforming to the requirements of ASTM Designation: A 615/A 615M, Grade 40 or 60, A 996/A 996M, Grade 50 or 60, or A 706/A 706M. Tie bars shall be epoxy-coated in conformance with the requirements in ASTM Designation: A 934/A 934M or A 775/A 775M and the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement," of the Standard Specifications, except the epoxy-coating thickness after curing shall be between 7 mils to 16 mils. Fabrication, sampling and jobsite 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 the 2 samples shall be 30 inches long. Epoxy-coated tie bars shall not be bent.

### **Epoxy (Drill and Bond)**

Epoxy for bonding tie bars and dowel bars shall be a two-component, epoxy-resin, conforming to the requirements of ASTM Designation: C 881, Type V, Grade 3 (Non-Sagging), Class A, B or C. The class used shall be dependent on the internal temperature of the hardened concrete at the time the epoxy is to be applied. Class A shall be used when the internal temperature is below 40 °F, but not lower than recommended by the manufacturer. Class B shall be used when the internal temperature is from 40 °F to 60 °F. Class C shall be used when the internal temperature is above 60 °F, but not higher than recommended by the manufacturer. A Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished with the epoxy. 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. Epoxy shall be applied in conformance with the manufacturer's recommendations.

### **Dowel Bars**

Dowel bars shall be plain round smooth, epoxy-coated steel conforming to the requirements in ASTM Designation: A 615/A 615M, Grade 40 or 60, 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 18 inches 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.

### **Bond Breaker**

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 gallon per 15 square yards.

### **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 or Type 2 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.

Concrete fasteners shall be used for anchoring dowel bar baskets to base (Rapid Strength Concrete). Concrete fasteners shall be driven fasteners such as nails, used specifically for fastening to hardened concrete used as base. Concrete fasteners shall conform to the requirements of ASTM Designation: F 1667. Nails used as fasteners on base (Rapid Strength Concrete) shall have a minimum shank diameter of 5/32 inch with a minimum shank length of 2-1/2 inches. Shank length shall be the distance from the point to the bottom of the nail head. 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 0.2-mil.

### **Reinforcement**

Reinforcement shall be epoxy coated and shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications.

### **Silicone Joint Sealant**

Low modulus silicone joint sealant shall be furnished in a one-part silicone formulation. Acid cure sealant shall not be used. The compound shall be compatible with the surface to which it is applied and shall conform to the following requirements:

| Property  | Test Method               | Requirement                                    |
|---|---------------------------|--|
| Tensile stress, 150% elongation, 7-day cure at 77° F <sup>±2°</sup> F and 45% to 55% R.H. <sup>e</sup>  | ASTM D 412 (Die C)        | 45 psi max.                                    |
| Flow at 77° F <sup>±2°</sup> F  | ASTM C 639 <sup>a</sup>   | Shall not flow from channel                    |
| Extrusion Rate at 77° F <sup>±2°</sup> F  | ASTM C 603 <sup>b</sup>   | 3 to 9 ounces/minute                           |
| Specific Gravity  | ASTM D 792 Method A       | 1.01 to 1.51                                   |
| Durometer Hardness, at 0° F, Shore A, cured 7 days at 77° F <sup>±2°</sup> F  | ASTM C 661                | 10 to 25                                       |
| Ozone and Ultraviolet Resistance, after 5,000 hours   | ASTM C 793                | No chalking, cracking or bond loss             |
| Tack free at 77° F <sup>±2°</sup> F and 45% to 55% R.H. <sup>e</sup>  | ASTM C 679                | Less than 75 minutes                           |
| Elongation, 7 day cure at 77° F <sup>±2°</sup> F and 45% to 55% R.H. <sup>e</sup>   | ASTM D 412 (Die C)        | 500 percent min.                               |
| Set to Touch, at 77° F <sup>±2°</sup> F and 45% to 55% R.H. <sup>e</sup>  | ASTM D 1640               | Less than 75 minutes                           |
| Shelf Life, from date of shipment   | —                         | 6 months min.                                  |
| Bond, to concrete mortar-concrete briquettes, air cured 7 days at 77° F <sup>±2°</sup> F  | AASHTO T 132 <sup>c</sup> | 50 psi min.                                    |
| Movement Capability and Adhesion, 100% extension at 0° F after, air cured 7 days at 77° F <sup>±2°</sup> F, and followed by 7 days in water at 77° F <sup>±2°</sup> F | ASTM C 719 <sup>d</sup>   | No adhesive or cohesive failure after 5 cycles |

Notes:

- a. ASTM Designation: C 639 Modified (15 percent slope channel A).
- b. ASTM Designation: C 603, through 1/8 inch opening at 50 psi.
- c. Mold briquettes in conformance with AASHTO Designation: T 132, sawed in half and bonded with a 1/16 inch maximum thickness of sealant and tested in conformance with AASHTO Designation: T 132. Briquettes shall be dried to constant mass at 212 ±10° F.
- d. Movement Capability and Adhesion: Prepare 12" x 1" x 3" concrete blocks in conformance with ASTM Designation: C 719. A sawed face shall be used for bond surface. Seal 2 inches of block leaving 1/2 inch on each end of specimen unsealed. The depth of sealant shall be 3/8 inch and the width 1/2 inch.
- e. R.H. equals relative humidity.

The silicone joint sealant shall be formulated to cure rapidly enough to prevent flow after application on grades of up to 15 percent.

A Certificate of Compliance for the silicone sealant 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 also be accompanied with a certified test report of the results of the required tests performed on the sealant material within the previous 12 months prior to proposed use. The Certificate and accompanying test report shall be provided for each lot of silicone joint sealant prior to use on the project.

#### **Foam Backer Rods**

Foam backer rods shall be Type 1, conforming to the requirements of ASTM Designation: D 5249. Foam backer rods shall have a diameter prior to placement at least 25 percent greater than the width of the sawcut and shall be expanded, crosslinked, closed-cell polyethylene foam that is compatible with the joint sealant so that no bond or adverse reaction occurs between the rod and sealant. Hot applied sealant that will melt the foam backer rod shall not be used. The Contractor shall submit a manufacturer's data sheet verifying that the foam backer rod is compatible with the sealant to be used.

#### **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 weight 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 |
|------------|--------------------|
| 1/2 inch   | 100                |
| 3/8 inch   | 85 - 100           |
| No. 4      | 10 - 30            |
| No. 8      | 0 - 10             |
| No. 16     | 0 - 5              |

### INSTALLING TIE BARS

Tie bars shall be installed at contact joints and longitudinal weakened plane joint as shown on the plans. Contiguous width of replace concrete pavement (Rapid Strength Concrete) tied together with tie bars shall not exceed 50 feet.

Tie bars shall be installed at longitudinal joints by one of the following methods:

1. Drilling and bonding tie bars with two-component, epoxy-resin that conforms to this section. 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. Tie bars will be rotated 180° while being inserted into the epoxy filled holes. 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 the epoxy has cured as specified by the manufacturer instructions. Tie bars that are improperly placed or bonded, as determined by the Engineer, will be rejected. If rejected, new holes shall be drilled and new tie bars shall be placed and securely bonded to the concrete. Rejected tie bars shall be cut flush with the joint face. Exposed ends of tie bars shall be epoxy coated. The center of the new holes shall be offset 3 inches horizontally from the center of the rejected hole to maintain the minimum clearance to the dowel bar. Work necessary to correct improperly bonded tie bars shall be performed at the Contractor's expense.
2. Using threaded dowel splice couplers fabricated from deformed bar reinforcement material, free of external welding or machining. Threaded dowel splice couplers 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 installation instructions. Installation of threaded dowel splice couplers shall conform to the requirements of the manufacturer's recommendations.

Tie bars shall be oriented perpendicular to the pavement joint and parallel with the surface of the pavement at mid-slab depth. Tie bar alignment tolerances shall conform to the requirements for dowel bars except embedment length tolerance shall be  $\pm 2$  inches.

### DOWEL PLACEMENT

Dowel bars shall be centered on the joint within a tolerance of  $\pm 2$  inches 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 at transverse weakened plane joints within shoulder areas except at drainage inlets.

Dowel bars shall be placed as shown on the plans by using dowel bar baskets, by drill and bond or by mechanical insertion.

When dowel bars are placed by mechanical insertion, the concrete over the dowel bars shall be reworked and refinished so that there is no evidence on the surface of the completed pavement that there has been any insertion performed. When drill and bonding of dowel bars is performed at contact joints, a grout retention ring shall be used.

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 12-foot dowel bar basket (4 per lower runner wire). At least 10 concrete fasteners shall be used for basket sections greater than 12 feet and less than or equal to 16 feet. 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. Paving shall be suspended when dowel bar baskets are not in place at least 200 feet in advance of the concrete placement

operation. The Engineer may waive this requirement upon written request by the Contractor, in areas, where access is restricted, or other construction limitations are encountered. 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 nails than the minimum lengths for the varying bases beneath the concrete pavement when anchored dowel bar baskets demonstrate movement.

Full compensation for providing longer nails shall be considered as included in the contract unit price paid per cubic yard for concrete pavement and no additional compensation will be allowed therefor.

| Dowel bar placement at transverse and longitudinal weakened plane joints |   |
|--|---|
| Horizontal offset  | ±1 inch   |
| Longitudinal translation   | ±2 inches   |
| Horizontal skew  | 3/8 inch  |
| Vertical skew  | 3/8 inch  |
| Vertical depth   | (d/3 +1/2 inch) from pavement surface to top of dowel bar or 5/8 inch below planned placement |

Note: d = pavement thickness in inches

**CORE DRILLING FOR DOWEL BAR AND TIE BAR PLACEMENT ALIGNMENT ASSURANCE TESTING**

Coring to confirm dowel bar and tie 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 2,000 square yards of doweled pavement or fraction thereof and one test for tie bar placement and position for every 4,000 square yards of pavement with tie bars. 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 5 inches. If the cores indicate that dowel bars or tie bars are not within the allowable tolerances or if air voids exist surrounding the dowel bars or tie 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 1,000 parts per million of chlorides as CL, nor more than 1,300 parts per million of sulfates as SO<sub>4</sub>, 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 and tie 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 3 feet, 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 1/8 inch 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. Holes for dowel bars to be placed along the longitudinal joint shall be drilled, not more than 1/8 inch 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 ±2 inches but less than ±3 inches 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 \$27.00 per square yard 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 incorrect tie bar

alignment or improper concrete consolidation around tie 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.

Tie bars which are not within the specified tolerance for placement and position, as determined from inspection and measurements of cores, may remain in place when requested by the Contractor and approved by the Engineer. The Contractor shall pay to the State the amount of \$20 per square yard for the quantity of concrete pavement panels represented by the cores indicating incorrect tie bar alignment or improper concrete consolidation around tie bars. 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 tie bar alignment or improper concrete consolidation around tie bars. 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.

### **LIQUID JOINT SEALANT INSTALLATION**

The joint sealant detail for transverse and longitudinal joints, as shown on the plans, shall apply only to weakened plane joints. Weakened plane joints shall be constructed by the sawing method. Should grinding or grooving be required over or adjacent to joints after sealant has been placed, the joint materials 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, and replaced at the Contractor's expense. Immediately after sawing, a water wash using less than 100 pounds per square inch of pressure shall be used to remove the slurry from the sawing operation.

Transverse weakened plane joints shall be Type A1 or B as shown on the plans. Longitudinal weakened plane joints shall be Type A2 or B as shown on the plans.

Seven days after the concrete pavement placement and not more than 4 hours before placing backer rods and joint sealant materials, 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. Sand blasting shall be performed in at least 2 passes, one for each side of the joint, with the nozzle held at an angle to the joint within one inch to 2 inches of the pavement. 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 2 inches 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 1/4 inch  $\pm$  1/32 inch and a minimum pressure of 90 pounds per square inch.

Backer rods shall be installed when the temperature of the concrete pavement is above the dew point of the air and when the air temperature is 40 °F 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 rod that leave a residue or film on joint walls shall not be used.

Immediately after placement of the backer rod, joint sealant shall be placed in the clean, dry, prepared joints as shown on the plans. The joint sealant shall be applied using a mechanical device with a nozzle shaped to fit inside the joint to introduce the sealant from inside the joint. Adequate pressure shall be applied to the sealant to ensure that the sealant material is extruded evenly and that full continuous contact is made with the joint walls. After application of the sealant, the surface of the sealant shall be recessed as shown on the plans.

Failure of the joint material in either adhesion or cohesion will be cause for rejection of the joint. The finished surface of joint sealant shall conform to the dimensions and allowable tolerances shown on the plans. Rejected joint materials or joint material whose finished surface does not conform to the dimensions shown on the plans, as determined by the Engineer, shall be repaired or replaced, at the Contractor's expense, with joint material that conforms to the requirements.

After each joint is sealed, surplus joint sealer on the pavement surface shall be removed. Traffic shall not be permitted over the sealed joints until the sealant is tack free and set sufficiently to prevent embedment of roadway debris into the sealant.

### **CONSTRUCTING TRANSVERSE CONTACT JOINTS**

A transverse contact (construction) joint shall be constructed, including dowel bars, at the end of each day's work or where concrete placement is interrupted for more than 30 minutes, to coincide with the next weakened plane joint location.

If sufficient concrete has not been mixed to form a slab to match the next weakened plane joint, when an interruption occurs, the excess concrete shall be removed and disposed of back to the last preceding joint. The cost of removing and disposing of excess concrete shall be at the Contractor's expense. Excess material 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.

A metal or wooden bulkhead (header) shall be used to form the joint. The bulkhead shall be designed to accommodate the installation of dowel bars.

### **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. The edge of the existing pavement shall be saw cut a width 1/8 inch and to the full depth of the existing concrete pavement to produce a flat vertical face. 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 silicone and placed in conformance with the requirements for liquid joint sealant installation as specified above, except references to backer rods shall not apply.

### **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 yard from and parallel with each lane line.

Profiled pavement shall conform to the following Profile Index requirements:

1. Pavement on tangent alignment and pavement on horizontal curves having a centerline radius of curve 2,000 feet or more shall have a Profile Index of 40 inches per mile or less.
2. Pavement on horizontal curves having a centerline radius of curve 1,000 feet or more but less than 2,000 feet and pavement within the superelevation transition of those curves shall have a Profile Index of 80 inches per mile or less.

Individual high points in excess of 5/16 inch, 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 5/16 inch.

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 550 pounds per square inch.

### **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 20 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 15 days to approve the QCP. Should the Engineer fail to complete the review of the 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 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 judgment 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 business 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 10' x 20' and shall be 9 inches thick where planned replacement pavement nominal thickness is less than 9 inches. The trial slab thickness shall be 10 inches where planned replacement pavement nominal thickness is 10 inches or greater. Where there are planned slab replacements with greater and less than 10 inches thickness then two trial slabs shall be required one at 9 inches thick and one at 10 inches 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 524. 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 5° F 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  $\pm 2^\circ$  F. Internal temperature readings shall be measured at one inch from the top and one inch from the bottom, no closer than 3 inches 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 524, 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 9 inches thick shall have an early age modulus of rupture of not less than 400 pounds per square inch and a 7-day modulus of rupture of not less than 600 pounds per square inch. Trial slabs 10 inches thick shall have an early age modulus of rupture of not less than 333 pounds per square inch and a 7-day modulus of rupture of not less than 600 pounds per square inch. 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 650 cubic yards 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 30 cubic yards, within the final truckload and at least once every 130 cubic yards.

During placement of RSC, the Contractor shall sample and test for yield, penetration, air content and unit weight at least once in every 650 cubic yards 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 524 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.

The contract price paid per cubic yard for base (Rapid Strength Concrete) shall include full compensation for furnishing all labor, materials (including cement in the amount determined by the Contractor), tools, equipment and incidentals, and for doing all the work involved in constructing, sampling and testing base (Rapid Strength Concrete) as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer. 142

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.

Full compensation for removing and disposing of existing concrete pavement, underlying base, and sub-base, constructing trial slabs, furnishing and placing bond breaker, furnishing and disposing of standby materials for temporary roadway structural section, constructing, maintaining, removing, and disposing of temporary roadway structural section, furnishing and applying replacement pavement delineation, and quality control program, and furnishing and placing epoxy-coated tie bars, epoxy-coated dowel bars and, when used, any dowel bar baskets with fasteners shall be considered as included in the contract price paid per cubic yard for replace concrete pavement (Rapid Strength Concrete), and no additional compensation will be allowed therefor.

Full compensation for drilling holes and bonding dowel bars and tie bars with epoxy resin shall be considered as included in the contract price paid per cubic yard for replace concrete pavement (Rapid Strength Concrete) and no additional compensation will be allowed therefor.

Full compensation for core drilling for dowel bar and tie bar alignment and backfilling with hydraulic cement grout shall be considered as included in the contract price per cubic yard for replace concrete pavement (Rapid Strength Concrete) and no additional compensation will be allowed therefor.

If the initial cores show that dowel bars and tie bars are out of alignment tolerances and the Engineer orders additional dowel bar or tie bar coring, full compensation for drilling the additional cores shall be considered as included in the contract price per cubic yard for replace concrete pavement (Rapid Strength Concrete) and no additional compensation will be allowed therefor.

If the initial cores show that dowel bars or tie bars are within alignment tolerances and the Engineer orders more dowel bar or tie bar coring the additional cores will be paid for as extra work in conformance with the provision in Section 4-1.03D, "Extra Work", of the Standard Specifications.

Sealing transverse contact joints, transverse weakened plane joints, and longitudinal isolation joints in replace concrete pavement (Rapid Strength Concrete) will be measured by the foot.

The contract price paid per foot 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 replace concrete pavement (Rapid Strength Concrete), furnishing and installing backer rod, 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.

If calibration of volumetric batch-trucks is performed more than 100 miles from the project limits, additional 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 replace concrete pavement (Rapid Strength Concrete) will be reduced \$1,000.

#### **10-1.43 SHOULDER RUMBLE STRIP (PORTLAND CEMENT CONCRETE, GROUND-IN INDENTATIONS)**

This work shall consist of constructing ground-in shoulder rumble strips in portland cement concrete pavement as shown on the plans and as specified in these special provisions.

Shoulder rumble strips shall be constructed in the portland cement concrete pavement by grinding after the concrete has hardened. The indentations shall not be constructed before a period of 10 calendar days has elapsed after the concrete has been placed, nor before the concrete has developed a modulus of rupture of 551 psi.

Shoulder rumble strips shall not be constructed on structures or approach slabs.

Rumble strip indentations shall not vary from the specified dimensions by more than 0.06-inch or 1/16 inch in depth or 10 percent in length and width. Rumble strips shall be constructed within 2 inches of the required alignment. The grinding equipment shall be equipped with a sighting device that will enable the operator to maintain the alignment of the rumble strip.

Residue from grinding operations shall be picked up by means of a vacuum attachment to the grinding machine and shall not be allowed to flow across the pavement nor be left on the surface of the pavement. Residue from grinding portland cement concrete pavement shall be disposed of at the location as specified in "Project Information" of these special provisions.

Finished rumble strips not meeting the specified tolerances, shall be brought within tolerance by either abrasive grinding or removal and replacement. The corrective method will be selected by the Engineer. Ground surface areas shall be neat and uniform in appearance. The corrective work shall be at the Contractor's expense.

Shoulder rumble strip (portland cement concrete, ground-in indentations) will be measured by the station along each shoulder on which the shoulder rumble strip is constructed, parallel with the adjacent traffic lane, without deductions for gaps between the ground-in indentations.

The contract price paid per station for shoulder rumble strip (portland cement concrete, ground-in indentations) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the shoulder rumble strip (portland cement concrete, ground-in indentations), complete in place, including removing and disposing of residue from grinding, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.44 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 0.08-inch to 0.12-inch wide with 55 grooves to 60 grooves per foot width of grinding. Tops of ridges shall be between 0.06-inch and 0.08-inch from the bottom of the blade grooves.

The ground surface at transverse joints or cracks will be tested with a 12-foot  $\pm 2-1/2$  inches 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 0.01-foot 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 12-foot  $\pm 2-1/2$  inches long straightedge placed perpendicular to the centerline, the ground pavement surface shall not vary more than 1/4 inch 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 3 feet 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 yard for grind existing concrete pavement and no additional compensation will be allowed therefor.

#### **10-1.45 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<br>(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:

- A. 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.
- B. 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:

- A. The name, address, and telephone number of the disposal facility.
- B. If the facility is not listed above:
  - 1. Copy of the facility's RWQCB or other applicable agency permit, or
  - 2. RWQCB's or other applicable agency's approval, or
  - 3. 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 therefore.

#### **10-1.46 PILING**

##### **GENERAL**

Piling shall conform to the provisions in Section 49, "Piling," of the Standard Specifications, and these special provisions.

Unless otherwise specified, welding of any work performed in conformance with the provisions in Section 49, "Piling," of the Standard Specifications, shall be in conformance with the requirements in AWS D1.1.

Attention is directed to "Welding" of these special provisions.

##### **CAST-IN-DRILLED-HOLE CONCRETE PILES**

Cast-in-drilled-hole concrete piling shall conform to the provisions in Section 49-4, "Cast-In-Place Concrete Piles," of the Standard Specifications and these special provisions.

The provisions of "Welding" of these special provisions shall not apply to temporary steel casings.

Cast-in-drilled-hole concrete piles 24 inches in diameter or larger may be constructed by excavation and depositing concrete under slurry.

##### **Materials**

Concrete deposited under slurry shall have a nominal penetration equal to or greater than 3-1/2 inches. Concrete shall be proportioned to prevent excessive bleed water and segregation.

Concrete deposited under slurry shall contain not less than 675 pounds of cementitious material per cubic yard.

The combined aggregate grading used in concrete for cast-in-drilled-hole concrete piling shall be either the one-inch maximum grading, the 1/2-inch maximum grading, or the 3/8-inch maximum grading and shall conform to the requirements in Section 90-3, "Aggregate Gradings," of the Standard Specifications.

Portions of cast-in-drilled-hole concrete piles shown on the plans to be formed shall be formed and finished in conformance with the provisions for concrete structures in Section 51, "Concrete Structures," of the Standard Specifications.

##### **Mineral Slurry**

Mineral slurry shall be mixed and thoroughly hydrated in slurry tanks, and slurry shall be sampled from the slurry tanks and tested before placement in the drilled hole.

Slurry shall be recirculated or continuously agitated in the drilled hole to maintain the specified properties.

Recirculation shall include removal of drill cuttings from the slurry before discharging the slurry back into the drilled hole. When recirculation is used, the slurry shall be sampled and tested at least every 2 hours after beginning its use until tests show that the samples taken from the slurry tank and from near the bottom of the hole have consistent specified properties. Subsequently, slurry shall be sampled at least twice per shift as long as the specified properties remain consistent.

Slurry that is not recirculated in the drilled hole shall be sampled and tested at least every 2 hours after beginning its use. The slurry shall be sampled mid-height and near the bottom of the hole. Slurry shall be recirculated when tests show that the samples taken from mid-height and near the bottom of the hole do not have consistent specified properties.

Slurry shall also be sampled and tested before final cleaning of the bottom of the hole and again just before placing concrete. Samples shall be taken from mid-height and near the bottom of the hole. Cleaning of the bottom of the hole and placement of the concrete shall not start until tests show that the samples taken from mid-height and near the bottom of the hole have consistent specified properties.

Mineral slurry shall be tested for conformance to the requirements shown in the following table:

| MINERAL SLURRY   |                                      |  |
|--|--------------------------------------|--|
| PROPERTY   | REQUIREMENT                          | TEST   |
| Density (pcf )<br>- before placement in the drilled hole<br>- during drilling<br><br>- before final cleaning<br>- immediately before placing concrete                              | 64.3* to 69.1*<br><br>64.3* to 75.0* | Mud Weight (Density)<br>API 13B-1<br>Section 1   |
| Viscosity (seconds/quart)<br><br>bentonite<br><br>attapulgate  | 28 to 50<br><br>28 to 40             | Marsh Funnel and Cup<br>API 13B-1<br>Section 2.2 |
| pH   | 8 to 10.5                            | Glass Electrode pH Meter or pH Paper             |
| Sand Content (percent)<br><br>- before final cleaning<br>- immediately before placing concrete   | less than or equal to 4.0            | Sand<br>API 13B-1<br>Section 5                   |
| *When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 2 pcf. Slurry temperature shall be at least 40°F when tested. |                                      |  |

Any caked slurry on the sides or bottom of hole shall be removed before placing reinforcement. If concrete is not placed immediately after placing reinforcement, the reinforcement shall be removed and cleaned of slurry, the sides of the drilled hole cleaned of caked slurry, and the reinforcement again placed in the hole for concrete placement.

### Synthetic Slurry

Synthetic slurries shall be used in conformance with the manufacturer's recommendations and these special provisions. The following synthetic slurries may be used:

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

Inclusion of a synthetic slurry on the above list may be obtained by meeting the Department's requirements for synthetic slurries. The requirements can be obtained from the Offices of Structures Design, P.O. Box 168041, MS# 9-4/11G, Sacramento, CA 95816-8041.

Synthetic slurries listed may not be appropriate for a given site.

Synthetic slurries shall not be used in holes drilled in primarily soft or very soft cohesive soils as determined by the Engineer.

A manufacturer's representative, as approved by the Engineer, shall provide technical assistance for the use of their product, shall be at the site before introduction of the synthetic slurry into a drilled hole, and shall remain at the site until released by the Engineer.

Synthetic slurries shall be sampled and tested at both mid-height and near the bottom of the drilled hole. Samples shall be taken and tested during drilling as necessary to verify the control of the properties of the slurry. Samples shall be taken and tested when drilling is complete, but before final cleaning of the bottom of the hole. When samples are in conformance with the requirements shown in the following tables for each slurry product, the bottom of the hole shall be cleaned and any loose or settled material removed. Samples shall be obtained and tested after final cleaning and immediately before placing concrete.

SlurryPro CDP synthetic slurries shall be tested for conformance to the requirements shown in the following table:

| SLURRYPRO CDP<br>KB Technologies Ltd.  |  |  |
|--|--|--|
| PROPERTY   | REQUIREMENT  | TEST   |
| Density (pcf )<br>- during drilling<br><br>- before final cleaning<br>- just before placing concrete   | less than or equal to 67.0*<br><br>less than or equal to 64.0* | Mud Weight (Density)<br>API 13B-1<br>Section 1   |
| Viscosity (seconds/quart)<br>- during drilling<br><br>-before final cleaning<br>- just before placing concrete   | 50 to 120<br><br>less than or equal to 70                      | Marsh Funnel and Cup<br>API 13B-1<br>Section 2.2 |
| pH   | 6 to 11.5  | Glass Electrode pH Meter or pH Paper             |
| Sand Content (percent)<br>- before final cleaning<br>- just before placing concrete  | less than or equal to 0.5                                      | Sand<br>API 13B-1<br>Section 5                   |
| *When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 2 pcf. Slurry temperature shall be at least 40°F when tested. |  |  |

Super Mud synthetic slurries shall be tested for conformance to the requirements shown in the following table:

| SUPER MUD<br>PDS Company   |  |  |
|--|--|--|
| PROPERTY   | REQUIREMENT                              | TEST   |
| Density (pcf)<br>- before final cleaning<br>- just before placing concrete   | less than or equal to 64.0*              | Mud Weight (Density)<br>API 13B-1<br>Section 1   |
| Viscosity (seconds/quart)<br>- during drilling<br><br>- before final cleaning<br>- just before placing concrete  | 32 to 60<br><br>less than or equal to 60 | Marsh Funnel and Cup<br>API 13B-1<br>Section 2.2 |
| pH   | 8 to 10.0                                | Glass Electrode pH Meter or pH Paper             |
| Sand Content (percent)<br>- before final cleaning<br>-just before placing concrete   | less than or equal to 0.5                | Sand<br>API 13B-1<br>Section 5                   |
| *When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 2 pcf. Slurry temperature shall be at least 40°F when tested. |  |  |

Shore Pac GCV synthetic slurries shall be tested for conformance to the requirements shown in the following table:

| Shore Pac GCV<br>CETCO Drilling Products Group   |  |  |
|--|--|--|
| PROPERTY   | REQUIREMENT                              | TEST   |
| Density (pcf)<br>- before final cleaning<br>- just before placing concrete   | less than or equal to 64.0*              | Mud Weight (Density)<br>API 13B-1<br>Section 1   |
| Viscosity (seconds/quart)<br>- during drilling<br><br>- before final cleaning<br>- just before placing concrete  | 33 to 74<br><br>less than or equal to 57 | Marsh Funnel and Cup<br>API 13B-1<br>Section 2.2 |
| pH   | 8.0 to 11.0                              | Glass Electrode pH Meter or pH Paper             |
| Sand Content (percent)<br>- before final cleaning<br>-just before placing concrete   | less than or equal to 0.5                | Sand<br>API 13B-1<br>Section 5                   |
| *When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 2 pcf. Slurry temperature shall be at least 40°F when tested. |  |  |

Novagel Polymer synthetic slurries shall be tested for conformance to the requirements shown in the following table:

| NOVAGEL POLYMER<br>Geo-Tech Drilling Fluids  |  |  |
|--|--|--|
| PROPERTY   | REQUIREMENT  | TEST   |
| Density (pcf)<br>- during drilling<br><br>- before final cleaning<br>- just before placing concrete  | less than or equal to 67.0*<br><br>less than or equal to 64.0* | Mud Weight (Density)<br>API 13B-1<br>Section 1   |
| Viscosity (seconds/quart)<br>- during drilling<br><br>- before final cleaning<br>- just before placing concrete  | 45 to 104<br><br>less than or equal to 104                     | Marsh Funnel and Cup<br>API 13B-1<br>Section 2.2 |
| pH   | 6.0 to 11.5  | Glass Electrode pH Meter or pH Paper             |
| Sand Content (percent)<br>- before final cleaning<br>- just before placing concrete  | less than or equal to 0.5                                      | Sand<br>API 13B-1<br>Section 5                   |
| *When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 2 pcf. Slurry temperature shall be at least 40°F when tested. |  |  |

### Water Slurry

At the option of the Contractor, water may be used as slurry when casing is used for the entire length of the drilled hole. Water slurry shall be tested for conformance to the requirements shown in the following table:

| WATER SLURRY  |                              |  |
|---|------------------------------|--|
| PROPERTY  | REQUIREMENT                  | TEST   |
| Density (pcf)<br>- before final cleaning<br>- just before placing concrete  | 63.5*                        | Mud Weight (Density)<br>API 13B-1<br>Section 1 |
| Sand Content (percent)<br>- before final cleaning<br>- just before placing concrete                                     | less than or equal to<br>0.5 | Sand<br>API 13B-1<br>Section 5                 |
| *When approved by the Engineer, salt water slurry may be used and the allowable densities may be increased up to 2 pcf. |                              |  |

### Construction

The Contractor shall submit a placing plan to the Engineer for approval prior to producing the test batch for cast-in-drilled-hole concrete piling and at least 10 working days prior to constructing piling. The plan shall include complete descriptions, details, and supporting calculations as listed below:

A. Requirements for all cast-in-drilled-hole concrete piling:

1. Concrete mix design, certified test data, and trial batch reports.
2. Drilling or coring methods and equipment.
3. Proposed method for casing installation and removal when necessary.
4. Plan view drawing of pile showing reinforcement.
5. Methods for placing, positioning, and supporting bar reinforcement.
6. Methods and equipment for accurately determining the depth of concrete and actual and theoretical volume placed, including effects on volume of concrete when any casings are withdrawn.
7. Methods and equipment for verifying that the bottom of the drilled hole is clean prior to placing concrete.
8. Methods and equipment for preventing upward movement of reinforcement, including the Contractor's means of detecting and measuring upward movement during concrete placement operations.

B. Additional requirements when concrete is placed under slurry:

1. Plan view drawing of pile showing inspection pipes.
2. Concrete batching, delivery, and placing systems, including time schedules and capacities therefor. Time schedules shall include the time required for each concrete placing operation at each pile.
3. Concrete placing rate calculations. When requested by the Engineer, calculations shall be based on the initial pump pressures or static head on the concrete and losses throughout the placing system, including anticipated head of slurry and concrete to be displaced.
4. Suppliers' test reports on the physical and chemical properties of the slurry and any proposed slurry chemical additives, including Material Safety Data Sheet.
5. Slurry testing equipment and procedures.
6. Methods of removal and disposal of excavation, slurry, and contaminated concrete, including removal rates.
7. Methods and equipment for slurry agitating, recirculating, and cleaning.

In addition to compressive strength requirements, the consistency of the concrete to be deposited under slurry shall be verified before use by producing a test batch. The test batch shall be produced and delivered to the project under conditions and in time periods similar to those expected during the placement of concrete in the piles. Concrete for the test batch shall

be placed in an excavated hole or suitable container of adequate size to allow for testing as specified herein. Depositing of test batch concrete under slurry will not be required. In addition to meeting the specified nominal penetration, the test batch shall meet the following requirements:

- A. For piles where the time required for each concrete placing operation, as submitted in the placing plan, will be 2 hours or less, the test batch shall demonstrate that the proposed concrete mix design achieves either a penetration of at least 2 inches or a slump of at least 5 inches after twice that time has elapsed.
- B. For piles where the time required for each concrete placing operation, as submitted in the placing plan, will be more than 2 hours, the test batch shall demonstrate that the proposed concrete mix design achieves either a penetration of at least 2 inches or a slump of at least 5 inches after that time plus 2 hours has elapsed.

The time period shall begin at the start of placement. The concrete shall not be vibrated or agitated during the test period. Penetration tests shall be performed in conformance with the requirements in California Test 533. Slump tests shall be performed in conformance with the requirements in ASTM Designation: C 143/C143M. Upon completion of testing, the concrete 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 concrete deposited under slurry shall be carefully placed in a compact, monolithic mass and by a method that will prevent washing of the concrete. Concrete deposited under slurry need not be vibrated. Placing concrete shall be a continuous operation lasting not more than the time required for each concrete placing operation at each pile, as submitted in the placing plan, unless otherwise approved in writing by the Engineer. The concrete shall be placed with concrete pumps and delivery tube system of adequate number and size to complete the placing of concrete in the time specified. The delivery tube system shall consist of one of the following:

- A. A tremie tube or tubes, each of which are at least 10 inches in diameter, fed by one or more concrete pumps.
- B. One or more concrete pump tubes, each fed by a single concrete pump.

The delivery tube system shall consist of watertight tubes with sufficient rigidity to keep the ends always in the mass of concrete placed. If only one delivery tube is utilized to place the concrete, the tube shall be placed near the center of the drilled hole. Multiple tubes shall be uniformly spaced in the hole. Internal bracing for the steel reinforcing cage shall accommodate the delivery tube system. Tremies shall not be used for piles without space for a 10-inch tube.

Spillage of concrete into the slurry during concrete placing operations shall not be allowed. Delivery tubes shall be capped with a watertight cap, or plugged above the slurry level with a good quality, tight fitting, moving plug that will expel the slurry from the tube as the tube is charged with concrete. The cap or plug shall be designed to be released as the tube is charged. The pump discharge or tremie tube shall extend to the bottom of the hole before charging the tube with concrete. After charging the delivery tube system with concrete, the flow of concrete through a tube shall be induced by slightly raising the discharge end. During concrete placement, the tip of the delivery tube shall be maintained as follows to prevent reentry of the slurry into the tube. Until at least 10 feet of concrete has been placed, the tip of the delivery tube shall be within 6 inches of the bottom of the drilled hole, and then the embedment of the tip shall be maintained at least 10 feet below the top surface of the concrete. Rapid raising or lowering of the delivery tube shall not be permitted. If the seal is lost or the delivery tube becomes plugged and must be removed, the tube shall be withdrawn, the tube cleaned, the tip of the tube capped to prevent entrance of the slurry, and the operation restarted by pushing the capped tube 10 feet into the concrete and then reinitiating the flow of concrete.

When slurry is used, a fully operational standby concrete pump, adequate to complete the work in the time specified, shall be provided at the site during concrete placement. The slurry level shall be maintained within 12 inches of the top of the drilled hole.

A log of concrete placement for each drilled hole shall be maintained by the Contractor when concrete is deposited under slurry. The log shall show the pile location, tip elevation, dates of excavation and concrete placement, total quantity of concrete deposited, length and tip elevation of any casing, and details of any hole stabilization method and materials used. The log shall include a 8-1/2" x 11" sized graph of the concrete placed versus depth of hole filled. The graph shall be plotted continuously throughout placing of concrete. The depth of drilled hole filled shall be plotted vertically with the pile tip oriented at the bottom and the quantity of concrete shall be plotted horizontally. Readings shall be made at least at each 5 feet of pile depth, and the time of the reading shall be indicated. The graph shall be labeled with the pile location, tip elevation, cutoff elevation, and the dates of excavation and concrete placement. The log shall be delivered to the Engineer within one working day of completion of placing concrete in the pile.

After placing reinforcement and prior to placing concrete in the drilled hole, if drill cuttings settle out of the slurry, the bottom of the drilled hole shall be cleaned. The Contractor shall verify that the bottom of the drilled hole is clean.

If temporary casing is used, concrete placed under slurry shall be maintained at a level at least 5 feet above the bottom of the casing. The withdrawal of casings shall not cause contamination of the concrete with slurry.

Material resulting from using slurry 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.

### **Acceptance Testing and Mitigation**

Vertical inspection pipes for acceptance testing shall be provided in all cast-in-drilled-hole concrete piles that are 24 inches in diameter or larger, except when the holes are dry or when the holes are dewatered without the use of temporary casing to control ground water.

Inspection pipes shall be Schedule 40 polyvinyl chloride pipes with a nominal inside diameter of 2 inches. Each inspection pipe shall be capped top and bottom and shall have watertight couplers to provide a clean, dry and unobstructed 2-inch-diameter clear opening from 3 feet above the pile cutoff down to the bottom of the reinforcing cage.

Inspection pipes shall be placed around the pile, inside the outermost spiral or hoop reinforcement, and 3 inches clear of the vertical reinforcement, at a uniform spacing not exceeding 2 feet 9 inches measured along the circle passing through the centers of inspection pipes. A minimum of 2 inspection pipes per pile shall be used. When the vertical reinforcement is not bundled and each bar is not more than one inch in diameter, inspection pipes may be placed 2 inches clear of the vertical reinforcement. The inspection pipes shall be placed to provide the maximum diameter circle that passes through the centers of the inspection pipes while maintaining the clear spacing required herein. The pipes shall be installed in straight alignment, parallel to the main reinforcement, and securely fastened in place to prevent misalignment during installation of the reinforcement and placing of concrete in the hole.

The Contractor shall log the location of the inspection pipe couplers with respect to the plane of pile cut off, and these logs shall be delivered to the Engineer upon completion of the placement of concrete in the drilled hole.

After placing concrete and before requesting acceptance tests, each inspection pipe shall be tested by the Contractor in the presence of the Engineer by passing a 1.9-inch-diameter rigid cylinder 2 feet long through the complete length of pipe. If the 1.9-inch-diameter rigid cylinder fails to pass any of the inspection pipes, the Contractor shall attempt to pass a 1-1/4-inch-diameter rigid cylinder 4.5 feet long through the complete length of those pipes in the presence of the Engineer. If an inspection pipe fails to pass the 1-1/4-inch-diameter cylinder, the Contractor shall immediately fill all inspection pipes in the pile with water.

The Contractor shall replace each inspection pipe that does not pass the 1-1/4-inch-diameter cylinder with a 2-inch-diameter hole cored through the concrete for the entire length of the pile. Cored holes shall be located as close as possible to the inspection pipes they are replacing and shall be no more than 6 inches inside the reinforcement. Coring shall not damage the pile reinforcement. Cored holes shall be made with a double wall core barrel system utilizing a split tube type inner barrel. Coring with a solid type inner barrel will not be allowed. Coring methods and equipment shall provide intact cores for the entire length of the pile concrete. The coring operation shall be logged by an Engineering Geologist or Civil Engineer licensed in the State of California and experienced in core logging. Coring logs shall include complete descriptions of inclusions and voids encountered during coring, and shall be delivered to the Engineer upon completion. Concrete cores shall be preserved, identified with the exact location the core was recovered from within the pile, and made available for inspection by the Engineer.

Acceptance tests of the concrete will be made by the Engineer, without cost to the Contractor. Acceptance tests will evaluate the homogeneity of the placed concrete. Tests will include gamma-gamma logging. Tests may also include crosshole sonic logging and other means of inspection selected by the Engineer. The Contractor shall not conduct operations within 25 feet of the gamma-gamma logging operations. The Contractor shall separate reinforcing steel as necessary to allow the Engineer access to the inspection pipes to perform gamma-gamma logging or other acceptance testing. After requesting acceptance tests and providing access to the piling, the Contractor shall allow 25 days for the Engineer to conduct these tests and make determination of acceptance if the 1.9-inch-diameter cylinder passed all inspection pipes, and 30 days if only the 1-1/4-inch-diameter cylinder passed all inspection pipes. Should the Engineer fail to complete these tests 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 inspection, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

All inspection pipes and cored holes in a pile shall be dewatered and filled with grout after notification by the Engineer that the pile is acceptable. Placement and removal of water in the inspection pipes shall be at the Contractor's expense. Grout shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. The inspection pipes and holes shall be filled using grout tubes that extend to the bottom of the pipe or hole or into the grout already placed.

If acceptance testing performed by the Engineer determines that a pile does not meet the requirements of the specifications, then that pile will be rejected and all depositing of concrete under slurry or concrete placed using temporary casing for the purpose of controlling groundwater shall be suspended until written changes to the methods of pile construction are approved in writing by the Engineer.

The Contractor shall submit to the Engineer for approval a mitigation plan for repair, supplementation, or replacement for each rejected cast-in-drilled-hole concrete pile, and this plan shall conform to the provisions in Section 5-1.02, "Plans and

Working Drawings," of the Standard Specifications. Prior to submitting this mitigation plan, the Engineer will hold a repair feasibility meeting with the Contractor to discuss the feasibility of repairing rejected piling. The Engineer will consider the size of the defect, the location of the defect, and the design information and corrosion protection considerations for the pile. This information will be made available to the Contractor, if appropriate, for the development of the mitigation plan. If the Engineer determines that it is not feasible to repair the rejected pile, the Contractor shall not include repair as a means of mitigation and shall proceed with the submittal of a mitigation plan for replacement or supplementation of the rejected pile.

If the Engineer determines that a rejected pile does not require mitigation due to structural, geotechnical, or corrosion concerns, the Contractor may elect to 1) repair the pile per the approved mitigation plan, or 2) not repair anomalies found during acceptance testing of that pile. For such unrepaired piles, the Contractor shall pay to the State, \$300 per cubic yard for the portion of the pile affected by the anomalies. The volume, in cubic yards, of the portion of the pile affected by the anomalies, shall be calculated as the area of the cross section of the pile affected by each anomaly, in square yards, as determined by the Engineer, multiplied by the distance, in yards, from the top of each anomaly to the specified tip of the pile. If the volume calculated for one anomaly overlaps the volume calculated for additional anomalies within the pile, the calculated volume for the overlap shall only be counted once. In no case shall the amount of the payment to the State for any such pile be less than \$300. The Department may deduct the amount from any moneys due, or that may become due the Contractor under the contract.

Pile mitigation plans shall include the following:

- A. The designation and location of the pile addressed by the mitigation plan.
- B. A review of the structural, geotechnical, and corrosion design requirements of the rejected pile.
- C. A step by step description of the mitigation work to be performed, including drawings if necessary.
- D. An assessment of how the proposed mitigation work will address the structural, geotechnical, and corrosion design requirements of the rejected pile.
- E. Methods for preservation or restoration of existing earthen materials.
- F. A list of affected facilities, if any, with methods and equipment for protection of these facilities during mitigation.
- G. The State assigned contract number, bridge number, full name of the structure as shown on the contract plans, District-County-Route-Post Mile, and the Contractor's (and Subcontractor's if applicable) name on each sheet.
- H. A list of materials, with quantity estimates, and personnel, with qualifications, to be used to perform the mitigation work.
- I. The seal and signature of an engineer who is licensed as a Civil Engineer by the State of California.

For rejected piles to be repaired, the Contractor shall submit a pile mitigation plan that contains the following additional information:

- A. An assessment of the nature and size of the anomalies in the rejected pile.
- B. Provisions for access for additional pile testing if required by the Engineer.

For rejected piles to be replaced or supplemented, the Contractor shall submit a pile mitigation plan that contains the following additional information:

- A. The proposed location and size of additional piling.
- B. Structural details and calculations for any modification to the structure to accommodate the replacement or supplemental piling.

All provisions for cast-in-drilled-hole concrete piling shall apply to replacement piling.

The Contractor shall allow the Engineer 25 days to review the mitigation plan after a complete submittal has been received.

Should the Engineer fail to review the complete pile mitigation submittal within the time specified, 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 pile mitigation plan, an extension of time commensurate with the delay in completion of the work thus caused will be granted in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

When repairs are performed, the Contractor shall submit a mitigation report to the Engineer within 10 days of completion of the repair. This report shall state exactly what repair work was performed and quantify the success of the repairs relative to the submitted mitigation plan. The mitigation report shall be stamped and signed by an engineer that is licensed as a Civil Engineer by the State of California. The mitigation report shall show the State assigned contract number, bridge number, full name of the structure as shown on the contract plans, District-County-Route-Post Mile, and the Contractor (and subcontractor if applicable) name on each sheet. The Engineer will be the sole judge as to whether a

mitigation proposal is acceptable, the mitigation efforts are successful, and to whether additional repairs, removal and replacement, or construction of a supplemental foundation is required.

#### **MEASUREMENT AND PAYMENT (PILING)**

Measurement and payment for the various types and classes of piles shall conform to the provisions in Sections 49-6.01, "Measurement," and 49-6.02, "Payment," of the Standard Specifications and these special provisions.

Full compensation for slurry, depositing concrete under slurry, test batches, inspection pipes, filling inspection holes and pipes with grout, drilling oversized cast-in-drilled-hole concrete piling, filling cave-ins and oversized piles with concrete, and redrilling through concrete, shall be considered as included in the contract prices paid per linear foot for cast-in-drilled-hole concrete piling of the types and sizes listed in the Engineer's Estimate, and no additional compensation will be allowed therefor.

#### **10-1.47 CONCRETE STRUCTURES**

Portland cement concrete structures shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Shotcrete shall not be used as an alternative construction method for reinforced concrete members unless otherwise specified.

#### **FALSEWORK**

Falsework shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Temporary crash cushion modules, as shown on the plans and conforming to the provisions in "Temporary Crash Cushion Module" of these special provisions, shall be installed at the approach end of temporary railings which are located less than 15 feet from the edge of a traffic lane. For 2-way traffic openings, temporary crash cushion modules shall be installed at the departing end of temporary railings which are located less than 6 feet from the edge of a traffic lane.

The Contractor's engineer who signs the falsework drawings shall also certify in writing that the falsework is constructed in conformance with the approved drawings and the contract specifications prior to placing concrete. This certification shall include performing any testing necessary to verify the ability of the falsework members to sustain the stresses required by the falsework design. The engineer who signs the drawings may designate a representative to perform this certification. Where falsework contains openings for railroads, vehicular traffic, or pedestrians, the designated representative shall be qualified to perform this work, shall have at least 3 years of combined experience in falsework design or supervising falsework construction, and shall be registered as a Civil Engineer in the State of California. For other falsework, the designated representative shall be qualified to perform this work and shall have at least 3 years of combined experience in falsework design or supervising falsework construction. The Contractor shall certify the experience of the designated representative in writing and provide supporting documentation demonstrating the required experience if requested by the Engineer.

#### **Welding and Nondestructive Testing**

Welding of steel members, except for previously welded splices and except for when fillet welds are used where load demands are less than or equal to 1,000 pounds per inch for each 1/8 inch of fillet weld, shall conform to AWS D1.1 or other recognized welding standard. The welding standard to be utilized shall be specified by the Contractor on the working drawings. Previously welded splices for falsework members are defined as splices made prior to the member being shipped to the project site.

Splices made by field welding of steel beams at the project site shall undergo nondestructive testing (NDT). At the option of the Contractor, either ultrasonic testing (UT) or radiographic testing (RT) shall be used as the method of NDT for each field weld and any repair made to a previously welded splice in a steel beam. Testing shall be performed at locations selected by the Contractor. The length of a splice weld where NDT is to be performed, shall be a cumulative weld length equal to 25 percent of the original splice weld length. The cover pass shall be ground smooth at the locations to be tested. The acceptance criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional NDT shall be performed on the repaired sections. The NDT method chosen shall be used for an entire splice evaluation including any required repairs.

For all field welded splices, the Contractor shall furnish to the Engineer a letter of certification which certifies that all welding and NDT, including visual inspection, are in conformance with the specifications and the welding standard shown on the approved working drawings. This letter of certification shall be signed by an engineer who is registered as a Civil Engineer in the State of California and shall be provided prior to placing any concrete for which the falsework is being erected to support.

For previously welded splices, the Contractor shall determine and perform all necessary testing and inspection required to certify the ability of the falsework members to sustain the stresses required by the falsework design. This welding

certification shall (1) itemize the testing and inspection methods used, (2) include the tracking and identifying documents for previously welded members, (3) be signed by an engineer who is registered as a Civil Engineer in the State of California, (4) and shall be provided prior to erecting the members.

## **MEASUREMENT AND PAYMENT**

Measurement and payment for concrete in structures shall conform to the provisions in Section 51-1.22, "Measurement," and Section 51-1.23, "Payment," of the Standard Specifications.

### **10-1.48 STRUCTURE APPROACH SLABS (TYPE R)**

Structure approach slabs (Type R) consist of removing portions of existing structures, existing pavement and base including reinforced concrete approach slabs, asphalt concrete surfacing, 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.

The voids between the new 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 with either aggregate base (approach slab) or structure approach slab concrete. If the Contractor chooses to fill these voids with structure approach slab concrete, they shall be filled at the time and in the same operation that the new concrete is placed.

The Contractor shall establish a grade line for new approach slabs that will provide a smooth profile grade. The profile grade will be subject to approval by the Engineer.

The Contractor shall schedule his work so that the pavement and base materials removed during a work period are replaced in that same work period with properly finished and cured approach slab concrete before the time the lane is to be opened to public traffic as specified 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 hot mix asphalt (HMA) and aggregate base equal to the quantity of pavement removed during the work shift shall be provided at the job 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 a 0.3-foot-thick layer of HMA over aggregate base.

The aggregate base for the temporary structural section shall conform to the requirements specified in "Aggregate Base (Approach Slab)" of these special provisions.

The HMA for the temporary structural section shall be produced from commercial quality aggregates and asphalt binder. The grading of the aggregate shall conform to the 3/4-inch maximum medium grading in Section 39-1.02E, "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 HMA 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 HMA may each be spread and compacted in one layer. The finished surface of the HMA shall not vary more than 0.05 foot from the lower edge of a 12-foot straightedge placed parallel with the centerline and shall match the elevation of the existing 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 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 job 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 0.25 foot 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 before 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, power impact tools shall not be used within 1.5 feet of the pavement that is required to remain in place.

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 3/4-inch 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 8 inches or less, the base may be spread and compacted in one layer. Where the required thickness of aggregate base is more than 8 inches, 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 8 inches. 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.

## **REINFORCED CONCRETE MATERIALS**

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.

The Contractor may use Type III cement in the concrete for structure approach slabs (Type R).

Concrete for use in approach slabs shall contain not less than 675 pounds or more than 800 pounds of cementitious material per cubic yard.

Approach slab concrete shall be constructed using rapid strength concrete (RSC). RSC approach slabs shall be constructed using either:

1. Concrete conforming to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications and a nonchloride Type C chemical admixture, or
2. Concrete made with proprietary cementitious material. The concrete shall conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications and the following:
  - 2.1. In lieu of the requirements specified in Section 90-2.01, "Cementitious Materials," of the Standard Specifications, the cementitious material shall meet the definition of hydraulic cement in ASTM C 219 and the following:

### Proprietary Cementitious Material

| 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 C 1038                                 | 0.04%, max.  |
| Soluble Chloride*             | California Test 422                         | 0.05%, max.  |
| Soluble Sulfate*              | California Test 417                         | 0.30%, max.  |
| Thermal Stability             | California Test 553                         | 90%, min.    |
| Compressive Strength @ 3 days | ASTM C 109                                  | 2500 psi     |

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

- 2.2. 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 when testing for requirements listed in the table above.

Supplementary cementitious material will not be required in approach slabs constructed using RSC.

RSC for approach slabs shall be prequalified before 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:

1. Immediately after fabrication of the 5 test cylinders, the cylinders shall be stored in a temperature medium of  $70 \pm 3$  °F until the cylinders are tested.
2. The Contractor shall determine the age of break to achieve an average strength of the 5 test cylinders of not less than 1200 psi. Not more than 2 test cylinders shall have a strength of less than 1150 psi. This age of break plus one hour will be the opening age.

Penetration requirements of Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications do not apply.

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.

Steel angles, plates, and bars at the concrete barrier joints shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

Building paper shall be commercial quality 30-pound asphalt felt.

PVC conduit used to encase the abutment tie rod shall be commercial quality.

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.

### TRIAL SLAB

Before beginning work on approach slabs constructed using RSC, the Contractor shall successfully complete one or more trial slabs for each concrete mix design to be used in constructing the approach slabs. Trial slabs shall be constructed, finished, cured, and tested with the materials, tools, equipment, personnel, and methods to be used in completing the approach slabs. Trial slabs shall demonstrate that the Contractor is capable of producing approach slabs in conformance with the provisions in this section, within anticipated time periods including delivery, placement, finishing, and curing times, and under similar atmospheric and temperature conditions expected during construction operations. Multiple trial slabs for each approach slab concrete mix design may be required to envelop variable atmospheric conditions.

The minimum trial slab dimensions shall be 10' x 20' x 9". Trial slabs shall be placed near the job 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.

Trial slab concrete shall develop compressive strengths of at least 1200 psi at the age of break used for prequalification of the concrete, and at least 2500 psi after 3 days when tested by the Contractor in conformance with the provisions in Section 90-9, "Compressive Strength," of the Standard Specifications.

Materials resulting from construction of trial slabs and test specimens 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.

At least 15 days before use in the trial slab, the Contractor shall submit mix designs for approach slab concrete that include the following:

1. Compressive strength test results at the age of break for prequalification of the concrete and at 3 days, 7 days, and 28 days
2. Proposed aggregate grading
3. Mix proportions of cementitious material, aggregate, and water
4. Types and amounts of chemical admixtures, if used
5. Initial and final set time of a 1' x 1' x 5-1/2" concrete block curing at  $70 \pm 9$  °F ambient temperature
6. Range of ambient temperatures over which the mix design will achieve the required minimum compressive strengths
7. Source of materials

## **REINFORCED CONCRETE CONSTRUCTION**

At the option of the Contractor, RSC may be proportioned and placed by volumetric continuous mixers.

### **Weighmaster Certificates**

Weighmaster certificates for RSC for approach slabs, 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 weight 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 weight of the cement used in the load.

### **Volumetric Proportioning**

When RSC for approach slabs is proportioned by volume, the method shall conform to requirements specified herein.

Liquid admixtures shall be proportioned in conformance with the provisions in Section 90-4.10, "Proportioning and Dispensing Liquid Admixtures," of the Standard Specifications, except that liquid admixtures shall be proportioned by a meter.

Supplementary cementitious materials shall be protected from exposure to moisture until used. Adequate facilities shall be provided to assure that supplementary cementitious materials meeting the specified requirements are kept separate from other supplementary cementitious materials in order to prevent any but the specified supplementary cementitious materials from entering the work. Safe and suitable facilities for sampling supplementary cementitious materials shall be provided at the batch-mixer storage hopper or in the feed line.

Batch-mixer trucks shall be equipped to proportion cement, water, aggregate, and additives by volume. Aggregate feeders shall be connected directly to the drive on the cement vane feeder. The cement feed rate shall be tied directly to the feed rate for the aggregate and other ingredients. Any change in the ratio of cement to aggregate shall be accomplished by changing the gate opening for the aggregate feed. The drive shaft of the aggregate feeder shall be equipped with a revolution counter reading to the nearest full or partial revolution of the aggregate delivery belt.

Aggregate shall be proportioned using a belt feeder operated with an adjustable cutoff gate delineated to the nearest quarter increment. Height of the gate opening shall be readily determinable. Cement shall be proportioned by a method that conforms to the accuracy requirements of these special provisions.

Delivery rate of aggregate and cement per revolution of the aggregate feeder shall be calibrated at appropriate gate settings for each batch-mixer truck used on the project and for each aggregate source. Batch-mixer trucks shall be calibrated at 3 different aggregate gate settings that are commensurate with production needs. Two or more calibration runs are required at each of the different aggregate gate openings. The actual weight of material delivered for aggregate proportioning device calibrations shall be determined by a platform scale as specified in these special provisions.

Aggregate belt feeder shall deliver aggregate to the mixer with volumetric consistency so that deviation for any individual aggregate delivery rate check-run does not exceed 1.0 percent of the mathematical average of all runs for the same gate opening and aggregate type. Each test run shall be at least 1,000 pounds. Fine aggregate used for calibration shall not be reused for device calibration.

At the time of batching, aggregates shall be dried or drained sufficiently to result in stable moisture content, so that no visible separation of water from aggregate takes 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 weight.

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 another supply.

Rotating and reciprocating equipment on batch-mixer trucks shall be covered with metal guards.

The cement proportioning system shall deliver cement to the mixer with a volumetric consistency so that the deviation for any individual delivery rate check-run does not exceed 1.0 percent of the mathematical average of 3 runs of at least 1,000 pounds each. Cement used for calibration shall not be reused for device calibration.

Water meter accuracy shall be such that, when operating between 50 percent and 100 percent of production capacity, the difference between the indicated weight of water delivered and the actual weight delivered does not exceed 1.5 percent of the actual weight for each of 2 individual runs of 75 gallons. The water meter shall be equipped with a resettable totalizer and display the operating rate.

Calibration tests for aggregate, cement, and water proportioning devices shall be conducted with a platform scale located at the calibration site. Weighing of test run calibration material shall be performed on a platform scale having a maximum capacity not exceeding 2.75 tons with maximum graduations of one pound. The platform scale shall be error tested within 8 hours of calibration of batch-mixer truck proportioning devices. Error testing shall be performed with test weights conforming to California Test 109 and shall produce a witness scale that is within 2 graduations of the test weight load. The scale shall be available for use at the production site throughout the production period. Equipment needed for the calibration of proportioning systems shall remain available at the production site throughout the production period. A Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," shall be furnished with each delivery of aggregate, cement, and admixtures used for calibration tests and shall be submitted to the Engineer with certified copies of the weight of each delivery. The Certificate of Compliance shall state that the source of materials used for the calibration tests is from the same source as to be used for the planned work. The Certificate of Compliance shall be signed by an authorized representative who shall have the authority to represent and act for the Contractor.

The batch-mixer truck shall be equipped so that an accuracy check can be made before the first operation for the project and at any other time directed by the Engineer. Further calibration of proportioning devices shall be required every 90 days after production begins or when the source or type of any ingredient is changed. A spot calibration shall consist of calibration of the cement proportioning system only. A 2-run spot recalibration of the cement proportioning system shall be performed each time 55 tons of cement has passed through the batch-mixer truck. Should the spot recalibration of the cement proportioning system fall outside the limitations specified herein, a full calibration of the cement proportioning system shall be completed before the resumption of production.

Cement storage shall be located immediately before the cement feeder and shall be equipped with a device that will automatically shut down the power to the cement feeder and aggregate belt feeder when the cement storage level is lowered to a point where less than 20 percent of the total volume is left in storage.

The Contractor shall furnish aggregate moisture determinations made in conformance with the requirements of California Test 223 at least every 2 hours during proportioning and mixing operations. Moisture determinations shall be recorded and presented to the Engineer at the end of the production shift.

Each aggregate bin shall be equipped with a device that will automatically shut down the power to the cement feeder and the aggregate belt feeder when the aggregate discharge rate is less than 95 percent of the scheduled discharge rate of any bin.

Indicators specified herein shall be in working order before commencing proportioning and mixing operations and shall be visible when standing near the batch-mixer truck.

Identifying numbers of batch-mixer trucks shall be at least 3 inches in height and be located on the front and rear of the vehicles.

Volumetric proportioned RSC for approach slabs shall be mixed in a mechanically operated mixer of adequate size and power for the type of RSC to be placed. Mixers may be of the auger type and shall be operated uniformly at the mixing speed recommended by the manufacturer. Mixers that have an accumulation of hard concrete or mortar shall be removed from service until cleaned. Other types of mixers may be used provided mixing quality will meet the requirements of these special provisions.

Charge or rate of feed to the mixer shall not exceed that that will permit complete mixing of the materials. Dead areas in the mixer, where material does not move or is not sufficiently agitated, shall be corrected by a reduction in the volume of material or by other adjustments. The mixer shall be designed to provide sufficient mixing action and movement to produce properly mixed RSC. Mixing shall continue until a homogeneous mixture is produced at discharge from the mixer. There shall be no lumps or evidence of non-dispersed cement at discharge from the mixer. No water shall be added to the RSC after discharge from the mixer.

Equipment having components made of aluminum or magnesium alloys that may have contact with plastic concrete during mixing or transporting of RSC shall not be used.

Uniformity of concrete mixtures will be determined by differences in penetration measurement made in conformance with the requirements in California Test 533. 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 5/8 inch. The Contractor shall furnish samples of freshly mixed concrete and provide facilities for obtaining the samples. Sampling facilities shall be safe, accessible, and clean, and shall produce a sample that is representative of production. Sample devices and sampling methods shall also conform to the requirements of California Test 125.

Ice shall not be used to cool RSC directly. When ice is used to cool water used in the mix, all of the ice shall be melted before entering the mixer.

Cement shall be proportioned and charged into the mixer by means that will result in no losses of cement due to wind or accumulation on equipment, or other conditions that will vary the required quantity of cement.

Each mixer shall have a prominently attached metal plate or plates on which the following information is provided:

1. Uses for which the equipment is designed
2. Manufacturer's guaranteed capacity of the mixer in terms of the volume of mixed concrete
3. Speed of rotation of the mixer

Consistency and workability of mixed concrete when discharged at the delivery point shall be suitable for placement and consolidation.

Information generated by volumetric devices will not be used for payment calculations.

The device that controls the proportioning of cement, aggregate, and water shall produce a log of production data. The log of production data shall consist of a series of snapshots captured at 15-minute intervals throughout the period of daily production. Each snapshot of production data shall be a register of production activity at that time and not a summation of the data over the preceding 15 minutes. The amount of material represented by each snapshot shall be the amount produced from 7.5 minutes before to 7.5 minutes after the capture time. The daily log shall be submitted to the Engineer in electronic or printed media at the end of each production shift or when requested by the Engineer and shall include the following:

1. Weight of cement per revolution count
2. Weight of each aggregate size per revolution count
3. Gate openings for each aggregate size being used
4. Weight of water added to the concrete per revolution count
5. Moisture content of each aggregate size being used
6. Individual volume of all other admixtures per revolution count
7. Time of day
8. Day of week
9. Production start and stop times
10. Batch-mixer truck identification
11. Name of supplier
12. Specific type, size, or designation of concrete being produced
13. Source of the individual aggregate sizes being used
14. Source, brand, and type of cement being used
15. Source, brand, and type of individual admixtures being used
16. Name and signature of operator

Required report items may be input by hand into a pre-printed form or captured and printed by the proportioning device. Electronic media containing recorded production data shall be presented in a tab-delimited format on a CD or a 3.5-inch diskette with a capacity of at least 1.4 megabytes. Each snapshot of the continuous production shall be followed by a line-feed carriage return with allowances for sufficient fields to satisfy the amount of data required by these specifications. The reported data shall be in the above order and shall include data titles at least once per report.

### **Construction**

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 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 for decks in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications. The finished top surface shall not vary more than 0.02 foot from the lower edge of a 12-foot straightedge placed parallel with the centerline. Edges of slabs shall be edger finished. The provisions for deck crack treatment do not apply to Type R approach slabs.

The surface of the approach slab will not be profiled, and the Profile Index requirements do not apply.

Approach slab concrete shall be cured before the time the lane is to be opened to public traffic as specified in "Maintaining Traffic" of these special provisions. The curing time shall be the opening age as determined during the prequalification of the concrete.

The approach slab may be opened to traffic at the age of break as determined during the prequalification of the concrete if successful compressive strength tests are performed in the field showing the slab has achieved 1200 psi. The compressive strength tests shall be performed by the Contractor in conformance with the provisions for sampling and testing cylinders in Section 90-9.01, "General," of the Standard Specifications. The decision to use this option shall be made in writing to the Engineer before beginning construction on the approach slab.

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 truckload 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 Contractor chooses the option of constructing approach slabs using RSC made with a proprietary cement, the curing method shall be as recommended by the manufacturer of the cement and as approved by the Engineer.

If the ambient temperature is below 65 °F 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. A heating tent may be used in lieu of or in combination with the insulating layer or blanket:

**R-Value Ratings**

| Temperature Range During Curing Period | R-value, minimum |
|--|------------------|
| 55 °F to 65 °F                         | 1                |
| 45 °F to 55 °F                         | 2                |
| 39 °F to 45 °F                         | 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.

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.

The pourable seal between the steel angle and concrete barrier shall conform to the requirements for Type A and AL seals in Section 51-1.12F(3), "Materials and Installation," of the Standard Specifications. The sealant may be mixed by hand-held power-driven agitators and placed by hand methods. Immediately before placing the seal, the joint shall be thoroughly cleaned, including abrasive blast cleaning of the concrete surfaces, so that all foreign material and concrete spillage are removed from all joint surfaces. Joint surfaces shall be dry at the time the seal is placed.

**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, Type AL joint seals, and pourable seals shall be considered as included in the contract price paid per cubic yard 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, will be measured and paid for by the cubic yard as aggregate base (approach slab).

The contract price paid per cubic yard 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 yard 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 yard for structural concrete, approach slab (Type R), and no separate payment will be made therefor.

Full compensation for constructing, testing, and removing trial slabs shall be considered as included in the contract price paid per cubic yard for structural concrete, approach slab (Type R), and no separate payment will be made therefor.

### 10-1.49 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 |
|-------------|--------------------|
| 1/2"        | 100                |
| No. 16      | 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 40° F 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 yard 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 yard 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.

### **10-1.50 CLEAN EXPANSION JOINTS**

All deck joints shown on the plans to be cleaned shall be cleaned as specified herein.

Cleaning shall include removal of all existing seal material, dirt, debris, damaged waterstop, and joint filler, and shall be accomplished by methods that do not damage existing sound concrete surfaces.

Joint size shall be verified after the joint has been cleaned.

The Contractor shall take necessary precautions to ensure that material removed from expansion joints does not fall onto public traffic, or into the waterway beneath the bridges. The Contractor shall submit for the Engineer's approval, details for preventing material, equipment, or debris from falling onto traffic.

Joints with undamaged waterstops shall be cleaned only to the top of the waterstop, provided the waterstop does not have to be removed for placement of the seal.

Joints without waterstops and joints with waterstops with existing damage or damage caused by the Contractor, shall be cleaned down to the hinge seat or bearing seat, unless otherwise directed by the Engineer.

All joint damage shall be repaired as directed by the Engineer.

Cleaning joints below existing damaged waterstops and repairing existing joint damage will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications. The cost of repairing damage caused by the Contractor's operations shall be borne by the Contractor.

Materials removed from the expansion joint, except for surface dust, shall be recovered and disposed of away from the site in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Cleaning expansion joints will be measured by the linear foot for the length of the deck joint as shown on the plans.

The contract price paid per linear foot for clean expansion joint shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in cleaning expansion joints, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### **10-1.51 SEALING JOINTS**

Joints in concrete bridge decks and joints between concrete structures and concrete approach slabs must 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.

When ordered by the Engineer, a joint seal larger than called for by the Movement Rating shown on the plans must 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 must 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, "Extra Work," of the Standard Specifications.

### **10-1.52 POLYESTER CONCRETE OVERLAY**

#### **GENERAL**

##### **Summary**

This work includes placing a polyester concrete overlay with a high molecular weight methacrylate (HMWM) resin prime coat to bridge decks.

##### **Submittals**

Submit an overlay placement plan and a public safety plan under Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The plan review time will be 15 days.

The overlay placement plan must include:

1. Schedule of overlay work and testing for each bridge
2. Description of equipment for applying HMWM resin
3. Description of equipment for measuring, mixing, placing, and finishing polyester concrete overlay
4. Method for isolating expansion joints
5. Cure time for polyester concrete
6. Description of equipment for applying sand
7. Storage and handling of HMWM resin and polyester concrete components
8. Disposal of excess HMWM resin, polyester concrete, and containers

The public safety plan must include details for:

1. A public notification letter with a list of delivery and posting addresses. The letter must state overlay work locations, dates, times, and what to expect. Deliver the letter to residences and businesses within 100 feet of overlay work and to local fire and police officials at least 7 days before starting work. Post the letter at the job site.
2. An airborne emissions monitoring plan prepared and executed by a certified industrial hygienist (CIH) certified in comprehensive practice by the American Board of Industrial Hygiene. The plan must have at least 4 monitoring points including the mixing point, application point, and point of nearest public contact. Monitor airborne emissions during overlay work and submit emissions monitoring results after completing the work.
3. An action plan for protection of the public when airborne emissions levels exceed permissible levels.
4. A copy of the CIH's certification.

Submit a material safety data sheet for each shipment of HMWM and polyester resin components before use.

#### **Quality Control and Assurance**

Submit samples of HMWM and polyester resins 15 days before use under Section 6-3, "Testing," of the Standard Specifications. Notify the Engineer 15 days before delivery of resin in containers over 55 gallons to the job site.

Complete a trial overlay before starting work.

The trial overlay must:

1. Be at least 12 feet wide by 6 feet long and the same thickness as the project overlay
2. Be constructed on a prepared concrete base
3. Be placed within the project limits at an approved location
4. Be constructed using the same equipment as the production work
5. Replicate field conditions for the production work
6. Determine the initial polyester concrete set time
7. Demonstrate suitability of the proposed means and methods
8. Be disposed of under Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications

#### **MATERIALS**

Polyester concrete consists of polyester resin binder and aggregate.

Polyester resin binder must:

1. Be an unsaturated isophthalic polyester-styrene co-polymer.
2. Contain at least 1 percent by weight gamma-methacryloxypropyltrimethoxysilane, an organosilane ester silane coupler.
3. Be used with a promoter compatible with suitable methyl ethyl ketone peroxide and cumene hydroperoxide initiators.
4. Comply with the following:

**Polyester Resin Binder**

| Property                                      | Requirement   | Test Method             |
|---|---|-------------------------|
| Viscosity *                                   | 75 to 200 cP<br>(RVT, No. 1 Spindle,<br>20 RPM at 77°F)                         | ASTM D 2196             |
| Specific Gravity *                            | 1.05 to 1.10 at 77°F  | ASTM D 1475             |
| Elongation                                    | 35 percent, minimum<br>Type I at 0.45 inch/min.<br>Thickness = 0.25 ± 0.03 inch | ASTM D 638              |
|   | Sample Conditioning:<br>18/25/50 + 5/70   | ASTM D 618              |
| Tensile Strength                              | 2500 psi, minimum Type I at<br>0.45 inch/min.<br>Thickness = 0.25 ± 0.03 inch   | ASTM D 638              |
|   | Sample Conditioning:<br>18/25/50 + 5/70   | ASTM D 618              |
| Styrene Content *                             | 40 percent to 50 percent by<br>weight   | ASTM D 2369             |
| PCC Saturated<br>Surface-Dry Bond<br>Strength | 3.5 MPa, minimum,<br>at 24 hours and<br>21° ± 1°C                               | California Test<br>551  |
| Static Volatile<br>Emission *                 | 60 gram per square meter,<br>loss, maximum                                      | SCAQMD<br>Method 309-91 |

\*Test must be performed before adding initiator.

Aggregate for polyester concrete must:

1. Comply with Section 90-2.02, "Aggregates," of the Standard Specifications
2. Have at most 45 percent crushed particles retained on the No. 8 sieve when tested under California Test 205
3. Have fine aggregate consisting of natural sand
4. Have a weighted average aggregate absorption of at most 1 percent when tested under California Tests 206 and 207
5. At the time of mixing with resin, have a moisture content of at most one half of the weighted average aggregate absorption when tested under California Test 226
6. Comply with one of the following aggregate gradings:

**Combined Aggregate Grading**

| Sieve Size | Percentage Passing |               |
|------------|--------------------|---------------|
|            | 3/8 inch Maximum   | No. 4 Maximum |
| 1/2 inch   | 100                | 100           |
| 3/8 inch   | 83 - 100           | 100           |
| No. 4      | 65 - 82            | 62 - 85       |
| No. 8      | 45 - 64            | 45 - 67       |
| No. 16     | 27 - 48            | 29 - 50       |
| No. 30     | 12 - 30            | 16 - 36       |
| No. 50     | 6 - 17             | 5 - 20        |
| No. 100    | 0 - 7              | 0 - 7         |
| No. 200    | 0 - 3              | 0 - 3         |

HMWM resin prime coat consists of a resin, promoter, and initiator. HMWM resin must:

1. Be low odor and wax-free
2. Comply with the following:

**Methacrylate Resin**

| Property                                      | Requirement   | Test Method         |
|---|---|---------------------|
| Volatile Content *                            | 30 percent, maximum   | ASTM D 2369         |
| Viscosity *                                   | 25 cP, maximum,<br>(Brookfield RVT with<br>UL adaptor,<br>50 RPM at 77°F) | ASTM D 2196         |
| Specific Gravity *                            | 0.90 minimum, at 77°F   | ASTM D 1475         |
| Flash Point *                                 | 180°F, minimum  | ASTM D 3278         |
| Vapor Pressure *                              | 1.0 mm Hg, maximum,<br>at 77°F  | ASTM D 323          |
| PCC Saturated<br>Surface-Dry Bond<br>Strength | 3.5 MPa, minimum at<br>24 hours and 21 ± 1°C                              | California Test 551 |

\* Test must be performed before adding initiator.

Sand for abrasive sand finish must:

1. Be commercial quality blast sand
2. Have at least 95 percent pass the No. 8 sieve and at least 95 percent retained on the No. 20 sieve when tested under California Test 205
3. Have an average absorption of at most 1 percent when tested under California Test 207

**CONSTRUCTION**

Use a continuous mixer to mix polyester concrete. The continuous mixer must:

1. Employ an auger screw/chute device.
2. Be equipped with an automatic metering device that measures and records aggregate and resin volumes. Record volumes at least every 5 minutes, including time and date. Submit recorded volumes at the end of the work shift.
3. Have a visible readout gage that displays volumes of aggregate and resin being recorded.
4. Be certified under California Test 109 before use.
5. Produce a satisfactory mix consistently during a demonstration.

Finishing equipment for polyester concrete must:

1. Have grade control capabilities
2. Be used to consolidate the polyester concrete

The Engineer will provide final grade and cross slope before the start of overlay work.

The Engineer may (1) test existing deck surfaces for smoothness under Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications, and (2) require the deck smoothness be modified under Section 42-2, "Grinding," of the Standard Specifications.

Prepare the deck under "Prepare Concrete Bridge Deck Surface," "Remove Unsound Concrete," and "Rapid Setting Concrete Patches" of these special provisions.

The deck must be dry before placing the HMWM prime coat. The concrete surface must be at least 50 degrees F and at most 100 degrees F. Relative humidity must be at most 85 percent.

Sweep the deck. Blow the deck clean with compressed air.

Thoroughly mix all components of HMWM resin prime coat. Apply the HMWM resin to the deck surface:

1. Within 5 minutes of mixing
2. At a rate of approximately 90 sq ft per gallon
3. Uniformly and spread to completely cover surfaces to be overlaid

Place the HMWM prime coat on magnesium phosphate concrete no sooner than 72 hours after final set or on modified high alumina based concrete no sooner than 30 minutes after final set.

Place the polyester concrete:

1. Immediately after applying the HMWM prime coat
2. Before gelling
3. Within 15 minutes of adding initiator

The resin binder must weigh approximately 12 percent of the weight of the aggregate. The Engineer will determine the exact percentage. Polyester concrete must have an initial set time of at least 30 minutes and at most 120 minutes when tested using an initial-setting time Gillmore needle under ASTM C 266.

Consolidate and finish the overlay to the required grade and cross section using finishing equipment. Polyester concrete must be consolidated to a relative compaction of at least 97 percent when tested under California Test 552.

Apply a sand finish of at least 0.8 lbs per sq yd before gelling occurs.

Protect the overlay from moisture for at least 4 hours after finishing. Allow traffic or equipment on the overlay no sooner than 4 hours after final finishing.

Completed polyester concrete deck surfaces must comply with Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications.

Taper polyester concrete overlay edges if the overlay is not completed within the allowable lane closure time and is more than 1/2 inch higher in elevation than the adjacent pavement. Taper edges transverse to the direction of traffic at a 20:1 (horizontal:vertical) slope. Taper edges longitudinal to the direction of traffic at a 4:1 (horizontal:vertical) slope. Tapers may remain and be overlaid with polyester concrete overlay.

## **MEASUREMENT AND PAYMENT**

Furnish polyester concrete overlay will be measured and paid for by the cubic foot. The volume to be paid for will be determined based on the quantity of resin binder used, the percent by weight of resin binder in the polyester concrete, and a unit weight of 135 lb per cu ft. The payment quantity shall be the calculated quantity of polyester concrete overlay used in the work, except material used in trial overlays and wasted or unused material. When the plans show that unsound concrete patching material is polyester overlay, the payment quantity will include the patches.

Place polyester concrete overlay will be measured and paid for by the square foot. The area to be paid for will be based on the plan dimensions.

The contract price paid per cubic foot for furnish polyester concrete overlay shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing polyester concrete, including furnishing HMWM resin prime coat and materials for trial overlays, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as ordered by the Engineer.

The contract price paid per square foot for place polyester concrete overlay shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the polyester concrete overlay, complete in place, including application of HMWM prime coat and constructing and disposing of trial overlays and base, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as ordered by the Engineer.

Public safety plan will be paid for on the basis of a lump sum price.

The contract lump sum price paid for public safety plan shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, including the public action plan and airborne emissions monitoring work performed by the CIH, notification of the public, and reporting test results, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Modifications to existing bridge deck smoothness will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

## **10-1.53 CORE TREATED BRIDGE DECK**

### **GENERAL**

#### **Summary**

This work includes taking deck core samples from methacrylate-treated bridge decks and filling the holes with rapid setting concrete.

### **MATERIALS**

Rapid setting concrete must comply with "Rapid Setting Concrete Patches" of these special provisions.

Water for coring activities must contain no more than 1,000 PPM of chlorides as Cl and no more than 1,300 PPM of sulfates as SO<sub>4</sub>.

## CONSTRUCTION

Take 2 core samples 2 inches in diameter and 5 inches deep from each bridge deck span. Clean cored holes and fill with rapid setting concrete. Label core samples with the project contract number, bridge number, and span location. Submit core samples to the Engineer.

Core holes no sooner than 24 hours after placing methacrylate resin. Core samples must be taken over an existing crack in the deck at a location determined by the Engineer. At most 8 core samples will be taken at each bridge.

Concrete adjacent to the holes must not be damaged during coring. Cored holes must be clean and dry before patching. Removing 1/8 inch of concrete during hole cleaning is not required.

## MEASUREMENT AND PAYMENT

Core treated bridge deck will be measured and paid for by the unit for each core sample.

The contract unit price paid for core treated bridge deck shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in coring the holes, including repairing damaged reinforcement and patching holes with rapid setting concrete, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

### 10-1.54 RAPID SETTING CONCRETE PATCHES

This work shall consist of cleaning the surfaces and furnishing, placing, and finishing concrete patches. Concrete patches shall be placed in conformance with the details shown on the plans, the provisions of the Standard Specifications, and these special provisions.

The concrete material 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 requirements 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 requirements for single component (water activated) magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions.

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 Size | Percentage Passing |
|------------|--------------------|
| 1/2"       | 100                |
| No. 16     | 0-5                |

The amount of aggregate filler shall conform to the manufacturer's recommendations, 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.

Mixing of components of dual component (with a prepackaged liquid activator) magnesium phosphate shall be by complete units, supplied by the manufacturer. Portions of units shall not be used. Water shall not be added to dual component magnesium phosphate.

Except where filling cored holes, cleaning the contact surfaces of existing concrete shall be accomplished by abrasive blast cleaning the concrete and exposed reinforcing steel, as necessary, to remove all rust, paint, grease, asphalt or other foreign materials. A minimum of 1/8 inch of concrete shall be removed. Immediately prior to applying the new concrete, the surfaces shall be recleaned by sweeping and pressure jetting, or by other approved means, as necessary to remove debris which has accumulated during construction or after abrasive blast cleaning. The surface temperature of the areas to be covered shall be 39° F or above when the concrete is applied. Methods proposed to heat said surfaces are subject to approval by the Engineer. The contact surface for the magnesium phosphate concrete shall be dry. The contact surfaces for modified high alumina based concrete or portland cement based concrete may be damp but not saturated.

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.

Unless otherwise permitted in writing by the Engineer, public traffic shall not be permitted on the new concrete until at least one hour after final set.

Rapid setting concrete (patch) will be measured and paid for by the cubic foot.

The quantities of rapid setting concrete (patch), in cubic feet, to be paid for will be determined from the total number of pounds of concrete actually used in the patch divided by a plastic density of 135 pounds per cubic foot. Wasted or unused concrete will not be included. The number of pounds of concrete, with or without aggregate filler, will be determined from scale weights.

The contract price paid per cubic foot for rapid setting concrete (patch) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing concrete patches, including cleaning contact surfaces, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.55 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:

[http://www.dot.ca.gov/hq/esc/approved\\_products\\_list/](http://www.dot.ca.gov/hq/esc/approved_products_list/)

The provisions in "Welding Quality Control" of these special provisions shall not apply to resistance butt welding.

#### **MEASUREMENT AND PAYMENT**

Measurement and payment for reinforcement in structures shall conform to the provisions in Section 52-1.10, "Measurement," and Section 52-1.11, "Payment," of the Standard Specifications

#### **10-1.56 BRIDGE DECK METHACRYLATE RESIN TREATMENT**

##### **GENERAL**

##### **Summary**

This work includes applying a high molecular weight methacrylate (HMWM) resin system with sand and absorbent material to bridge decks.

##### **Submittals**

Submit a HMWM resin placement plan and a public safety plan under Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The plan review time will be 15 days.

The HMWM resin placement plan must include:

1. Schedule of work and testing for each bridge
2. Description of equipment for applying HMWM resin
3. Range of gel time and final cure time for HMWM resin
4. Absorbent material to be used
5. Description of equipment for applying and removing excess sand and absorbent material
6. Procedure for removing HMWM resin from the deck, including equipment
7. Storage and handling of HMWM resin components and absorbent material
8. Disposal of excess HMWM resin and containers

The public safety plan must include:

1. A public notification letter with a list of delivery and posting addresses. The letter must state HMWM resin work locations, dates, times, and what to expect. Deliver the letter to residences and businesses within 100 feet of HMWM resin work locations and to local fire and police officials at least 7 days before starting work. Post the letter at the job site.
2. An airborne emissions monitoring plan prepared and executed by a industrial hygienist certified in comprehensive practice by the American Board of Industrial Hygiene. The plan must have at least 4 monitoring points including the mixing point, application point, and point of nearest public contact. Monitor airborne emissions during HMWM resin work and submit emissions monitoring results after completing the work.
3. An action plan for protection of the public when airborne emissions levels exceed permissible levels.

4. A copy of the hygienist's certification.

Submit a material safety data sheet for each HMWM resin and diatomaceous earth shipment before use.

### Quality Control and Assurance

Submit samples of HMWM resin 15 days before use under Section 6-3, "Testing," of the Standard Specifications. Notify the Engineer 15 days before delivery of resin in containers over 55 gallons to the job site.

Complete a test area before starting work.

The test area must:

1. Be approximately 500 sq ft
2. Be placed within the project limits outside the traveled way at an approved location
3. Be constructed using the same equipment as the production work
4. Replicate field conditions for the production work
5. Demonstrate proposed means and methods meet the acceptance criteria
6. Demonstrate production work will be completed within the time allowed

The test area will be acceptable if:

1. The treated deck surface is tack free and non-oily
2. The sand cover adheres and resists brushing by hand
3. Excess sand and absorbent material has been removed
4. The coefficient of friction is at least 0.35 when tested under California Test 342

### MATERIALS

HMWM resin system consists of a resin, promoter, and initiator. HMWM resin must be low odor and comply with the following:

**HMWM Resin**

| Property                                      | Requirement   | Test Method                                      |
|---|---|--|
| Volatile Content <sup>a</sup>                 | 30 percent, maximum   | ASTM D 2369                                      |
| Viscosity <sup>a</sup>                        | 25 cP, maximum,<br>(Brookfield RVT with<br>UL adaptor,<br>50 RPM at 77°F) | ASTM D 2196                                      |
| Specific Gravity <sup>a</sup>                 | 0.90 minimum, at 77°F   | ASTM D 1475                                      |
| Flash Point <sup>a</sup>                      | 180°F, minimum  | ASTM D 3278                                      |
| Vapor Pressure <sup>a</sup>                   | 1.0 mm Hg, maximum,<br>at 77°F  | ASTM D 323                                       |
| Tack-free Time                                | 400 minutes,<br>maximum, at 25°C  | Specimens prepared<br>per California<br>Test 551 |
| PCC Saturated<br>Surface-Dry Bond<br>Strength | 3.5 MPa, minimum at<br>24 hours and 21 ± 1°C                              | California Test 551                              |

<sup>a</sup>Test must be performed before adding initiator.

Sand for abrasive sand finish must:

1. Be commercial quality dry blast sand
2. Have at least 95 percent pass the No. 8 sieve and at least 95 percent retained on the No. 20 sieve when tested under California Test 205

Absorbent material must be diatomaceous earth, abrasive blast dust, or substitute recommended by the HMWM resin supplier and approved by the Engineer.

Polyester resin must:

1. Be an unsaturated isophthalic polyester-styrene co-polymer
2. Contain at least 1 percent by weight gamma-methacryloxypropyltrimethoxysilane, an organosilane ester silane coupler
3. Be used with a promoter compatible with suitable methyl ethyl ketone peroxide and cumene hydroperoxide initiators
4. Comply with the following:

**Polyester Resin Binder**

| Property                                      | Requirement  | Test Method             |
|---|--|-------------------------|
| Viscosity <sup>a</sup>                        | 75 to 200 cP<br>(RVT, No. 1 Spindle,<br>20 RPM at 77°F)                            | ASTM D 2196             |
| Specific Gravity <sup>a</sup>                 | 1.05 to 1.10 at 77°F   | ASTM D 1475             |
| Elongation                                    | 35 percent, minimum<br>Type I at 0.45 inch/min.<br>Thickness =<br>0.25 ± 0.03 inch | ASTM D 638              |
|   | Sample Conditioning:<br>18/25/50 + 5/70  | ASTM D 618              |
| Tensile Strength                              | 2500 psi, minimum<br>Type I at 0.45 inch/min.<br>Thickness =<br>0.25 ± 0.03 inch   | ASTM D 638              |
|   | Sample Conditioning:<br>18/25/50 + 5/70  | ASTM D 618              |
| Styrene Content <sup>a</sup>                  | 40 percent to 50 percent<br>by weight  | ASTM D 2369             |
| PCC Saturated<br>Surface-Dry Bond<br>Strength | 3.5 MPa, minimum, at<br>24 hours and<br>21° ± 1°C                                  | California Test 551     |
| Static Volatile<br>Emission <sup>a</sup>      | 60 gram per square<br>meter, loss, maximum   | SCAQMD<br>Method 309-91 |

<sup>a</sup>Test must be performed before adding initiator.

**CONSTRUCTION**

HMWM resin applied by machine must be:

1. Combined in volumetric streams of promoted resin to initiated resin by static in-line mixers
2. Applied without atomization

HMWM resin may be applied manually. Limit the quantity of resin mixed for manual application to 5 gallons at a time. Prepare the deck under "Prepare Concrete Bridge Deck Surface," "Remove Unsound Concrete," and "Rapid Setting Concrete Patches" of these special provisions.

The deck must be dry before applying HMWM resin. The concrete surface must be at least 50 degrees F and at most 100 degrees F. Relative humidity must be at most 85 percent.

Thoroughly mix all components of HMWM resin. Apply HMWM resin to the deck surface within 5 minutes of mixing at approximately 90 sq ft per gallon; the Engineer will determine the exact application rate. The resin gel time must be between 40 and 90 minutes. Resin that thickens during application will be rejected.

Spread the HMWM resin uniformly to completely cover surfaces to be treated. Redistribute excess resin using squeegees or brooms within 10 minutes of application. For textured or grooved deck surfaces, excess resin must be removed from the texture indentations.

Apply the abrasive sand finish of at least 2 lbs per sq yd or until refusal as determined by the Engineer no sooner than 20 minutes after applying resin. Apply absorbent material 1 hour before opening lane to traffic. Remove excess sand and absorbent material by vacuuming or power sweeping.

Traffic or equipment will be allowed on the overlay after the Engineer has determined:

1. The treated deck surface is tack free and non-oily

2. The sand cover adheres and resists brushing by hand
3. Excess sand and absorbent material has been removed
4. No material will be tracked onto the adjacent roadway by traffic

Perform one of the following operations if the Engineer determines (1) the above listed conditions have not been met and (2) the allowable lane closure time will be exceeded:

1. Remove the HMWM resin from the deck surface
2. Place a layer of polyester resin having a cure time of at most 1 hour over the HMWM resin with an abrasive sand finish of at least 2 lbs per sq yd

The Engineer will perform California Test 342 on treated deck surfaces. The Engineer will provide at least a 15-day notice for the Contractor to provide traffic control for each bridge location. The coefficient of friction of the treated deck must be at least 0.35.

#### **MEASUREMENT AND PAYMENT**

Bridge deck methacrylate resin treatment will be measured by the square foot based on the dimensions shown on the plans and will be paid for as treat bridge deck. Furnish bridge deck treatment material will be measured by the gallon of mixed HMWM resin actually placed and will be paid for as furnish bridge deck treatment material. No payment will be made for materials wasted or not incorporated in the work.

The contract price paid per square foot for treat bridge deck shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in preparing and applying bridge deck HMWM resin treatment, including sand and absorbent material, 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 gallon for furnish bridge deck treatment material shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to furnish the bridge deck treatment material to the site of the work ready for application, as specified in the Standard Specifications and these special provisions and as directed by the Engineer.

Public safety plan will be paid for on the basis of a lump sum price.

The contract lump sum price paid for public safety plan shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, including the public action plan and airborne emissions monitoring work performed by the CIH, notification of the public, and reporting test results, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for providing traffic control for the Engineer to perform inspections and testing shall be considered as included in the contract prices paid for the items of work involving bridge deck methacrylate resin treatment and no additional compensation will be allowed therefor.

#### **10-1.57 STEEL STRUCTURES**

Construction of steel structures shall conform to the provisions in Section 55, "Steel Structures," of the Standard Specifications and these special provisions.

##### **GENERAL**

Attention is directed to "Welding" in Section 8, "Materials," of these special provisions.

##### **ROTATIONAL CAPACITY TESTING PRIOR TO SHIPMENT TO JOB SITE**

Rotational capacity tests shall be performed on all lots of high-strength fastener assemblies prior to shipment of these lots to the project site. Zinc-coated assemblies shall be tested after all fabrication, coating, and lubrication of components has been completed. One hardened washer shall be used under each nut for the tests.

The requirements of this section do not apply to high-strength cap screws or high-strength bolts used for slip base plates.

Each combination of bolt production lot, nut lot, and washer lot shall be tested as an assembly.

A rotational capacity lot number shall be assigned to each combination of lots tested. Each shipping unit of fastener assemblies shall be plainly marked with the rotational capacity lot number.

Two fastener assemblies from each rotational capacity lot shall be tested.

The following equipment, procedure, and acceptance criteria shall be used to perform rotational capacity tests on and determine acceptance of long bolts. Fasteners are considered to be long bolts when full nut thread engagement can be achieved when installed in a bolt tension measuring device:

A. Long Bolt Test Equipment:

1. Calibrated bolt tension measuring device with adequate tension capacity for the bolts being tested.
2. Calibrated dial or digital torque wrench. Other suitable tools will be required for performing Steps 7 and 8 of the Long Bolt Test Procedure. A torque multiplier may be required for large diameter bolts.
3. Spacer washers or bushings. When spacer washers or bushings are required, they shall have the same inside diameter and equal or larger outside diameter as the appropriate hardened washers conforming to the requirements in ASTM Designation: F 436.
4. Steel beam or member, such as a girder flange or cross frame, to which the bolt tension measuring device will be attached. The device shall be accessible from the ground.

B Long Bolt Test Procedure:

1. Measure the bolt length. The bolt length is defined as the distance from the end of the threaded portion of the shank to the underside of the bolt head.
2. Install the nut on the bolt so that 3 to 5 full threads of the bolt are located between the bearing face of the nut and the underside of the bolt head. Measure and record the thread stickout of the bolt. Thread stickout is determined by measuring the distance from the outer face of the nut to the end of the threaded portion of the shank.
3. Insert the bolt into the bolt tension measuring device and install the required number of washers, and additional spacers as needed, directly beneath the nut to produce the thread stickout measured in Step 2 of this procedure.
4. Tighten the nut using a hand wrench to a snug-tight condition. The snug tension shall not be less than the Table A value but may exceed the Table A value by a maximum of 2 kips.

Table A

| High-Strength Fastener Assembly Tension Values to Approximate Snug-Tight Condition |                        |
|--|------------------------|
| Bolt Diameter<br>(inches)  | Snug Tension<br>(kips) |
| 1/2  | 1                      |
| 5/8  | 2                      |
| 3/4  | 3                      |
| 7/8  | 4                      |
| 1  | 5                      |
| 1-1/8  | 6                      |
| 1-1/4  | 7                      |
| 1-3/8  | 9                      |
| 1-1/2  | 10                     |

5. Match-mark the assembly by placing a heavy reference start line on the face plate of the bolt tension measuring device which aligns with (1) a mark placed on one corner of the nut and (2) a radial line placed across the flat on the end of the bolt or on the exposed portions of the threads of tension control bolts. Place an additional mark on the outside of the socket that overlays the mark on the nut corner such that this mark will be visible while turning the nut. Make an additional mark on the face plate, either 2/3 of a turn, one turn, or 1-1/3 turn clockwise from the heavy reference start line, depending on the bolt length being tested as shown in Table B.

Table B

| Required Nut Rotation for Rotational Capacity Tests <sup>(a) (b)</sup>         |                          |
|--|--------------------------|
| Bolt Length (measured in Step 1)   | Required Rotation (turn) |
| 4 bolt diameters or less   | 2/3                      |
| Greater than 4 bolt diameters but no more than 8 bolt diameters                | 1                        |
| Greater than 8 bolt diameters, but no more than 12 bolt diameters <sup>©</sup> | 1-1/3                    |

(a) Nut rotation is relative to bolt, regardless of the element (nut or bolt) being turned. For bolts installed by 1/2 turn and less, the tolerance shall be plus or minus 30 degrees; for bolts installed by 2/3 turn and more, the tolerance shall be plus or minus 45 degrees.

(b) Applicable only to connections in which all material within grip of the bolt is steel.

© When bolt length exceeds 12 diameters, the required rotation shall be determined by actual tests in a suitable tension device simulating the actual conditions.

6. Turn the nut to achieve the applicable minimum bolt tension value listed in Table C. After reaching this tension, record the moving torque, in foot-pounds, required to turn the nut, and also record the corresponding bolt tension value in pounds. Torque shall be measured with the nut in motion. Calculate the value, T, where  $T = [(the\ measured\ tension\ in\ pounds) \times (the\ bolt\ diameter\ in\ inches) / 48]$ .

Table C

| Minimum Tension Values for High-Strength Fastener Assemblies |                        |
|--|------------------------|
| Bolt Diameter (inches)                                       | Minimum Tension (kips) |
| 1/2  | 12                     |
| 5/8  | 19                     |
| 3/4  | 28                     |
| 7/8  | 39                     |
| 1  | 51                     |
| 1-1/8  | 56                     |
| 1-1/4  | 71                     |
| 1-3/8  | 85                     |
| 1-1/2  | 103                    |

7. Turn the nut further to increase bolt tension until the rotation listed in Table B is reached. The rotation is measured from the heavy reference line made on the face plate after the bolt was snug-tight. Record this bolt tension.
8. Loosen and remove the nut and examine the threads on both the nut and bolt.

C. Long Bolt Acceptance Criteria:

1. An assembly shall pass the following requirements to be acceptable: (1) the measured moving torque (Step 6) shall be less than or equal to the calculated value, T (Step 6), (2) the bolt tension measured in Step 7 shall be greater than or equal to the applicable turn test tension value listed in Table D, (3) the nut shall be able to be removed from the bolt without signs of thread stripping or galling after the required rotation in Step 7 has been achieved, (4) the bolt does not shear from torsion or fail during the test, and (5) the assembly does not seize before the final rotation in Step 7 is reached. Elongation of the bolt in the threaded region between the bearing face of the nut and the underside of the bolt head is expected and will not be considered a failure. Both fastener assemblies tested from one rotational capacity lot shall pass for the rotational capacity lot to be acceptable.

Table D

| Turn Test Tension Values  |                             |
|---------------------------|-----------------------------|
| Bolt Diameter<br>(inches) | Turn Test Tension<br>(kips) |
| 1/2                       | 14                          |
| 5/8                       | 22                          |
| 3/4                       | 32                          |
| 7/8                       | 45                          |
| 1                         | 59                          |
| 1-1/8                     | 64                          |
| 1-1/4                     | 82                          |
| 1-3/8                     | 98                          |
| 1-1/2                     | 118                         |

The following equipment, procedure, and acceptance criteria shall be used to perform rotational capacity tests on and determine acceptance of short bolts. Fasteners are considered to be short bolts when full nut thread engagement cannot be achieved when installed in a bolt tension measuring device:

A. Short Bolt Test Equipment:

1. Calibrated dial or digital torque wrench. Other suitable tools will be required for performing Steps 7 and 8 of the Short Bolt Test Procedure. A torque multiplier may be required for large diameter bolts.
2. Spud wrench or equivalent.
3. Spacer washers or bushings. When spacer washers or bushings are required, they shall have the same inside diameter and equal or larger outside diameter as the appropriate hardened washers conforming to the requirements in ASTM Designation: F 436.
4. Steel plate or girder with a hole to install bolt. The hole size shall be 1/16 inch greater than the nominal diameter of the bolt to be tested. The grip length, including any plates, washers, and additional spacers as needed, shall provide the proper number of threads within the grip, as required in Step 2 of the Short Bolt Test Procedure.

B. Short Bolt Test Procedure:

1. Measure the bolt length. The bolt length is defined as the distance from the end of the threaded portion of the shank to the underside of the bolt head.
2. Install the nut on the bolt so that 3 to 5 full threads of the bolt are located between the bearing face of the nut and the underside of the bolt head. Measure and record the thread stickout of the bolt. Thread stickout is determined by measuring the distance from the outer face of the nut to the end of the threaded portion of the shank.
3. Install the bolt into a hole on the plate or girder and install the required number of washers and additional spacers as needed between the bearing face of the nut and the underside of the bolt head to produce the thread stickout measured in Step 2 of this procedure.
4. Tighten the nut using a hand wrench to a snug-tight condition. The snug condition shall be the full manual effort applied to the end of a 12-inch long wrench. This applied torque shall not exceed 20 percent of the maximum allowable torque in Table E.

Table E

| Maximum Allowable Torque for High-Strength Fastener Assemblies |                   |
|--|-------------------|
| Bolt Diameter<br>(inches)                                      | Torque<br>(ft-lb) |
| 1/2  | 145               |
| 5/8  | 285               |
| 3/4  | 500               |
| 7/8  | 820               |
| 1  | 1220              |
| 1-1/8  | 1500              |
| 1-1/4  | 2130              |
| 1-3/8  | 2800              |
| 1-1/2  | 3700              |

5. Match-mark the assembly by placing a heavy reference start line on the steel plate or girder which aligns with (1) a mark placed on one corner of the nut and (2) a radial line placed across the flat on the end of the bolt or on the exposed portions of the threads of tension control bolts. Place an additional mark on the outside of the socket that overlays the mark on the nut corner such that this mark will be visible while turning the nut. Make 2 additional small marks on the steel plate or girder, one 1/3 of a turn and one 2/3 of a turn clockwise from the heavy reference start line on the steel plate or girder.
6. Using the torque wrench, tighten the nut to the rotation value listed in Table F. The rotation is measured from the heavy reference line described in Step 5 made after the bolt was snug-tight. A second wrench shall be used to prevent rotation of the bolt head during tightening. Measure and record the moving torque after this rotation has been reached. The torque shall be measured with the nut in motion.

Table F

| Nut Rotation Required for Turn-of-Nut Installation <sup>(a),(b)</sup> |                          |
|---|--------------------------|
| Bolt Length (measured in Step 1)                                      | Required Rotation (turn) |
| 4 bolt diameters or less  | 1/3                      |

- (a) Nut rotation is relative to bolt, regardless of the element (nut or bolt) being turned. For bolts installed by 1/2 turn and less, the tolerance shall be plus or minus 30 degrees.
- (b) Applicable only to connections in which all material within grip of the bolt is steel.

7. Tighten the nut further to the 2/3-turn mark as indicated in Table G. The rotation is measured from the heavy reference start line made on the plate or girder when the bolt was snug-tight. Verify that the radial line on the bolt end or on the exposed portions of the threads of tension control bolts is still in alignment with the start line.

Table G

| Required Nut Rotation for Rotational Capacity Test |                          |
|--|--------------------------|
| Bolt Length (measured in Step 1)                   | Required Rotation (turn) |
| 4 bolt diameters or less                           | 2/3                      |

8. Loosen and remove the nut and examine the threads on both the nut and bolt.

C. Short Bolt Acceptance Criteria:

1. An assembly shall pass the following requirements to be acceptable: (1) the measured moving torque from Step 6 shall be less than or equal to the maximum allowable torque from Table E, (2) the nut shall be able to be removed from the bolt without signs of thread stripping or galling after the required rotation in Step 7 has been achieved, (3) the bolt does not shear from torsion or fail during the test, and (4) the assembly shall not seize before the final rotation in Step 7 is reached. Elongation of the bolt in the threaded region between the bearing face of the nut and the underside of the bolt head will not be considered a failure. Both fastener assemblies tested from one rotational capacity lot shall pass for the rotational capacity lot to be acceptable.

## **INSTALLATION TENSION TESTING AND ROTATIONAL CAPACITY TESTING AFTER ARRIVAL ON THE JOB SITE**

Installation tension tests and rotational capacity tests on high-strength fastener assemblies shall be performed by the Contractor prior to acceptance or installation and after arrival of the fastener assemblies on the project site. Installation tension tests and rotational capacity tests shall be performed at the job site, in the presence of the Engineer, on each rotational capacity lot of fastener assemblies.

The requirements of this section do not apply to high-strength cap screws or high-strength bolts used for slip base plates.

Installation tension tests shall be performed on 3 representative fastener assemblies in conformance with the provisions in Section 8, "Installation," of the RCSC Specification. For short bolts, Section 8.2, "Pretensioned Joints," of the RCSC Specification shall be replaced by the "Pre-Installation Testing Procedures," of the "Structural Bolting Handbook," published by the Steel Structures Technology Center, Incorporated.

The rotational capacity tests shall be performed in conformance with the requirements for rotational capacity tests in "Rotational Capacity Testing Prior to Shipment to Job Site" of these special provisions.

At the Contractor's expense, additional installation tension tests, tests required to determine job inspecting torque, and rotational capacity tests shall be performed by the Contractor on each rotational capacity lot, in the presence of the Engineer, if:

1. Any fastener is not used within 3 months after arrival on the job site,
2. Fasteners are improperly handled, stored, or subjected to inclement weather prior to final tightening,
3. Significant changes are noted in original surface condition of threads, washers, or nut lubricant, or
4. The Contractor's required inspection is not performed within 48 hours after all fasteners in a joint have been tensioned.

Failure of a job-site installation tension test or a rotational capacity test will be cause for rejection of unused fasteners that are part of the rotational capacity lot.

When direct tension indicators are used, installation verification tests shall be performed in conformance with Appendix Section X1.4 of ASTM Designation: F 959, except that bolts shall be initially tensioned to a value 5 percent greater than the minimum required bolt tension.

## **SURFACE PREPARATION**

For all bolted connections the following shall be cleaned and coated before assembly in conformance with the provisions for cleaning and painting structural steel of these special provisions:

1. Contact surfaces,
2. Outer surfaces of existing members that are within the grip and will be hidden by surfaces of outside existing members within the grip under bolt heads, nuts, and washers, and
3. Inside surfaces of bolt holes.

## **SEALING**

When zinc-coated tension control bolts are used, the sheared end of each fastener shall be completely sealed with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II. The sealant shall be gray in color and shall have a minimum thickness of 50 mils. The sealant shall be applied to a clean sheared surface on the same day that the splined end is sheared off.

## **WELDING**

Table 2.2 of AWS D1.5 is superseded by the following table:

| Base Metal Thickness of the Thicker Part Joined, inches | Minimum Effective Partial Joint Penetration Groove Weld Size*, inches |
|---|---|
| Over 1/4 to 1/2 inclusive                               | 3/16  |
| Over 1/2 to 3/4 inclusive                               | 1/4   |
| Over 3/4 to 1-1/2 inclusive                             | 5/16  |
| Over 1-1/2 to 2-1/4 inclusive                           | 3/8   |
| Over 2-1/4 to 6 inclusive                               | 1/2   |
| Over 6  | 5/8   |

\* Except the weld size need not exceed the thickness of the thinner part

The requirement of conformance with AWS D1.5 shall not apply to work conforming to Section 56-1, "Overhead Sign Structures," or Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications.

### MEASUREMENT AND PAYMENT

The contract price paid per pound for structural steel (bridge) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and erecting structural steel, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### 10-1.58 REPAIR STEEL GIRDER WEB CRACKS

Repairing steel girder web cracks shall conform to the details shown on the plans and the provisions of Section 55, "Steel Structures," of the Standard Specifications and these special provisions.

Attention is directed to "Field Welding Quality Control" and "Clean and Paint Existing Structural Steel" in these special provisions.

Repair procedures shall be as follows:

- A. Liquid-penetrant test all cracks to identify the beginning and end of proposed crack repair.
- B. Carbon arc gouge crack-half way through the first side of the web plate approximately 3/16 inch deep.
- C. Weld first side in an upward progression, ending weld at the run off tab.
- D. Carbon arc gouge second side of the web to sound weld metal.
- E. Weld second side in upward progression, ending weld at the run off tab.
- F. Liquid-penetrant test inside of the hole.
- G. Grind welds flush as required to allow fitting of bolted angles.
- H. Radiograph 25 percent of all new welds.

Upon completion of penetrant tests used to identify crack location and prior to beginning the weld repair the Engineer shall verify and approve proposed crack repair locations and lengths.

Web crack repair will be measured by the unit.

The contract unit price paid for repair crack (steel girder web) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in welding structural steel web cracks, complete in place, including drilling holes, installing and removing run-off tabs, liquid-penetrant testing, magnetic particle testing and radiographing welds, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### 10-1.59 SIGN STRUCTURES

Sign structures and foundations for overhead signs shall conform to the provisions in Section 56-1, "Overhead Sign Structures," of the Standard Specifications, "Steel Structures" of these special provisions, and the following requirements.

Before commencing fabrication of sign structures, the Contractor shall submit 2 sets of working drawings to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The working drawings shall include sign panel dimensions, span lengths, post heights, anchorage layouts, proposed splice locations, a snugging and tensioning pattern for anchor bolts and high-strength bolted connections, and details for permanent steel anchor bolt templates. The working drawings shall be supplemented with a written quality control program that includes methods, equipment, and personnel necessary to satisfy the requirements specified herein.

Working drawings shall be 22" x 34" or 11" x 17" in size and each drawing and calculation sheet shall include the State assigned designations for the sign structure type and reference as shown on the contract plans, District-County-Route-Post Mile, and contract number.

The Engineer shall have 30 days to review the sign structure working drawings after a complete submittal has been received. No fabrication or installation of sign structures shall be performed until the working drawings are approved in writing by the Engineer.

Should the Engineer fail to complete the review 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 sign structure working drawings, 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.

Steel bolts not designated on the plans as high strength (HS) or stainless steel shall be for general applications and shall conform to the requirements in ASTM Designation: A 307.

A permanent steel template shall be used to maintain the proper anchor bolt spacing.

One top nut, one leveling nut, and 2 washers shall be provided for the upper threaded portion of each anchor bolt.

Flatness of surfaces for the following shall conform to the requirements in ASTM Designation: A 6/A 6M:

1. Base plates that are to come in contact with concrete, grout, or washers and leveling nuts
2. Plates in high-strength bolted connections

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

Longitudinal seam welds shall have 60 percent minimum penetration, except that within 6 inches of circumferential welds, longitudinal seam welds shall be complete joint penetration (CJP) groove welds. In addition, longitudinal seam welds on 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 6 inches.

Steel members used for overhead sign structures shall receive nondestructive testing (NDT) in conformance with AWS D1.1 and the following:

1.
 

| Weld Location  | Weld Type  | Minimum Required NDT  |
|--|--|---|
| Splice welds around the perimeter of tubular sections, poles, and arms.                        | CJP groove weld with backing ring                        | 100% UT <sup>a</sup> or RT <sup>b</sup>   |
| Longitudinal seam welds  | CJP or PJP <sup>c</sup> groove weld                      | Random 25% MT <sup>d</sup>  |
| Longitudinal seam welds within 6 inches of a circumferential splice.                           | CJP groove weld  | 100% UT or RT   |
| Welds attaching base plates, flange plates, or pole or mast arm plates, to poles or arm tubes. | CJP groove weld with backing ring and reinforcing fillet | t > 3/16 inch: 100% UT and MT<br>t < 3/16 inch: 100% MT after root weld pass and final weld pass<br>t = pole or arm thickness |
|  | External (top) fillet weld for socket-type connections   | 100% MT   |

a ultrasonic testing

b radiographic testing

c partial joint penetration

d magnetic particle testing

2. The acceptance and repair criteria for UT of welded joints where any of the members are less than 5/16 inch thick or where tubular sections are less than 13 inches in diameter shall conform to the requirements in AWS D1.1, Section 6.13.3.1. A written procedure approved by the Engineer shall be used when performing this UT. These written procedures shall conform to the requirements in AWS D1.1, Annex K. The acceptance and repair criteria for other welded joints receiving UT shall conform to the requirements in AWS D1.1, Section 6, Table 6.3 for cyclically loaded nontubular connections.
3. The acceptance and repair criteria for radiographic or real time image testing shall conform to the requirements of AWS D1.1 for tensile stress welds.
4. For longitudinal seam welds, the random locations for NDT will be selected by the Engineer. The cover pass shall be ground smooth at the locations to be tested. If repairs are required in a portion of a tested weld, the repaired portion shall receive NDT, and additional NDT shall be performed on untested portions of the weld. The additional NDT shall be performed on 25 percent of that longitudinal seam weld. After this additional NDT is performed and if more repairs are required, then that entire longitudinal seam weld shall receive NDT.

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

All ferrous metal parts of tubular sign structures shall be galvanized and shall not be painted.

Full compensation for furnishing anchor bolt templates and for testing of welds shall be considered as included in the contract price paid per pound for furnish sign structure, and no additional compensation will be allowed therefor.

#### **10-1.60 ROADSIDE SIGNS**

Roadside signs shall be furnished and installed at the locations shown on the plans or where designated by the Engineer and in conformance with the provisions in Section 56-2, "Roadside Signs," of the Standard Specifications and these special provisions.

The Contractor shall furnish roadside sign panels in conformance with the provisions in "Furnish Sign" of these special provisions.

Wood posts shall be pressure treated after fabrication in conformance with the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling," of the Standard Specifications and AWPA Use Category System: UC4A, Commodity Specification A or B.

Type N (CA), Type P (CA), and Type R (CA) marker panels mounted on a post with a roadside sign shall be considered to be sign panels and will not be paid for as markers.

#### **10-1.61 INSTALL SIGN PANEL ON EXISTING FRAME**

Sign panels shall be installed on existing frames at the locations shown on the plans or where designated by the Engineer and in conformance with the provisions in Section 56-1.06, "Sign Panels and Fastening Hardware," of the Standard Specifications and these special provisions.

The Contractor shall furnish sign panels in conformance with the provisions in "Furnish Sign" of these special provisions.

Installing sign panels on existing frames will be measured as units determined from actual count of sign panels installed in place.

The contract unit price paid for install sign panel on existing frame shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing sign panels on existing frames, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.62 FURNISH SIGN**

Signs shall be fabricated and furnished in accordance with details shown on the plans, the Traffic Sign Specifications, and these special provisions.

Traffic Sign Specifications for California sign codes are available for review at:

<http://www.dot.ca.gov/hq/traffops/signtech/signdel/specs.htm>

Traffic Sign Specifications for signs referenced with Federal MUTCD sign codes can be found in Standard Highway Signs Book, administered by the Federal Highway Administration, which is available for review at:

[http://mutcd.fhwa.dot.gov/ser-shs\\_millennium.htm](http://mutcd.fhwa.dot.gov/ser-shs_millennium.htm)

Information on cross-referencing California sign codes with the Federal MUTCD sign codes is available at:

<http://www.dot.ca.gov/hq/traffops/signtech/signdel/specs.htm>

Temporary or permanent signs shall 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 25 feet. 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 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.

#### **QUALITY CONTROL FOR SIGNS**

The requirements of "Quality Control for Signs" in this section shall not apply to construction area signs.

No later than 14 days before sign fabrication, the Contractor shall submit a written copy of the quality control plan for signs to the Engineer for review. The Engineer will have 10 days to review the quality control plan. Sign fabrication shall not begin until the Engineer approves the Contractor's quality control plan in writing. The Contractor shall submit to the Engineer at least 3 copies of the approved quality control plan. The quality control plan shall include, but not be limited to the following requirements:

- A. Identification of the party responsible for quality control of signs,
- B. Basis of acceptance for incoming raw materials at the fabrication facility,
- C. Type, method and frequency of quality control testing at the fabrication facility,
- D. List (by manufacturer and product name) of process colors, protective overlay film, retroreflective sheeting and black non-reflective film,
- E. Recommended cleaning procedure for each product, and
- F. Method of packaging, transport and storage for signs.

No legend shall be installed at the project site. Legend shall include letters, numerals, tildes, bars, arrows, route shields, symbols, logos, borders, artwork, and miscellaneous characters. The style, font, size, and spacing of the legend shall conform to the Standard Alphabets published in the FHWA Standard Highway Signs Book. The legend shall be oriented in the same direction in accordance with the manufacturer's orientation marks found on the retroreflective sheeting.

On multiple panel signs, legend shall be placed across joints without affecting the size, shape, spacing, and appearance of the legend. Background and legend shall be wrapped around interior edges of formed panel signs as shown on plans to prevent delamination.

The following notation shall be placed on the lower right side of the back of each sign where the notation will not be blocked by the sign post or frame:

- A. PROPERTY OF STATE OF CALIFORNIA,
- B. Name of the sign manufacturer,
- C. Month and year of fabrication,
- D. Type of retroreflective sheeting, and
- E. Manufacturer's identification and lot number of retroreflective sheeting.

The above notation shall be applied directly to the aluminum sign panels in 1/4-inch upper case letters and numerals by die-stamp and applied by similar method to the fiberglass reinforced plastic signs. Painting, screening, or engraving the notation will not be allowed. The notation shall be applied without damaging the finish of the sign.

Signs with a protective overlay film shall be marked with a dot of 3/8 inch in diameter. The dot placed on white border shall be black, while the dot placed on black border shall be white. The dot shall be placed on the lower border of the sign before application of the protective overlay film and shall not be placed over the legend and bolt holes. The application method and exact location of the dot shall be determined by the manufacturer of the signs.

For sign panels that have a minor dimension of 48 inches 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 48 inches, only one horizontal splice will be allowed in the retroreflective sheeting.

Unless specified by the manufacturer of the retroreflective sheeting, splices in retroreflective sheeting shall overlap by a minimum of one inch. Splices shall not be placed within 2 inches from edges of the panels. Except at the horizontal borders, the splices shall overlap in the direction from top to bottom of the sign to prevent moisture penetration. The retroreflective sheeting at the overlap shall not exhibit a color difference under the incident and reflected light.

Signs exhibiting a significant color difference between daytime and nighttime shall be replaced immediately.

Repairing sign panels will not be allowed except when approved by the Engineer.

The Department will inspect signs at the Contractor's facility and delivery location, and in accordance with Section 6, "Control of Materials," of the Standard Specifications. The Engineer will inspect signs for damage and defects before and after installation.

Regardless of kind, size, type, or whether delivered by the Contractor or by a common carrier, signs shall be protected by thorough wrapping, tarping, or other methods to ensure that signs are not damaged by weather conditions and during transit. Signs shall be dry during transit and shipped on pallets, in crates, or tier racks. Padding and protective materials shall be placed between signs as appropriate. Finished sign panels shall be transported and stored by method that protects the face of signs from damage. The Contractor shall replace wet, damaged, and defective signs.

Signs shall be stored in dry environment at all times. Signs shall not rest directly on the ground or become wet during storage. Signs, whether stored indoor or outdoor, shall be free standing. In areas of high heat and humidity signs shall be stored in enclosed climate-controlled trailers or containers. Signs shall be stored indoor if duration of the storage will exceed 30 days.

Screen processed signs shall be protected, transported and stored as recommended by the manufacturer of the retroreflective sheeting.

When requested, the Contractor shall provide the Engineer test samples of signs and materials used at various stages of production. Sign samples shall be 12" x 12" in size with applied background, letter or numeral, and border strip.

The Contractor shall assume the costs and responsibilities resulting from the use of patented materials, equipment, devices, and processes for the Contractor's work.

### **SHEET ALUMINUM**

Alloy and temper designations for sheet aluminum shall be in accordance with ASTM Designation: B 209.

The Contractor shall furnish the Engineer a Certificate of Compliance in conformance with 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: B 449. 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 weight between 10 milligrams per square foot and 35 milligrams per square foot, and an average weight of 25 milligrams per square foot. 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 conformance with ASTM Designation: D 4956 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: D 4956 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: D 4956.

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 48 inches, 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  $\pm 1/8$  inch. The face sheet shall be affixed to the frame with rivets of 3/16-inch diameter. Rivets shall be placed within the web of channels and shall not be placed less than 1/2 inch 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  $\pm 1/32$  inch per linear foot when measured across the plane of the sign in all directions. The finished signs shall have an overall tolerance within  $\pm 1/8$  inch 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 sign in accordance with ASTM Designation: D 3841 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: D 635, the extent of burning shall not exceed one inch.

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 sign shall be weather resistant Grade II thermoset polyester laminate.

The fiberglass reinforced plastic panels shall be minimum 0.135-inch thick. Finished fiberglass reinforced plastic panel signs shall be flat within a tolerance of  $\pm 1/32$  inch per linear foot when measured across the plane of the sign in all directions. The finished signs shall have an overall tolerance within  $\pm 1/8$  inch of the specified dimensions.

Color of fiberglass reinforced plastic panels shall be uniform gray within Munsel color 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.

**LAMINATED PANEL SIGN**

Laminated panel signs shall consist of two sheet aluminum laminated to a honeycomb core and extruded aluminum frame to produce flat and rigid panels of one-inch or 2-1/2-inch nominal thickness.

The face of laminated panel signs shall be fabricated from sheet aluminum alloy 6061-T6 or 5052-H32 of 0.063-inch thickness. The back of laminated panel signs shall be fabricated from sheet aluminum alloy 3003-H14 of 0.040-inch thickness. The Contractor shall furnish sheet aluminum as provided in "Sheet Aluminum" of these special provisions.

The core material shall be phenolic impregnated kraft paper honeycomb and fungus resistant in accordance to Military Specification MIL-D-5272. The honeycomb cell size shall be 1/2 inch. Weight of the kraft paper shall be 80 pounds and impregnated minimum 18 percent by weight.

A laminating adhesive that can produce a resilient oil and water-resistant bond shall be used to adhere the extruded aluminum frame and the honeycomb core to the sheet aluminum. Edge and interior delamination occur when a 0.010-inch thick feeler gauge of 1/2 inch in length can be inserted into a depth of more than 1/2 inch between the extruded aluminum frame and the sheet aluminum. Laminated panel sign with delamination will be rejected.

Laminated panels shall be able to resist a wind load of 33 pounds per square foot for the following simple span lengths with a bending safety factor of 1.25:

| Panel Type | Nominal Panel Thickness | Simple Span Length |
|------------|-------------------------|--------------------|
| A          | one inch                | 9 feet 0 inch      |
| B          | one inch                | 9 feet 0 inch      |
|            | 2-1/2 inch              | 14 feet 6 inches   |
| H          | 2-1/2 inch              | 14 feet 6 inches   |

The tensile strength of laminated panels shall be at least 20 pounds per square inch when tested in accordance with the following modification and with ASTM Designations: C 297 and C 481, Cycle B after aging. Instead of spraying with hot water, the specimen shall be totally immersed in 158° F hot water. When requested by the Engineer or the Transportation Laboratory, at least one test sample of 12" x 12" in size shall be taken for every 2,000 square feet of the panel production cycle or of the total factory production order, whichever occurs first.

Rivets used to secure the sheet aluminum to the perimeter frame shall be fabricated from aluminum alloy 5052 and anodized or treated with a conversion coating to prevent corrosion. Size of the aluminum rivets shall be 3/16 inch in

diameter and placed at the corners of the laminated panels. Color of the exposed portion of the rivets shall be the same color as the sign background or legend on which the rivets are placed. Rivets or stainless steel screws shall be placed in holes drilled during fabrication in the perimeter frame.

On laminated multiple panel signs, a closure H-Section shall be placed in the top channel of the bottom panel. Perimeter frame of adjoining panel shall accommodate the closure H-Section in the closed position.

For signs with a depth of 5 feet 0 inch or less, the laminated panels shall be fabricated with no horizontal joints, splices or seams. For signs with a depth of greater than 5 feet 0 inch, the laminated panels may be fabricated in two panels.

The face of laminated panels shall be flat with a tolerance of  $\pm 3/32$  inch per linear foot when measured across the plane of each panel in all directions. Where laminated panels adjoin, the gap between adjoining edges from one corner to the other corner shall not deviate by more than  $1/32$  inch. Non-adjoining edges from one corner to the other corner shall not deviate by more than  $1/8$  inch from a straight plane. The front and back sheet aluminum shall be flush with the perimeter frame. The panel edges shall be smooth.

Laminated panel signs shall be within  $+1/8$  inch or  $-1/2$  inch of the detailed dimensions. The difference in length between adjoining panels of multiple panel signs shall not be greater than  $1/2$  inch.

Roadside laminated panel signs shall be Type B. Type B panels shall have a nominal thickness of one inch or 2- $1/2$  inches.

The perimeter frame of Type B panels shall consist of extruded channel edges. The interior and exterior sides of the channels, except the sides touching the face and back sheet aluminum, shall be welded at the joint. Sealant shall be placed at the corners of the perimeter frame to prevent moisture penetration.

Each side of the vertical tube spacers of Type B panels shall be welded to the perimeter frame, except the sides touching the front and back sheet aluminum.

### **FORMED PANEL SIGN**

Formed panel signs shall be fabricated from one continuous sheet aluminum alloy 5052-H32 of 0.063-inch thickness. The Contractor shall furnish sheet aluminum as provided in "Sheet Aluminum" of these special provisions.

The aluminum frame shall be affixed to the panel with aluminum rivets through the face of the sign panels. Color of the exposed portion of the rivets shall be the same color as the sign background or legend on which the rivets are placed.

The face of finished formed panel sign shall be flat with a tolerance of  $1/8$  inch per linear foot when measured across the plane of each panel in all directions.

The Contractor shall furnish mounting hardware for overhead formed panel signs. Hardware for the overhead formed panel signs shall include bolts, nuts, and washers.

The length and depth of the overhead formed panel signs shall be within  $\pm 1/16$  inch of the detailed dimension.

The formed edges of the overhead panel signs shall be square. The mounting holes shall be straight and perpendicular to the front and back surfaces of the formed edges at the spacing shown on the plans. Holes that are improperly spaced and placed at the wrong angle will be rejected.

### **MEASUREMENT AND PAYMENT**

Furnishing signs (except for construction area signs) will be measured by the square foot and the quantity to be paid for will be the total area, in square feet, of the sign panel types installed in place.

The contract price paid per square foot for furnish sign of the types specified in the Engineer's estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in fabricating and furnishing the signs, including removable sign panel frame and fastening hardware, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### **10-1.63 CLEAN AND PAINT STRUCTURAL STEEL**

New metal surfaces and connections to existing steel shall be cleaned and painted in conformance with the provisions in Section 59-2, "Painting Structural Steel," Section 59-3, "Painting Galvanized Surfaces," and Section 91, "Paint," of the Standard Specifications and these special provisions.

### **GENERAL**

The existing paint systems consist of materials listed in "Existing Highway Facilities" of these special provisions.

Before performing any painting or paint removal, 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, 3 copies of a separate Painting Quality Work Plan (PQWP) for each item of work for which painting or paint removal is to be performed. As a minimum, each PQWP shall include the following:

- A. The name of each Contractor or subcontractor to be used.

- B. One copy each of all current ASTM and "SSPC: The Society for Protective Coatings" specifications or qualification procedures applicable to the painting or paint removal to be performed. These documents shall become the permanent property of the Department.
- C. A copy of the coating manufacturer's guidelines and recommendations for surface preparation, painting, drying, curing, handling, shipping, and storage of painted structural steel, including testing methods and maximum allowable levels for soluble salts.
- D. Proposed materials, methods, and equipment to be used for any paint application.
- E. Proof of each of any required certifications, SSPC-QP 1, SSPC-QP 2, SSPC-QP 3. Where SSPC-QP 3 certification is required, an enclosed shop facility shall be required. Certification of AISC Sophisticated Paint Endorsement Quality Program, P-1 Enclosed endorsement, will be considered equivalent to SSPC-QP 3.
- F. Proposed methods to control environmental conditions in accordance with the manufacturer's recommendations and these special provisions.
- G. Proposed methods to protect the coating during curing, shipping, handling, and storage.
- H. Proposed rinse water collection plan.
- I. A detailed paint repair plan for the repair of damaged areas.
- J. Procedures for containing blast media and water during application of coatings and coating repair of erected steel.
- K. Examples of proposed daily reports for all testing to be performed, including type of testing, location, lot size, time, weather conditions, test personnel, and results.

Before submitting the PQWP, a prepainting meeting between the Engineer, the Contractor, and a representative from each entity performing painting for this project shall be held to discuss the requirements for the PQWP.

The Engineer shall have 20 days to review the PQWP submittal after a complete plan has been received. No painting or paint removal shall be performed until the PQWP for that work is approved by the Engineer. Should the Engineer fail to complete the review within this 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 PQWP, 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.

The Engineer's approval of the Contractor's PQWP 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.

The Contractor shall provide enclosures to permit cleaning and painting during inclement weather. Provisions shall be made to control atmospheric conditions inside the enclosures within specified limits during cleaning and painting operations, drying to solvent insolubility, and throughout the curing period in accordance with the manufacturer's recommendations and these special provisions. Full compensation for providing and maintaining such enclosures shall be considered as included in the prices paid for the various contract items of work requiring paint and no additional compensation will be allowed therefor.

Fresh, potable water with a maximum chloride content of 75 ppm and a maximum sulfate content of 200 ppm shall be used for water rinsing or pressure washing operations. No continuous recycling of rinse water will be permitted. If rinse water is collected into a tank and subsequent testing determines the collected water conforms to the specified requirements, reuse may be permitted by the Engineer if no collected water is added to the tank after sample collection for determination of conformance to specified requirements.

## **CLEANING**

New metal surfaces and areas of connections to existing steel, except where galvanized, shall be dry blast cleaned and dry spot blast cleaned, respectively, in conformance with the requirements in SSPC-SP 10, "Near White Blast Cleaning," of the "SSPC: The Society for Protective Coatings." Blast cleaning shall leave surfaces with a dense, uniform, angular anchor pattern of no less than 1.5 mils nor more than 3.5 mils as measured in conformance with the requirements in ASTM Designation: D 4417.

The areas of connections to existing steel to be dry spot blast cleaned shall consist of, as a minimum:

- A. New and existing contact surfaces and existing member surfaces under bolt heads, nuts or washers of high-strength bolted connections,
- B. Exposed bare surfaces of existing steel remaining after trimming, cutting, drilling or reaming, and
- C. Areas of existing steel within a 4-inch radius measured in any direction from the point of application of heat for welding or flame cutting.

Mineral and slag abrasives used for blast cleaning steel surfaces shall conform to the requirements for Class A, Grade 2 to 3 abrasives contained in SSPC-AB 1, "Mineral and Slag Abrasives," of the "SSPC: The Society for Protective Coatings," and shall not contain hazardous material.

Steel abrasives used for blast cleaning steel surfaces shall comply with the requirements of SSPC-AB 3, "Ferrous Metallic Abrasive," of the "SSPC: The Society for Protective Coatings." If steel abrasive is recycled through shop or field abrasive blast cleaning units, the recycled abrasive shall conform to the requirements of SSPC-AB 2, "Specification for Cleanliness of Recycled Ferrous Metallic Abrasive," of the "SSPC: The Society for Protective Coatings."

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications and a Material Safety Data Sheet shall be furnished before use for each shipment of blast cleaning material for existing steel.

Abrasive blast cleaned surfaces shall be tested by the Contractor for soluble salts using a Class A or B retrieval method as described in Technology Guide 15, "Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates," of the "SSPC: The Society for Protective Coatings," and cleaned so the maximum level of soluble salts does not exceed the lesser of the coating manufacturer's written recommendations or 10 micrograms per square centimeter. Areas of abrasive blast cleaned steel shall be tested at the rate of 3 tests for the first 1,000 square feet prepared per day, and one test for each additional 1,000 square feet or portion thereof, at locations selected by the Engineer. When less than 1,000 square feet of surface area is prepared in a shift, at least 2 tests shall be performed. If levels of soluble salts exceed the maximum allowed by these special provisions, the entire area represented by the testing will be rejected. The Contractor shall perform additional cleaning and testing of rejected areas until soluble salt levels conform to these requirements.

Corners shall be chamfered to remove sharp edges.

Thermal cut edges (TCEs) to be painted shall be conditioned before blast cleaning by shallow grinding or other method approved by the Engineer to remove the thin, hardened layer of material resulting from resolidification during cooling.

Visually evident base metal surface irregularities and defects shall be removed in accordance with ASTM Designation: A 6 or AASHTO Designation: M 160 before blast cleaning steel. When material defects exposed by blast cleaning are removed, the blast profile shall be restored by either blast cleaning or by using mechanical tools in accordance with SSPC-SP 11, "Power Tool Cleaning to Bare Metal," of the "SSPC: The Society for Protective Coatings."

## **PAINTING**

Blast cleaned surfaces shall receive a single undercoat of an exterior grade latex paint supplied by the manufacturer of the inorganic zinc coating.

The single undercoat shall consist of an inorganic zinc coating conforming to the requirements in AASHTO Designation: M 300, Type I or Type II, except that:

- A. The first 3 sentences of Section 4.7, "Primer Field Performance Requirements," shall not apply for Type II coatings, and
- B. The entire Section 5.6.1 shall not apply for either type of inorganic zinc coating.

If the Contractor proposes to use a Type I coating, the Contractor shall furnish to the Engineer for review documentation as required in Section 5.6 of AASHTO Designation: M 300. The Contractor shall allow the Engineer 30 days to review the proposal. Type I coatings selected for use shall meet the current applicable volatile organic compound limits for the air district in which the project is located.

If the Contractor proposes to use a Type II coating, the coating shall be selected from the qualified products list, which may be obtained from the Transportation Laboratory.

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

The single undercoat of inorganic zinc coating shall be applied to the required dry film thickness in 2 or more applications within 8 hours of the start of blast cleaning. Abrasive blast cleaned steel shall not be exposed to relative humidity exceeding 85 percent before application of inorganic zinc coating.

The total dry film thickness of all applications of the inorganic zinc undercoat, including the surfaces of outside existing members within the grip under bolt heads, nuts and washers, shall be not less than 4 mils nor more than 8 mils, except that the total dry film thickness on each faying (contact) surface of high strength bolted connections shall be between one mil and the maximum allowable dry film thickness for Class B coatings as determined by certified testing in conformance with Appendix A of the "Specification for Structural Joints Using ASTM A325 or A490 Bolts" of the Research Council on Structural Connections (RCSC Specification). Unless otherwise stated, all inorganic zinc coatings used on faying surfaces shall meet the slip coefficient requirements for a Class B coating on blast-cleaned steel, as specified in the RCSC Specification. The Contractor shall provide results of certified testing showing the maximum allowable dry film thickness for the Class B coating from the qualifying tests for the coating chosen, and shall maintain the coating thickness on actual faying surfaces of the structure at or below this maximum allowable coating thickness.

Areas where mudcracking occurs in the inorganic zinc coating shall be blast cleaned and repainted with inorganic zinc coating to the specified thickness.

Steel surfaces coated with Type II inorganic zinc coating shall be protected from conditions that may cause the coating film to dissolve. The Contractor, at the Contractor's expense, shall repair areas where the coating has dissolved by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

Dry spray, or overspray, as defined in the Steel Structures Painting Manual, Volume 1, "Good Painting Practice," of the "SSPC: The Society for Protective Coatings," shall be removed before application of subsequent coats or final acceptance. Removal of dry spray shall be by screening or other methods that minimize polishing of the inorganic zinc surface. The dry film thickness of the coating after removal of dry spray shall be in conformance with the provisions for applying the single undercoat, as specified herein.

The Contractor shall test the inorganic zinc coating before application of finish coats. The locations of the tests will be determined by the Engineer. The Contractor shall determine the sequence of the testing operations. The testing for adhesion and hardness shall be performed no sooner than 72 hours after application of the single undercoat of inorganic zinc coating. Satisfactory access shall be provided to allow the Engineer to determine the location of the tests.

The inorganic zinc coating shall pass the following tests:

- A. The inorganic zinc coating shall have a minimum adhesion to steel of 600 psi when measured using a self-aligning adhesion tester in conformance with the requirements in ASTM Designation: D 4541. The Engineer will select 3 locations per girder or 1,000 square feet of painted surface, whichever is less, for adhesion testing. If less than 1,000 square feet of steel is painted in a work shift, the Engineer will select 3 areas painted during the work shift for testing. If 2 or more of the locations tested fail to meet adhesion requirements, the entire area represented by the tests will be rejected. If one of the locations tested fails to meet adhesion requirements, an additional 3 locations shall be tested. Should any of the additional locations fail to meet adhesion requirements, the entire area represented by the tests will be rejected. The Contractor, at the Contractor's expense, shall repair the rejected area by blast cleaning and repainting with inorganic zinc to the specified thickness. Test locations for areas of inorganic zinc meeting adhesion testing requirements shall be repaired by application of organic zinc primer as specified in Section 91-1.04, "Materials," of the Standard Specifications to the specified minimum dry film thickness.
- B. Areas of inorganic zinc coating where finish coats are to be applied shall be tested for soluble salts using a Class A or B retrieval method as described in Technology Guide 15, "Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates," of the "SSPC: The Society for Protective Coatings," and cleaned so the maximum level of soluble salts does not exceed the lesser of the manufacturer's written recommendations or 10 micrograms per square centimeter. Areas of inorganic zinc coating shall be tested at the rate of 3 tests for the first 1,000 square feet to be painted per day and one test for each additional 1,000 square feet or portion thereof at locations selected by the Engineer. When less than 1,000 square feet of surface area is painted in a shift, at least 2 tests shall be performed. If levels of soluble salts exceed the maximum allowed by these special provisions, the entire area represented by the testing will be rejected. The Contractor shall perform additional cleaning and testing of rejected areas until soluble salt levels conform to these requirements.
- C. The inorganic zinc coating shall exhibit a solid, hard, and polished metal surface when firmly scraped with the knurled edge of a quarter. Inorganic zinc coating that is powdery, soft, or does not exhibit a polished metal surface, as determined by the Engineer, shall be repaired by the Contractor, at the Contractor's expense, by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

#### **Additional Requirements for Water Borne Inorganic Zinc Primers**

- A. The surface pH of the inorganic zinc primer shall be tested by wetting the surface with de-ionized water for a minimum of 15 minutes but no longer than 30 minutes and applying pH paper with a capability of measuring in increments of 0.5 pH units. At least 2 surface pH readings shall be taken for every 500 square feet or portion thereof. If less than 500 square feet of steel is coated in a single shift or day, at least 2 surface pH readings shall be taken for primer applied during that period. Application of finish coats will not be permitted until the surface pH is less than or equal to 7.
- B. Dry to solvent insolubility for water borne inorganic zinc primers shall be determined in conformance with the requirements in ASTM Designation: D 4752, except that water shall be the solvent. The resistance rating shall be not less than 4. Areas of inorganic zinc coating shall be tested for solvent insolubility at the rate of one test per 500 square feet or portion thereof. Inorganic zinc coating represented by the tested area that does not meet the solvent insolubility requirements will be rejected. The Contractor, at the Contractor's expense, shall repair rejected areas by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

### **Additional Requirements for Solvent Borne Inorganic Zinc Primers**

- A. Dry to solvent insolubility for solvent borne inorganic zinc primers shall be determined in conformance with the requirements in ASTM Designation: D 4752. The resistance rating shall be not less than 4. Areas of inorganic zinc coating shall be tested for solvent insolubility at the rate of one test per 500 square feet or portion thereof. Inorganic zinc coating represented by the tested area that does not meet the solvent insolubility requirements will be rejected. The Contractor, at the Contractor's expense, shall repair rejected areas by blast cleaning and repainting with inorganic zinc coating to the specified thickness.
- B. Surface hardness of solvent borne inorganic zinc shall be a minimum 2H when measured in conformance with the requirements in ASTM Designation: D 3363. Areas of inorganic zinc coating shall be tested at the rate of one test per 500 square feet or portion thereof. Inorganic zinc coating that fails to meet the surface hardness requirements shall be repaired by the Contractor, at the Contractor's expense, by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

The Contractor, at the Contractor's expense, shall retest all rejected areas of inorganic zinc coating after repairs have been completed.

Exposed areas of inorganic zinc coating shall receive a minimum of 2 finish coats of an exterior grade latex paint supplied by the manufacturer of the inorganic zinc undercoat.

All areas of inorganic zinc coating to receive finish coats shall be water rinsed in conformance with the requirements in Section 59-1.03, "Application," of the Standard Specifications and these special provisions. Areas of the coating removed by water rinsing shall be reapplied in conformance with the provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications and these special provisions. Except as approved by the Engineer, a minimum time of 72 hours shall be allowed between application of inorganic zinc coating and water rinsing.

The first finish coat shall be applied within 48 hours following the water rinsing.

The finish coat paint shall be formulated for application to inorganic zinc coating, shall meet the requirements for SSPC-Paint 24, "Latex Semi-Gloss Exterior Topcoat," of the "SSPC: The Society for Protective Coatings," and shall conform to the following:

- A. No visible color change in the finish coats shall occur when tested for 800 hours in conformance with the requirements in ASTM Designation: D 4587, Test Cycle 2.
- B. The vehicle shall be an acrylic or modified acrylic copolymer with a minimum of necessary additives.

The first finish coat shall be applied in 2 applications. The first application shall consist of a spray applied mist application. The second application shall be applied after the mist application has dried to a set to touch condition as determined by the procedure described in Section 7 of ASTM Designation: D 1640. The first finish coat color shall match Federal Standard 595B No. 34272. The total dry film thickness of both applications of the first finish coat shall be not less than 2 mils.

Except as approved by the Engineer, a minimum drying time of 12 hours shall be allowed between finish coats.

The second finish coat color shall match Federal Standard 595B, No. 14090. The total dry film thickness of all applications of the second finish coat shall be not less than 2 mils.

The 2 finish coats shall be applied in 3 or more applications to a total dry film thickness of not less than 4 mils nor more than 8 mils.

The total dry film thickness of all applications of inorganic zinc coating and finish coat paint shall be not less than 8 mils nor more than 14 mils.

Cleaning and painting of existing contact surfaces of high strength bolted connections that contain rust, loose paint, or other foreign substances, except loose dirt and dust, will be considered as extra work as specified in Section 4-1.03D, "Extra Work," of the Standard Specifications. Cost of repair of damage to existing paint caused by the Contractor's operations shall be borne by the Contractor.

### **MEASUREMENT AND PAYMENT**

Dry spot blast cleaning and undercoat painting of blast cleaned areas of existing surfaces will be measured by the square foot of spot blast cleaned areas, and will be paid for as spot blast clean and paint undercoat.

The contract price paid per square foot for spot blast clean and paint undercoat shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in dry spot blast cleaning and painting undercoat on the existing surfaces complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for clean and paint structural steel shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in cleaning and painting the exposed

surfaces of the new structural steel and finish coat on undercoated areas of existing metal, complete in place, including water rinsing, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.64 CLEAN AND PAINT EXISTING STRUCTURAL STEEL**

Metal surfaces of the existing structure shall be cleaned and painted in conformance with the provisions in Section 59-2, "Painting Structural Steel," Section 59-3, "Painting Galvanized Surfaces," and Section 91, "Paint," of the Standard Specifications and these special provisions.

The existing paint systems consist of materials listed in "Existing Highway Facilities" of these special provisions.

Prior to performing any painting or paint removal, 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, 3 copies of a separate Painting Quality Work Plan (PQWP) for each item of work for which painting or paint removal is to be performed. As a minimum, each PQWP shall include the following:

- A. The name of each Contractor or subcontractor to be used.
- B. One copy each of all current ASTM and "SSPC: The Society for Protective Coatings" specifications or qualification procedures applicable to the painting or paint removal to be performed. These documents shall become the permanent property of the Department.
- C. A copy of the coating manufacturer's guidelines and recommendations for surface preparation, painting, drying, and curing of painted structural steel, including testing methods and maximum allowable levels for soluble salts.
- D. Proposed methods and equipment to be used for any paint application.
- E. Proof of each of any required certifications, SSPC-QP 1 and SSPC-QP 2.
- F. Proposed methods to control environmental conditions in accordance with the manufacturer's recommendations and these special provisions.
- G. Proposed methods to protect the coating during the curing period.
- H. Proposed rinse water collection plan.
- I. A detailed paint repair plan for the repair of damaged areas.
- J. Procedures for containing blast media and water during application of coatings and coating repair of erected steel.
- K. Examples of proposed daily reports for all testing to be performed, including type of testing, location, lot size, time, weather conditions, test personnel, and results.

Prior to submitting the PQWP, a prepainting meeting between the Engineer, the Contractor, and a representative from each entity performing painting for this project shall be held to discuss the requirements for the PQWP.

The Engineer shall have 3 weeks to review the PQWP submittal after a complete plan has been received. No painting or paint removal shall be performed until the PQWP for that work is approved by the Engineer. Should the Engineer fail to complete the review within this 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 PQWP, 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.

It is understood that the Engineer's approval of the Contractor's PQWP 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.

The Contractor shall provide enclosures to permit cleaning and painting during inclement weather. Provisions shall be made to control atmospheric conditions inside the enclosures within specified limits during cleaning and painting operations, drying to solvent insolubility, and throughout the curing period in accordance with the manufacturer's recommendations and these special provisions. Full compensation for providing and maintaining such enclosures shall be considered as included in the prices paid for the various contract items of work requiring paint and no additional compensation will be allowed therefor.

Fresh, potable water with a maximum chloride content of 75 ppm and a maximum sulfate content of 200 ppm shall be used for water rinsing, pressure washing, or steam cleaning operations. No continuous recycling of rinse water will be permitted. If rinse water is collected into a tank and subsequent testing determines the collected water conforms to the specified requirements, reuse may be permitted by the Engineer if no collected water is added to the tank after sample collection for determination of conformance to specified requirements.

#### **CLEANING**

Metal surfaces shall be steam cleaned as provided in Section 59-2.05, "Steam Cleaning," of the Standard Specifications. The temperature of the steam produced shall be between 275° F and 375° F at the nozzle.

At the option of the Contractor, a pressure wash system with a nozzle pressure between 2,500 psi and 3,000 psi may be substituted for steam cleaning apparatus. Addition of biodegradable detergent to the pressure wash will not be required.

Gloss on the existing paint shall be removed without removing sound paint so that 60 degree specular gloss is less than 6 when measured in conformance with ASTM Designation: D 523.

Areas containing rust or other foreign substances that are not removable by steam cleaning and rinsing or pressure washing, and which would hinder the bonding of new paint, shall be spot blast cleaned with abrasive blasting as required in Section 59-2.03, "Blast Cleaning," of the Standard Specifications. Blast cleaning shall not be performed until the surfaces are thoroughly dry.

Mineral and slag abrasives used for blast cleaning steel surfaces shall conform to the requirements for Class A, Grade 2 to 3 abrasives contained in SSPC-AB 1, "Mineral and Slag Abrasives," of the "SSPC: The Society for Protective Coatings," and shall not contain hazardous material.

Steel abrasives used for blast cleaning steel surfaces shall comply with the requirements of SSPC-AB 3, "Ferrous Metal Abrasive," of the "SSPC: The Society for Protective Coatings." If steel abrasive is recycled through shop or field abrasive blast cleaning units, the recycled abrasive shall conform to the requirements of SSPC-AB 2, "Specification for Cleanliness of Recycled Ferrous Metallic Abrasive," of the "SSPC: The Society for Protective Coatings."

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications and a Material Safety Data Sheet shall be furnished prior to use for each shipment of blast cleaning material for cleaning existing steel.

Abrasive blast cleaned surfaces shall be tested by the Contractor for soluble salts using a Class A or B retrieval method as described in Technology Guide 15, "Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates," of the "SSPC: The Society for Protective Coatings," and cleaned so the maximum level of soluble salts does not exceed the lesser of the coating manufacturer's written recommendations or 10 micrograms per square centimeter. Areas of abrasive blast cleaned steel shall be tested at the rate of 3 tests for the first 1,000 square feet prepared per day, and one test for each additional 1,000 square feet or portion thereof, at locations selected by the Engineer. When less than 1,000 square feet of surface area is prepared in a shift, at least 2 tests shall be performed. If levels of soluble salts exceed the maximum allowed by these special provisions, the entire area represented by the testing will be rejected. The Contractor shall perform additional cleaning and testing of rejected areas until soluble salt levels conform to these requirements.

## **PAINTING**

The paints to be applied to the existing metal surfaces, the minimum number of coats, and the total dry film thickness shall conform to the following requirements:

- A. Precede each specified undercoat by a stripe coat on all edges, corners, seams, crevices, interior angles, junctions of joining members, weld lines, and similar surface irregularities. This stripe coat shall be of sufficient thickness to completely hide the surface being covered and shall be followed as soon as practical by the application of the full undercoat to its specified thickness.
- B. Blast cleaned areas shall be coated with the first undercoat paint conforming to the requirements for Red Primer Paint-Waterborne, Formula PWB 145D. The first undercoat shall be applied in one or more applications, to a dry film thickness of not less than 2 mils nor more than 4 mils.
- C. After the blast cleaned areas have received the specified thickness of first undercoat, exposed surfaces of existing structural steel shall receive the following full undercoat paint and finish coat paint:
  1. Undercoat paint conforming to the requirements for Pink Primer Paint-Waterborne, Formula PWB 146D, shall be applied in one or more applications, to a dry film thickness of not less than 2 mils nor more than 4 mils.
  2. The first finish coat paint conforming to the requirements for Light Green Finish Paint-Waterborne, Formula PWB 171B, shall be applied in one or more applications to a dry film thickness of not less than 1.5 mils nor more than 3 mils.
  3. The second finish coat paint conforming to the requirements for Green Finish Paint-Waterborne, Formula PWB 172B, shall be applied in one or more applications to a dry film thickness of not less than 1.5 mils nor more than 3 mils.

A minimum of 12 hours drying time shall be allowed before applying the succeeding undercoat or finish coat.

The 2 undercoats and first finish coat shall be applied within 30 days of blast cleaning of existing metal surfaces.

The total dry film thickness on areas that have been blast cleaned shall be not less than 7 mils nor more than 12 mils. The total dry film thickness of new paint on areas not blast cleaned shall be not less than 5 mils nor more than 10 mils.

## **PAYMENT**

Steam cleaning and rinsing, pressure washing, or sanding of exposed surfaces of existing structural steel will be paid for at a lump sum price for clean structural steel (existing bridge).

The contract lump sum price paid for clean structural steel (existing bridge) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in steam cleaning, pressure washing, and sanding of surfaces of existing structural steel, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Blast cleaning and first undercoat painting of blast cleaned areas will be measured by the square foot of spot blast cleaned areas and will be paid for as spot blast clean and paint undercoat.

The contract price paid per square foot for spot blast clean and paint undercoat shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in spot blast cleaning and painting first undercoat on existing surfaces, including testing for soluble salts, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The second undercoat and finish coat painting of exposed surfaces of existing structural steel will be paid for at a lump sum price for paint structural steel (existing bridge).

The contract lump sum price paid for paint structural steel (existing bridge) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the second undercoat and finish coat painting the surfaces of existing structural steel, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Concrete backfill for alternative culverts shall be constructed in conformance with the provisions in Section 66-1.045, "Concrete Backfill," of the Standard Specifications and will be measured and paid for in conformance with the provisions in Section 66-4, "Measurement and Payment," of the Standard Specifications and the following:

- A. The quantity of concrete backfill to be paid for, regardless of the kind of culvert and wall thickness of the culvert installed, will be based on the dimensions shown on the plans and the installation of reinforced concrete pipe with the least wall thickness shown in AASHTO Designation: M 170M for the Class of pipe designated.

### **10-1.65 REINFORCED CONCRETE PIPE**

Reinforced concrete pipe shall conform to the provisions in Section 65, "Reinforced Concrete Pipe," of the Standard Specifications and these special provisions.

#### **GENERAL**

Where embankment will not be placed over the top of the pipe, a relative compaction of not less than 85 percent shall be required below the pipe spring line for pipe installed using Method 1 backfill in trench, as shown on Standard Plan A62D. Where the pipe is to be placed under the traveled way, a relative compaction of not less than 90 percent shall be required unless the minimum distance between the top of the pipe and the pavement surface is the greater of 4 feet or one half of the outside diameter of the pipe.

Except as otherwise designated by classification on the plans or in the specifications, joints for culvert and drainage pipes shall conform to the plans or specifications for standard joints.

#### **MATERIALS**

The concrete for reinforced concrete pipe must contain not less than 470 pounds of cementitious material per cubic yard with a water-cementitious material ratio not to exceed 0.35 by weight. Supplementary cementitious material is optional. Reinforcement shall have a minimum cover of 1 inch.

### **10-1.66 CORRUGATED STEEL PIPE**

Corrugated steel pipe culverts shall conform to the provisions in Section 66, "Corrugated Metal Pipe," of the Standard Specifications and these special provisions.

Corrugated steel pipe shall be fabricated from zinc-coated steel sheet.

### **10-1.67 MISCELLANEOUS CONCRETE CONSTRUCTION**

Minor Concrete (Textured Paving) shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications and these special provisions.

Aggregate for minor concrete (textured paving) shall conform to the grading specified for fine aggregate in Section 90-3.03, "Fine Aggregate Grading," of the Standard Specifications. Aggregate for grout shall conform to the following grading:

| Sieve Sizes | Percentage Passing |
|-------------|--------------------|
| No. 4       | 100                |
| No. 8       | 90 - 100           |
| No. 16      | 60 - 100           |
| No. 30      | 35 - 70            |
| No. 50      | 15 - 35            |
| No. 100     | 2 - 15             |

A sample of sufficient size, of each type of the textured paving, to demonstrate the textured paving, including hardener, curing and finishing compounds, for both grouted and ungrouted finishes, shall be submitted to the Engineer for written approval.

Textured paving shall not be placed on the project prior to approval by the Engineer of the samples prepared and submitted by the Contractor. In the event more than one sample of each type of textured paving to be placed is required by the Engineer, each additional sample will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

Welded wire fabric, of the size and type shown on the plans and conforming to the provisions in Section 52, "Reinforcement," of the Standard Specifications, shall be placed in the textured paving areas as shown on the plans.

Aggregate base shall be Class 2 and shall conform to the provisions in Section 26, "Aggregate Bases," of the Standard Specifications.

The respective pattern types of concrete for textured paving shall be placed at the locations shown on the plans, struck off and compacted until a layer of mortar is brought to the surface. The concrete shall be screeded to the required grade and cross section and floated to a uniform surface.

Floor hardener shall be applied to the plastic surface of the concrete by the "dry-shake" method using a minimum of 60 pounds of hardener per 100 square feet. Hardener shall be applied in 2 applications, shall be wood-floated after each application, and shall be trowelled only after the final floating.

The forming tools for the textured paving shall be applied to form the patterned surfaces while the concrete is still in the plastic stage of set.

Textured paving areas shall be cured by the curing compound method. The curing compound shall be curing compound (6) conforming to the provisions in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications.

The textured paving shall be grouted in the areas shown on the plans. The grout shall be placed after initial curing of that portion of the textured paving. The grout shall be spread over the textured concrete surface and consolidated by methods recommended by the grout manufacturer and approved by the Engineer. Surplus grout shall be removed by a squeegee and damp burlap rag or by other approved methods before the curing seal is applied to the grouted areas.

Curing seal and other deleterious substances shall be removed from the impressions in the textured areas, to receive the grout, before the grout is placed. Cleaning and removal methods shall not stain or discolor those portions of the textured paving to remain exposed after grouting. Methods of cleaning the impressions in textured areas to be grouted shall be approved by the Engineer.

For payment purposes, the area in square feet of minor concrete (textured paving) will be determined from horizontal measurements of the finished textured paving.

The contract price paid per square foot for minor concrete (textured paving) shall include full compensation for furnishing all labor, materials (including welded wire fabric, where required, and aggregate base), tools, equipment, and incidentals, and for doing all the work involved in constructing textured paving, including grouted areas, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.68 GRATE LOCKING DEVICE**

The grate locking device shall conform to the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

The grate locking device will be measured by the contract unit as shown on the plans.

The contract unit price paid for grate locking device shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in grate locking device, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.69 MISCELLANEOUS METAL (BRIDGE)**

Miscellaneous metal (bridge) shall conform to the provisions for miscellaneous bridge metal in Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

Attention is directed to "Welding" of these special provisions.

Miscellaneous metal (bridge) shall consist of the miscellaneous bridge metal items listed in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications and the following:

- A. Pipe hanger supports and appurtenances at Bridge No. 08-0095R

### **10-1.70 MARKERS AND DELINEATORS**

Markers and delineators shall conform to the provisions in Section 82, "Markers and Delineators," of the Standard Specifications and these special provisions.

Markers and delineators on flexible posts shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. Flexible posts shall be made from a flexible white plastic which shall be resistant to impact, ultraviolet light, ozone, and hydrocarbons. Flexible posts shall resist stiffening with age and shall be free of burns, discoloration, contamination, and other objectionable marks or defects which affect appearance or serviceability.

Retroreflective sheeting for metal and flexible target plates shall be the retroreflective sheeting designated for channelizers, markers, and delineators conforming to the requirements in ASTM Designation: D 4956-95 and in conformance with the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

### **10-1.71 METAL BEAM GUARD RAILING**

Metal beam guard railing 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, steel, or plastic. Blocks shall be wood or plastic.

### **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.

- A. **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 13<sup>th</sup> Street, S.W., Canton, OH 44708, telephone (330) 477-4800.
- B. **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 2 inches 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 4 inches 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 149° F or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

For 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 4 inches 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 149° F 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.

- A. **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 13<sup>th</sup> Street, S.W., Canton, OH 44708, telephone (330) 477-4800.
- B. **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 2 inches 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 4 inches 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 149° F or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

For 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 4 inches 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 149° F 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.

**ALTERNATIVE CRASH CUSHION**

Alternative crash cushion shall be furnished and installed as shown on the plans and in conformance with these special provisions.

The allowable alternatives for a crash cushion shall consist of one of the following or a Department approved equal.

- A. CRASH CUSHION (TYPE CAT) shall be a CAT-350 Crash Cushion Attenuating Terminal as manufactured by Trinity Industries, Inc., and shall include all the items detailed for crash cushion (Type CAT), including crash cushion (Type CAT) backup, shown on the plans. The CAT-350 Crash Cushion Attenuating Terminal can be obtained from the manufacturer, Trinity Industries, Inc., P.O. Box 99, 950 West 400S, Centerville, UT 84014, telephone (800) 772-7976
- B. CRASH CUSHION (ADIEM) shall be an ADIEM-350 as manufactured by Trinity Industries, Inc., and shall include the items detailed for crash cushion shown on the plans. The crash cushion (ADIEM) can be obtained from the manufacturer, Trinity Industries, Inc., P.O. Box 99, 950 West 400S, Centerville, UT 84014, telephone (800) 772-7976.

CCRASH CUSHION (REACT) shall be a multiple recoverable type, manufactured by Energy Absorption Systems, Inc. Crash cushion (REACT) and additional components shall conform to the descriptions as follows:

| Contract Item Description   | Manufacturer's Product Description |
|-----------------------------|------------------------------------|
| Crash Cushion (REACT 9SCBS) | REACT 350.9 Self Contained         |

The crash cushion (REACT) manufactured by Energy Absorption Systems, Inc. at 35 East Wacker Drive, Suite 1100, Chicago, IL 60601 can be obtained through:

- 1. Northern California: Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, telephone (800) 884-8274, FAX (916) 387-9734
- 2. Southern California: Traffic Control Service, Inc., 1818 E. Orangethorpe, Fullerton, CA 92831-5324, telephone (800) 222-8274, FAX (714) 526-9501

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 crash cushions 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.

Crash cushions shall be installed in conformance with the manufacturer's installation instructions and these requirements. Each crash cushion installed shall be identified by painting the type of crash cushion in neat black letters and figures 2 inches high on the backside of the rail element between system posts numbers 4 and 5.

For the crash cushion (Type CAT), it shall be installed in conformance with the manufacturer's installation instructions and these requirements. 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 4 inches 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 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 149 °F 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 crash cushion 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 crash cushion 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 crash cushion, 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.

**10-1.72 VEGETATION CONTROL (MINOR CONCRETE)**

This work shall consist of furnishing and constructing vegetation control as specified in these special provisions, as shown on the plans and as directed by the Engineer.

## **MATERIALS**

### **Minor Concrete**

Concrete for vegetation control shall consist of a mixture of portland cement concrete, crumb rubber and concrete reinforcing fibers. Concrete shall conform to the provisions for minor concrete in Section 90, "Portland Cement Concrete," of the Standard Specifications and these special provisions. Components of the concrete for vegetation control shall be incorporated homogeneously at the concrete plant before delivery to the work site.

Crumb rubber for minor concrete shall be scrap tire crumb rubber consisting of ground or granulated rubber derived from a combination of passenger tires, truck tires or tire buffings. The scrap tire crumb rubber to be blended into the concrete shall be equivalent to 3 percent by mass of the combined mixture of concrete and scrap tire crumb rubber. Crumb rubber shall be ground or granulated at ambient temperature. The maximum size of individual particles shall not exceed 1/16-inch in diameter and 1/2-inch in fibrous length or 1/4-inch ground rubber chips. Crumb rubber shall not contain more than 0.01 percent of wire (by mass of crumb rubber) and shall be free of contaminants, except fabric. Fabric shall not exceed 0.05 percent by mass of crumb rubber.

Reinforcing fibers for minor concrete shall consist of polypropylene fibers with an engineered sinusoidal contoured profile, manufactured specifically for use as concrete reinforcement. Reinforcing fiber shall consist of a blended ratio of 4 parts of coarse monofilament fibers with maximum individual fiber lengths of 2-inch  $\pm$  1/2-inch and 1 part of fine fibrillated polypropylene fibers of various lengths and thickness. Reinforcing fibers shall be of a commercial source, combined with the concrete in proportions as recommended by the manufacturer.

### **Grout**

Grout for vegetation control shall conform to the provisions in Section 19-3.062, "Slurry Cement Backfill," of the Standard Specifications and these special provisions.

Not more than 188 pounds of cement shall be used for each cubic yard of material produced.

Aggregate for grout shall be commercial quality concrete sand.

Color of grout shall match the color of the minor concrete used to construct the vegetation control.

### **Landscape Fabric**

Landscape fabric shall be manufactured from thermally spun bonded polypropylene fabric and shall conform to the following:

| Specification         | Minimum Requirement      |
|-----------------------|--------------------------|
| Grab Tensile Strength | 135 lbs                  |
| Grab Elongation       | 70%                      |
| UV Resistance         | 70% @ 150 hours          |
| Weight                | 3 ounces per square yard |

Staples for landscape fabric shall be 2 inches in width, 6 inches in length and 11-gauge wire.

A copy of the manufacturer's product sheet, together with instructions for installation, shall be furnished to the Engineer 5 business days before installation.

A Certificate of Compliance for the landscape fabric shall be furnished to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

## **SITE PREPARATION**

### **Clearing**

Areas to receive vegetation control shall be cleared of trash and debris in conformance with Section 16, "Clearing and Grubbing," of the Standard Specifications and these special provisions.

Vegetation shall be removed to the ground. Cleared trash, debris and removed vegetation shall be disposed of outside the highway right of way in conformance with Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

### **Earthwork**

Earthwork shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

After clearing, areas to receive vegetation control shall be excavated. Where vegetation control abuts the existing surfacing, the edge of the existing surfacing shall be on a neat line or shall be cut on a neat line to a minimum depth of

0.17-foot before removing the surfacing. The area to receive vegetation control shall be excavated to maintain planned flow lines, slope gradient and contours of the project site.

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

Surplus excavated material shall become the property of the Contractor and shall be disposed of outside the highway right of way in conformance with Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

### **PLACEMENT**

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

Grout shall be spread to completely fill voids as shown on the plans.

Minor concrete shall be placed to a depth of 2 inches.

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

Two weakened plane joints shall be constructed in the minor concrete at each post location, perpendicular to the rail and in line with the edge of the grout. The joints shall be constructed to a minimum depth of 1/4 inch by scoring with a tool that will leave the corners rounded and ensure free movement of concrete at the joint.

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

### **MEASUREMENT AND PAYMENT**

Quantities of vegetation control (minor concrete) will be measured by the square yard computed from measurements of actual areas placed. Vegetation control (minor concrete) placed outside the dimensions shown on the plans will not be paid for.

The contract price paid per square yard for vegetation control (minor concrete) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing vegetation control (minor concrete), including clearing trash, debris and vegetation and excavation, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### **10-1.73 CONCRETE BARRIER**

Concrete barriers shall conform to the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

Concrete barriers shall be constructed on a layer of Class 2 Aggregate Base as shown on the plans. Aggregate base shall conform to the provisions in "Aggregate Base" of these special provisions. When concrete barriers are to be constructed on aggregate base, the height of the barriers shall be adjusted to compensate for irregularities in the surface of the finished aggregate base. The amount of adjustment will be determined by the Engineer and will be ordered before the concrete is placed.

Concrete barrier markers shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. At those locations shown on the plans, concrete barrier markers shall be cemented to the barrier in conformance with the manufacturer's recommendations.

### **10-1.74 CONCRETE BARRIER (EXTENSION)**

Concrete barrier extensions shall conform to the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

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 the Contractor shall drill a new hole adjacent to the rejected hole to the depth shown on the plans.

Concrete barriers on bridges or walls shall be cured in conformance with the provisions in Section 90-7.01A, "Water Method," of the Standard Specifications.

### **10-1.75 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.

**10-1.76 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 m<sup>-2</sup> lx<sup>-1</sup>. Yellow thermoplastic traffic stripes shall have a minimum initial retroreflectivity of 150 mcd m<sup>-2</sup> lx<sup>-1</sup>.

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 4 inches in width.

| Minimum Stripe Thickness (inch) | Minimum Application Rate (lb/ft) |
|---------------------------------|----------------------------------|
| 0.098                           | 0.34                             |

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 linear foot as thermoplastic traffic stripe.

**10-1.77 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 HIGHWAY PLANTING AND IRRIGATION SYSTEMS**

**10-2.01 GENERAL**

The work performed in connection with highway planting and irrigation systems shall conform to the provisions in Section 20, "Erosion Control and Highway Planting," of the Standard Specifications and these special provisions.

The Contractor shall notify the Engineer not less than 72 hours prior to requiring initial access to the existing irrigation controllers. When the Engineer determines that access to the controllers is required at other times, arrangements will be made to provide this access.

When fluctuations of water pressure and water supply are encountered during normal working hours, plants shall be watered at other times, as often, and in sufficient amounts as conditions may require to keep the soil and plant roots moist during the life of the contract.

Full compensation for watering plants outside normal working hours shall be considered as included in the contract lump sum prices paid for maintain existing plants and no additional compensation will be allowed therefor.

## **PROGRESS INSPECTIONS**

Progress inspections will be performed by the Engineer for completed irrigation system work at designated stages during the life of the contract.

Progress inspections will not relieve the Contractor of responsibility for installation in conformance with the special provisions, plans and Standard Specifications. Work within an area shall not progress beyond each stage until the inspection has been completed, corrective work has been performed, and the work is approved, unless otherwise permitted by the Engineer.

The requirements for progress inspections will not preclude additional inspections of work by the Engineer at other times during the life of the contract.

The Contractor shall notify the Engineer, in writing, at least 4 working days prior to completion of the work for each stage of an area and shall allow a minimum of 3 working days for the inspection.

Progress inspections will be performed at the following stages of work:

- A. During pressure testing of the pipelines on the supply side of control valves.
- B. During testing of low voltage conductors.

## **COST BREAK-DOWN**

The Contractor shall furnish the Engineer a cost break-down for the contract lump sum item of irrigation system. The cost break-down table shall be submitted to the Engineer for approval within 15 working days after the contract has been approved. The cost break-down table will be approved, in writing, by the Engineer before any partial payment will be made for the item of irrigation system.

Attention is directed to "Time-Related Overhead" of these special provisions regarding compensation for time-related overhead.

The cost break-down shall be completed and furnished in the format shown in the sample of the cost break-down included in this section. Line item descriptions of work shown in the samples are the minimum to be submitted. Additional line item descriptions of work may be designated by the Contractor. If the Contractor elects to designate additional line item descriptions of work, the quantity, value and amount for those line items shall be completed in the same manner as for the line item descriptions shown in the samples. The line items and quantities given in the sample are to show the manner of preparing the cost break-down to be furnished by the Contractor.

The Contractor shall determine the quantities required to complete the work shown on the plans. The quantities and their values shall be included in the cost break-down submitted to the Engineer for approval. The Contractor shall be responsible for the accuracy of the quantities and values used in the cost break-down submitted for approval.

The sum of the amounts for the line items of work listed in the cost break-down table for irrigation system work shall be equal to the contract lump sum price bid for the work. Overhead and profit, except for time-related overhead, shall be included in each individual line item of work listed in the cost break-down table.

No adjustment in compensation will be made in the contract lump sum price paid for irrigation system due to differences between the quantities shown in the cost break-down table furnished by the Contractor and the quantities required to complete the work as shown on the plans and as specified in these special provisions.

Individual line item values in the approved cost break-down table will be used to determine partial payments during the progress of the work and as the basis for calculating an adjustment in compensation for the contract lump sum item of irrigation system due to changes in line items of work ordered by the Engineer. When the total value of ordered changes to line items of work increases or decreases the lump sum price bid for irrigation system by more than 25 percent, the adjustment in compensation will be determined in the same manner specified for increases and decreases in the total pay quantity of an item of work in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications.

**IRRIGATION SYSTEM COST BREAK-DOWN**

**Contract No. 02-2C50U4**

| UNIT DESCRIPTION                           | UNIT     | APPROXIMATE QUANTITY | VALUE | AMOUNT |
|--|----------|----------------------|-------|--------|
| CHECK AND TEST IRRIGATION SYSTEM           | LUMP SUM | LS                   |       |        |
| REMOVE IRRIGATION SYSTEMS                  | LUMP SUM | LS                   |       |        |
| CONTROL & NEUTRAL CONDUCTORS               | LUMP SUM | LS                   |       |        |
| 2" REMOTE CONTROL VALVE                    | EA       | 9                    |       |        |
| SPRINKLER (TYPE C-2)                       | EA       | 441                  |       |        |
| 3/4" PLASTIC PIPE (SUPPLY LINE) (SCH.40)   | LF       | 1285                 |       |        |
| 1" PLASTIC PIPE (SUPPLY LINE) (SCH.40)     | LF       | 1125                 |       |        |
| 1-1/4" PLASTIC PIPE (SUPPLY LINE) (SCH.40) | LF       | 1420                 |       |        |
| 1-1/2" PLASTIC PIPE (SUPPLY LINE) (SCH.40) | LF       | 1195                 |       |        |
| 2" PLASTIC PIPE (SUPPLY LINE) (SCH.40)     | LF       | 1030                 |       |        |
| 2-12" PLASTIC PIPE (SUPPLY LINE) (SCH.40)  | LF       | 5440                 |       |        |
| 2" GATE VALVE                              | EA       | 4                    |       |        |
| 2" WYE STRAINER                            | EA       | 4                    |       |        |
|  |          |                      |       |        |
|  |          |                      |       |        |
|  |          |                      |       |        |
| <b>TOTAL _____</b>                         |          |                      |       |        |

## **10-2.02 EXISTING HIGHWAY PLANTING**

In addition to the provisions in Section 20, "Erosion Control and Highway Planting," of the Standard Specifications, work performed in connection with existing highway planting shall conform to the provisions in "Existing Highway Facilities," of these special provisions.

### **MAINTAIN EXISTING PLANTED AREAS**

Existing planted areas, designated on the plans to be maintained, shall be maintained throughout the life of the contract in conformance with these special provisions.

Existing plants shall be watered in conformance with the provisions in Section 20-4.06, "Watering," of the Standard Specifications.

Existing planted areas to be maintained shall be inspected for deficiencies by the Contractor in the presence of the Engineer. Deficiencies requiring corrective action shall include weeds; dead, diseased, or unhealthy plants; missing plant stakes and tree ties; inadequate plant basins; and other deficiencies needing corrective action to promote healthy plant life. The inspection shall be completed within 15 days after the start of work.

Deficiencies found during the inspection shall be corrected within 15 days after the inspection ends. Correction of deficiencies, as directed by the Engineer, will be paid for as extra work in conformance with the provisions in Section 4-1.03D, "Extra Work," of the Standard Specifications.

After deficiencies have been corrected, the Contractor shall perform work to maintain existing planted areas in a neat appearance and to promote healthy plant growth. The work shall include the following:

- A. Weeds shall be killed before the weeds reach the seed stage of growth or exceed 6 inches in length.
- B. Weeds shall be removed from existing planted areas. Weeds shall be killed prior to removal. Weed removal in ground cover areas shall extend beyond the outer limits of ground cover areas to the adjacent edges of paving, fences and proposed plants and planting areas, and a 6-foot diameter area centered at each existing tree and shrub outside of existing ground cover areas.
- C. When a portion of a new automatic irrigation system is completed, the existing plants to be watered by that portion of the irrigation system shall be watered automatically.
- D. Pesticides for maintaining existing planted areas shall conform to the provisions in "Pesticides" of these special provisions.
- E. Existing plant basins shall be kept well-formed and free of silt. If existing plant basins require repairs, and the plant basins contain mulch, the mulch shall be replaced after the plant basins have been repaired.

The contract lump sum price paid for maintain existing planted areas shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in maintain existing planted areas, complete in place, as shown on the plans, as specified in the standard specifications and these special provisions, and as directed by the Engineer.

### **PRUNE EXISTING PLANTS**

Existing plants shown on the plans to be pruned shall be pruned in conformance with the provisions in Section 20-4.055, "Pruning," of the Standard Specifications.

Pruning shall include removal of deadwood, suckers, and broken or bruised branches one inch or larger in diameter. Tree seal compounds shall not be used to cover pruning cuts.

Removed pruned materials shall be disposed of in conformance to the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications. At the Contractor's option, prunings may be reduced to chips. Chipped materials shall be spread within the highway right of way where designated by the Engineer.

The contract lump sum price paid for prune existing plants, except as otherwise provided, shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in pruning existing plants, complete in place, including removing and disposing of pruned materials, or chipping and spreading of chipped materials, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

## **10-2.03 EXISTING HIGHWAY IRRIGATION FACILITIES**

The work performed in connection with the various existing highway irrigation system facilities shall conform to the provisions in "Existing Highway Facilities," of these special provisions.

Water shall be maintained in conformance with the provisions in Section 20-5.025, "Maintain Existing Water Supply," of the Standard Specifications.

## **LOCATE EXISTING CROSSOVERS AND CONDUITS**

Existing crossovers and conduits shown on the plans to be incorporated in the new work shall be located in conformance with the provisions for locating conduits in Section 20-5.03B, "Conduit for Irrigation Crossovers," of the Standard Specifications.

Unless otherwise directed by the Engineer, existing crossovers and conduits shown on the plans to be incorporated in the new work shall be located prior to performing work on irrigation systems.

If debris is encountered in the ends of conduits, the debris shall be removed prior to performing other work in the conduits. Removal of debris within the first 3 feet in these conduits shall be at the Contractor's expense. If debris is encountered in the conduits more than 3 feet from the ends of the conduits, the additional debris shall be removed as directed by the Engineer and the removal work will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

## **CHECK AND TEST EXISTING IRRIGATION FACILITIES**

Existing irrigation facilities that are to remain or to be relocated, and that are within those areas where clearing and grubbing or earthwork operations are to be performed, shall be checked for missing or damaged components and proper operation prior to performing clearing and grubbing or earthwork operations. Existing irrigation facilities outside of work areas that are affected by the construction work shall also be checked for proper operation.

A written list of existing irrigation system deficiencies shall be submitted to the Engineer within 5 working days after checking the existing facilities.

Deficiencies found during checking of the existing facilities shall be corrected as directed by the Engineer. Corrective work ordered by the Engineer will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

Length of watering cycles for use of potable water from water meters for checking or testing existing irrigation facilities shall be as determined by the Engineer.

Additional repairs required for the existing irrigation system as ordered by the Engineer, except as otherwise provided for in "Existing Highway Irrigation Facilities" of these special provisions, will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

## **REMOVE EXISTING IRRIGATION FACILITIES**

Existing irrigation facilities where shown on the plans to be removed, shall be removed. Facilities that are more than 6 inches below finished grade, excluding facilities to be salvaged, may be abandoned in place.

Immediately after disconnecting an existing irrigation facility to be removed or abandoned from an existing facility to remain, the remaining facility shall be capped or plugged, or shall be connected to a new or existing irrigation facility.

### **10-2.04 (BLANK)**

### **10-2.05 IRRIGATION SYSTEMS**

Irrigation systems shall be furnished and installed in conformance with the provisions in Section 20-5, "Irrigation Systems," of the Standard Specifications, except materials containing asbestos fibers shall not be used.

Method A pressure testing shall conform to the provisions in Section 20-5.03H(1), "Method A", of the Standard Specifications, except leaks that develop in the tested portion of the system shall be located and repaired after each test period when a drop of more than 5 pounds per square inch is indicated by the pressure gage. After the leaks have been repaired, the one hour pressure test shall be repeated and additional repairs made until the drop in pressure is 5 pounds per square inch or less.

## **VALVE BOXES**

Valve boxes shall conform to the provisions in Section 20-2.24, "Valve Boxes," of the Standard Specifications, except as otherwise provided herein.

Valve boxes shall be precast portland cement concrete.

Covers for concrete valve boxes shall be cast iron or steel.

Valve boxes shall be identified on the top surface of the covers by labels containing the appropriate abbreviation for the irrigation facility contained in the valve box as shown on the plans. Valve boxes that contain remote control valves shall be identified by the appropriate letters and numbers (controller and station numbers). Labels for valve boxes shall conform to the provisions in Section 20-5.03F, "Valves and Valve Boxes," of the Standard Specifications.

Label material shall be plate plastic or polyurethane.

## **GATE VALVES**

Gate valves shall be as shown on the plans and in conformance with the provisions in Section 20-2.28, "Gate Valves," of the Standard Specifications and these special provisions.

Gate valves shall have a solid bronze or brass wedge.

## **ELECTRIC AUTOMATIC IRRIGATION COMPONENTS**

### **Electric Remote Control Valves**

Electric remote control valves shall conform to the provisions in Section 20-2.23, "Control Valves," of the Standard Specifications and the following:

- A. Valves shall be brass construction.
- B. Valves shall be straight pattern (side inlet) as shown on the plans.

### **Pull Boxes**

Pull box installations shall conform to the provisions in Section 20-5.027I, "Conductors, Electrical Conduits and Pull Boxes," of the Standard Specifications.

### **Conductors**

Low voltage, as used in this section "Conductors," shall mean 36 V or less.

Low voltage control and neutral conductors in pull boxes and valve boxes, at irrigation controller terminals, and at splices shall be marked as follows:

- A. Conductor terminations and splices shall be marked with adhesive backed paper markers or adhesive cloth wrap-around markers, with clear, heat-shrinkable sleeves sealed over the markers.
- B. Non-spliced conductors in pull boxes and valve boxes shall be marked with clip-on, "C" shaped, white extruded polyvinyl chloride sleeves. Marker sleeves shall have black, indented legends of uniform depth with transparent overlays over the legends and "chevron" cuts for alignment of 2 or more sleeves.

Markers for the control conductors shall be identified with the appropriate number or letter designations of irrigation controllers and station numbers. Markers for neutral conductors shall be identified with the appropriate number or letter designations of the irrigation controllers.

New control and neutral conductors that are to replace existing control and neutral conductors shall be the same size and color as the existing control and neutral conductors being connected to. All wiring shall be installed in Type 3 electrical conduit, 2" diameter.

The color of low voltage neutral and control conductor insulation, except for the striped portions, shall be homogeneous throughout the entire thickness of the insulation.

Insulation for conductors may be UL listed polyethylene conforming to UL44 test standards with a minimum insulation thickness of 41 mils for wire sizes 10AWG and smaller.

## **PIPE**

### **Plastic Pipe**

Plastic pipe supply lines shall be polyvinyl chloride (PVC) 1120 or 1220 pressure rated pipe with the minimum pressure rating (PR) shown on the plans.

Plastic pipe supply lines and fittings that are 3 inches or larger in diameter on the supply side of control valves shall be the rubber ring gasket type, except when pressure rating (PR) 315 plastic pipe supply line is required.

Plastic pipe supply lines less than 3 inches in diameter shall have solvent cemented type joints. Primers shall be used on the solvent cemented type joints.

Plastic pipe supply lines downstream from the remote control valves for Type C sprinklers shall have a minimum cover of 6 inches.

Plastic pipe (irrigation lines) shall be installed not less than 12 inches below the finished grade, measured to the top of the pipe.

Fittings for plastic pipe supply lines with a pressure rating (PR) of 315 shall be Schedule 40.

## **SPRINKLERS**

Sprinklers shall conform to the type, pattern, material, and operating characteristics listed in the "Sprinkler Schedule" shown on the plans.

## **WYE STRAINERS**

Wye strainers shall be installed on the upstream side of the electric remote control valves as shown on the plans.

Removable stainless steel strainers for wye strainers shall be 20 size mesh.

When garden valves are opened, discharge shall be up and out of the valve box.

## **FINAL IRRIGATION SYSTEM CHECK**

A final check of existing and new irrigation facilities shall be performed not more than 30 working days and not less than 14 working days prior to acceptance of the contract.

The length of watering cycles using potable water measured by water meters for the final check of irrigation facilities will be determined by the Engineer.

Remote control valves connected to existing and new irrigation controllers shall be checked for automatic performance when the controllers are in automatic mode.

Unsatisfactory performance of irrigation facilities installed or modified by the Contractor shall be repaired and rechecked at the Contractor's expense until satisfactory performance is obtained, as determined by the Engineer.

Repair or replacement of existing irrigation facilities due to unsatisfactory performance shall conform to the provisions in "Existing Highway Irrigation Facilities" of these special provisions.

Nothing in this section "Final Irrigation System Check" shall relieve the Contractor of full responsibility for making good or repairing defective work or materials found before the formal written acceptance of the entire contract by the Director.

Full compensation for checking the irrigation systems prior to the acceptance of the contract shall be considered as included in the contract prices paid for the various contract items of irrigation systems involved and no additional compensation will be allowed therefor.

## **SECTION 10-3. SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS**

### **10-3.01 DESCRIPTION**

Traffic monitoring stations, highway advisory radio and maintaining existing traffic management system elements during construction shall conform to the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and these special provisions.

### **10-3.02 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 break-down shall include the following items in addition to those listed in the Standard Specifications:

- A. Pull box paving
- B. Object marker (type PB)
- C. TMS cabinets

### **10-3.03 MAINTAINING EXISTING TRAFFIC MANAGEMENT SYSTEM ELEMENTS DURING CONSTRUCTION**

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

Existing TMS elements, including detection systems, identified on the plans and located within the project limits shall remain in place, and be protected from damage. If the construction activities require existing TMS elements to be nonoperational or off line, and if temporary or portable TMS elements are not shown on the plans, the Contractor shall provide for temporary or portable TMS elements. The Contractor shall receive the Engineer's approval on the type of temporary or portable TMS elements and installation method.

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

The Contractor shall obtain written approval from the Engineer, at least 72 hours before interrupting existing TMS elements' communication with the TMC that will result in the elements being nonoperational or off line. The Contractor shall notify the Engineer at least 72 hours before starting excavation activities.

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

1. for a duration of up to 15 days on any continuous segment of the freeway/highway longer than 3 miles
2. for a duration of up to 60 days on any continuous segment of the freeway/highway shorter than 3 miles

If the construction activities require existing detection systems to be nonoperational or off line for a longer time period or the spacing between traffic monitoring stations is more than the specified criteria above, and temporary or portable detection operations are not shown on the plans, the Contractor shall provide provisions for temporary or portable detection operations. The Contractor shall receive the Engineer's approval on the type of detection and installation before installing the temporary or portable detection.

If existing TMS elements shown on the plans or identified during the pre-construction operational status check, except traffic monitoring stations, are damaged or fail due to the Contractor's activity, where the elements are not fully functional, the Engineer shall be notified immediately. If the Contractor is notified by the Engineer that existing TMS elements have been damaged, have failed or are not fully functional due to the Contractor's activity, the damaged or failed TMS elements, excluding Structure-related elements, shall be repaired or replaced, at the Contractor's expense, within 24 hours. For a Structure-related elements, the Contractor shall install temporary or portable TMS elements within 24 hours. For nonstructure-related TMS elements, the Engineer may approve temporary or portable TMS elements for use during the construction activities.

The Contractor shall demonstrate that repaired or replaced elements operate in a manner equal to or better than the replaced equipment or as directed by the Engineer. If the Contractor fails to perform required repairs or replacement work, as determined by the Engineer, the State may perform the repair or replacement work and the cost will be deducted from monies due to the Contractor.

A TMS element shall be considered nonoperational or off line for the duration of time that active communications with the TMC is disrupted, resulting in messages and commands not transmitted from or to the TMS element.

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

If the pre-construction operational status check identified existing TMS elements, then the Contractor, the Engineer, and the Department's Traffic Operations Electrical representatives shall jointly conduct a post construction operational status check of all existing TMS elements and each element's communication status with the TMC. The Department's Traffic Operations Electrical representatives will certify the TMS elements' status and provide a copy of the certified list of the existing TMS elements within the project limits to the Contractor. The status list will include the operational, defined as having full functionality, and the nonoperational components. TMS elements that cease to be functional between pre and post construction status checks shall be repaired at the Contractor's expense and as directed by the Engineer.

The Engineer will approve, in writing, the schedule for final replacement, the replacement methods and the replacement elements, including element types and installation methods before repair or replacement work is performed. The final TMS elements shall be new and of equal or better quality than the existing TMS elements.

## **PAYMENT**

The contract lump sum price paid for maintaining existing traffic management system elements during construction shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work

involved in maintaining existing traffic management system elements as shown on the plans, specified in the Standard specifications and these special provisions, and as directed by the Engineer.

If no electrical work exists on the project and no TMS elements are identified within the project limits, the pre-construction operational status check will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

Furnishing and installing temporary or portable TMS elements that are not shown on the plans, but are required when an existing TMS element becomes nonoperational or off line due to construction activities, will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

Furnishing and installing temporary or portable TMS elements and replacing TMS elements that are not shown on the plans nor identified during the pre-construction operational status check and were damaged by construction activities will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

If the Contractor is required to submit provisions for the replacement of TMS elements that were not identified, the provisions will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

### **10-3.04 CAST-IN-DRILLED-HOLE CONCRETE PILE FOUNDATIONS**

#### **GENERAL**

##### **Summary**

This work includes constructing cast-in-drilled-hole concrete pile foundations for lighting standards.

Comply with Section 86-2.03, "Foundations," of the Standard Specifications and "Piling" of these special provision..

#### **MATERIALS**

Concrete must contain not less than 590 pounds of cementitious material per cubic yard.

#### **CONSTRUCTION**

For standards located in sidewalk areas, the pile foundation must be:

1. Placed to final sidewalk grade before the sidewalk is placed
2. Square for the top 4 inches

#### **PAYMENT**

Payment for cast-in-drilled-hole concrete pile foundations shall conform to the provisions in Section 86-8, "Payment," of the Standard Specifications.

### **10-3.05 STANDARDS, STEEL PEDESTALS, AND POSTS**

Standards, steel pedestals, and posts for traffic signal and lighting standards shall conform to the provisions in Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, "Steel Structures" of these special provisions, and the following requirements.

Steel bolts not designated on the plans as high-strength (HS) or stainless steel shall be for general applications and shall conform to the requirements in ASTM Designation: A 307.

Where the plans refer to the side tenon detail at the end of the signal mast arm, the applicable tip tenon detail may be substituted.

The sign mounting hardware shall be installed at the locations shown on the plans.

Handhole reinforcement rings for standards, steel pedestals, and posts shall be continuous around the handholes.

All ferrous metal parts of tubular sign structures shall be galvanized and shall not be painted.

### **10-3.06 CONDUIT**

Conduit to be installed underground shall be Type 1 or Type 3 unless otherwise specified. Detector termination conduits shall be Type 3 or Type 4.

The conduit in a foundation and between a foundation and the nearest pull box shall be Type 1.

When Type 3 conduit is placed in a trench (not in pavement or under portland cement concrete sidewalk), after the bedding material is placed and the conduit is installed, the trench shall be backfilled to not less than 4 inches above the conduit with minor concrete conforming to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications, except the concrete shall contain not less than 421 pounds of cementitious material per cubic yard. The remaining trench shall be backfilled to finished grade with backfill material.

Conduit runs shown on the plans to be located behind curbs may be installed in the street, within 3 feet of, and parallel with the face of the curb, by the "Trenching in Pavement Method" in conformance with the provisions in Section 86-2.05C,

"Installation," of the Standard Specifications. Pull boxes shall be located behind the curb or at the locations shown on the plans.

After conductors have been installed, the ends of conduits terminating in pull boxes, service equipment enclosures, and controller cabinets shall be sealed with an approved type of sealing compound.

At those locations where conduit is required to be installed under pavement and existing underground facilities require special precautions in conformance with the provisions in "Obstructions" of these special provisions, conduit shall be placed by the "Trenching in Pavement Method" in conformance with the provisions in Section 86-2.05C, "Installation," of the Standard Specifications.

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

### **10-3.07 HIGH DENSITY POLYETHYLENE (HDPE) CONDUIT**

#### **GENERAL**

High density polyethylene (HDPE) conduit shall be installed where shown on the plans and conform to these special provisions, and as directed by Engineer.

#### **MATERIAL**

High density polyethylene conduit shall be manufactured from high density polyethylene virgin compounds.

High density polyethylene compounds used in the manufacture of communication conduit shall conform to the cell classifications specified in ASTM Designation D 3350.

#### **CONDUIT**

High density polyethylene conduit size (nominal trade outside diameter) and location shall be as shown on plans. Conduit shall be the smooth interior wall type.

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High density polyethylene conduit color shall be black.

Conduit shall contain carbon black ultraviolet shielding suitable for the conduit to sustain unprotected outdoor exposure for at least one year.

Conduit shall be continuously marked with clear, distinctive and permanent markings at intervals not greater than 10 feet. The marking shall be in a contrasting color to the conduit color. The height of the marking shall be approximately 1 inch or larger. Conduit marking information shall include, as a minimum, the following information:

- A. Nominal Size
- B. Schedule
- C. Manufacturer Name and Product/Model Number
- D. Material Code
- E. Plant Identification
- F. Production Date
- G. Cell Classification

Coils and reels shall have sequential measurement markings every meter.

High density polyethylene conduit shall be schedule 40 per ASTM D2447 for controlled outside diameter.

High density polyethylene conduit shall be manufactured in accordance with NEMA TC-7 and shall be U.L. 651B listed.

#### **JOINING OF CONDUIT**

Conduit shall be joined by heat fusion. Heat fusion (includes electrofusion) of high density polyethylene conduit shall be by methods recommended by the conduit manufacturer, and with equipment approved for the purpose. Equipment shall not expose conduit to direct flame. Heat fusion shall be performed by conduit manufacturer certified or authorized personnel. A minimum of 2 test fusions, by each fusion operator, shall be demonstrated to the Engineer prior to performing fusion operations on any high density polyethylene conduit to be installed.

#### **INSTALLATION**

High density polyethylene conduit shall be installed at underground locations only.

High density polyethylene conduit shall be installed by "Directional Boring Method" as described in these special provisions.

Conduit bends, except factory bends, shall have a radius of not less than the manufacturer's recommended minimum bend radius. Where factory bends are not used, conduit shall be bent, without crimping or flattening, using the longest radius practicable.

Bending of high density polyethylene conduit shall be by methods recommended by the conduit manufacturer, and with equipment approved for the purpose. Equipment shall not expose conduit to direct flame.

Attention is directed to "Conduit" elsewhere in these special provisions regarding sealing conduit.

The ends of high density polyethylene conduit shall be capped until the installation of cable is started.

A pull rope, conforming to Section 86-2.05C, "Installation," of the Standard Specifications shall be installed in conduits which are to receive future conductors

#### **CERTIFICATES OF COMPLIANCE, MATERIALS RECEIVING INSPECTION AND MANUFACTURER'S DATA**

In conformance with the provisions in Section 6-1.07, "Certificates of Compliance," a Certificate of Compliance shall be furnished to the Engineer for each type of high density polyethylene conduit furnished. The certificate shall also certify that the high density polyethylene conduit complies with the requirements of these special provisions and shall include the resin material Cell Classification, unit mass of pipe, average pipe stiffness and date of manufacture.

Conduit, when delivered to the site, which exhibits damage in excess of 10% of the conduit wall thickness may be rejected by the Engineer. Conduit exhibiting damage which does not meet the manufacturer's recommendations for usable conduit may also be rejected by the Engineer. Conduit sections may be repaired if approved by the Engineer. Replacement or repair of rejected conduit shall be at the Contractor's expense.

Two copies of the manufacturer's product technical specification information shall be furnished to the Engineer at least two weeks subsequent to the start of the scheduled delivery.

Two copies of the manufacturer's test data for the delivered shipment shall be furnished to the Engineer at the time of the delivery.

#### **10-3.08 DIRECTIONAL BORING METHOD**

Where jacking and drilling is shown on the plans as the required installation method, conduits may be installed by the directional boring method. Directional boring shall not be used at other locations unless approved by the Engineer. All pull boxes or vaults shall be located at the locations shown on the plans.

Minimum depth of conduit below finished grade in pavement areas shall be 8 feet.

A listing of materials (composition and strength) and methods used in directional boring shall be submitted for the Engineer's review.

The diameter of the boring tool shall not exceed 1.5 times the outside diameter of the conduit. Mineral slurry or wetting solution shall only be used to lubricate the boring tool and to stabilize the soil surrounding the boring path. Mineral slurry or wetting solution shall be water based and environmentally safe.

Residue from directional boring operations shall be handled in the same manner as residue from slot cutting operations described in Section 86-5.01A(5), "Installation Details," of the Standard Specifications.

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

The directional boring equipment shall be equipped with a tension measuring device that indicates the amount of tension exerted on conduit during conduit pulling operations.

Slurry cement backfill and warning tape, as shown on the plans for trench installations of conduit, are not required where the directional boring method is used. Tracer wire shall be attached to the uppermost conduit prior to conduit installation.

A representative of the Contractor must be in direct charge and control of the directional boring operation at all times.

The Engineer shall be notified in writing 2 working days in advance of starting directional boring operations. The location and equipment to be used in the boring operation shall be included in the advance notice to the Engineer. Directional boring shall only be performed in the presence of the Engineer unless otherwise notified in writing by the Engineer.

Full compensation for directional boring shall be considered as included in the contract lump sum price paid for various items and no additional compensation will be allowed therefor.

#### **10-3.09 CONDUCTORS AND WIRING**

Detector splices shall be insulated by "Method B." At the Contractor's option, other splices of conductors may be insulated by "Method B" or with heat-shrink tubing of the appropriate size after thoroughly painting the spliced conductors with electrical insulating coating.

### **10-3.10 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 3/16-inch 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 3/16-inch diameter or larger brass or bronze bolt.

Equipment bonding and grounding conductors are required in conduits, except when the conduits contain only 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. 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.

### **10-3.11 SERVICE**

Service equipment enclosures shall be the aluminum type.

Circuit breakers shall be the plug-in type, mounted on energized clips. All circuit breakers shall be mounted vertically with the up position of the handle being the "ON" position.

#### **ELECTRIC SERVICE (IRRIGATION)**

Electric service (irrigation) shall be from the service points to the irrigation controllers (IC) and to the spaces provided in the irrigation controller enclosure cabinets (CEC) for irrigation controllers as shown on the plans.

Service disconnects in service equipment enclosures shall be a single-pole, 20-A circuit breaker.

Nameplate inscriptions shall be as shown on the plans.

### **10-3.12 TRAFFIC MONITORING STATION CABINETS**

The traffic monitoring station (TMS) cabinets shall conform to the provisions in Section 86-3.03, "Model 170 and Model 2070 Controller Assemblies," of the Standard Specifications and these special provisions.

Cabinets shall be Type 1 and shall consist of a Type 1 housing (A), a mounting cage 1, and the following listed equipment. The equipment shall conform to the provisions of Chapter 6 of the Traffic Signal Control Equipment Specifications (TSCES).

- A. Service panel No. 1
- B. Power distribution assembly
- C. Controller and equipment shelves
- D. Dual fan assembly with thermostatic control

Police panels will not be required.

Prior to shipping to the project site, each TMS cabinet shall be submitted to the Transportation Laboratory for acceptance testing.

Foundations for Type 1 housing shall conform to the details in the plans for Model 332A and 334 cabinets.

The Engineer shall be notified when each TMS cabinet is ready for the functional test. The functional test will be conducted by State forces.

The following equipment shall be provided with each power distribution assembly:

- A. Two each of Duplex NEMA Type 5-20R controller receptacle
- B. One each of 30 A, 1-pole, 120 V(ac) Main circuit breaker
- C. Two each of 15 A, 1-pole, 120 V(ac) circuit breaker

Shelves shall be furnished as shown on the plans. Each shelf shall be attached to the tops of 2 supporting angles with 4 screws. Supporting angles shall extend from the front to the back rails. Two supporting angles will be State furnished and 4 shall be Contractor furnished. The front of the shelf shall abut the front member of the mounting cage. The shelves shall

be arranged as shown on the plans. The angles shall be designed to support a minimum of 50 pounds each. The horizontal side of each angle shall be a minimum of 3 inches. The angles shall be vertically adjustable.

Three terminal blocks shall be furnished as shown on the plans. Terminal blocks shall conform to the requirements in Chapter 6, Section 5, Subsection 6.5.3, Paragraph 5.3.1 of the TSCES, except that the screw size shall be 8-32.

Full compensation for traffic monitoring station cabinet shall be considered as included in the contract lump sum price paid for traffic monitoring station and no additional compensation will be allowed therefor.

### **10-3.13 DETECTORS**

Loop wire shall be Type 2.

Loop detector lead-in cable shall be Type B.

Slots shall be filled with asphaltic emulsion sealant or hot-melt rubberized asphalt sealant.

Slots in portland cement concrete shall be filled with elastomeric sealant or hot-melt rubberized asphalt sealant, or shall be filled with an epoxy sealant conforming to the provisions in Section 95-2.09, "Epoxy Sealant for Inductive Loops," of the Standard Specifications.

### **10-3.14 LUMINAIRES**

Ballasts shall be the lag type.

### **10-3.15 SIGN LIGHTING FIXTURES-INDUCTION**

Induction sign lighting fixtures shall conform to the provisions for mercury sign lighting fixtures in Section 86-6.05, "Sign Lighting Fixtures-Mercury," of the Standard Specifications and these special provisions.

Each fixture shall consist of a housing with door, a reflector, refractor or a lens, a lamp, a power coupler, a high frequency generator and a fuse block.

Fixtures shall have a minimum average rating of 60,000 hours. Fixtures shall be for a wattage of 87 W, 120/240 V(ac). The power factor of the fixtures shall be greater than 90 percent and the total harmonic distortion shall be less than 10 percent. Fixtures shall be Underwriter's Laboratories (UL) approved for wet locations and be Federal Communications Commission (FCC) Class A listed.

The weight of the fixture shall not exceed 44 pounds. The manufacturer's brand name, trademark, model number, serial number and date of manufacture shall be located on the packaged assembly and permanently marked on the outside and inside of the housing.

## **MATERIALS**

### **Mounting Assembly**

The mounting assembly may be either cast aluminum, hot-dip galvanized steel plate or steel plate that has been galvanized and finished with a polymeric coating system or the same finish that is used for the housing.

### **Housing**

Housings shall have a door designed to hold a refractor or lens. Housing doors shall be designed to be opened without the use of tools. Housings and doors shall have a powder coat or polyester paint finish of a gray color resembling unfinished fabricated aluminum.

### **Reflector**

Reflectors shall be designed to be removed as a unit that includes the lamp and power coupler.

### **Refractor**

Refractors or lenses shall have smooth exteriors. Lenses shall be flat or convex. Convex lenses shall be made from heat resistant, high-impact resistant, tempered glass.

Convex lenses shall be designed or shielded so that no fixture luminance is visible when the fixture is approached directly from the rear and the viewing level is the bottom of the fixture. When a shield is used it shall be an integral part of the door casting.

### **Lamp**

Each fixture shall be furnished with a 85-W induction lamp. Interior lamp walls shall be fluorescent phosphor coated. Lamp light output shall be at least 70 percent at 60,000 hours. Lamps shall have a minimum color-rendering index of 80. Lamps shall be rated at a color temperature of 4,000 K. Lamps shall be removable without the use of tools.

### **Power Coupler**

Power couplers shall consist of a construction base with antenna, heat sink and electrical connection cable. The power coupler shall be designed so that it can be removed with common hand tools.

### **High Frequency Generator**

High frequency generators shall start and operate lamps at an ambient temperature of -25 °C or greater for the rated life of the lamp.

Generator output frequency shall be 2.65 MHz ±10 percent. The generator radio frequency interference shall meet the requirements of the Federal Communications Commission Title 47, Part 18, regulations concerning harmful interference.

High frequency generators shall operate continuously at ambient air temperatures from -25 °C to +25 °C without reduction in generator life. High frequency generators shall have a design life of at least 100,000 hours at 55 °C.

High frequency generators shall be capable of being replaced with common hand tools. Conductor terminals shall be identified as to the component terminal to which they connect.

High frequency generators shall be mounted to use the fixture upon which they are mounted as a heat sink.

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications, and a copy of the high frequency generator test methods and results shall be submitted by the manufacturer with each lot of fixtures. The certificate shall state that the high frequency generators meet the requirements of this section and the generator specifications of the lamp manufacturer.

### **10-3.16 REMOVING, REINSTALLING OR SALVAGING ELECTRICAL EQUIPMENT**

Salvaged electrical materials shall be hauled to District 2 Signal Shop, 5650 Mountain Lakes Blvd., Redding 96003 and stockpiled.

The Contractor shall provide the equipment, as necessary, to safely unload and stockpile the material. A minimum notice of 2 business days shall be given prior to delivery. Contact Signal Shop supervisor at (530) 225-3469.

### **10-3.17 PAYMENT**

If any of the fabrication sites for the materials listed are located more than 300 air line miles from both Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. Whereas it is and will be impractical and difficult to determine the actual increase in these expenses, it is agreed that payment to the Contractor for furnishing these listed materials from each fabrication site located more than 300 air line miles from both Sacramento and Los Angeles will be reduced \$2,000:

1. Service equipment enclosures
2. Traffic Monitoring Station cabinets furnished by the Contractor

Full compensation for object marker (type PB) and for pull box paving shall be considered as included in the contract lump sum price paid for traffic monitoring station and no separate payment will be made therefor.

**AMENDMENTS TO THE STANDARD SPECIFICATIONS  
DATED MAY 2006**



The use of this new style does not change the meaning of a specification not yet using this style.

The specifications are written to the Bidder before award and the Contractor after. Before award, interpret sentences written in the imperative mood as starting with "The Bidder must" and interpret "you" as "the Bidder" and "your" as "the Bidder's." After award, interpret sentences written in the imperative mood as starting with "The Contractor must" and interpret "you" as "the Contractor" and "your" as "the Contractor's."

Omission of "a," "an," and "the" is intentional. These articles have been omitted in some specifications for streamlining purposes.

Unless an object or activity is specified to be less than the total, the quantity or amount is all of the object or activity.

A plural term includes the singular.

All items in a list apply unless the items are specified as choices.

Headings are included for the purposes of organization and referencing. Inclusion of a heading with no related content, "Reserved," or "Not Used" does not indicate that no specification exists for that subject; applicable specifications may be covered in a general or referenced specification.

## 1-2 REFERENCES

### 1-2.01 REFERENCES

A reference within parentheses to a law or regulation is included in the contract for convenience only and is not a comprehensive listing of related laws and regulations. Lack of a reference does not indicate no related laws or regulations exist.

If the version of a referenced document is not specified, use the current version in effect on the date of Notice to Bidders.

A reference to a subsection includes the section's general specifications of which the subsection is a part.

A code not specified as a Federal code is a California code.

## 1-3 ABBREVIATIONS AND MEASUREMENT UNITS

### 1-3.01 ABBREVIATIONS

#### Abbreviations

| Abbreviation | Meaning  |
|--------------|--|
| AAN          | American Association of Nurserymen                                 |
| AASHTO       | American Association of State Highway and Transportation Officials |
| AISC         | American Institute of Steel Construction                           |
| AISI         | American Iron and Steel Institute                                  |
| AMA          | archaeological monitoring area                                     |
| ANSI         | American National Standards Institute                              |
| APHA         | American Public Health Association                                 |
| API          | American Petroleum Institute                                       |
| AREMA        | American Railway Engineering and Maintenance-of-Way Association    |
| ASME         | American Society of Mechanical Engineers                           |
| ASTM         | American Society for Testing and Materials                         |
| AWG          | American Wire Gage   |
| AWPA         | American Wood-Preservers' Association                              |
| AWS          | American Welding Society   |
| AWWA         | American Water Works Association                                   |
| CIH          | Certified Industrial Hygienist                                     |
| DBE          | Disadvantaged Business Enterprise                                  |
| DVBE         | Disabled Veteran Business Enterprise                               |
| EIA          | Electronic Industries Alliance                                     |
| ESA          | environmentally sensitive area                                     |
| ETL          | Electrical Testing Laboratories                                    |
| FHWA         | Federal Highway Administration                                     |
| IEEE         | Institute of Electrical and Electronics Engineers                  |
| NETA         | National Electrical Testing Association, Inc.                      |
| NEMA         | National Electrical Manufacturers Association                      |
| PLAC         | permit, license, agreement, certification, or any combination of   |

|      |                                     |
|------|-------------------------------------|
|      | these                               |
| SSPC | The Society for Protective Coatings |
| UL   | Underwriters' Laboratories Inc.     |

### 1-3.02 MEASUREMENT UNITS

#### Measurement Units

| Symbols as used in the specifications | Symbols as used in the Bid Item List | Meaning                     |
|---------------------------------------|--------------------------------------|-----------------------------|
| A                                     | —                                    | amperes                     |
|                                       | ACRE                                 | acre                        |
|                                       | CF                                   | cubic foot                  |
|                                       | CY                                   | cubic yard                  |
| --                                    | EA                                   | each                        |
| g                                     | --                                   | gram                        |
| ksi                                   | --                                   | kips per square inch        |
|                                       | GAL                                  | gallon                      |
| h                                     | H                                    | hour                        |
|                                       | LB                                   | pound                       |
| --                                    | LS                                   | lump sum                    |
|                                       | LF                                   | linear foot                 |
|                                       | LNMI                                 | lane mile                   |
|                                       | MFBM                                 | thousand foot board measure |
|                                       | MI                                   | mile                        |
|                                       | MSYD                                 | thousand station yard       |
| Ω                                     | --                                   | ohm                         |
| pcf                                   | --                                   | pounds per cubic foot       |
| s                                     | --                                   | second                      |
|                                       | STA                                  | 100 feet                    |
|                                       | SQFT                                 | square foot                 |
|                                       | SQYD                                 | square yard                 |
|                                       | TAB                                  | tablet                      |
| ton                                   | TON                                  | 2,000 pounds                |
| W                                     | --                                   | watt                        |
| V                                     | --                                   | volt                        |

### 1-4 DEFINITIONS

#### 1-4.01 GENERAL

Interpret terms as defined in the contract documents. A construction-industry term not defined in the contract documents has the meaning defined in Means Illustrated Construction Dictionary, Condensed Version, Second Edition.

#### 1-4.02 GLOSSARY

**aerially deposited lead:** Lead primarily from vehicle emissions deposited within unpaved areas or formerly unpaved areas.

**archaeological monitoring area:** Area within, near, or straddling the project limits where access is allowed, but work is subject to archaeological monitoring.

**archaeological resources:** Remains of past human activity, including historic and prehistoric material (e.g., tools and tool fragments, hearth and food remains, structural remains, and human remains).

**acceptance:** Formal written acceptance by the Director of an entire contract that has been completed in all respects in accordance with the plans and specifications and any modifications to them previously approved.

**base:** Layer of specified material of planned thickness placed immediately below the pavement or surfacing.

**basement material:** Material in excavation or embankments underlying the lowest layer of subbase, base, pavement, surfacing, or other specified layer to be placed.

**bid item:** Specific work unit for which the bidder provides a price.

**Bid Item List:** List of bid items and the associated quantities.

**Bid Item List, verified:** Bid Item List with verified prices. The Contract Proposal of Low Bidder at the Department's Web site is the verified Bid Item List.

**bridge:** Structure, with a bridge number, that carries a utility facility, or railroad, highway, pedestrian or other traffic, over a water course or over or under or around any obstruction.

**building-construction contract:** Contract that has "building construction" on the cover of the Notice to Bidders and Special Provisions.

**business day:** Day on the calendar except Saturday or holiday.

**California Manual on Uniform Traffic Control Devices:** The California Manual on Uniform Traffic Control Devices for Streets and Highways (California MUTCD) is issued by the Department of Transportation and is the Federal Highway Administration's MUTCD 2003 Edition, as amended for use in California.

**Certified Industrial Hygienist:** Industrial hygienist certified in comprehensive practice by the American Board of Industrial Hygiene.

**conduit:** Pipe or tube in which smaller pipes, tubes, or electrical conductors are inserted or are to be inserted.

**contract:** Written and executed contract between the Department and the Contractor.

**contract bonds:** Security for the payment of workers and suppliers furnishing materials, labor, and services and for guaranteeing the Contractor's work performance.

**contract item:** Bid item.

**Contractor:** Person or business or its legal representative entering into a contract with the Department for performance of the work.

**culvert:** Structure, other than a bridge, that provides an opening under a roadway for drainage or other purposes.

**day:** 24 consecutive hours running from midnight to midnight; calendar day.

**deduction:** Amount of money permanently taken from progress payment and final payment. Deductions are not retentions under Pub Cont Code § 7107.

**Department:** Department of Transportation as defined in St & Hwy Code § 20 and authorized in St & Hwy Code § 90; its authorized representatives.

**detour:** Temporary route for traffic around a closed road part. A passageway through a job site is not a detour.

**Director:** Department's Director.

**Disabled Veteran Business Enterprise:** Business certified as a DVBE by the Office of Small Business and DVBE Services, Department of General Services.

**divided highway:** Highway with separated traveled ways for traffic, generally in opposite directions.

**Engineer:** Department's Chief Engineer acting either directly or through properly authorized agents; the agents acting within the scope of the particular duties delegated to them.

**environmentally sensitive area:** Area within, near, or straddling the project limits where access is prohibited or limited to protect environmental resources.

**Federal-aid contract:** Contract that has a Federal-aid project number on the cover of the Notice to Bidders and Special Provisions.

**fixed costs:** Labor, material, or equipment cost directly incurred by the Contractor as a result of performing or supplying a particular bid item that remains constant regardless of the item's quantity.

**frontage road:** Local street or road auxiliary to and located generally on the side of an arterial highway for service to abutting property and adjacent areas and for control of access.

**grading plane:** Basement material surface on which the lowest layer of subbase, base, pavement, surfacing, or other specified layer is placed.

**highway:** Whole right of way or area that is reserved for and secured for use in constructing the roadway and its appurtenances.

**holiday:**

1. Every Sunday
2. January 1st, New Year's Day
3. 3rd Monday in January, Birthday of Martin Luther King, Jr.
4. February 12th, Lincoln's Birthday
5. 3rd Monday in February, Washington's Birthday
6. March 31st, Cesar Chavez Day
7. Last Monday in May, Memorial Day
8. July 4th, Independence Day
9. 1st Monday in September, Labor Day
10. 2nd Monday in October, Columbus Day
11. November 11th, Veterans Day
12. 4th Thursday in November, Thanksgiving Day

- 13. Day after Thanksgiving Day
- 14. December 25th, Christmas Day

If January 1st, February 12th, March 31st, July 4th, November 11th, or December 25th falls on a Sunday, the Monday following is a holiday. If November 11th falls on a Saturday, the preceding Friday is a holiday. Interpret "legal holiday" as "holiday."

**informal-bid contract:** Contract that has "Informal Bid Authorized by Pub Cont Code §10122" on the cover of the Notice to Bidders and Special Provisions.

**Information Handout:** Supplemental project information furnished to bidders as a handout.

**laboratory:** Laboratory authorized by the Department to test materials.

**liquidated damages:** Amount prescribed in the specifications, pursuant to the authority of Pub Cont Code § 10226, to be paid to the State or to be deducted for each day's delay in completing the whole or any specified portion of the work beyond the time allowed in the specifications.

**median:** Portion of a divided highway separating the traveled ways for traffic in opposite directions including inside shoulders.

**Notice to Bidders:** Document that provides a general work description, bidder and bid specifications, and the time and location the Department receives bids.

**paleontological resources:** Fossils and the deposits they are found in. Fossils are evidence of ancient life preserved in sediments and rock. Examples of paleontological resources are remains of (1) animals, (2) animal tracks, (3) plants, and (4) other organisms. Archaeological resources are not paleontological and fossils found within an archaeological resource are generally considered archaeological resources, not paleontological resources.

**pavement:** Uppermost layer of material placed on the traveled way or shoulders. This term is used interchangeably with surfacing.

**plans:** Official project plans and Standard Plans, profiles, typical cross sections, working drawings and supplemental drawings, or reproductions thereof, approved by the Engineer, which show the location, character, dimensions and details of the work to be performed. These documents are to be considered as a part of the plans.

In the above definition, the following terms are defined as follows:

**Standard Plans:** Standard Plans issued by the Department.

**project plans:** Specific details and dimensions peculiar to the work supplemented by the Standard Plans insofar as the same may apply.

**roadbed:** Area between the intersection of the upper surface of the roadway and the side slopes or curb lines. The roadbed rises in elevation as each increment or layer of subbase, base, surfacing or pavement is placed. Where the medians are so wide as to include areas of undisturbed land, a divided highway is considered as including 2 separate roadbeds.

**roadway:** Highway portion included between the outside lines of sidewalks, or curbs, slopes, ditches, channels, waterways, and including all the appertaining structures, and other features necessary to proper drainage and protection.

**shoulder:** Roadway portion contiguous with the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses.

**special provisions:** Specific clauses setting forth conditions or requirements peculiar to the work and supplementary to these Standard Specifications. The Department's publication titled "Labor Surcharge And Equipment Rental Rates" is part of the special provisions.

**specifications:** Directions, provisions, and requirements contained in these Standard Specifications, Amendments to the Standard Specifications, and the special provisions. Where the term "these specifications" or "these Standard Specifications" is used in this book, it means the provisions set forth in this book.

**State:** State of California, including its agencies, departments, or divisions, whose conduct or action is related to the work.

**Structure Design:** Offices of Structure Design of the Department.

**subbase:** Layer of specified material of planned thickness between a base and the basement material.

**subgrade:** Roadbed portion on which pavement, surfacing, base, subbase, or a layer of any other material is placed.

**substructure:** Bridge portions below the bridge seats, tops of piers, haunches of rigid frames, or below the spring lines of arches. Backwalls and parapets of abutments and wingwalls of bridges are portions of the substructure.

**superstructure:** Bridge portion except the bridge substructure.

**supplemental project information:** Information relevant to the project, specified as supplemental project information, and made available to bidders.

**surfacing:** Uppermost layer of material placed on the traveled way, or shoulders. This term is used interchangeably with pavement.

**traffic lane:** Portion of a traveled way for the movement of a single line of vehicles.

**traveled way:** Portion of the roadway for the movement of vehicles, exclusive of shoulders.

**total bid:** Sum of the item totals as verified by the Department; original contract price.

**withhold:** Money temporarily or permanently taken from progress payment. Withholds are not retentions under Pub Cont Code § 7107.

**work:** All the work specified, indicated, shown or contemplated in the contract to construct the improvement, including all alterations, amendments, or extensions to it made by contract change order or other written orders of the Engineer.

### 1-5 DISTRICTS

#### District Composition and Office Addresses

| District | Counties   | Location Address                           | Mailing Address                                   |
|----------|--|--|---|
| 1        | Del Norte (DN), Humboldt (Hum), Lake (Lak), Mendocino (Men)  | 1656 UNION ST<br>EUREKA, CA                | PO BOX 3700<br>EUREKA CA 95502                    |
| 2        | Lassen (Las), Modoc (Mod), Plumas (Plu), Shasta (Sha), Siskiyou (Sis), Tehama (Teh), Trinity (Tri)   | 1657 RIVERSIDE DR<br>REDDING, CA           | PO BOX 496073<br>REDDING CA 96049-6073            |
| 3        | Butte (But), Colusa (Col), El Dorado (ED), Glenn (Gle), Nevada (Nev), Placer (Pla), Sacramento (Sac), Sierra (Sie), Sutter (Sut), Yolo (Yol), Yuba (Yub) | 703 B ST<br>MARYSVILLE, CA                 | PO BOX 911<br>MARYSVILLE CA 95901                 |
| 4        | Alameda (Ala), Contra Costa (CC), Marin (Mrn), Napa (Nap), San Francisco (SF), San Mateo (SM), Santa Clara (SCI), Solano (Sol), Sonoma (Son)             | 111 GRAND AVE<br>OAKLAND, CA               | PO BOX 23660<br>OAKLAND CA 94623-0660             |
| 5        | Monterey (Mon), San Benito (SBt), San Luis Obispo (SLO), Santa Barbara (SB), Santa Cruz (SCr)  | 50 HIGUERA ST<br>SAN LUIS OBISPO, CA       | 50 HIGUERA ST<br>SAN LUIS OBISPO CA 93401-5415    |
| 6        | Fresno (Fre), Kern (Ker), Kings (Kin), Madera (Mad), Tulare (Tul)  | 1352 W. OLIVE AVE<br>FRESNO, CA            | PO BOX 12616<br>FRESNO CA 93728-2616              |
| 7        | Los Angeles (LA), Ventura (Ven)  | 100 S. MAIN ST<br>LOS ANGELES              | 100 S MAIN ST<br>LOS ANGELES CA 90012             |
| 8        | Riverside (Riv), San Bernardino (SBd)  | 464 W 4TH ST<br>SAN BERNARDINO, CA         | 464 W 4TH ST<br>SAN BERNARDINO CA<br>92401-1400   |
| 9        | Inyo (Iny), Mono (Mno)   | 500 S MAIN ST<br>BISHOP, CA                | 500 S MAIN ST<br>BISHOP CA 93514-3423             |
| 10       | Alpine (Alp), Amador (Ama), Calaveras (Cal), Mariposa (Mpa), Merced (Mer), San Joaquin (SJ), Stanislaus (Sta), Tuolumne (Tuo)                            | 1976 E CHARTER WAY<br>STOCKTON, CA         | PO BOX 2048<br>STOCKTON CA 95201                  |
| 11       | Imperial (Imp), San Diego (SD)   | 4050 TAYLOR ST<br>SAN DIEGO, CA            | 4050 TAYLOR ST<br>SAN DIEGO CA 92110-2737         |
| 12       | Orange (Ora)   | 3347 MICHELSON DR<br>STE 100<br>IRVINE, CA | 3347 MICHELSON DR STE 100<br>IRVINE CA 92612-0661 |

A project with work in District 1, 2, or 3 is a North Region project. For Districts 1, 2, and 3, interpret each reference to the district office as the North Region office. The North Region office address is the District 3 address.

**1-6 WEB SITES, ADDRESSES, AND TELEPHONE NUMBERS**

**Web Sites, Addresses, and Telephone Numbers**

| Agency, Department Unit, or Reference                                      | Web Site  | Address   | Telephone No.                    |
|--|---|---|----------------------------------|
| Bid Document Unit  |   | MSC 26<br>BID DOCUMENT UNIT<br>DEPARTMENT OF<br>TRANSPORTATION<br>1120 N ST RM 200<br>SACRAMENTO CA 95814-5605  |                                  |
| Department   | <a href="http://www.dot.ca.gov">www.dot.ca.gov</a>  |   |                                  |
| Department of General Services, Office of Small Business and DVBE Services | <a href="http://www.pd.dgs.ca.gov/smbus/default.htm">www.pd.dgs.ca.gov/smbus/default.htm</a>  | OFFICE OF SMALL BUSINESS AND DVBE SERVICES<br>DEPARTMENT OF GENERAL SERVICES<br>707 3RD ST<br>WEST SACRAMENTO CA 95605-2811                                   | (800) 559-5529<br>(916) 375-4940 |
| Department of Industrial Relations   | <a href="http://www.dir.ca.gov">www.dir.ca.gov</a>  |   |                                  |
| Department of Industrial Relations, Division of Apprenticeship Standards   |   | 455 GOLDEN GATE AVENUE<br>SAN FRANCISCO, CA 94102   |                                  |
| Office Engineer  |   | MSC 43<br>OFFICE ENGINEER<br>DEPARTMENT OF<br>TRANSPORTATION<br>1727 30TH ST<br>SACRAMENTO CA 95816-7005  |                                  |
| Office Engineer– Verified Bid Results                                      | <a href="http://www.dot.ca.gov/hq/esc/oe/awards/bidsum_html/6week_list.html">http://www.dot.ca.gov/hq/esc/oe/awards/bidsum_html/6week_list.html</a> |   |                                  |
| Offices of Structure Design, Documents Unit                                |   | MSC 9-4/4I<br>DOCUMENTS UNIT OFFICES OF<br>STRUCTURE DESIGN<br>DEPARTMENT OF<br>TRANSPORTATION<br>1801 30TH ST<br>SACRAMENTO CA 95816-7006                    | (916) 227-0716                   |
| Publication Distribution Unit  |   | PUBLICATION UNIT<br>DEPARTMENT OF<br>TRANSPORTATION<br>1900 ROYAL OAKS DRIVE<br>SACRAMENTO CA 95815-3800  |                                  |
| Transportation Laboratory  |   | MATERIALS AND ENGINEERING<br>TESTING SERVICES AND<br>GEOTECHNICAL SERVICES<br>DEPARTMENT OF<br>TRANSPORTATION<br>5900 FOLSOM BLVD<br>SACRAMENTO CA 95819-4612 | (916) 227-7000                   |
| Department's Pre-Qualified Products List                                   | <a href="http://www.dot.ca.gov/hq/esc/approved_products_list">http://www.dot.ca.gov/hq/esc/approved_products_list</a>                               |   |                                  |



If bridge as-built drawings are available:

1. For a project in District 1 through 6 or 10, you may request them from the Office of Structure Maintenance and Investigations, fax (916) 227-8357
2. For a project in District 7, 8, 9, 11, or 12, you may request them from the Office of Structure Maintenance and Investigations, fax (916) 227-8357, and are available at the Office of Structure Maintenance and Investigations, Los Angeles, CA, telephone (213) 897-0877

As-built drawings may not show existing dimensions and conditions. Where new construction dimensions are dependent on existing bridge dimensions, verify the field dimensions and adjust dimensions of the work to fit existing conditions.

#### **2-1.04 SMALL BUSINESS ENTERPRISE GOAL**

The Department has established an overall 25 percent small business participation goal. To determine if the goal is achieved, the Department is tracking small business participation on all contracts.

Contractors, subcontractors, suppliers, and service providers who qualify as small business are encouraged to apply for certification as a small business by submitting their application to the Department of General Services, Office of Small Business and DVBE Services.

#### **2-1.05 DISADVANTAGED BUSINESS ENTERPRISES**

Section 2-1.05, "Disadvantaged Business Enterprises," applies to a Federal-aid contract.

Under 49 CFR 26.13(b):

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.

In order to ensure the Department achieves its federally mandated statewide overall DBE goal, the Department encourages the participation of DBEs as defined in 49 CFR 26.

#### **2-1.06 DISABLED VETERAN BUSINESS ENTERPRISES**

##### **2-1.06A General**

Section 2-1.06, "Disabled Veteran Business Enterprises," applies to a non-Federal-aid contract.

Take necessary and reasonable steps to ensure that DVBEs have opportunity to participate in the contract.

Comply with Mil & Vet Code § 999 et seq.

##### **2-1.06B No Goal**

Section 2-1.06B, "No Goal," applies if no DVBE goal is shown in the Notice to Bidders.

The Department encourages bidders to obtain DVBE participation in order to ensure the Department achieves its State-mandated overall DVBE goal.

##### **2-1.06C Goal**

Section 2-1.06C, "Goal," applies if a DVBE goal is shown in the Notice to Bidders.

Make work available to DVBEs and select work parts consistent with available DVBE subcontractors and suppliers.

Meet the goal shown or demonstrate that you made good faith efforts to meet this goal.

#### **2-1.07 SMALL BUSINESS AND NON-SMALL BUSINESS SUBCONTRACTOR PREFERENCES**

##### **2-1.07A General**

Section 2-1.07, "Small Business and Non-Small Business Subcontractor Preferences (Govt Code § 14835 et seq. and 2 CA Code of Regs § 1896 et seq.)," applies to a non-Federal-aid contract.

##### **2-1.07B Small Business Preference**

The Department allows a bidder certified as a small business by the Office of Small Business and DVBE Services, Department of General Services, a preference if:

1. You completed a Request for Small Business Preference or Non–Small Business Preference form
2. You attached a copy of your Office of Small Business and DVBE Services small business certification to the form
3. The low bidder is not certified as a small business

The bidder's signature on the Request for Small Business Preference or Non–Small Business Preference form certifies that the bidder is certified as a small business at the time and day of bid or has submitted a complete application to the Department of General Services. The complete application and any required substantiating documentation must be received by the Department of General Services by 5:00 p.m. on bid opening date.

The Department of General Services determines if a bidder was certified on bid opening date. The Department confirms the bidder's status as a small business before applying the small business preference.

The small business preference is a reduction for bid comparison in the total bid submitted by the small business subcontractor by the lesser of:

1. 5 percent of the verified total bid of the low bidder
2. \$50,000

If this reduction results in the small business contractor becoming the low bidder, the contract award is based on the total bid, not the reduced bid.

### **2-1.07C Non–Small Business Subcontractor Preference**

The Department allows a bidder not certified as a small business by the Office of Small Business and DVBE Services, Department of General Services, a preference if:

1. You completed a Request for Small Business Preference or Non–Small Business Preference form
2. The low bidder is not certified as a small business and has not requested preference
3. The Certified Small Business Listing for the Non–Small Business Preference form shows that you are subcontracting at least 25 percent to certified small businesses.

The non–small business subcontractor preference is a reduction for bid comparison in the total bid submitted by the non–small business contractor requesting the preference by the lesser of:

1. 5 percent of the verified total bid of the low bidder
2. \$50,000

If this reduction results in the non–small business contractor becoming the low bidder or a tie with a non-small business low bidder not requesting the preference, the contract award is based on the total bid, not the reduced bid.

A non-small business bidder cannot displace a small business bidder.

### **2-1.08 DVBE INCENTIVE EVALUATION**

Section 2-1.08, "DVBE Incentive Evaluation," applies to a non-Federal-aid contract.

The Department applies the Small Business and Non–Small Business preference during bid verification and proceeds with the following evaluation for DVBE incentive.

The Department grants a DVBE incentive to bidders who achieve a DVBE participation of 1 percent or greater of the value of their bid (Mil & Vet Code and Code of Regs § 1896.98 et seq).

The DVBE incentive is a reduction, for bid comparison only, in the total bid submitted by the lesser of:

1. Percentage of DVBE achievement, rounded to 2 decimal places, of the verified total bid of the low bidder
2. 5 percent of the verified total bid of the low bidder
3. \$100,000

The Department applies DVBE incentive and determines if bid ranking changes.

A non-small business bidder cannot displace a small business bidder. However, a small business bidder with higher DVBE achievement can displace another small business bidder.

The Department proceeds with awarding the contract to the new low bidder and posts the new verified bid results at its Office Engineer Web site.

## **2-1.09 PREFERENCE HIERARCHY**

Section 2-1.09, "Preference Hierarchy," applies to a non-Federal-aid contract.

If a small business bidder and a non-small business bidder request preferences and the reductions result in a tied bid, the Department awards the contract to the small business bidder.

If a DVBE bidder and a non-DVBE bidder request preferences and the reduction results in a tied bid, the Department awards the contract to the DVBE bidder.

## **2-1.10 CALIFORNIA COMPANIES**

Section 2-1.10, "California Companies," applies to a non-Federal-aid contract.

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

Complete a California Company Preference form.

The California company reciprocal preference amount is equal to the preference amount applied by the state of the nonresident contractor with the lowest responsive bid unless the California company is eligible for a small business preference or a non-small business subcontractor preference; in which case the preference amount is the greater of the two, but not both.

If the low bidder is not a California company and a California company's bid with reciprocal preference is equal to or less than the lowest bid, the Department awards the contract to the California company on the basis of its total bid, not the reduced bid used for comparison except as specified in Section 2-1.09, "Preference Hierarchy."

## **2-1.11 JOB SITE AND DOCUMENT EXAMINATION**

Examine the job site and bid documents.

Bid submission is your acknowledgment that you have examined the job site and bid documents and are satisfied with:

1. General and local conditions to be encountered
2. Character, quality, and scope of work to be performed
3. Quantities of materials to be furnished
4. Character, quality, and quantity of surface and subsurface materials or obstacles
5. Requirements of the contract

## **2-1.12 BID DOCUMENT COMPLETION**

### **2-1.12A General**

Complete forms in the Bid book. Submit the forms with your bid except:

1. For the following 2 forms for non-federal-aid non-informal-bid contracts:
  - 1.1. Certified DVBE Summary and DVBE - Good Faith Efforts forms. You may submit these forms with your bid. If you do not and you are the low bidder or the 2nd or 3rd low bidder, submit them so that they are received at the Office Engineer no later than 4:00 p.m. on the 4th business day after bid opening. If a DVBE joint venture is used, submit the joint venture agreement with the Certified DVBE Summary form. Other bidders may be required to submit these forms if bid ranking changes.
  - 1.2. Certified Small Business Listing for the Non-Small Business Preference form. If you are applying for the non-small business subcontractor preference, you may submit this information with your bid. If you do not, submit it so that it is received at the Office Engineer no later than 4:00 p.m. on the 2nd business day after bid opening. The listed subcontractors and suppliers must be certified as a small business at the time and day of bid or must have submitted a complete application to the Department of General Services. The complete application and any required substantiating documentation must be received by the Department of General Services by 5:00 p.m. on bid opening date.
2. On the Subcontractor List you may either submit the percentage of each bid item subcontracted with your bid or fax the percentage to (916) 227-6282 within 24 hours after bid opening.

Except for the percentage of each bid item subcontracted, do not fax submittals.

The Department determines a bidder has made good faith efforts if it submits evidence that it:

1. Contacted the Office of Small Business and DVBE Services, Department of General Services

2. Advertised in trade media and media focusing on DVBEs unless time limits the Department imposes do not allow the advertising
3. Submitted invitations to bid to potential DVBE contractors
4. Considered available DVBEs

#### **2-1.12B Bid Item List and Bid Comparison**

Submit a bid based on the work item quantities the Department shows in the Bid Item List.

For a lump sum based bid, the Department compares bids based on the total price.

For a unit price based bid, the Department compares bids based on the sum of the item totals.

For a cost plus time based bid, the Department compares bids based on the sum of the item totals and the total bid for time.

#### **2-1.12C Subcontractor List**

In the Subcontractor List, list each subcontractor to perform work:

1. In an amount in excess of 1/2 of 1 percent of the total bid or \$10,000, whichever is greater (Pub Cont Code § 4100 et seq.)
2. That is a 1st tier DVBE subcontractor regardless of percentage of the total bid

The Subcontractor List must show the name, address, and work portions to be performed by each subcontractor listed. Show work portion by bid item number, description, and percentage of each bid item subcontracted.

#### **2-1.13 BIDDER'S SECURITY**

Submit your bid with one of the following forms of bidder's security equal to at least 10 percent of the bid:

1. Cash
2. Cashier's check
3. Certified check
4. Bidder's bond signed by a surety insurer who is licensed in California

Make checks and bonds payable to the Department of Transportation.

If using a bidder's bond, you may use the form in the Bid book. If you do not use the form in the Bid book, use a form containing the same information.

#### **2-1.14 BID SUBMITTAL**

Submit your bid:

1. Under sealed cover
2. Marked as a bid
3. Identifying the contract number and the bid opening date

If an agent other than the authorized corporation officer or a partnership member signs the bid, file a Power of Attorney with the Department either before opening bids or with the bid. Otherwise, the bid may be nonresponsive.

#### **2-1.15 BID WITHDRAWAL**

An authorized agent may withdraw a bid before the bid opening date and time by submitting a written bid withdrawal request at the location where the bid was submitted. Withdrawing a bid does not prevent you from submitting a new bid.

After the bid opening time, you cannot withdraw a bid.

#### **2-1.16 BID OPENING**

The Department publicly opens and reads bids at the time and place described in the Notice to Bidders.

#### **2-1.17 BID REJECTION**

The Department may reject:

1. All bids



### **3-1.04 CONTRACTOR LICENSE**

For a Federal-aid contract, the Contractor must be properly licensed as a contractor (Pub Cont Code § 10164) from contract award through contract acceptance.

For a non-Federal-aid contract:

1. The Contractor must be properly licensed as a contractor from bid opening through contract acceptance (Bus & Prof Code § 7028.15)
2. Joint venture bidders must obtain a joint venture license before contract award (Bus & Prof Code § 7029.1)

### **3-1.05 INSURANCE POLICIES**

The successful bidder must submit:

1. Copy of its commercial general liability policy and its excess policy or binder until such time as a policy is available, including the declarations page, applicable endorsements, riders, and other modifications in effect at the time of contract execution. Standard ISO form No. CG 0001 or similar exclusions are allowed if not inconsistent with Section 7-1.12, "Indemnification and Insurance." Allowance of additional exclusions is at the discretion of the Department.
2. Certificate of insurance showing all other required coverages. Certificates of insurance, as evidence of required insurance for the auto liability and any other required policy, shall set forth deductible amounts applicable to each policy and all exclusions that are added by endorsement to each policy. The evidence of insurance shall provide that no cancellation, lapse, or reduction of coverage will occur without 10 days prior written notice to the Department.
3. A declaration under the penalty of perjury by a CPA certifying the accountant has applied GAAP guidelines confirming the successful bidder has sufficient funds and resources to cover any self-insured retentions if the self-insured retention is \$50,000 or higher.

If the successful bidder uses any form of self-insurance for workers compensation in lieu of an insurance policy, it shall submit a certificate of consent to self-insure under Labor Code § 3700.

### **3-1.06 SMALL BUSINESS PARTICIPATION REPORT**

Complete and sign the Small Business (SB) Participation Report form included in the contract documents even if no small business participation is reported.

### **3-1.07 PAYEE DATA RECORD**

Complete and sign the Payee Data Record form included in the contract documents.

### **3-1.08 CALTRANS BIDDER - DBE INFORMATION FORM**

Section 3-1.08, "Caltrans Bidder - DBE Information Form," applies to a Federal-aid contract.

Complete and sign the Caltrans Bidder - DBE Information form included in the contract documents even if no DBE participation is reported.

Provide written confirmation from each DBE that the DBE is participating in the contract. A copy of a DBE's quote serves as written confirmation. If a DBE is participating as a joint venture partner, the Department encourages you to submit a copy of the joint venture agreement.

### **3-1.09 CONTRACT EXECUTION**

The successful bidder must sign the contract.

Deliver to the Office Engineer:

1. Signed Contract form
2. Contract bonds
3. Documents identified in Section 3-1.05, "Insurance Policies"
4. Small Business Participation Report
5. Payee data record
6. For a Federal-aid contract, Caltrans Bidder - DBE Information form

For an informal-bid contract, the Office Engineer must receive these documents before the 5th business day after the bidder receives the contract. For all other contracts, the Office Engineer must receive these documents before the 10th business day after the bidder receives the contract.

The bidder's security may be forfeited for failure to execute the contract within the time specified (Pub Cont Code §§ 10181, 10182, and 10183).

The following is a copy of the Contract form:



STATE OF CALIFORNIA  
DEPARTMENT OF TRANSPORTATION  
CONTRACT NO. \_\_\_\_\_

This contract is entered into between the State of California's Department of Transportation and the Contractor named below:

\_\_\_\_\_  
CONTRACTOR'S NAME

The parties agree to comply with the terms of the following exhibits that are by this reference made a part of this contract.

- Exhibit A - Bid book dated \_\_\_\_\_
- Exhibit B - Notice to Bidders and Special Provisions dated \_\_\_\_\_
- Exhibit C - Project Plans approved \_\_\_\_\_
- Exhibit D - Standard Specifications dated \_\_\_\_\_
- Exhibit E - Standard Plans dated \_\_\_\_\_
- Exhibit F - Addenda

Exhibits A, B, C, and F are those exhibits identified with the same contract number as this contract.

**This contract has been executed by the following parties:**

\_\_\_\_\_  
**CONTRACTOR**

CONTRACTOR'S NAME (if other than an individual, state whether a corporation, partnership, etc.)

BY (Authorized Signature)

DATE SIGNED (Do not type)

PRINTED NAME AND TITLE OF PERSON SIGNING

FEDERAL EMPLOYER IDENTIFICATION NUMBER

\_\_\_\_\_  
**DEPARTMENT OF TRANSPORTATION**

BY (Authorized Signature)

DATE SIGNED (Do not type)

PRINTED NAME AND TITLE OF PERSON SIGNING

**ADA Notice** For individuals with sensory disabilities, this document is available in alternate formats. For information call (916) 654-6410 or TDD (916) 654-3880 or write Records and Forms Management, 1120 N Street, MS-89, Sacramento, CA 95814.



2. Itemization of contract specifications and drawing details that would be changed.
3. Detailed cost estimate for performing the work under the existing contract and under the proposed change. Determine the estimates under Section 9-1.03, "Force Account Payment."
4. Deadline for the Engineer to decide on the changes.
5. Bid items affected and resulting quantity changes.

The Department is not required to consider a VECP. If a VECP is similar to a change in the plans or specifications being considered by the Department at the time the proposal is submitted or if the proposal is based on or similar to drawings or specifications adopted by the Department before Contract award, the Department does not accept the VECP and may make these changes without VECP payments.

Until the Department approves a change order incorporating the VECP or parts of it, continue to perform the work under the contract. If the Department does not approve a change order before the deadline stated in the VECP or other date you subsequently stated in writing, the VECP is rejected. The Department does not adjust time or payment for a rejected VECP.

The Department decides whether to accept a VECP and the estimated net construction-cost savings from adopting the VECP or parts of it.

The Department may require you to accept a share of the investigation cost as a condition of reviewing a VECP. After written acceptance, the Department considers the VECP and deducts the agreed cost.

If the Department accepts the VECP or parts of it, the Department issues a change order that:

1. Incorporates changes in the contract necessary to implement the VECP or the parts adopted
2. Includes the Department's acceptance conditions
3. States the estimated net construction-cost savings resulting from the VECP
4. Obligates the Department to pay you 50 percent of the estimated net savings

In determining the estimated net construction-cost savings, the Department excludes your VECP preparation cost and the Department's VECP investigation cost, including parts paid by you.

If a VECP providing for a reduction in working days is accepted by the Department, 50 percent of the reduction is deducted from contract time.

If a VECP providing for a reduction in traffic congestion or avoiding traffic congestion is accepted by the Department, the Department pays 60 percent of the estimated net savings in construction costs attributable to the VECP. Submit detailed traffic handling comparisons between the existing contract and the proposed change, including estimates of the traffic volumes and congestion.

The Department may apply an accepted VECP for general use on other contracts.

If an accepted VECP is adopted for general use, the Department pays only the contractor who first submitted the VECP and only to the contracts awarded to that contractor before the submission of the accepted VECP.

If the Department does not adopt a general-use VECP, an identical or similar submitted proposal is eligible for acceptance.

#### **4-1.035C Value Analysis Workshop**

Section 4-1.035C, "Value Analysis Workshop," applies to a non-building-work contract with a total bid of over \$5 million.

You may request a value analysis workshop by submitting a request after contract approval.

The Department offers a value analysis workshop to:

1. Identify value enhancing opportunities
2. Consider changes to the contract that will reduce the total cost of construction, construction activity duration, or traffic congestion without impairing the essential functions specified for a VECP in Section 4-1.035B, "Value Engineering Change Proposal."

If the request is authorized, you and the Engineer:

1. Schedule a value analysis workshop
2. Select a facilitator and workshop site
3. Agree to other workshop administrative details

The workshop must be conducted under the methods described in the Department's Value Analysis Team Guide available at:



1. Using early and regular communication with involved parties
2. Establishing and maintaining a relationship of shared trust, equity, and commitment
3. Identifying, quantifying, and supporting attainment of mutual goals
4. Developing strategies for using risk management concepts
5. Implementing timely communication and decision making
6. Resolving potential problems at the lowest possible level to avoid negative impacts
7. Holding periodic partnering meetings and workshops as appropriate to maintain partnering relationships and benefits throughout the life of the project
8. Establishing periodic joint evaluations of the partnering process and attainment of mutual goals

Partnering does not void any contract part.

The Department's "Field Guide to Partnering on Caltrans Construction Projects" current at the time of bid is available to the project team as reference. This guide provides structure, context, and clarity to the partnering process requirements. This guide is available at the Department's Partnering Program website:

<http://www.dot.ca.gov/hq/construc/partnering.html>

In implementing project partnering, the project team must:

1. Create a partnering charter that includes:
  - 1.1. Mutual goals, including core project goals and may also include project-specific goals and mutually supported individual goals.
  - 1.2. Partnering maintenance and close-out plan.
  - 1.3. Dispute resolution plan that includes a dispute resolution ladder and may also include use of facilitated dispute resolution sessions.
  - 1.4. Team commitment statement and signatures.
2. Participate in monthly partnering evaluation surveys to measure progress on mutual goals and may also measure short-term key issues as they arise.
3. Evaluate the partnering facilitator on Forms CEM-5501 and CEM-5502. The Engineer provides the evaluation forms to the project team and collects the results. The Department makes evaluation results available upon request. Facilitator evaluations must be completed:
  - 3.1. At the end of the initial partnering workshop on Form CEM-5501.
  - 3.2. At the end of the project close-out partnering workshop on Form CEM-5502.
4. Conduct a project close-out partnering workshop.
5. Document lessons learned before contract acceptance.

#### **5-1.012B Partnering Facilitator, Workshops, and Monthly Evaluation Surveys**

The Engineer sends you a written invitation to enter into a partnering relationship after contract approval. Respond within 15 days to accept the invitation and request the initial and additional partnering workshops. After the Engineer receives the request, you and the Engineer cooperatively:

1. Select a partnering facilitator that offers the service of a monthly partnering evaluation survey with a 5-point rating and agrees to follow the Department's "Partnering Facilitator Standards and Expectations" available at the Department's Partnering Program website
2. Schedule initial partnering workshop
3. Determine initial workshop site and duration
4. Agree to other workshop administrative details

Additional partnering workshops and sessions are encouraged throughout the life of the project as determined necessary by you and the Engineer, recommended quarterly.

### **5-1.012C Training in Partnering Skills Development**

For a project with a total bid of \$25 million or greater, training in partnering skills development is required.

For a project with a total bid between \$10 million and \$25 million, training in partnering skills is optional.

You and the Engineer cooperatively schedule the training session and select a professional trainer, training site, and 1 to 4 topics from the following list to be covered in the training:

1. Active Listening
2. Building Teams
3. Change Management
4. Communication
5. Conflict Resolution
6. Cultural Diversity
7. Dealing with Difficult People
8. Decision Making
9. Effective Escalation Ladders
10. Emotional Intelligence
11. Empathy
12. Ethics
13. Facilitation Skills
14. Leadership
15. Partnering Process and Concepts
16. Project Management
17. Project Organization
18. Problem Solving
19. Running Effective Meetings
20. Time Management
21. Win-Win Negotiation

Before the initial partnering workshop, the trainer conducts a 1-day training session in partnering skills development for the Contractor's and the Engineer's representatives. This training session must be a separate session from the initial partnering workshop and must be conducted locally. The training session must be consistent with the partnering principles under the Department's "Field Guide to Partnering on Caltrans Construction Projects."

Send at least 2 representatives to the training session. One of these must be your assigned representative as specified in Section 5-1.06, "Superintendence," of the Standard Specifications.

### **5-1.012D Payment**

The Department pays you for:

1. 1/2 of partnering workshops and sessions based on facilitator and workshop site cost
2. 1/2 of monthly partnering evaluation survey service cost
3. Partnering skills development trainer and training site cost

The Department determines the costs based on invoice prices minus any available or offered discounts. The Department does not pay markups on these costs.

The Department does not pay for wages, travel expenses, or other costs associated with the partnering workshops and sessions, monthly partnering evaluation surveys, and training in partnering skills development.

### **Add:**

#### **5-1.015 RECORDS**

##### **5-1.015A General**

Reserved

##### **5-1.015B Record Retention**

Retain project records from bid preparation through:

1. Final payment
2. Resolution of claims, if any

For at least 3 years after the later of these, retain cost records, including records of:

1. Bid preparation
2. Overhead
3. Payrolls
4. Payments to suppliers and subcontractors
5. Cost accounting

Maintain the records in an organized way in the original format, electronic and hard copy, conducive to professional review and audit.

#### **5-1.015C Record Inspection, Copying, and Auditing**

Make your records available for inspection, copying, and auditing by State representatives for the same time frame specified under Section 5-1.015B, "Record Retention." The records of subcontractors and suppliers must be made available for inspection, copying, and auditing by State representatives for the same period. Before contract acceptance, the State representative notifies the Contractor, subcontractor, or supplier 5 business days before inspection, copying, or auditing.

If an audit is to start more than 30 days after contract acceptance, the State representative notifies the Contractor, subcontractor, or supplier when the audit is to start.

#### **5-1.015D Cost Accounting Records**

Maintain cost accounting records for the project distinguishing between the following work cost categories:

1. Contract item work
2. Work character changes
3. Force account work
4. Extra work
5. Work performed under protests and claim notifications
6. Overhead
7. Subcontractors, suppliers, owner-operators, and professional services

Cost accounting records must include:

1. Final cost code lists and definitions
2. Itemization of the materials used and corresponding vendor's invoice copies
3. Direct cost of labor
4. Equipment rental charges
5. Workers' certified payrolls
6. Equipment:
  - 6.1. Size
  - 6.2. Type
  - 6.3. Identification number
  - 6.4. Hours operated

#### **5-1.015E Extra Work Bills**

Maintain separate records for force account costs.

Submit extra work bills using the Department's Internet extra work billing system.

The Contractor submitting and the Engineer approving an extra work bill using the Internet force account work billing system is the same as each party signing the report.

The Department provides billing system:

1. Training within 30 days of your written request
2. Accounts and user identification to your assigned representatives after a representative has received training

Each representative must maintain a unique password.

**Replace Section 5-1.04 with:**

**5-1.04 CONTRACT COMPONENTS**

A component in one contract part applies as if appearing in each. The parts are complementary and describe and provide for a complete work.

If a discrepancy exists:

1. The governing ranking of contract parts in descending order is:
  - 1.1. Special provisions
  - 1.2. Project plans
  - 1.3. Revised Standard Plans
  - 1.4. Standard Plans
  - 1.5. Amendments to the Standard Specifications
  - 1.6. Standard Specifications
  - 1.7. Supplemental project information
2. Written numbers and notes on a drawing govern over graphics
3. A detail drawing governs over a general drawing
4. A detail specification governs over a general specification
5. A specification in a section governs over a specification referenced by that section

If a discrepancy is found or confusion arises, request correction or clarification.

**Add:**

**5-1.055 SUBCONTRACTING**

**5-1.055A General**

No subcontract releases you from the contract or relieves you of your responsibility for a subcontractor's work.

If you violate Pub Cont Code § 4100 et seq., the Department may exercise the remedies provided under Pub Cont Code § 4110. The Department may refer the violation to the Contractors State License Board as provided under Pub Cont Code § 4111.

Except for a building-construction non-federal-aid contract, perform work equaling at least 30 percent of the value of the original total bid with your employees and with equipment owned or rented by you, with or without operators.

Each subcontract must comply with the contract.

Each subcontractor must have an active and valid State contractor's license with a classification appropriate for the work to be performed (Bus & Prof Code, § 7000 et seq.).

Submit copies of subcontracts upon request.

Before subcontracted work starts, submit a Subcontracting Request form.

Do not use a debarred contractor; a current list of debarred contractors is available at the Department of Industrial Relations' Web site.

Upon request, immediately remove and not again use a subcontractor who fails to prosecute the work satisfactorily.

**5-1.055B Disadvantaged Business Enterprises**

Section 5-1.055B, "Disadvantaged Business Enterprises," applies to a Federal-aid contract.

Use each subcontractor as listed on the Subcontractor List form unless you receive authorization for a substitution.

The Department requests the Contractor to:

1. Notify the Engineer of any changes to its anticipated DBE participation
2. Provide this notification before starting the affected work

Maintain records including:

1. Name and business address of each 1st-tier subcontractor

2. Name and business address of each DBE subcontractor, DBE vendor, and DBE trucking company, regardless of tier
2. Date of payment and total amount paid to each business

If you are a DBE contractor, include the date of work performed by your own forces and the corresponding value of the work.

Before the 15th of each month, submit a Monthly DBE Trucking Verification form.

For a DBE that leases trucks from a non-DBE, count only the fee or commission the DBE receives as a result of the lease arrangement.

If a DBE subcontractor is decertified before completing subcontracted work, the subcontractor must notify you in writing of the decertification date. If a subcontractor becomes a certified DBE before completing subcontracted work, the subcontractor must notify you in writing of the certification date. Submit the notifications. On contract work completion, complete a Disadvantaged Business Enterprises (DBE) Certification Status Change form. Submit the form within 90 days of contract acceptance.

Upon contract work completion, complete a Final Report – Utilization of Disadvantaged Business Enterprises (DBE), First-Tier Subcontractors form. Submit it within 90 days of contract acceptance. The Department withholds \$10,000 until the form is submitted. The Department releases the withhold upon submission of the completed form.

### **5-1.055C Disabled Veteran Business Enterprises**

Section 5-1.055C, "Disabled Veteran Business Enterprises," applies to a non-Federal-aid contract.

If a DVBE goal is shown in the Notice to Bidders:

1. Use each DVBE as shown on the Certified DVBE Summary form unless you receive authorization for a substitution
2. The requirement that DVBEs be certified by the bid opening date does not apply to DVBE substitutions after contract award
3. Maintain records of subcontracts made with certified DVBEs. Include in the records:
  - 3.1. Name and business address of each business
  - 3.2. Total amount paid to each business
4. For the purpose of determining compliance with Pub Cont Code § 10115 et seq.:
  - 4.1. Provide the Department relevant information requested
  - 4.2. Upon reasonable notice and during normal business hours, permit access to its premises for the purpose of:
    - 4.2.1. Interviewing employees
    - 4.2.2. Inspecting and copying books, records, accounts and other material that may be relevant to a matter under investigation

If no DVBE goal is shown in the Notice to Bidders and if you obtain DVBE participation, submit the participating DVBE names and value of work or supplies supplied by each DVBE transaction upon contract completion.

### **5-1.055D Non-Small Businesses**

Section 5-1.055D, "Non-Small Businesses," applies to a non-Federal-aid contract.

Use each subcontractor as shown on the Certified Small Business Listing for the Non-Small Business Preference form unless you receive authorization for a substitution.

The requirement that small businesses be certified by the bid opening date does not apply to small business substitutions after contract award.

Maintain records of subcontracts made with certified small business subcontractors and records of materials purchased from certified small business suppliers. Include in the records:

1. Name and business address of each business
2. Total amount paid to each business

For the purpose of determining compliance with 2 CA Code of Regs § 1896 et seq.:

1. Provide the Department relevant information requested.
2. Upon reasonable notice and during normal business hours, permit access to its premises for the purpose of:

- 2.1. Interviewing employees
- 2.2. Inspecting and copying books, records, accounts and other material that may be relevant to a matter under investigation

**Replace Section 5-1.07 with:**

**5-1.07 LINES AND GRADES**

The Engineer places stakes and marks under Chapter 12, "Construction Surveys," of the Department's Surveys Manual. Submit your request for Department-furnished stakes:

1. On a Request for Construction Stakes form. Ensure:
  - 1.1. Requested staking area is ready for stakes
  - 1.2. You use the stakes in a reasonable time
2. A reasonable time before starting an activity using the stakes

Establish priorities for stakes and note priorities on the request.

Preserve stakes and marks placed by the Engineer. If the stakes or marks are destroyed, the Engineer replaces them at the Engineer's earliest convenience and deducts the cost.

**Replace Section 5-1.116 with:**

**5-1.116 DIFFERING SITE CONDITIONS (23 CFR 635.109)**

**5-1.116A Contractor's Notification**

Promptly notify the Engineer if you find either of the following:

1. Physical conditions differing materially from either of the following:
  - 1.1. Contract documents
  - 1.2. Job site examination
2. Physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work provided for in the contract

Include details explaining the information you relied on and the material differences you discovered.

If you fail to notify the Engineer promptly, you waive the differing site condition claim for the period between your discovery of the differing site condition and your notification to the Engineer.

If you disturb the site after discovery and before the Engineer's investigation, you waive the differing site condition claim.

**5-1.116B Engineer's Investigation and Decision**

Upon your notification, the Engineer investigates job site conditions and:

1. Notifies you whether to resume affected work
2. Decides whether the condition differs materially and is cause for an adjustment of time, payment, or both

**5-1.116C Protests**

You may protest the Engineer's decision by:

1. Submitting an Initial Notice of Potential Claim within 5 business days after receipt of the Engineer's notification
2. Complying with claim procedures

The Initial Notice of Potential Claim must detail the differences in your position from the Engineer's determination and support your position with additional information, including additional geotechnical data. Attach to the Initial Notice of Potential Claim a certification stating that you complied with Section 2-1.11, "Job Site and Document Examination."  
Promptly submit supplementary information when obtained.

**Replace Section 5-1.14 with:**

**5-1.14 COST REDUCTION INCENTIVE**

Comply with Section 4-1.035B, "Value Engineering Change Proposal."

**Add:**

**5-1.15 DISPUTE RESOLUTION**

**5-1.15A General**

Section 5-1.15, "Dispute Resolution," applies to a contract with 100 or more working days.

In the Dispute Resolution Advisor Agreement and in the Dispute Review Board Agreement, interpret a reference to the special provisions as a reference to the Amendments to the Standard Specifications. In the Dispute Review Board Agreement, replace "Proposal and Contract" with "Bid book." Where the section title does not match the section number for a reference, refer to the referenced title.

**5-1.15B Dispute Resolution Advisor**

Section 5-1.15B, "Dispute Resolution Advisor," applies to a contract from \$3 million to \$10 million.

A dispute resolution advisor, hereinafter referred to as "DRA", is chosen by the Department and the Contractor to assist in the resolution of disputes. The DRA is a part of the contract administrative claims 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. The DRA shall not serve as a substitute for filing a protest or a notice of potential claim.

The DRA shall be established by the Department and the Contractor within 30 days of contract approval.

The Department and the Contractor shall each propose 3 potential DRA candidates. Each potential candidate shall provide the Department and the Contractor with their disclosure statement. The disclosure statement shall include a resume of the potential candidate's experience and a declaration statement describing past, present, anticipated, and planned relationships with all parties involved in this contract.

The Department and the Contractor shall select one of the 6 nominees to be the DRA. If the Department and the Contractor cannot agree on one candidate, the Department and the Contractor shall each choose one of the 3 nominated by the other. The final selection of the DRA will be decided by a coin toss between the two candidates.

The Department and the Contractor shall complete and adhere to the Dispute Resolution Advisor Agreement. No DRA meeting shall take place until the Dispute Resolution Advisor Agreement has been signed by all parties, unless all parties agree to sign it at the first meeting.

If DRA needs outside technical services, technical services shall be preapproved by both the Department and the Contractor.

DRA recommendations are nonbinding.

The Contractor shall not use the DRA for disputes between subcontractors or suppliers that have no grounds for a lawsuit against the Department.

DRA replacement is selected in the same manner as the original selection. The appointment of a replacement DRA will begin promptly upon determination of the need for replacement. The Dispute Resolution Advisor Agreement shall be amended to reflect the change of the DRA.

Failure of the Contractor to participate in selecting DRA will result in the withhold of 25 percent of the estimated value of all work performed during each estimate period that the Contractor fails to comply. DRA withholds will be released for payment on the next monthly progress payment following the date that the Contractor has provided assistance in choosing the DRA and no interest will be due the Contractor.

The State and the Contractor shall bear the costs and expenses of the DRA equally.

The DRA shall be compensated at an agreed rate of \$1,500 per day for time spent per meeting either at the start of the project or for a dispute. A member serving on more than one State DRA or Dispute Review Board, regardless the number of meetings per day shall not be paid more than the agreed rate per day. The agreed rate 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 DRA is at an authorized DRA meeting.

No additional compensation will be made for time spent by the DRA to review and research activities outside the official DRA meetings unless that time, such as time spent evaluating and preparing recommendations on specific issues presented to

the DRA, 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 Department and the Contractor will be compensated at an agreed rate of \$150 per hour. The agreed amount of \$150 per hour shall include all incidentals including expenses for telephone, fax, and computer services.

The State will provide conference facilities for DRA meetings at no cost to the Contractor.

The Contractor shall make direct payments to the DRA for participation in authorized meetings and approved hourly rate charges from invoices submitted.

The State will reimburse the Contractor for the State's share of the costs.

There will be no markups applied to expenses associated with the DRA, either by the DRA or by the Contractor when requesting payment of the State's share of DRA expenses. Regardless of the DRA recommendation, neither party will be entitled to reimbursement of DRA costs from the other party.

The Contractor shall submit extra work bills and include invoices with original supporting documents for reimbursement of the State's share.

The cost of technical services will be borne equally by the State and Contractor. There will be no markups for these costs.

A copy of the "Dispute Resolution Advisor Agreement" to be executed by the Contractor, State and the DRA is as follows:

Form CEM 6206 Rev (04-06-07)

**DISPUTE RESOLUTION ADVISOR AGREEMENT**

\_\_\_\_\_  
(Contract Identification)

Contract No. \_\_\_\_\_

**THIS DISPUTE RESOLUTION ADVISOR 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 Resolution Advisor, hereinafter called the "DRA." .

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 DRA to assist in resolving disputes; and

WHEREAS, the DRA is composed of one person, chosen by the CONTRACTOR and the STATE;

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 DRA hereto agree as follows:

**SECTION I DESCRIPTION OF WORK**

To assist in the timely resolution of disputes between the parties, the contract provides for the establishment and the operation of the DRA. The DRA is to fairly and impartially consider disputes placed before it and provide recommendations for resolution of these disputes to the parties. The DRA shall provide recommendations based on the facts related to the dispute, the contract and applicable laws and regulations. The DRA shall perform the services necessary to participate in the DRA's actions as designated in Section III, Scope of Work.

**SECTION II DRA QUALIFICATIONS**

DRA shall be knowledgeable in the type of construction and contract documents anticipated by the contract and shall have completed training through the Dispute Review Board Foundation. In addition, it is desirable for the DRA to have served on several State Dispute Review Boards (DRB).

No DRA shall have prior direct involvement in this contract. No DRA shall have a financial interest in this contract or parties thereto, including but not limited to the CONTRACTOR, subcontractors, suppliers, consultants, and legal and business services, within a period 6 months prior to award and during this contract. Exceptions to above are compensation for services on this or other DRAs and DRBs or retirement payments or pensions received from a party that are not tied to, dependent on or affected by the net worth of the party.

DRA shall fully disclose all direct or indirect professional or personal relationships with all key members of the contract.

### **SECTION III SCOPE OF WORK**

The Scope of Work of the DRA includes, but is not limited to, the following:

#### **A. PROCEDURES**

The DRA shall meet with the parties at the start of the project to establish procedures 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. The DRA established procedures shall only be implemented upon approval by the parties. Subsequent meetings shall be held only to hear disputes between the parties.

The DRA shall not meet with, or discuss contract issues with individual parties.

State shall provide the DRA with the contract and all written correspondence regarding the dispute between the parties and, if available, the Contractor's supplemental notice of potential claim, and the Engineer's response to the supplemental notice of potential claim.

The parties shall not call the DRA who served on this contract as a witness in arbitration proceedings, which may arise from this contract.

The DRA shall have no claim against the STATE or the CONTRACTOR, or both, from claimed harm arising out of the parties' evaluations of the DRA's opinions.

#### **B. DISPUTE MEETING**

The term "dispute meeting" as used in this subsection shall refer to both the informal and traditional dispute meeting processes, unless otherwise noted.

If the CONTRACTOR requests a dispute meeting with the DRA, the Contractor must simultaneously notify the STATE. Upon being notified of the need for a dispute meeting, the DRA shall review and consider the dispute. The DRA shall determine the time and location of the dispute meeting with due consideration for the needs and preferences of the parties, while recognizing the importance of a speedy resolution to the dispute.

Dispute meetings shall be conducted at any location that would be convenient and provide required facilities and access to necessary documentation.

Only the STATE's Resident Engineer or Area Construction Engineer and the CONTRACTOR's or subcontractor's, if the dispute involves a subcontractor, Superintendent or Project Manager may present information at a dispute meeting. 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. The exception to this is technical services, as described below:

The DRA, with approval of the parties, 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 two parties as specified in an approved contract change order. The CONTRACTOR shall not be entitled to markups for the payments made for these services.

At the dispute meeting the DRA may ask questions, seek clarification, and request further clarification of data presented by either of the parties as may be necessary to assist in making a fully informed recommendation. However, the DRA shall refrain from expressing opinions on the merits of statements on matters under dispute during the parties' presentations. Each party will be given ample time to fully present its position, make rebuttals, provide relevant documents, and respond to DRA questions and requests.

There shall be no testimony under oath or cross-examination, during DRA dispute meetings. 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 DRA in conformance with the rules and regulations established at the first meeting between the DRA and parties. These established rules and regulations need not comply with prescribed legal laws of evidence.

Failure to attend a dispute meeting by either of the parties shall be conclusively considered by the DRA as indication that the non-attending party considers all written documents and correspondence submitted 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 at the meeting until all aspects of the dispute are thoroughly covered.

## **1. TRADITIONAL DISPUTE MEETING:**

The following procedure shall be used for the traditional dispute meeting:

- a. Within 5 days, after receiving the STATE's written response to the CONTRACTOR's supplemental notice of potential claim, the CONTRACTOR shall refer the dispute to the DRA, if the CONTRACTOR wishes to further pursue the dispute. The CONTRACTOR shall make the referral in writing to the DRA, simultaneously copied to the STATE. The written dispute referral shall describe the disputed matter in individual discrete segments, so that it will be clear to both parties and the DRA 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.
- b. The parties shall each be afforded an opportunity to be present and to be heard by the DRA, and to offer evidence. Either party furnishing written evidence or documentation to the DRA must furnish copies of such information to the other party a minimum of 10 days prior to the date the DRA is scheduled to convene the meeting for the dispute. Either party shall produce such additional evidence as the DRA 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 DRA. The DRA shall not consider evidence not furnished in conformance with the terms specified herein.
- c. Upon receipt by the DRA of a written referral of a dispute, the DRA shall convene to review and consider the dispute. The dispute meeting shall be held no later than 25 days after receipt of the written referral unless otherwise agreed to by all parties.
- d. The DRA shall furnish a written report to both parties. The DRA may request clarifying information of either party within 5 days after the DRA dispute meeting. Requested information shall be submitted to the DRA within 5 days of the DRA request. The DRA shall complete its report and submit it to the parties within 10 days of the DRA dispute meeting, except that time extensions may be granted at the request of the DRA with the written concurrence of both parties. The report shall summarize the facts considered, the contract language, law or regulation viewed by the DRA as pertinent to the dispute, and the DRA's interpretation and philosophy in arriving at its conclusions and recommendations and, if appropriate, recommends guidelines for determining compensation. The DRA's written opinion shall stand on its own, without attachments or appendices.
- e. Within 10 days after receiving the DRA's report, both parties shall respond to the DRA 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 DRA'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 DRA recommendation. Immediately after responses have been received from both parties, the DRA shall provide copies of both responses to the parties simultaneously. Either party may request clarification of elements of the DRA's report from the DRA prior to responding to the report. The DRA shall consider any clarification request only if submitted within 5 days of receipt of the DRA's report, and if submitted simultaneously in writing to both the DRA and the other party. Each party may submit only one request for clarification for any individual DRA report. The DRA shall respond, in writing, to requests for clarification within 5 days of receipt of such requests.
- f. Either party may seek a reconsideration of the DRA's recommendation. The DRA shall only grant reconsideration based upon submission of new evidence and if the request is submitted within the 10 day time limit specified for response to the DRA's written report. Each party may submit only one request for reconsideration regarding an individual DRA recommendation.
- g. If the parties are able to settle their dispute with the aid of the DRA's report, the STATE and CONTRACTOR shall promptly accept and implement the settlement of the parties. If the parties cannot agree on compensation within 30 days of the acceptance by both parties of the settlement, either party may request the DRA to make a recommendation regarding compensation.

## **2. INFORMAL DISPUTE MEETING**

An informal dispute meeting shall be convened, only if, the parties and the DRA agree that this dispute resolution process is appropriate to settle the dispute.

The following procedure shall be used for the informal dispute meeting:

- a. The parties shall furnish the DRA with one copy of pertinent documents requested by the DRA that are or may become necessary for the DRA to perform its function. The party furnishing documents shall furnish such documents to the other party at the same time the document is provided to the DRA.

- b. After the dispute meeting has concluded; the DRA shall deliberate in private the same day, until a response to the parties is reached or as otherwise agreed to by the parties.
- c. The DRA then verbally delivers its recommendation with findings to the parties.
- d. After the recommendation is presented, the parties may ask for clarifications.
- e. Occasionally the DRA on complex issues may be unable to formulate a recommendation based on the information given at a dispute meeting. However, the DRA may provide the parties with advice on strengths and weaknesses of their prospective positions, in the hope of the parties reaching settlement.
- f. If the parties are able to settle their dispute with the aid of the DRA's opinion, the STATE and CONTRACTOR shall promptly accept and implement the settlement of the parties.
- g. The DRA will not be bound by its oral recommendation in the event that a dispute is later heard by the DRA in a traditional dispute meeting.

Unless the dispute is settled, use of the informal dispute meeting does not relieve the parties of their responsibilities under Section 5-1.12, "Dispute Resolution Advisor," of the Special Provisions or Subsection, "Traditional Dispute Meeting," of this AGREEMENT. There will be no extension of time allowed for the process to permit the use of the informal dispute meeting, unless otherwise agreed to by the parties.

#### **SECTION IV TIME FOR BEGINNING AND COMPLETION**

Once established, the DRA shall be in operation until the day the Director accepts the contract. The DRA shall not begin work under the terms of this AGREEMENT until authorized in writing by the STATE or as agreed to by the parties.

#### **SECTION V PAYMENT**

DRA shall be compensated at an agreed rate of \$1,500 per day for time spent per meeting, either at the start of the project or for a dispute. A member serving on more than one State DRA or DRB, regardless the number of meetings per day, shall not be paid more than the agreed rate per day. The agreed rate shall be considered full compensation for onsite time, travel expenses, transportation, lodging, time for travel and incidentals for each day, or portion thereof that the DRA is at an authorized DRA meeting. No additional compensation will be made for time spent by DRA to review and research activities outside the official DRA meetings unless that time, (such as time spent evaluating and preparing recommendations on specific issues presented to the DRA), has been specifically agreed to in advance by the parties. Time away from the project, which has been specifically agreed to in advance by the parties, will be compensated at an agreed rate of \$150 per hour. The agreed amount of \$150 per hour shall include all incidentals including expenses for telephone, fax, and computer services. The State will provide administrative services such as conference facilities to the DRA.

##### **A. PAYMENT PROCESSING**

CONTRACTOR shall make direct payments to DRA for their participation in authorized meetings and approved hourly rate charges, from invoices submitted by the DRA, and technical services.

DRA 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 DRA until the amount and extent of those fees are approved by the STATE and CONTRACTOR.

##### **B. INSPECTION OF COSTS RECORDS**

DRA 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 VI ASSIGNMENT OF TASKS OF WORK**

DRA shall not assign the work of this AGREEMENT.

#### **SECTION VII TERMINATION OF A DRA MEMBER**

DRA may resign after providing not less than 15 days written notice of the resignation to the STATE and CONTRACTOR. The DRA may be terminated, by either party, for failing to fully comply at all times with all required

employment or financial disclosure conditions of DRA membership in conformance with the terms of the contract and this AGREEMENT. Each party shall document the need for replacement and substantiate the replacement request in writing to the other party and the DRA.

#### **SECTION VIII LEGAL RELATIONS**

The parties hereto mutually understand and agree that the DRA in the performance of duties 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 DRA 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 DRA.

#### **SECTION IX CONFIDENTIALITY**

The parties hereto mutually understand and agree that all documents and records provided by the parties in reference to issues brought before the DRA, which documents and records are marked "Confidential - for use by the DRA only," shall be kept in confidence and used only for the purpose of resolution of subject disputes, and for assisting in development of DRA 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 this AGREEMENT. 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 DRA. However, the parties understand that such documents may be subsequently discoverable and admissible in court or arbitration proceedings unless a protective order has been obtained by the party seeking further confidentiality.

#### **SECTION X DISPUTES**

Disputes between the parties arising out of the work or other terms of this AGREEMENT that 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. Disputes between the DRA and the parties that cannot be resolved by negotiation and mutual concurrence shall be resolved in the appropriate forum.

#### **SECTION XI VENUE, APPLICABLE LAW, AND PERSONAL JURISDICTION**

In the event that any party, including the DRA, 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 XII FEDERAL REVIEW AND REQUIREMENTS**

On Federal-Aid contracts, the Federal Highway Administration shall have the right to review the work of the DRA in progress, except for private meetings or deliberations of the DRA.

Other Federal requirements in this agreement shall only apply to Federal-Aid contracts.

**SECTION XIII CERTIFICATION OF CONTRACTOR, DRA, AND STATE**

IN WITNESS WHEREOF, the parties hereto have executed this AGREEMENT as of the day and year first above written.

DRA

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

Title: \_\_\_\_\_

CONTRACTOR

CALIFORNIA STATE DEPARTMENT  
OF TRANSPORTATION

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

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

Title: \_\_\_\_\_

Title: \_\_\_\_\_

**5-1.15C Dispute Review Board**

Section 5-1.15C, "Dispute Review Board," applies to a contract over \$10 million.

**5-1.15C(1) 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.

**5-1.15C(2) 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 breach 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 3 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.

### **5-1.15C(3) 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.

### **5-1.15C(4) 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 2 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.

### **5-1.15C(5) 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.

**5-1.15C(6) 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.

**5-1.15C(7) 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:

**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

DRB MEMBER

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

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

Title: \_\_\_\_\_

Title : \_\_\_\_\_

DRB MEMBER

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

Title : \_\_\_\_\_

CONTRACTOR

CALIFORNIA STATE DEPARTMENT  
OF TRANSPORTATION

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

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

Title: \_\_\_\_\_

Title: \_\_\_\_\_

**Add:**

**5-1.16-5-17 (BLANK)**

**Add:**

**5-1.18 PROPERTY AND FACILITY PRESERVATION**

**5-1.18A General**

Preserve property and facilities, including:

1. Adjacent property
2. Department's instrumentation
3. ESAs
4. Lands administered by other agencies
5. Railroads and railroad equipment
6. Roadside vegetation not to be removed
7. Utilities
8. Waterways

Immediately report damage to the Engineer.

If you cause damage, you are responsible.

Install sheet piling, cribbing, bulkheads, shores, or other supports necessary to support existing facilities or support material carrying the facilities.

Dispose of temporary facilities when they are no longer needed.

If you damage plants not to be removed:

1. Dispose of them outside the right of way unless the Engineer allows you to reduce them to chips and spread the chips within the highway at locations designated by the Engineer
2. Replace them

Replace plants with plants of the same species.

Replace trees with 24-inch-box trees.



**Replace Section 6-1.05 with:**

**6-1.05 SPECIFIC BRAND OR TRADE NAME AND SUBSTITUTION**

A reference to a specific brand or trade name establishes a quality standard and is not intended to limit competition. You may use a product that is equal to or better than the specified brand or trade name if approved.

Submit a substitution request within a time period that:

1. Follows Contract award
2. Allows 30 days for review
3. Causes no delay

Include substantiating data with the substitution request that proves the substitution:

1. Is of equal or better quality and suitability
2. Causes no delay in product delivery and installation

**Add:**

**6-1.075 GUARANTEE**

Guarantee the work remains free from substantial defects for 1 year after contract acceptance except for work parts for which you were relieved of maintenance and protection. Guarantee each of these relieved work parts for 1 year after the relief date.

The guarantee excludes damage or displacement caused by an event outside your control including:

1. Normal wear and tear
2. Improper operation
3. Insufficient maintenance
4. Abuse
5. Unauthorized change
6. Act of God

During the guarantee period, repair or replace each work portion having a substantial defect.

The Department does not pay for corrective work.

During corrective work activities, provide insurance coverage specified for coverage before contract acceptance.

The contract bonds must be in full force and effect until the later of:

1. Expiration of guarantee period
2. Completion of corrective work

If a warranty specification conflicts with Section 6-1.075, "Guarantee," comply with the warranty specification.

During the guarantee period, the Engineer monitors the completed work. If the Engineer finds work having a substantial defect, the Engineer lists work parts and furnishes you the list.

Within 10 days of receipt of the list, submit for authorization a detailed plan for correcting the work. Include a schedule that includes:

1. Start and completion dates
2. List of labor, equipment, materials, and any special services you plan to use
3. Work related to the corrective work, including traffic control and temporary and permanent pavement markings

The Engineer notifies you when the plan is authorized. Start corrective work and related work within 15 days of notice.

If the Engineer determines corrective work is urgently required to prevent injury or property damage:

1. The Engineer furnishes you a request to start emergency repair work and a list of parts requiring corrective work
2. Mobilize within 24 hours and start work
3. Submit a corrective work plan within 5 days of starting emergency repair work

If you fail to perform work as specified, the Department may perform the work and bill you.

**Add:**

**6-1.085 BUY AMERICA (23 CFR 635.410)**

For a Federal-aid contract, furnish steel and iron materials to be incorporated into the work that are produced in the United States except:

1. Foreign pig iron and processed, pelletized, and reduced iron ore may be used in the domestic production of the steel and iron materials [60 Fed Reg 15478 (03/24/1995)]
2. If the total combined cost of the materials does not exceed the greater of 0.1 percent of the total bid or \$2,500, material produced outside the United States may be used

Production includes:

1. Processing steel and iron materials, including smelting or other processes that alter the physical form or shape (such as rolling, extruding, machining, bending, grinding, and drilling) or chemical composition
2. Coating application, including epoxy coating, galvanizing, and painting, that protects or enhances the value of steel and iron materials

For steel and iron materials to be incorporated into the work, submit a Certificate of Compliance under Section 6-1.07, "Certificates of Compliance," of the Standard Specifications that certifies all production processes occurred in the United States except for the above exceptions.

**Add:**

**6-1.087 BUY AMERICA (PUB RES CODE § 42703(d))**

Furnish crumb rubber to be incorporated into the work that is produced in the United States and is derived from waste tires taken from vehicles owned and operated in the United States.

For crumb rubber to be incorporated into the work, submit a Certificate of Compliance under Section 6-1.07, "Certificates of Compliance," of the Standard Specifications that certifies only crumb rubber manufactured in the United States and derived from waste tires taken from vehicles owned and operated in the United States is used.

**In Section 6-2.01 delete the 4th paragraph.**

**In Section 6-2.01 replace the 7th paragraph with:**

Upon the Contractor's written request, the Department tests materials from an untested local source. If satisfactory material from that source is used in the work, the Department does not charge the Contractor for the tests; otherwise, the Department deducts the test cost.

**In Section 6-2.01 delete the 8th paragraph.**

**In Section 6-2.02 delete the 3rd paragraph.**

**In Section 6-2.02 in the 7th paragraph, replace the 2nd sentence with:**

The Department deducts the charges for the removed material.

**In Section 6-3.01 delete the 4th paragraph.**



**In Section 7-1.01A(3) replace the 2nd paragraph with:**

The Department withholds the penalties specified in subdivision (g) of Labor Code § 1776 for noncompliance with the requirements in Section 1776.

**In Section 7-1.01A(3) replace the 4th paragraph with:**

The Department withholds for delinquent or inadequate payroll records (Labor Code § 1771.5). If the Contractor has not submitted an adequate payroll record by the month's 15th day for the period ending on or before the 1st of that month, the Department withholds 10 percent of the monthly progress estimate, exclusive of mobilization. The Department does not withhold more than \$10,000 or less than \$1,000.

**In Section 7-1.01A(3) delete the 5th paragraph.**

**Replace Section 7-1.01A(6) with:**

**7-1.01A(6) (Blank)**

**Add:**

**7-1.01A(8) Lead Compliance Plan**

Section 7-1.01A(8) applies if a bid item for a lead compliance plan is included in the Contract.

Prepare a work plan to prevent or minimize worker exposure to lead while managing and handling earth materials, paint system debris, traffic stripe residue, and pavement marking residue containing lead. Regulations containing specific Cal/OSHA requirements when working with lead include 8 CA Code of Regs § 1532.1.

The plan must contain the items listed in 8 CA Code of Regs § 1532.1(e)(2)(B). Before submittal, a CIH must sign and seal the plan. Submit the plan at least 7 days before starting any activity that presents the potential for lead exposure. The Engineer notifies you of the acceptability of the plan within 4 business days of receipt.

Before starting any activity that presents the potential for lead exposure to employees who have no prior training, including State employees, provide a safety training program to these employees that complies with 8 CA Code of Regs § 1532.1 and your lead compliance program.

Submit copies of air monitoring or job site inspection reports made by or under the direction of the CIH under 8 CA Code of Regs § 1532.1 within 10 days after the date of monitoring or inspection.

Supply personal protective equipment, training, and washing facilities required by your lead compliance plan for 5 State employees.

**Replace Section 7-1.01F with:**

**7-1.01F (Blank)**

**Replace Section 7-1.01I with:**

**7-1.01I (Blank)**

**In Section 7-1.02 in the 2nd paragraph, replace the 4th sentence with:**

Trucks used to haul treated base, portland cement concrete, or hot mix asphalt shall enter onto the base to dump at the nearest practical entry point ahead of spreading equipment.

**In Section 7-1.02 between the 4th and 5th paragraphs, add:**

Loads imposed on existing, new, or partially completed structures shall not exceed the load carrying capacity of the structure or any portion of the structure as determined by AASHTO LRFD with interims and California Amendments, Design

Strength Limit State II. The compressive strength of concrete ( $f_c$ ) to be used in computing the load carrying capacity shall be the smaller of the following:

1. Actual compressive strength at the time of loading
2. Value of  $f_c$  shown on the plans for that portion of the structure or 2.5 times the value of  $f_c$  (extreme fiber compressive stress in concrete at service loads) shown on the plans for portions of the structure where no  $f_c$  is shown

**In Section 7-1.06 in the 1st paragraph, add:**

The Contractor's Injury and Illness Prevention Program shall be submitted to the Engineer. The program shall address the use of personal and company issued electronic devices during work. The use of entertainment and personal communication devices in the work zone shall not be allowed. Workers may use a communication device for business purposes in the work area, at a location where their safety and the safety of other workers and the traveling public is not compromised.

**Replace Section 7-1.08 with:**

**7-1.08 PUBLIC CONVENIENCE**

Compliance with the provisions of this section does not relieve you of your responsibility for public safety.

Construction activities must not inconvenience the public or abutting property owners. Schedule and conduct work to avoid unnecessary inconvenience to the public and abutting property owners. Avoid undue delay in construction activities to reduce the public's exposure to construction.

Where possible, route traffic on new or existing paved surfaces.

Maintain convenient access to driveways, houses, and buildings. When the abutting property owner's access across the right of way line is to be eliminated or replaced under the contract, the existing access must not be closed until the replacement access facilities are usable. Construct temporary approaches to crossings and intersecting highways.

Provide a reasonably smooth and even surface for use by traffic at all time during excavation of roadways and construction of embankments. Before other grading activities, place fill at culverts and bridges to allow traffic to cross. If ordered, excavate roadway cuts in layers and construct embankments in partial widths at a time alternating construction from one side to the other and routing traffic over the side opposite the one under construction. Install or construct culverts on only 1/2 the width of the traveled way at a time; keep the traveled way portion being used by traffic open and unobstructed until the opposite side of the traveled way is ready for use by traffic.

Upon completion of rough grading or placing any subsequent layer, bring the surface of the roadbed to a smooth and even condition, free of humps and depressions and satisfactory for the use of the public.

After subgrade preparation for a specified layer of material has been completed, repair any damage to the roadbed or completed subgrade, including damage due to use by the public.

While subgrade and paving activities are underway, allow the public to use the shoulders. If half-width paving methods are used, allow the public to use the side of the roadbed opposite the one under construction. If enough width is available, keep open a passageway wide enough to accommodate at least 2 lanes of traffic at locations where subgrade and paving activities are underway. Shape shoulders or reshape subgrade as necessary to accommodate traffic during subgrade preparation and paving activities.

Apply water or dust palliative for the prevention or alleviation of dust nuisance.

Install signs, lights, flares, temporary railing (Type K), barricades and other facilities to direct traffic. Furnish flaggers whenever necessary to direct the movement of the public through or around the work.

You will be required to pay the cost of replacing or repairing all facilities installed under extra work for the convenience or direction or warning of the public which are lost while in your custody, or are damaged by your operations to such an extent as to require replacement or repair.

The Engineer may order or consent to your request to open a completed section of surfacing, pavement, or structure roadway surface for public use. You will not be compensated for any delay to your construction activities caused by the public. This does not relieve you from any other contractual responsibility.

**Replace Section 7-1.09 with:**

**7-1.09 PUBLIC SAFETY**

You are responsible to provide for public safety.

Do not construct a temporary facility that interferes with the safe passage of traffic.

Control dust resulting from the work, inside and outside the right-of-way.

Move workers, equipment, and materials without endangering traffic.

Whenever your operations create a condition hazardous to the public, furnish, erect and maintain those fences, temporary railing, barricades, lights, signs, and other devices and take any other necessary protective measures to prevent damage or injury to the public.

Any fences, temporary railing, barricades, lights, signs, or other devices furnished, erected and maintained by you are in addition to those for which payment is provided elsewhere in the specifications.

Provide flaggers whenever necessary to ensure that the public is given safe guidance through the work zone. Except as ordered, at locations where traffic is being routed through construction under one-way controls, move your equipment in compliance with the one-way controls.

Use of signs, lights, flags, or other protective devices must conform with the California MUTCD and as ordered. Signs, lights, flags or other protective devices must 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 or traffic control devices.

Keep existing traffic signals and highway lighting in operation. Other entities perform routine maintenance of these facilities during the work.

Cover signs that direct traffic to a closed area. Providing, maintaining, and removing the covers on construction area signs is paid as extra work under Section 4-1.03, "Extra Work."

Install temporary illumination in a manner which the illumination and the illumination equipment does not interfere with public safety. The installation of general roadway illumination does not relieve you from furnishing and maintaining any protective devices.

Equipment must enter and leave the highway via existing ramps and crossovers and must move in the direction of public traffic. All movements of workmen and construction equipment on or across lanes open to public traffic must be performed in a manner that will not endanger the public. Your vehicles or other mobile equipment leaving an open traffic lane to enter the construction area, must slow down gradually in advance of the location of the turnoff to give traffic following an opportunity to slow down. When leaving a work area and entering a roadway carrying public traffic, your vehicles and equipment must yield to public traffic.

Immediately remove hauling spillage from roadway lanes or shoulders open to traffic. When hauling on roadways, trim loads and remove material from shelf areas to minimize spillage.

Notify the Engineer not less than 20 days and not more than 90 days before the anticipated start of an activity that will change the vertical or horizontal clearance available to public traffic, including shoulders.

If vertical clearance is temporarily reduced to 15.5 feet or less, place low clearance warning signs in accordance with the California MUTCD and as ordered. Signs must comply with the dimensions, color, and legend requirements of the California MUTCD and these specifications except that the signs must have black letters and numbers on an orange retroreflective background. W12-2P signs must be illuminated so that the signs are clearly visible.

Pave or provide full width continuous and cleared wood walks for pedestrian openings through falsework. Protect pedestrians from falling objects and curing water for concrete. Extend overhead protection for pedestrians not less than 4 feet beyond the edge of the bridge deck. Illuminate all pedestrian openings through falsework. Temporary pedestrian facilities must comply with the American with Disabilities Act of 1990 (ADA).

Do not store vehicles, material, or equipment in a way that:

1. Creates a hazard to the public
2. Obstructs traffic control devices

Do not install or place temporary facilities used to perform the work which interfere with the free and safe passage of public traffic.

If you appear to be neglectful or negligent in furnishing warning devices and taking protective measures, the Engineer may direct your attention to the existence of a hazard and the necessary warning devices must be furnished and installed and protective measures taken by you. If the Engineer points out the inadequacy of warning devices and protective measures, that action on the part of the Engineer does not relieve you from your responsibility for public safety or abrogate the obligation to furnish and pay for these devices and measures.

Install temporary railing (Type K) or other approved protection system under the following conditions:

1. Excavations: Where the near edge of the excavation is within 15 feet from the edge of an open traffic lane
2. Temporarily Unprotected Permanent Obstacles: When the work includes the installation of a fixed obstacle together with a protective system, such as a sign structure together with protective railing, and you elect to install the obstacle before installing the protective system; or you, for your convenience and as authorized, remove a portion of an existing protective railing at an obstacle and do not replace such railing completely the same day

3. Storage Areas: When material or equipment is stored within 15 feet of the edge of an open traffic lane and the storage is not otherwise prohibited by the provisions of these Standard Specifications and the special provisions
4. Height Differentials: When construction operations create a height differential greater than 0.15 feet within 15 feet of the edge of traffic lane

Temporary railing (Type K) does not need to be installed where excavations within 15 feet from edge of an open traffic lane are:

1. Covered with steel plates or concrete covers of adequate thickness to prevent accidental entry by traffic or the public
2. In side slopes, where the downhill slope is 4:1 (horizontal:vertical) or less unless a naturally occurring condition
3. Protected by existing barrier or railing

Offset the approach end of temporary railing (Type K) a minimum of 15 feet from the edge of an open traffic lane. Install the temporary railing on a skew toward the edge of the traffic lane of not more than one foot transversely to 10 feet longitudinally with respect to the edge of the traffic lane. If the 15-foot minimum offset cannot be achieved, the temporary railing must 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 must be installed at the approach end of the temporary railing.

Secure in place temporary railing (Type K) before starting work for which the temporary railing is required.

Where 2 or more lanes in the same direction are adjacent to the area where the work is being performed, including shoulders, and unless a barrier is present, the adjacent lane must be closed under any of the following conditions:

1. Work is within 6 feet of the edge of traveled way and approach speed is greater than 45 miles per hour
2. Work is within 3 feet of the edge of traveled way and approach speed is less than 45 mile per hour

Do not reduce an open traffic lane width to less than 10 feet. When traffic cones or delineators are used for temporary edge delineation, the line of cones or delineators is considered the edge of the traveled way.

If a traffic lane is closed with channelizers for excavation work, move the devices to the adjacent edge of the traveled way when not excavating. Space the devices the same as specified for the lane closure.

Do not move or temporarily suspend anything over a traffic lane open to the public unless the public is protected.

**Replace Section 7-1.11 with:**

**7-1.11 PRESERVATION OF PROPERTY**

Comply with Section 5-1.18, "Property and Facility Preservation."

**Replace Section 7-1.12 with:**

**7-1.12 INDEMNIFICATION AND INSURANCE**

The Contractor's obligations regarding indemnification of the State of California and the requirements for insurance shall conform to the provisions in Section 3-1.05, "Insurance Policies," and Sections 7-1.12A, "Indemnification," and 7-1.12B, "Insurance," of this Section 7-1.12.

**7-1.12A Indemnification**

The Contractor shall defend, indemnify, and save harmless the State, including its officers, employees, and agents (excluding agents who are design professionals) from any and all claims, demands, causes of action, damages, costs, expenses, actual attorneys' fees, losses or liabilities, in law or in equity (Section 7-1.12A Claims) arising out of or in connection with the Contractor's performance of this contract for:

1. Bodily injury including, but not limited to, bodily injury, sickness or disease, emotional injury or death to persons, including, but not limited to, the public, any employees or agents of the Contractor, the State, or any other contractor; and
2. Damage to property of anyone including loss of use thereof; caused or alleged to be caused in whole or in part by any negligent or otherwise legally actionable act or omission of the Contractor or anyone directly or indirectly employed by the Contractor or anyone for whose acts the Contractor may be liable.

Except as otherwise provided by law, these requirements apply regardless of the existence or degree of fault of the State. The Contractor is not obligated to indemnify the State for Claims arising from conduct delineated in Civil Code Section 2782 and to Claims arising from any defective or substandard condition of the highway that existed at or before the start of work, unless this condition has been changed by the work or the scope of the work requires the Contractor to maintain existing highway facilities and the Claim arises from the Contractor's failure to maintain. The Contractor's defense and indemnity obligation shall extend to Claims arising after the work is completed and accepted if the Claims are directly related to alleged acts or omissions by the Contractor that occurred during the course of the work. State inspection is not a waiver of full compliance with these requirements.

The Contractor's obligation to defend and indemnify shall not be excused because of the Contractor's inability to evaluate liability or because the Contractor evaluates liability and determine that the Contractor is not liable. The Contractor shall respond within 30 days to the tender of any Claim for defense and indemnity by the State, unless this time has been extended by the State. If the Contractor fails to accept or reject a tender of defense and indemnity within 30 days, in addition to any other remedy authorized by law, the Department may withhold such funds the State reasonably considers necessary for its defense and indemnity until disposition has been made of the Claim or until the Contractor accepts or rejects the tender of defense, whichever occurs first.

With respect to third-party claims against the Contractor, the Contractor waives all rights of any type to express or implied indemnity against the State, its officers, employees, or agents (excluding agents who are design professionals).

Nothing in the Contract is intended to establish a standard of care owed to any member of the public or to extend to the public the status of a third-party beneficiary for any of these indemnification specifications.

### **7-1.12B Insurance**

#### **7-1.12B(1) General**

Nothing in the contract is intended to establish a standard of care owed to any member of the public or to extend to the public the status of a third-party beneficiary for any of these insurance specifications.

#### **7-1.12B(2) Casualty Insurance**

The Contractor shall procure and maintain insurance on all of its operations with companies acceptable to the State as follows:

1. The Contractor shall keep all insurance in full force and effect from the beginning of the work through contract acceptance.
2. All insurance shall be with an insurance company with a rating from A.M. Best Financial Strength Rating of A- or better and a Financial Size Category of VII or better.
3. The Contractor shall maintain completed operations coverage with a carrier acceptable to the State through the expiration of the patent deficiency in construction statute of repose set forth in Code of Civil Procedure Section 337.1.

#### **7-1.12B(3) Workers' Compensation and Employer's Liability Insurance**

In accordance with Labor Code Section 1860, the Contractor shall secure the payment of worker's compensation in accordance with Labor Code Section 3700.

In accordance with Labor Code Section 1861, the Contractor shall submit to the Department the following certification before performing the work:

I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.

Contract execution constitutes certification submittal.

The Contractor shall provide Employer's Liability Insurance in amounts not less than:

1. \$1,000,000 for each accident for bodily injury by accident
2. \$1,000,000 policy limit for bodily injury by disease
3. \$1,000,000 for each employee for bodily injury by disease

If there is an exposure of injury to the Contractor's employees under the U.S. Longshoremen's and Harbor Workers' Compensation Act, the Jones Act, or under laws, regulations, or statutes applicable to maritime employees, coverage shall be included for such injuries or claims.

**7-1.12B(4) Liability Insurance**

**7-1.12B(4)(a) General**

The Contractor shall carry General Liability and Umbrella or Excess Liability Insurance covering all operations by or on behalf of the Contractor providing insurance for bodily injury liability and property damage liability for the following limits and including coverage for:

1. Premises, operations, and mobile equipment
2. Products and completed operations
3. Broad form property damage (including completed operations)
4. Explosion, collapse, and underground hazards
5. Personal injury
6. Contractual liability

**7-1.12B(4)(b) Liability Limits/Additional Insureds**

The limits of liability shall be at least the amounts shown in the following table:

| Total Bid   | For Each Occurrence <sup>1</sup> | Aggregate for Products/Completed Operation | General Aggregate <sup>2</sup> | Umbrella or Excess Liability <sup>3</sup> |
|---|----------------------------------|--|--------------------------------|---|
| ≤\$1,000,000  | \$1,000,000                      | \$2,000,000                                | \$2,000,000                    | \$5,000,000                               |
| >\$1,000,000<br>≤\$5,000,000  | \$1,000,000                      | \$2,000,000                                | \$2,000,000                    | \$10,000,000                              |
| >\$5,000,000<br>≤\$25,000,000   | \$2,000,000                      | \$2,000,000                                | \$4,000,000                    | \$15,000,000                              |
| >\$25,000,000   | \$2,000,000                      | \$2,000,000                                | \$4,000,000                    | \$25,000,000                              |
| <ol style="list-style-type: none"> <li>1. Combined single limit for bodily injury and property damage.</li> <li>2. This limit shall apply separately to the Contractor's work under this contract.</li> <li>3. The umbrella or excess policy shall contain a clause stating that it takes effect (drops down) in the event the primary limits are impaired or exhausted.</li> </ol> |                                  |  |                                |   |

The Contractor shall not require certified Small Business subcontractors to carry Liability Insurance that exceeds the limits in the table above. Notwithstanding the limits specified herein, at the option of the Contractor, the liability insurance limits for certified Small Business subcontractors of any tier may be less than those limits specified in the table. For Small Business subcontracts, "Total Bid" shall be interpreted as the amount of subcontracted work to a certified Small Business.

The State, including its officers, directors, agents (excluding agents who are design professionals), and employees, shall be named as additional insureds under the General Liability and Umbrella Liability Policies with respect to liability arising out of or connected with work or operations performed by or on behalf of the Contractor under this contract. Coverage for such additional insureds does not extend to liability:

1. Arising from any defective or substandard condition of the roadway which existed at or before the time the Contractor started work, unless such condition has been changed by the work or the scope of the work requires the Contractor to maintain existing roadway facilities and the claim arises from the Contractor's failure to maintain;
2. For claims occurring after the work is completed and accepted unless these claims are directly related to alleged acts or omissions of the Contractor that occurred during the course of the work; or
3. To the extent prohibited by Insurance Code Section 11580.04

Additional insured coverage shall be provided by a policy provision or by an endorsement providing coverage at least as broad as Additional Insured (Form B) endorsement form CG 2010, as published by the Insurance Services Office (ISO), or other form designated by the Department.

**7-1.12B(4)(c) Contractor's Insurance Policy is Primary**

The policy shall stipulate that the insurance afforded the additional insureds applies as primary insurance. Any other insurance or self-insurance maintained by the State is excess only and shall not be called upon to contribute with this insurance.

#### **7-1.12B(5) Automobile Liability Insurance**

The Contractor shall carry automobile liability insurance, including coverage for all owned, hired, and nonowned automobiles. The primary limits of liability shall be not less than \$1,000,000 combined single limit each accident for bodily injury and property damage. The umbrella or excess liability coverage required under Section 7-1.12B(4)(b) also applies to automobile liability.

#### **7-1.12B(6) Policy Forms, Endorsements, and Certificates**

The Contractor shall provide its General Liability Insurance under Commercial General Liability policy form No. CG0001 as published by the Insurance Services Office (ISO) or under a policy form at least as broad as policy form No. CG0001.

#### **7-1.12B(7) Deductibles**

The State may expressly allow deductible clauses, which it does not consider excessive, overly broad, or harmful to the interests of the State. Regardless of the allowance of exclusions or deductions by the State, the Contractor is responsible for any deductible amount and shall warrant that the coverage provided to the State is in accordance with Section 7-1.12B, "Insurance."

#### **7-1.12B(8) Enforcement**

The Department may assure the Contractor's compliance with its insurance obligations. Ten days before an insurance policy lapses or is canceled during the contract period, the Contractor shall submit to the Department evidence of renewal or replacement of the policy.

If the Contractor fails to maintain any required insurance coverage, the Department may maintain this coverage and withhold or charge the expense to the Contractor or terminate the Contractor's control of the work in accordance with Section 8-1.08, "Termination of Control."

The Contractor is not relieved of its duties and responsibilities to indemnify, defend, and hold harmless the State, its officers, agents, and employees by the Department's acceptance of insurance policies and certificates.

Minimum insurance coverage amounts do not relieve the Contractor for liability in excess of such coverage, nor do they preclude the State from taking other actions available to it, including the withholding of funds under this contract.

#### **7-1.12B(9) Self-Insurance**

Self-insurance programs and self-insured retentions in insurance policies are subject to separate annual review and approval by the State.

If the Contractor uses a self-insurance program or self-insured retention, the Contractor shall provide the State with the same protection from liability and defense of suits as would be afforded by first-dollar insurance. Execution of the contract is the Contractor's acknowledgement that the Contractor will be bound by all laws as if the Contractor were an insurer as defined under Insurance Code Section 23 and that the self-insurance program or self-insured retention shall operate as insurance as defined under Insurance Code Section 22.

**In Section 7-1.13 delete the 5th and 6th paragraphs.**

**Add:**

#### **7-1.50 FEDERAL LAWS FOR FEDERAL-AID CONTRACTS**

##### **7-1.50A General**

Section 7-1.50, "Federal Laws for Federal-Aid Contracts," includes specifications required in a Federal-aid construction contract and applies to a Federal-aid contract.

Form FHWA-1273 is included in the contract in Section 7-1.50B, "FHWA-1273." Some contract terms on the form are different than those used in other contract parts as shown in the following table:

### FHWA-1273 Terms and Department Equivalencies

| FHWA-1273 Term          | Equivalent Term Used in Other Contract Parts |
|-------------------------|--|
| SHA                     | Department                                   |
| SHA contracting officer | Engineer                                     |
| SHA resident engineer   | Engineer                                     |

#### 7-1.50B FHWA-1273

FHWA-1273 Electronic version -- March 10, 1994  
with revised Section VI

#### REQUIRED CONTRACT PROVISIONS FEDERAL-AID CONSTRUCTION CONTRACTS

- I. General
- II. Nondiscrimination
- III. Nonsegregated Facilities
- IV. Payment of Predetermined Minimum Wage
- V. Statements and Payrolls
- VI. Record of Materials, Supplies, and Labor
- VII. Subletting or Assigning the Contract
- VIII. Safety: Accident Prevention
- IX. False Statements Concerning Highway Projects
- X. Implementation of Clean Air Act and Federal Water Pollution Control Act
- XI. Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion
- XII. Certification Regarding Use of Contract Funds for Lobbying

#### ATTACHMENTS

- A. Employment Preference for Appalachian Contracts (included in Appalachian contracts only)

#### 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 specifications, 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, timeclocks, 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 of the types described in Section 1(b)(2)(B) of the Davis Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. 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 than the applicable wage rate and fringe benefits or cash equivalent for the classification of work 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**

(As of May 22, 2007, Form FHWA-47 is no longer required.)

## **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 of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined not more than \$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.

\* \* \* \* \*

### **Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Primary Covered Transactions**

1. The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:
  - a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

- b. 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;
  - c. 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
  - d. 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.
2. 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.

\* \* \* \* \*

**2. 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.

\* \* \* \* \*

**Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Covered Transactions:**

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.
2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

\* \* \* \* \*

**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.

**7-1.50C Female and Minority Goals**

To comply with Section II, "Nondiscrimination," of "Required Contract Provisions Federal-Aid Construction Contracts," the Department is including in Section 7-1.50C, "Female and Minority Goals," female and minority utilization goals for Federal-aid construction contracts and subcontracts that exceed \$10,000.

The nationwide goal for female utilization is 6.9 percent.

The goals for minority utilization [45 Fed Reg 65984 (10/3/1980)] are as follows:

**Minority Utilization Goals**

| Economic Area |  | Goal<br>(Percent)                                   |
|---------------|--|---|
| 174           | Redding CA:<br>Non-SMSA Counties:<br>CA Lassen; CA Modoc; CA Plumas; CA Shasta; CA Siskiyou; CA Tehama   | 6.8   |
| 175           | Eureka, CA<br>Non-SMSA Counties:<br>CA Del Norte; CA Humboldt; CA Trinity  | 6.6   |
| 176           | San Francisco-Oakland-San Jose, CA:<br>SMSA Counties:<br>7120 Salinas-Seaside-Monterey, CA<br>CA Monterey<br>7360 San Francisco-Oakland<br>CA Alameda; CA Contra Costa; CA Marin; CA San Francisco; CA San Mateo<br>7400 San Jose, CA<br>CA Santa Clara, CA<br>7485 Santa Cruz, CA<br>CA Santa Cruz<br>7500 Santa Rosa<br>CA Sonoma<br>8720 Vallejo-Fairfield-Napa, CA<br>CA Napa; CA Solano<br>Non-SMSA Counties:<br>CA Lake; CA Mendocino; CA San Benito | 28.9<br>25.6<br>19.6<br>14.9<br>9.1<br>17.1<br>23.2 |
| 177           | Sacramento, CA:<br>SMSA Counties:<br>6920 Sacramento, CA<br>CA Placer; CA Sacramento; CA Yolo<br>Non-SMSA Counties<br>CA Butte; CA Colusa; CA El Dorado; CA Glenn; CA Nevada; CA Sierra; CA Sutter; CA Yuba  | 16.1<br>14.3  |
| 178           | Stockton-Modesto, CA:<br>SMSA Counties:<br>5170 Modesto, CA<br>CA Stanislaus<br>8120 Stockton, CA<br>CA San Joaquin<br>Non-SMSA Counties<br>CA Alpine; CA Amador; CA Calaveras; CA Mariposa; CA Merced; CA Toulumne  | 12.3<br>24.3<br>19.8                                |
| 179           | Fresno-Bakersfield, CA<br>SMSA Counties:<br>0680 Bakersfield, CA<br>CA Kern<br>2840 Fresno, CA<br>CA Fresno<br>Non-SMSA Counties:<br>CA Kings; CA Madera; CA Tulare  | 19.1<br>26.1<br>23.6                                |
| 180           | Los Angeles, CA:<br>SMSA Counties:<br>0360 Anaheim-Santa Ana-Garden Grove, CA<br>CA Orange<br>4480 Los Angeles-Long Beach, CA<br>CA Los Angeles<br>6000 Oxnard-Simi Valley-Ventura, CA<br>CA Ventura   | 11.9<br>28.3<br>21.5                                |

|     |  |      |
|-----|--|------|
|     | 6780 Riverside-San Bernardino-Ontario, CA<br>CA Riverside; CA San Bernardino | 19.0 |
|     | 7480 Santa Barbara-Santa Maria-Lompoc, CA<br>CA Santa Barbara                | 19.7 |
|     | Non-SMSA Counties<br>CA Inyo; CA Mono; CA San Luis Obispo                    | 24.6 |
| 181 | San Diego, CA:<br>SMSA Counties<br>7320 San Diego, CA<br>CA San Diego        | 16.9 |
|     | Non-SMSA Counties<br>CA Imperial   | 18.2 |

For each July during which work is performed under the contract, you and each non-material-supplier subcontractor with a subcontract of \$10,000 or more must complete Form FHWA PR-1391 (Appendix C to 23 CFR 230). Submit the forms by August 15.

### 7-1.50D Training

Section 7-1.50D, "Training," applies if a number of trainees or apprentices is specified in the special provisions.

As part of your equal opportunity affirmative action program, provide on-the-job training to develop full journeymen in the types of trades or job classifications involved.

You have primary responsibility for meeting this training requirement.

If you subcontract a contract part, determine how many trainees or apprentices are to be trained by the subcontractor.

Include these training requirements in your subcontract.

Where feasible, 25 percent of apprentices or trainees in each occupation must be in their 1st year of apprenticeship or training.

Distribute the number of apprentices or trainees among the work classifications on the basis of your needs and the availability of journeymen in the various classifications within a reasonable recruitment area.

Before starting work, submit to the Department:

1. Number of apprentices or trainees to be trained for each classification
2. Training program to be used
3. Training starting date for each classification

Obtain the Department's approval for this submitted information before you start work. The Department credits you for each apprentice or trainee you employ on the work who is currently enrolled or becomes enrolled in an approved program.

The primary objective of Section 7-1.50D, "Training," is to train and upgrade minorities and women toward journeyman status. Make every effort to enroll minority and women apprentices or trainees, such as conducting systematic and direct recruitment through public and private sources likely to yield minority and women apprentices or trainees, to the extent they are available within a reasonable recruitment area. Show that you have made the efforts. In making these efforts, do not discriminate against any applicant for training.

Do not employ as an apprentice or trainee an employee:

1. In any classification in which the employee has successfully completed a training course leading to journeyman status or in which the employee has been employed as a journeyman
2. Who is not registered in a program approved by the US Department of Labor, Bureau of Apprenticeship and Training

Ask the employee if the employee has successfully completed a training course leading to journeyman status or has been employed as a journeyman. Your records must show the employee's answers to the questions.

In your training program, establish the minimum length and training type for each classification. The Department and FHWA approves a program if one of the following is met:

1. It is calculated to:
  - 1.1. Meet the your equal employment opportunity responsibilities





If approval is not granted prior to the start of the proposed specialty work, the Contractor or subcontractor shall itemize labor, material, and equipment rental costs and apply percentage markups as required by Section 9-1.03A, "Work Performed by Contractor."

**In Section 9-1.03C delete the 6th paragraph.**

**In Section 9-1.04 in the 14th paragraph, replace the 2nd sentence with:**

Administrative disputes are disputes of administrative deductions or withholds, 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."

**Replace Section 9-1.05 with:**

**9-1.05 STOP NOTICE WITHHOLDS**

The Department may withhold payments to cover claims filed under Civ Code § 3179 et seq.

**Add:**

**9-1.053 PERFORMANCE FAILURE WITHHOLDS**

During each estimate period you fail to comply with a contract part, including submittal of a document as specified, the Department withholds a part of the progress payment. The documents include quality control plans, schedules, traffic control plans, and water pollution control submittals.

For 1 performance failure, the Department withholds 25 percent of the progress payment but does not withhold more than 10 percent of the total bid.

For multiple performance failures, the Department withholds 100 percent of the progress payment but does not withhold more than 10 percent of the total bid.

The Department returns performance-failure withholds in the progress payment following the correction of noncompliance.

**Add:**

**9-1.055 PENALTY WITHHOLDS**

Penalties include fines and damages that are proposed, assessed, or levied against you or the Department by a governmental agency or citizen lawsuit. Penalties are also payments made or costs incurred in settling alleged permit violations of Federal, State, or local laws, regulations, or requirements. The cost incurred may include the amount spent for mitigation or correcting a violation.

If you or the Department is assessed a penalty, the Department may withhold the penalty amount until the penalty disposition has been resolved. The Department may withhold penalty funds and notify you within 15 days of the withhold. If the penalty amount is less than the amount being withheld from progress payments for retentions, the Department will not withhold the penalty amount.

If the penalty is resolved for less than the amount withheld, the Department pays interest at a rate of 6 percent per year on the excess withhold. If the penalty is not resolved, the withhold becomes a deduction.

Instead of the withhold, you may provide a bond payable to the Department of Transportation equal to the highest estimated liability for any disputed penalties proposed.

**Add:**

**9-1.057 PROGRESS WITHHOLDS**

The Department withholds 10 percent of a partial payment for noncompliant progress. Noncompliant progress occurs when:

1. Total days to date exceed 75 percent of the revised contract working days
2. Percent of working days elapsed exceeds the percent of value of work completed by more than 15 percent





4. If the ESA is damaged, the Department determines what efforts are necessary to remedy the damage and who performs the remedy; you are responsible for remedies and charges.

## **14-2 CULTURAL RESOURCES**

### **14-2.01 GENERAL**

Reserved

### **14-2.02 ARCHAEOLOGICAL RESOURCES**

If archaeological resources are discovered at the job site, do not disturb the resources and immediately:

1. Stop all work within a 60-foot radius of the discovery
2. Protect the discovery area
3. Notify the Engineer

The Department investigates. Do not take archaeological resources from the job site. Do not resume work within the discovery area until authorized.

If, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of an archaeological find, or investigation or recovery of archeological materials, you 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."

If ordered, furnish resources to assist in the investigation or recovery of archaeological resources. This work will be paid for as extra work as specified in Section 4-1.03D, "Extra Work."

### **14-2.03 ARCHAEOLOGICAL MONITORING AREA**

Section 14-2.03 applies if an AMA is described in the Contract.

The Department assigns an archaeological monitor to monitor job site activities within the AMA. Do not work within the AMA unless the archeological monitor is present.

The Engineer and the Department archaeological monitor conduct an AMA location field review with you at least 5 business days before start of work. The Department marks the exact boundaries of the AMA on the ground.

If temporary fence (Type ESA) for an AMA is described in the Contract, install temporary fence (Type ESA) to define the boundaries of the AMA during the AMA location field review.

At least 5 business days before starting work within an AMA, submit a schedule of days and hours to be worked for the Engineer's approval. If you require changes in the schedule, submit an update for the Engineer's approval at least 5 business days before any changed work day.

If archaeological resources are discovered within an AMA, comply with Section 14-2.02, "Archaeological Resources."

### **14-2.04 HISTORIC STRUCTURES**

Reserved

## **14-3 COMMUNITY IMPACTS AND ENVIRONMENTAL JUSTICE**

Reserved

## **14-4 NATIVE AMERICAN CONCERNS**

Reserved

## **14-5 AESTHETICS**

Reserved

## **14-6 BIOLOGICAL RESOURCES**

### **14-6.01 GENERAL**

Reserved

### **14-6.02 BIRD PROTECTION**

Protect migratory and nongame birds, their occupied nests, and their eggs.

The Department anticipates nesting or attempted nesting from February 15 to September 1.

The federal Migratory Bird Treaty Act, 16 USC § 703–711, and 50 CFR Pt 10 and Fish & Game Code §§ 3503, 3513, and 3800 protect migratory and nongame birds, their occupied nests, and their eggs.

The federal Endangered Species Act of 1973, 16 USC §§ 1531 and 1543, and the California Endangered Species Act, Fish & Game Code §§ 2050–2115.5, prohibit the take of listed species and protect occupied and unoccupied nests of threatened and endangered bird species.

The Bald and Golden Eagle Protection Act, 16 USC § 668, prohibits the destruction of bald and golden eagles and their occupied and unoccupied nests.

If migratory or nongame bird nests are discovered that may be adversely affected by construction activities or an injured or killed bird is found, immediately:

1. Stop all work within a 100-foot radius of the discovery.
2. Notify the Engineer.

The Department investigates. Do not resume work within the specified radius of the discovery until authorized.

When ordered, use exclusion devices, take nesting prevention measures, remove and dispose of partially constructed and unoccupied nests of migratory or nongame birds on a regular basis to prevent their occupation, or perform any combination of these. This work will be paid for as extra work as specified in Section 4-1.03D, "Extra Work."

Prevent nest materials from falling into waterways.

Bird protection that causes a delay to the controlling activity is a condition unfavorable to the suitable prosecution of work as specified in Section 8-1.05, "Temporary Suspension of Work."

## **14-7 PALEONTOLOGICAL RESOURCES**

If paleontological resources are discovered at the job site, do not disturb the material and immediately:

1. Stop all work within a 60-foot radius of the discovery
2. Protect the area
3. Notify the Engineer

The Department investigates and modifies the dimensions of the protected area if necessary. Do not take paleontological resources from the job site. Do not resume work within the specified radius of the discovery until authorized.

## **14-8 NOISE AND VIBRATION**

### **14-8.01 GENERAL**

Reserved

### **14-8.02 NOISE CONTROL**

Do not exceed 86 dBA at 50 feet from the job site activities from 9 p.m. to 6 a.m. Use an alternative warning method instead of a sound signal unless required by safety laws.

Equip an internal combustion engine with the manufacturer-recommended muffler. Do not operate an internal combustion engine on the job site without the appropriate muffler.

## **14-9 AIR QUALITY**

### **14-9.01 AIR POLLUTION CONTROL**

Comply with air pollution control rules, regulations, ordinances, and statutes that apply to work performed under the Contract, including air pollution control rules, regulations, ordinances, and statutes provided in Govt Code § 11017 (Pub Cont Code § 10231).

Do not burn material to be disposed of.

### **14-9.02 DUST CONTROL**

Prevent and alleviate dust by applying water, dust palliative, or both under Section 14-9.01.

Apply water under Section 17, "Watering."

Apply dust palliative under Section 18, "Dust Palliative."

If ordered, apply water, dust palliative, or both to control dust caused by public traffic. This work will be paid for as extra work as specified in Section 4-1.03D, "Extra Work."





Soil amendment shall not be derived from mixed municipal solid waste and must be reasonably free of visible contaminants. Soil amendment must not contain paint, petroleum products, pesticides or any other chemical residues harmful to animal life or plant growth. Soil amendment must not possess objectionable odors.

Metal concentrations in soil amendment must not exceed the maximum metal concentrations listed in Title 14, California Code of Regulations, Division 7, Chapter 3.1, Section 17868.2.

Soil amendment must comply with the following:

| Physical/Chemical Requirements |  |  |
|--------------------------------|--|--|
| Property                       | Test Method  | Requirement                                  |
| pH                             | *TMECC 04.11-A, Elastometric pH 1:5 Slurry Method, pH Units  | 6.0–8.0                                      |
| Soluble Salts                  | TMECC 04.10-A, Electrical Conductivity 1:5 Slurry Method dS/m (mmhos/cm)   | 0-10.0                                       |
| Moisture Content               | TMECC 03.09-A, Total Solids & Moisture at 70+/- 5 deg C, % Wet Weight Basis  | 30–60  |
| Organic Matter Content         | TMECC 05.07-A, Loss-On-Ignition Organic Matter Method (LOI), % Dry Weight Basis  | 30–65  |
| Maturity                       | TMECC 05.05-A, Germination and Vigor<br>Seed Emergence<br>Seedling Vigor<br>% Relative to Positive Control                                   | 80 or Above<br>80 or Above                   |
| Stability                      | TMECC 05.08-B, Carbon Dioxide Evolution Rate<br>mg CO <sub>2</sub> -C/g OM per day   | 8 or below                                   |
| Particle Size                  | TMECC 02.02-B Sample Sieving for Aggregate Size Classification % Dry Weight Basis  | 95% Passing 5/8 inch<br>70% Passing 3/8 inch |
| Pathogen                       | TMECC 07.01-B, Fecal Coliform Bacteria < 1000 MPN/gram dry wt.   | Pass   |
| Pathogen                       | TMECC 07.01-B, Salmonella < 3 MPN/4 grams dry wt.  | Pass   |
| Physical Contaminants          | TMECC 02.02-C, Man Made Inert Removal and Classification:<br>Plastic, Glass and Metal, % > 4mm fraction                                      | Combined Total: < 1.0                        |
| Physical Contaminants          | TMECC 02.02-C, Man Made Inert Removal and Classification:<br>Sharps (Sewing needles, straight pins and hypodermic needles), % > 4mm fraction | None Detected                                |

\*TMECC refers to "Test Methods for the Examination of Composting and Compost," published by the United States Department of Agriculture and the United States Compost Council (USCC).

Prior to application, the Contractor shall provide the Engineer with a copy of the soil amendment producer's Compost Technical Data Sheet and a copy of the compost producers STA certification. The Compost Technical Data Sheet shall include laboratory analytical test results, directions for product use, and a list of product ingredients.

Prior to application, the Contractor shall provide the Engineer with a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

**In Section 20-2.10 delete the 8th, 9th, and 10th paragraphs.**

**In Section 20-3.04A delete the last paragraph.**











1. Standard
2. Method
3. Quality Control / Quality Assurance (QC / QA)

### 39-1.02 MATERIALS

#### 39-1.02A Geosynthetic Pavement Interlayer

Geosynthetic pavement interlayer must comply with the specifications for pavement fabric or paving mat in Section 88-1.07, "Pavement Interlayer."

#### 39-1.02B Tack Coat

Tack coat must comply with the specifications for asphaltic emulsion in Section 94, "Asphaltic Emulsion," or asphalt binder in Section 92, "Asphalts." Choose the type and grade.

Notify the Engineer if you dilute asphaltic emulsion with water. The weight ratio of added water to asphaltic emulsion must not exceed 1 to 1.

Measure added water either by weight or volume in compliance with the specifications for weighing, measuring, and metering devices under Section 9-1.01, "Measurement of Quantities," or you may use water meters from water districts, cities, or counties. If you measure water by volume, apply a conversion factor to determine the correct weight.

With each dilution, submit in writing:

1. The weight ratio of water to bituminous material in the original asphaltic emulsion
2. The weight of asphaltic emulsion before diluting
3. The weight of added water
4. The final dilution weight ratio of water to asphaltic emulsion

#### 39-1.02C Asphalt Binder

Asphalt binder in HMA must comply with Section 92, "Asphalts," or Section 39-1.02D, "Asphalt Rubber Binder." The special provisions specify the grade.

Asphalt binder for geosynthetic pavement interlayer must comply with Section 92, "Asphalts." Choose from Grades PG 64-10, PG 64-16, or PG 70-10.

#### 39-1.02D Asphalt Rubber Binder

##### General

Use asphalt rubber binder in RHMA-G, RHMA-O, and RHMA-O-HB. Asphalt rubber binder must be a combination of:

1. Asphalt binder
2. Asphalt modifier
3. Crumb rubber modifier (CRM)

The combined asphalt binder and asphalt modifier must be  $80.0 \pm 2.0$  percent by weight of the asphalt rubber binder.

##### Asphalt Modifier

Asphalt modifier must be a resinous, high flash point, and aromatic hydrocarbon, and comply with:

**Asphalt Modifier for Asphalt Rubber Binder**

| Quality Characteristic                            | ASTM   | Specification |
|---|--------|---------------|
| Viscosity, $m^2/s$ ( $\times 10^{-6}$ ) at 100 °C | D 445  | $X \pm 3^a$   |
| Flash Point, CL.O.C., °C                          | D 92   | 207 minimum   |
| Molecular Analysis                                |        |               |
| Asphaltenes, percent by mass                      | D 2007 | 0.1 maximum   |
| Aromatics, percent by mass                        | D 2007 | 55 minimum    |

Note:

<sup>a</sup> The symbol "X" is the proposed asphalt modifier viscosity. "X" must be between 19 and 36. A change in "X" requires a new asphalt rubber binder design.

Asphalt modifier must be from 2.0 percent to 6.0 percent by weight of the asphalt binder in the asphalt rubber binder.

### Crumb Rubber Modifier

CRM consists of a ground or granulated combination of scrap tire CRM and high natural CRM. CRM must be 75.0 ± 2.0 percent scrap tire CRM and 25.0 ± 2.0 percent high natural CRM by total weight of CRM. Scrap tire CRM must be from any combination of automobile tires, truck tires, or tire buffings.

Sample and test scrap tire CRM and high natural CRM separately. CRM must comply with:

#### Crumb Rubber Modifier for Asphalt Rubber Binder

| Quality Characteristic                                      | Test Method | Specification |
|---|-------------|---------------|
| Scrap tire CRM gradation<br>(% passing No. 8 sieve)         | LP-10       | 100           |
| High natural CRM gradation<br>(% passing No. 10 sieve)      | LP-10       | 100           |
| Wire in CRM (% max.)  | LP-10       | 0.01          |
| Fabric in CRM (% max.)                                      | LP-10       | 0.05          |
| CRM particle length (inch max.) <sup>a</sup>                | --          | 3/16          |
| CRM specific gravity <sup>a</sup>                           | CT 208      | 1.1 – 1.2     |
| Natural rubber content in high natural CRM (%) <sup>a</sup> | ASTM D 297  | 40.0 – 48.0   |

Note:

<sup>a</sup> Test at mix design and for Certificate of Compliance.

Only use CRM ground and granulated at ambient temperature. If steel and fiber are cryogenically separated, it must occur before grinding and granulating. Only use cryogenically produced CRM particles that can be ground or granulated and not pass through the grinder or granulator.

CRM must be dry, free-flowing particles that do not stick together. CRM must not cause foaming when combined with the asphalt binder and asphalt modifier. You may add calcium carbonate or talc up to 3 percent by weight of CRM.

### Asphalt Rubber Binder Design and Profile

Submit in writing an asphalt rubber binder design and profile. In the design, designate the asphalt, asphalt modifier, and CRM and their proportions. The profile is not a specification and only serves to indicate expected trends in asphalt rubber binder properties during binder production. The profile must include the same component sources for the asphalt rubber binder used.

Design the asphalt rubber binder from testing you perform for each quality characteristic and for the reaction temperatures expected during production. The 24-hour (1,440-minute) interaction period determines the design profile. At a minimum, mix asphalt rubber binder components, take samples, and perform and record the following tests:

#### Asphalt Rubber Binder Reaction Design Profile

| Test  | Minutes of Reaction <sup>a</sup> |    |    |     |     |     |      | Limits        |
|---|----------------------------------|----|----|-----|-----|-----|------|---------------|
|   | 45                               | 60 | 90 | 120 | 240 | 360 | 1440 |               |
| Cone penetration @ 77 °F, 0.10-mm (ASTM D 217)    | X <sup>b</sup>                   |    |    |     | X   |     | X    | 25 - 70       |
| Resilience @ 77 °F, percent rebound (ASTM D 5329) | X                                |    |    |     | X   |     | X    | 18 min.       |
| Field softening point, °F (ASTM D 36)             | X                                |    |    |     | X   |     | X    | 125 - 165     |
| Viscosity, centipoises (LP-11)                    | X                                | X  | X  | X   | X   | X   | X    | 1,500 - 4,000 |

Notes:

<sup>a</sup> Six hours (360 minutes) after CRM addition, reduce the oven temperature to 275 °F for a period of 16 hours. After the 16-hour (1320 minutes) cool-down after CRM addition, reheat the binder to the reaction temperature expected during production for sampling and testing at 24 hours (1440 minutes).

<sup>b</sup> "X" denotes required testing

### Asphalt Rubber Binder

After interacting for a minimum of 45 minutes, asphalt rubber binder must comply with:

### Asphalt Rubber Binder

| Quality Characteristic              | Test for Quality Control or Acceptance | Test Method | Specification |         |
|-------------------------------------|--|-------------|---------------|---------|
|                                     |  |             | Minimum       | Maximum |
| Cone penetration @ 77 °F, 0.10-mm   | Acceptance                             | ASTM D 217  | 25            | 70      |
| Resilience @ 77 °F, percent rebound | Acceptance                             | ASTM D 5329 | 18            | --      |
| Field softening point, °F           | Acceptance                             | ASTM D 36   | 125           | 165     |
| Viscosity @ 375 °F, centipoises     | Quality Control                        | LP-11       | 1,500         | 4,000   |

#### 39-1.02E Aggregate

Aggregate must be clean and free from deleterious substances. Aggregate:

1. Retained on the No. 4 sieve is coarse
2. Passing the No. 4 sieve is fine
3. Added and passing the No. 30 sieve is supplemental fine, including:
  - 3.1. Hydrated lime
  - 3.2. Portland cement
  - 3.3. Fines from dust collectors

The special provisions specify the aggregate gradation for each HMA type.

The specified aggregate gradation is before the addition of asphalt binder and includes supplemental fines. The Engineer tests for aggregate grading under California Test 202, modified by California Test 105 if there is a difference in specific gravity of 0.2 or more between the coarse and fine parts of different aggregate blends.

Choose a sieve size target value (TV) within each target value limit presented in the aggregate gradation tables.

**Aggregate Gradation  
(Percentage Passing)  
HMA Types A and B**

3/4-inch HMA Types A and B

| Sieve Sizes | Target Value Limits | Allowable Tolerance |
|-------------|---------------------|---------------------|
| 1"          | 100                 | —                   |
| 3/4"        | 90 - 100            | TV ±5               |
| 1/2"        | 70 - 90             | TV ±6               |
| No. 4       | 45 - 55             | TV ±7               |
| No. 8       | 32 - 40             | TV ±5               |
| No. 30      | 12 - 21             | TV ±4               |
| No. 200     | 2 - 7               | TV ±2               |

1/2-inch HMA Types A and B

| Sieve Sizes | Target Value Limits | Allowable Tolerance |
|-------------|---------------------|---------------------|
| 3/4"        | 100                 | —                   |
| 1/2"        | 95 - 99             | TV ±6               |
| 3/8"        | 75 - 95             | TV ±6               |
| No. 4       | 55 - 66             | TV ±7               |
| No. 8       | 38 - 49             | TV ±5               |
| No. 30      | 15 - 27             | TV ±4               |
| No. 200     | 2 - 8               | TV ±2               |

3/8-inch HMA Types A and B

| Sieve Sizes | Target Value Limits | Allowable Tolerance |
|-------------|---------------------|---------------------|
| 1/2"        | 100                 | —                   |
| 3/8"        | 95 - 100            | TV ±6               |
| No. 4       | 58 - 72             | TV ±7               |
| No. 8       | 34 - 48             | TV ±6               |
| No. 30      | 18 - 32             | TV ±5               |
| No. 200     | 2 - 9               | TV ±2               |

No. 4 HMA Types A and B

| Sieve Sizes | Target Value Limits | Allowable Tolerance |
|-------------|---------------------|---------------------|
| 3/8"        | 100                 | —                   |
| No. 4       | 95 - 100            | TV ±7               |
| No. 8       | 72 - 77             | TV ±7               |
| No. 30      | 37 - 43             | TV ±7               |
| No. 200     | 2 - 12              | TV ±4               |

**Rubberized Hot Mix Asphalt - Gap Graded (RHMA-G)**

3/4-inch RHMA-G

| Sieve Sizes | Target Value Limits | Allowable Tolerance |
|-------------|---------------------|---------------------|
| 1"          | 100                 | —                   |
| 3/4"        | 95 - 100            | TV ±5               |
| 1/2"        | 83 - 87             | TV ±6               |
| 3/8"        | 65 - 70             | TV ±6               |
| No. 4       | 28 - 42             | TV ±7               |
| No. 8       | 14 - 22             | TV ±5               |
| No. 200     | 0 - 6               | TV ±2               |

1/2-inch RHMA-G

| Sieve Sizes | Target Value Limits | Allowable Tolerance |
|-------------|---------------------|---------------------|
| 3/4"        | 100                 | —                   |
| 1/2"        | 90 - 100            | TV ±6               |
| 3/8"        | 83 - 87             | TV ±6               |
| No. 4       | 28 - 42             | TV ±7               |
| No. 8       | 14 - 22             | TV ±5               |
| No. 200     | 0 - 6               | TV ±2               |

**Open Graded Friction Course (OGFC)**

1-inch OGFC

| Sieve Sizes | Target Value Limits | Allowable Tolerance |
|-------------|---------------------|---------------------|
| 1 1/2"      | 100                 | —                   |
| 1"          | 99 - 100            | TV ±5               |
| 3/4"        | 85 - 96             | TV ±5               |
| 1/2"        | 55 - 71             | TV ±6               |
| No. 4       | 10 - 25             | TV ±7               |
| No. 8       | 6 - 16              | TV ±5               |
| No. 200     | 1 - 6               | TV ±2               |

1/2-inch OGFC

| Sieve Sizes | Target Value Limits | Allowable Tolerance |
|-------------|---------------------|---------------------|
| 3/4"        | 100                 | —                   |
| 1/2"        | 95 - 100            | TV ±6               |
| 3/8"        | 78 - 89             | TV ±6               |
| No. 4       | 28 - 37             | TV ±7               |
| No. 8       | 7 - 18              | TV ±5               |
| No. 30      | 0 - 10              | TV ±4               |
| No. 200     | 0 - 3               | TV ±2               |

3/8-inch OGFC

| Sieve Sizes | Target Value Limits | Allowable Tolerance |
|-------------|---------------------|---------------------|
| 1/2"        | 100                 | —                   |
| 3/8"        | 90 - 100            | TV ±6               |
| No. 4       | 29 - 36             | TV ±7               |
| No. 8       | 7 - 18              | TV ±6               |
| No. 30      | 0 - 10              | TV ±5               |
| No. 200     | 0 - 3               | TV ±2               |

Before the addition of asphalt binder and lime treatment, aggregate must comply with:

### Aggregate Quality

| Quality Characteristic   | Test Method                 | HMA Type |    |        |      |
|--|-----------------------------|----------|----|--------|------|
|  |                             | A        | B  | RHMA-G | OGFC |
| Percent of crushed particles<br>Coarse aggregate (% min.)<br>One fractured face                        | CT 205                      | 90       | 25 | --     | 90   |
| Two fractured faces  |                             | 75       | -- | 90     | 75   |
| Fine aggregate (% min.)<br>(Passing No. 4 sieve<br>and retained on No. 8 sieve.)<br>One fractured face |                             | 70       | 20 | 70     | 90   |
| Los Angeles Rattler (% max.)<br>Loss at 100 Rev.   | CT 211                      | 12       | -- | 12     | 12   |
| Loss at 500 Rev.   |                             | 45       | 50 | 40     | 40   |
| Sand equivalent (min.) <sup>a</sup>  | CT 217                      | 47       | 42 | 47     | --   |
| Fine aggregate angularity (% min.) <sup>b</sup>  | AASHTO T<br>304 Method<br>A | 45       | 45 | 45     | --   |
| Flat and elongated particles (% max.<br>by weight @ 5:1)   | ASTM D<br>4791              | 10       | 10 | 10     | 10   |

Notes:

<sup>a</sup> Reported value must be the average of 3 tests from a single sample.

<sup>b</sup> The Engineer waives this specification if HMA contains less than 10 percent of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

#### 39-1.02F Reclaimed Asphalt Pavement

You may produce HMA using reclaimed asphalt pavement (RAP). HMA produced using RAP must comply with the specifications for HMA except aggregate quality specifications do not apply to RAP. You may substitute RAP aggregate for a part of the virgin aggregate in HMA in a quantity not exceeding 15.0 percent of the aggregate blend. Do not use RAP in OGFC and RHMA-G.

Assign the substitution rate of RAP aggregate for virgin aggregate with the job mix formula (JMF) submittal. The JMF must include the percent of RAP used. If you change your assigned RAP aggregate substitution rate by more than 5 percent (within the 15.0 percent limit), submit a new JMF.

Process RAP from asphalt concrete. You may process and stockpile RAP throughout the project's life. Prevent material contamination and segregation. Store RAP in stockpiles on smooth surfaces free of debris and organic material. Processed RAP stockpiles must consist only of homogeneous RAP.

#### 39-1.03 HOT MIX ASPHALT MIX DESIGN REQUIREMENTS

##### 39-1.03A General

A mix design consists of performing California Test 367 and laboratory procedures on combinations of aggregate gradations and asphalt binder contents to determine the optimum binder content (OBC) and HMA mixture qualities. If RAP is used, use Laboratory Procedure LP-9. The result of the mix design becomes the proposed JMF.

Use Form CEM-3512 to document aggregate quality and mix design data. Use Form CEM-3511 to present the JMF.

Laboratories testing aggregate qualities and preparing the mix design and JMF must be qualified under the Department's Independent Assurance Program. Take samples under California Test 125.

The Engineer reviews the aggregate qualities, mix design, and JMF and verifies and accepts the JMF.

You may change the JMF during production. Do not use the changed JMF until the Engineer accepts it. Except when adjusting the JMF in compliance with Section 39-1.03E, "Job Mix Formula Verification," perform a new mix design and submit in writing a new JMF submittal for changing any of the following:

1. Target asphalt binder percentage
2. Asphalt binder supplier
3. Asphalt rubber binder supplier
4. Component materials used in asphalt rubber binder or percentage of any component materials
5. Combined aggregate gradation
6. Aggregate sources
7. Substitution rate for RAP aggregate of more than 5 percent

8. Any material in the JMF

For OGFC, submit in writing a complete JMF submittal except asphalt binder content. The Engineer determines the asphalt binder content under California Test 368 within 20 days of your complete JMF submittal and provides you a Form CEM-3513.

**39-1.03B Hot Mix Asphalt Mix Design**

Perform a mix design that produces HMA in compliance with:

**Hot Mix Asphalt Mix Design Requirements**

| Quality Characteristic                 | Test Method         | HMA Type    |                          |                          |
|--|---------------------|-------------|--------------------------|--------------------------|
|  |                     | A           | B                        | RHMA-G                   |
| Air voids content (%)                  | CT 367 <sup>a</sup> | 4.0         | 4.0                      | Special Provisions       |
| Voids in mineral aggregate (% min.)    | LP-2                |             |                          |                          |
| No. 4 grading                          |                     | 17.0        | 17.0                     | --                       |
| 3/8" grading                           |                     | 15.0        | 15.0                     | --                       |
| 1/2" grading                           |                     | 14.0        | 14.0                     | 18.0 – 23.0 <sup>b</sup> |
| 3/4" grading                           | 13.0                | 13.0        | 18.0 – 23.0 <sup>b</sup> |                          |
| Voids filled with asphalt (%)          | LP-3                |             |                          |                          |
| No. 4 grading                          |                     | 76.0 – 80.0 | 76.0 – 80.0              | Note d                   |
| 3/8" grading                           |                     | 73.0 – 76.0 | 73.0 – 76.0              |                          |
| 1/2" grading                           |                     | 65.0 – 75.0 | 65.0 – 75.0              |                          |
| 3/4" grading                           | 65.0 – 75.0         | 65.0 – 75.0 |                          |                          |
| Dust proportion                        | LP-4                |             |                          |                          |
| No. 4 and 3/8" gradings                |                     | 0.9 – 2.0   | 0.9 – 2.0                | Note d                   |
| 1/2" and 3/4" gradings                 | 0.6 – 1.3           | 0.6 – 1.3   |                          |                          |
| Stabilometer value (min.) <sup>c</sup> | CT 366              |             |                          |                          |
| No. 4 and 3/8" gradings                |                     | 30          | 30                       | --                       |
| 1/2" and 3/4" gradings                 | 37                  | 35          | 23                       |                          |

Notes:

<sup>a</sup> Calculate the air voids content of each specimen using California Test 309 and Lab Procedure LP-1. Modify California Test 367, Paragraph C5, to use the exact air voids content specified in the selection of OBC.

<sup>b</sup> Voids in mineral aggregate for RHMA-G must be within this range.

<sup>c</sup> Modify California Test 304, Part 2.B.2.c: "After compaction in the compactor, cool to 140 °± 5 °F by allowing the briquettes to cool at room temperature for 0.5-hour, then place the briquettes in the oven at 140 °F for a minimum of 2 hours and not more than 3 hours."

<sup>d</sup> Report this value in the JMF submittal.

For stability and air voids content, prepare 3 briquettes at the OBC and test for compliance. Report the average of 3 tests. Prepare new briquettes and test if the range of stability for the 3 briquettes is more than 8 points. The average air void content may vary from the specified air void content by ±0.5 percent.

You may use the briquettes used for stability testing to determine bulk specific gravity under CT 308. If you use the same briquettes and tests using bulk specific gravity fail, you may prepare 3 new briquettes and determine a new bulk specific gravity.

**39-1.03C Job Mix Formula Submittal**

Each JMF submittal must consist of:

1. Proposed JMF on Form CEM-3511
2. Mix design documentation on Form CEM-3512 dated within 12 months of submittal
3. JMF verification on Form CEM-3513, if applicable
4. Materials Safety Data Sheets (MSDS) for:
  - 4.1. Asphalt binder
  - 4.2. Base asphalt binder used in asphalt rubber binder
  - 4.3. CRM and asphalt modifier used in asphalt rubber binder

- 4.4. Blended asphalt rubber binder mixture
- 4.5. Supplemental fine aggregate except fines from dust collectors
- 4.6. Antistrip additives

If the JMF must be verified or if the Engineer requests, submit samples of the following materials in labeled containers weighing no more than 50 pounds each (notify the Engineer at least 2 business days before sampling materials):

1. Coarse, fine, and supplemental fine aggregate from stockpiles, cold feed belts, or hot bins. Samples must include at least 120 pounds for each coarse aggregate, 80 pounds for each fine aggregate, and 10 pounds for each type of supplemental fines. The Department combines these aggregate samples to comply with the JMF target values submitted on Form CEM-3511.
2. RAP from stockpiles or RAP system. Samples must be at least 60 pounds.
3. Asphalt binder from the binder supplier. Samples must be in two 1-quart cylindrical shaped cans with open top and friction lids.
4. Asphalt rubber binder with the components blended in the proportions to be used. Samples must be in four 1-quart cylindrical shaped cans with open top and friction lids.

#### **39-1.03D Job Mix Formula Review**

The Engineer reviews each mix design and proposed JMF within 5 business days from the complete JMF submittal. The review consists of reviewing the mix design procedures and comparing the proposed JMF with the specifications.

The Engineer may verify aggregate qualities during this review period.

#### **39-1.03E Job Mix Formula Verification**

If you cannot submit a Department-verified JMF on Form CEM-3513 dated within 12 months before HMA production, the Engineer verifies the JMF.

Based on your testing and production experience, you may submit on Form CEM-3511 an adjusted JMF before the Engineer's verification testing. JMF adjustments may include a change in the:

1. Asphalt binder content target value up to  $\pm 0.6$  percent from the optimum binder content value submitted on Form CEM-3512 except do not adjust the target value for asphalt rubber binder for RHMA-G below 7.0 percent
2. Aggregate gradation target values within the target value limits specified in the aggregate gradation tables

Test samples from the HMA plant to be used to determine possible JMF adjustments.

For HMA Type A, Type B, and RHMA-G, the Engineer verifies the JMF from samples taken from HMA produced by the plant to be used. The Engineer verifies each proposed JMF within 20 days of receiving verification samples. Verification is testing for compliance with the specifications for:

1. Aggregate quality
2. Aggregate gradation (JMF TV  $\pm$  tolerance)
3. Asphalt binder content (JMF TV  $\pm$  tolerance)
4. HMA quality specified in the table Hot Mix Asphalt Mix Design Requirements except:
  - 4.1. Air voids content (design value  $\pm 2.0$  percent)
  - 4.2. Voids filled with asphalt (report only if an adjustment for asphalt binder content target value is less than or equal to  $\pm 0.3$  percent from OBC)
  - 4.3. Dust proportion (report only if an adjustment for asphalt binder content target value is less than or equal to  $\pm 0.3$  percent from OBC)

If you request in writing, the Engineer verifies RHMA-G quality requirements within 3 business days of sampling.

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

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

Sample aggregate from cold feed belts or hot bins. Sample RAP from the RAP system. Sample HMA under California Test 125 except if you request in writing and the Engineer approves, you may sample from any of the following locations:

1. The plant
2. A truck
3. A windrow
4. The paver hopper
5. The mat behind the paver

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

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

The Engineer prepares 3 briquettes from a single split sample. To verify the JMF for stability, the Engineer tests the 3 briquettes and reports the average of 3 tests. The Engineer prepares new briquettes if the range of stability for the 3 briquettes is more than 8 points.

The Engineer may use the briquettes used for stability testing to determine bulk specific gravity under CT 308. If the Engineer uses the same briquettes and the tests using bulk specific gravity fail, the Engineer prepares 3 new briquettes and determines a new bulk specific gravity.

If the Engineer verifies the JMF, the Engineer provides you a Form CEM-3513.

If the Engineer's tests on plant-produced samples do not verify the JMF, the Engineer notifies you in writing and you must submit a new JMF submittal or submit an adjusted JMF based on your testing. JMF adjustments may include a change in the:

1. Asphalt binder content target value up to  $\pm 0.6$  percent from the optimum binder content value submitted on Form CEM-3512 except do not adjust the target value for asphalt rubber binder for RHMA-G below 7.0 percent
2. Aggregate gradation target values within the target value limits specified in the aggregate gradation tables

You may adjust the JMF only once due to a failed verification test. An adjusted JMF requires a new Form CEM-3511 and verification of a plant-produced sample.

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

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

### **39-1.03F Job Mix Formula Renewal**

You may request a JMF renewal by submitting the following:

1. Proposed JMF on Form CEM-3511
2. A previously verified JMF documented on Form CEM-3513 dated within 12 months
3. Mix design documentation on Form CEM-3512 used for the previously verified JMF
4. Samples of aggregates, asphalt binder, and additives
5. Samples of the following materials obtained in the presence of the Engineer and placed in labeled containers weighing no more than 50 pounds each:
  - 5.1. Coarse, fine, and supplemental fine aggregate from stockpiles, cold feed belts, or hot bins. Samples must include at least 120 pounds for each coarse aggregate, 80 pounds for each fine aggregate, and 10 pounds for each type of supplemental fines. The Department combines these aggregate samples to comply with the JMF target values submitted on Form CEM-3511.
  - 5.2. RAP from stockpiles or RAP system. Samples must be at least 60 pounds.
  - 5.3. Asphalt binder from the binder supplier. Samples must be in two 1-quart cylindrical shaped cans with open top and friction lids.
  - 5.4. Asphalt rubber binder with the components blended in the proportions to be used. Samples must be in four 1-quart cylindrical shaped cans with open top and friction lids.

Notify the Engineer in writing at least 2 business days before sampling materials. Split samples into at least 2 parts. You must test 1 part and provide the Engineer a part. The Engineer retains samples until you provide test results for your part on Form CEM-3514.

The Engineer reviews each proposed JMF within 5 business days from the complete JMF submittal and test results. The review consists of reviewing the mix design procedures, test results from the split samples and comparing the proposed JMF with the specifications.

The Engineer may verify aggregate qualities during this review period.

The Engineer verifies the JMF under Section 39-1.03E, "Job Mix Formula Verification," except:

1. The Engineer verifies each proposed JMF within 30 days of receiving verification samples.
2. You may not adjust the JMF due to a failed verification.
3. For each HMA type and aggregate gradation specified, the Engineer verifies at the State's expense 1 proposed JMF.
4. If the Engineer verifies the JMF renewal, the Engineer provides you a Form CEM-3513.

### **39-1.03G Job Mix Formula Acceptance**

You may start HMA production if:

1. The Engineer's review of the JMF shows compliance with the specifications.
2. The Department has verified the JMF within 12 months before HMA production.
3. The Engineer accepts the verified JMF.

## **39-1.04 CONTRACTOR QUALITY CONTROL**

### **39-1.04A General**

Establish, maintain, and change a quality control system to ensure materials and work comply with the specifications. Submit quality control test results to the Engineer within 3 days of a request except when QC / QA is specified.

You must identify the HMA sampling location in your Quality Control Plan. During production, take samples under California Test 125 except if you request in writing and the Engineer approves, you may sample HMA from:

1. The plant
2. The truck
3. A windrow
4. The paver hopper
5. The mat behind the paver

### **39-1.04B Prepaving Conference**

Meet with the Engineer at a prepaving conference at a mutually agreed time and place. Discuss methods of performing the production and paving work.

### **39-1.04C Asphalt Rubber Binder**

Take asphalt rubber binder samples from the feed line connecting the asphalt rubber binder tank to the HMA plant. Sample and test asphalt rubber binder under Laboratory Procedure LP-11.

Test asphalt rubber binder for compliance with the viscosity specifications in Section 39-1.02, "Materials." During asphalt rubber binder production and HMA production using asphalt rubber binder, measure viscosity every hour with not less than 1 reading for each asphalt rubber binder batch. Log measurements with corresponding time and asphalt rubber binder temperature. Submit the log daily in writing.

Submit a Certificate of Compliance under Section 6-1.07, "Certificates of Compliance." With the Certificate of Compliance, submit test results in writing for CRM and asphalt modifier with each truckload delivered to the HMA plant. A Certificate of Compliance for asphalt modifier must not represent more than 5,000 pounds. Use an AASHTO-certified laboratory for testing.

Sample and test gradation and wire and fabric content of CRM once per 10,000 pounds of scrap tire CRM and once per 3,400 pounds of high natural CRM. Sample and test scrap tire CRM and high natural CRM separately.

Submit certified weight slips in writing for the CRM and asphalt modifier furnished.

#### **39-1.04D Aggregate**

Determine the aggregate moisture content and RAP moisture content in continuous mixing plants at least twice a day during production and adjust the plant controller. Determine the RAP moisture content in batch mixing plants at least twice a day during production and adjust the plant controller.

#### **39-1.04E Reclaimed Asphalt Pavement**

Perform RAP quality control testing each day.

Sample RAP once daily and determine the RAP aggregate gradation under Laboratory Procedure LP-9 and submit the results to the Engineer in writing with the combined aggregate gradation.

#### **39-1.04F Density Cores**

To determine density for Standard and QC / QA projects, take 4-inch or 6-inch diameter density cores at least once every 5 business days. Take 1 density core for every 250 tons of HMA from random locations the Engineer designates. Take density cores in the Engineer's presence and backfill and compact holes with material authorized by the Engineer. Before submitting a density core to the Engineer, mark it with the density core's location and place it in a protective container.

If a density core is damaged, replace it with a density core taken within 1 foot longitudinally from the original density core. Relocate any density core located within 1 foot of a rumble strip to 1 foot transversely away from the rumble strip.

#### **39-1.04G Briquettes**

Prepare 3 briquettes for each stability and air voids content determination. Report the average of 3 tests. Prepare new briquettes and test if the range of stability for the 3 briquettes is more than 12 points.

You may use the briquettes used for stability testing to determine bulk specific gravity under CT 308. If you use these briquettes and tests using bulk specific gravity fail, you may prepare 3 new briquettes and determine a new bulk specific gravity.

#### **39-1.05 ENGINEER'S ACCEPTANCE**

The Engineer's acceptance of HMA is specified in the sections for each HMA construction process.

The Engineer samples materials for testing under California Test 125 and the applicable test method except samples may be taken from:

1. The plant from:
  - 1.1. A truck
  - 1.2. An automatic sampling device
2. The mat behind the paver

Sampling must be independent of Contractor quality control, statistically-based, and random.

If you request, the Engineer splits samples and provides you with a part.

The Engineer accepts HMA based on:

1. Accepted JMF
2. Accepted QCP for Standard and QC / QA
3. Compliance with the HMA Acceptance tables
4. Acceptance of a lot for QC / QA
5. Visual inspection

The Engineer prepares 3 briquettes for each stability and air voids content determination. The Engineer reports the average of 3 tests. The Engineer prepares new briquettes and test if the range of stability for the 3 briquettes is more than 8 points.

The Engineer may use the briquettes used for stability testing to determine bulk specific gravity under CT 308. If the Engineer uses the same briquettes and the tests using bulk specific gravity fail, the Engineer prepares 3 new briquettes and determines a new bulk specific gravity.

### **39-1.06 DISPUTE RESOLUTION**

You and the Engineer must work together to avoid potential conflicts and to resolve disputes regarding test result discrepancies. Notify the Engineer in writing within 5 days of receiving a test result if you dispute the test result.

If you or the Engineer dispute each other's test results, submit written quality control test results and copies of paperwork including worksheets used to determine the disputed test results to the Engineer. An Independent Third Party (ITP) performs referee testing. Before the ITP participates in a dispute resolution, the ITP must be accredited under the Department's Independent Assurance Program. The ITP must be independent of the project. By mutual agreement, the ITP is chosen from:

1. A Department laboratory
2. A Department laboratory in a district or region not in the district or region the project is located
3. The Transportation Laboratory
4. A laboratory not currently employed by you or your HMA producer

If split quality control or acceptance samples are not available, the ITP uses any available material representing the disputed HMA for evaluation.

### **39-1.07 PRODUCTION START-UP EVALUATION**

The Engineer evaluates HMA production and placement at production start-up.

Within the first 750 tons produced on the first day of HMA production, in the Engineer's presence and from the same production run, take samples of:

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

Sample aggregate from cold feed belts or hot bins. Take RAP samples from the RAP system. Sample HMA under California Test 125 except if you request in writing and the Engineer approves, you may sample HMA from:

1. The plant
2. The truck
3. A windrow
4. The paver hopper
5. The mat behind the paver

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

For Standard and QC / QA projects, you and the Engineer must test the split samples and report test results in writing within 3 business days of sampling. If you proceed before receipt of the test results, the Engineer may consider the HMA placed to be represented by these test results.

For Standard and QC / QA projects, take 4-inch or 6-inch diameter density cores within the first 750 tons on the first day of HMA production. For each density core, the Engineer reports the bulk specific gravity determined under California Test 308, Method A in addition to the percent of maximum theoretical density. You may test for in-place density at the density core locations and include them in your production tests for percent of maximum theoretical density.

### **39-1.08 PRODUCTION**

#### **39-1.08A General**

Produce HMA in a batch mixing plant or a continuous mixing plant. Proportion aggregate by hot or cold feed control.

HMA plants must be Department-qualified. Before production, the HMA plant must have a current qualification under the Department's Materials Plant Quality Program.

During production, you may adjust:

1. Hot or cold feed proportion controls for virgin aggregate and RAP
2. The set point for asphalt binder content

### **39-1.08B Mixing**

Mix HMA ingredients into a homogeneous mixture of coated aggregates.

Asphalt binder must be between 275 °F and 375 °F when mixed with aggregate.

Asphalt rubber binder must be between 375 °F and 425 °F when mixed with aggregate.

When mixed with asphalt binder, aggregate must not be more than 325 °F except aggregate for OGFC with unmodified asphalt binder must be not more than 275 °F. Aggregate temperature specifications do not apply when you use RAP.

HMA with or without RAP must not be more than 325 °F.

### **39-1.08C Asphalt Rubber Binder**

Deliver scrap tire CRM and high natural CRM in separate bags.

Either proportion and mix asphalt binder, asphalt modifier, and CRM simultaneously or premix the asphalt binder and asphalt modifier before adding CRM. If you premix asphalt binder and asphalt modifier, mix them for at least 20 minutes. When you add CRM, the asphalt binder and asphalt modifier must be between 375 °F and 440 °F.

Do not use asphalt rubber binder during the first 45 minutes of the reaction period. During this period, the asphalt rubber binder mixture must be between 350 °F and the lower of 425 °F or 25 °F below the asphalt binder's flash point indicated in the MSDS.

If any asphalt rubber binder is not used within 4 hours after the reaction period, discontinue heating. If the asphalt rubber binder drops below 375 °F, reheat before use. If you add more scrap tire CRM to the reheated asphalt rubber binder, the binder must undergo a 45-minute reaction period. The added scrap tire CRM must not exceed 10 percent of the total asphalt rubber binder weight. Reheated and reacted asphalt rubber binder must comply with the viscosity specifications for asphalt rubber binder in Section 39-1.02, "Materials." Do not reheat asphalt rubber binder more than twice.

## **39-1.09 SUBGRADE, TACK COAT, AND GEOSYNTHETIC PAVEMENT INTERLAYER**

### **39-1.09A General**

Prepare subgrade or apply tack coat to surfaces receiving HMA. If specified, place geosynthetic pavement interlayer over a coat of asphalt binder.

### **39-1.09B Subgrade**

Subgrade to receive HMA must comply with the compaction and elevation tolerance specifications in the sections for the material involved. Subgrade must be free of loose and extraneous material. If HMA is paved on existing base or pavement, remove loose paving particles, dirt, and other extraneous material by any means including flushing and sweeping.

### **39-1.09C Tack Coat**

Apply tack coat:

1. To existing pavement including planed surfaces
2. Between HMA layers
3. To vertical surfaces of:
  - 3.1. Curbs
  - 3.2. Gutters
  - 3.3. Construction joints

Before placing HMA, apply tack coat in 1 application at the minimum residual rate specified for the condition of the underlying surface:

**Tack Coat Application Rates for HMA Type A, Type B, and RHMA-G**

| HMA over:                    | Minimum Residual Rates (gallons per square yard)       |  |   |
|------------------------------|--|--|---|
|                              | CSS1/CSS1h, SS1/SS1h and QS1h/CQS1h Asphaltic Emulsion | CRS1/CRS2, RS1/RS2 and QS1/CQS1 Asphaltic Emulsion | Asphalt Binder and PMRS2/PMCRS2 and PMRS2h/PMCRS2h Asphaltic Emulsion |
| New HMA (between layers)     | 0.02   | 0.03   | 0.02  |
| Existing AC and PCC pavement | 0.03   | 0.04   | 0.03  |
| Planed pavement              | 0.05   | 0.06   | 0.04  |

**Tack Coat Application Rates for OGFC**

| OGFC over:                   | Minimum Residual Rates (gallons per square yard)       |  |   |
|------------------------------|--|--|---|
|                              | CSS1/CSS1h, SS1/SS1h and QS1h/CQS1h Asphaltic Emulsion | CRS1/CRS2, RS1/RS2 and QS1/CQS1 Asphaltic Emulsion | Asphalt Binder and PMRS2/PMCRS2 and PMRS2h/PMCRS2h Asphaltic Emulsion |
| New HMA                      | 0.03   | 0.04   | 0.03  |
| Existing AC and PCC pavement | 0.05   | 0.06   | 0.04  |
| Planed pavement              | 0.06   | 0.07   | 0.05  |

If you dilute asphaltic emulsion, mix until homogeneous before application.

Apply to vertical surfaces with a residual tack coat rate that will thoroughly coat the vertical face without running off.

If you request in writing and the Engineer authorizes, you may:

1. Change tack coat rates
2. Omit tack coat between layers of new HMA during the same work shift if:
  - 2.1. No dust, dirt, or extraneous material is present
  - 2.2. The surface is at least 140 °F

Immediately in advance of placing HMA, apply additional tack coat to damaged areas or where loose or extraneous material is removed.

Close areas receiving tack coat to traffic. Do not track tack coat onto pavement surfaces beyond the job site.

Asphalt binder tack coat must be between 285 °F and 350 °F when applied.

**39-1.09D Geosynthetic Pavement Interlayer**

Place geosynthetic pavement interlayer in compliance with the manufacturer's recommendations.

Before placing the geosynthetic pavement interlayer and asphalt binder:

1. Repair cracks 1/4 inch and wider, spalls, and holes in the pavement. The State pays for this repair work under Section 4-1.03D, "Extra Work."
2. Clean the pavement of loose and extraneous material.

Immediately before placing the interlayer, apply 0.25 gallon ± 0.03 gallon of asphalt binder per square yard of interlayer or until the fabric is saturated. Apply asphalt binder the width of the geosynthetic pavement interlayer plus 3 inches on each side. At interlayer overlaps, apply asphalt binder on the lower interlayer the same overlap distance as the upper interlayer.

Align and place the interlayer with no overlapping wrinkles, except a wrinkle that overlaps may remain if it is less than 1/2 inch thick. If the overlapping wrinkle is more than 1/2 inch thick, cut the wrinkle out and overlap the interlayer no more than 2 inches.

The minimum HMA thickness over the interlayer must be 0.12 foot thick including conform tapers. Do not place the interlayer on a wet or frozen surface.

Overlap the interlayer borders between 2 inches and 4 inches. In the direction of paving, overlap the following roll with the preceding roll at any break.

You may use rolling equipment to correct distortions or wrinkles in the interlayer.

If asphalt binder tracked onto the interlayer or brought to the surface by construction equipment causes interlayer displacement, cover it with a small quantity of HMA.

Before placing HMA on the interlayer, do not expose the interlayer to:

1. Traffic except for crossings under traffic control and only after you place a small HMA quantity
2. Sharp turns from construction equipment
3. Damaging elements

Pave HMA on the interlayer during the same work shift.

### **39-1.10 Spreading And Compacting Equipment**

Paving equipment for spreading must be:

1. Self-propelled
2. Mechanical
3. Equipped with a screed or strike-off assembly that can distribute HMA the full width of a traffic lane
4. Equipped with a full-width compacting device
5. Equipped with automatic screed controls and sensing devices that control the thickness, longitudinal grade, and transverse screed slope

Install and maintain grade and slope references.

The screed must produce a uniform HMA surface texture without tearing, shoving, or gouging.

The paver must not leave marks such as ridges and indentations unless you can eliminate them by rolling.

Rollers must be equipped with a system that prevents HMA from sticking to the wheels. You may use a parting agent that does not damage the HMA or impede the bonding of layers.

In areas inaccessible to spreading and compacting equipment:

1. Spread the HMA by any means to obtain the specified lines, grades and cross sections.
2. Use a pneumatic tamper, plate compactor, or equivalent to achieve thorough compaction.

### **39-1.11 Transporting, Spreading, And Compacting**

Do not pave HMA on a wet pavement or frozen surface.

You may deposit HMA in a windrow and load it in the paver if:

1. Paver is equipped with a hopper that automatically feeds the screed
2. Loading equipment can pick up the windrowed material and deposit it in the paver hopper without damaging base material
3. Activities for deposit, pick-up, loading, and paving are continuous
4. HMA temperature in the windrow does not fall below 260 °F

You may pave HMA in 1 or more layers on areas less than 5 feet wide and outside the traveled way including shoulders. You may use mechanical equipment other than a paver for these areas. The equipment must produce a uniform smoothness and texture.

HMA handled, spread, or windrowed must not stain the finished surface of any improvement including pavement.

Do not use petroleum products such as kerosene or diesel fuel to release HMA from trucks, spreaders, or compactors.

HMA must be free of:

1. Segregation
2. Coarse or fine aggregate pockets
3. Hardened lumps

Longitudinal joints in the top layer must match specified lane edges. Alternate longitudinal joint offsets in lower layers at least 0.5 foot from each side of the specified lane edges. You may request in writing other longitudinal joint placement patterns.

Until the adjoining through lane's top layer has been paved, do not pave the top layer of:

1. Shoulders

2. Tapers
3. Transitions
4. Road connections
5. Driveways
6. Curve widenings
7. Chain control lanes
8. Turnouts
9. Turn pockets

If the number of lanes change, pave each through lane's top layer before paving a tapering lane's top layer. Simultaneous to paving a through lane's top layer, you may pave an adjoining area's top layer including shoulders. Do not operate spreading equipment on any area's top layer until completing final compaction.

If HMA (leveling) is specified, fill and level irregularities and ruts with HMA before spreading HMA over base, existing surfaces, or bridge decks. You may use mechanical equipment other than a paver for these areas. The equipment must produce a uniform smoothness and texture. HMA used to change an existing surface's cross slope or profile is not HMA (leveling).

If placing HMA against the edge of existing pavement, sawcut or grind the pavement straight and vertical along the joint and remove extraneous material without damaging the surface remaining in place. If placing HMA against the edge of a longitudinal or transverse construction joint and the joint is damaged or not placed to a neat line, sawcut or grind the pavement straight and vertical along the joint and remove extraneous material without damaging the surface remaining in place. Repair or remove and replace damaged pavement at your expense.

Rolling must leave the completed surface compacted and smooth without tearing, cracking, or shoving. Complete finish rolling activities before the pavement surface temperature is:

1. Below 150 °F for HMA with unmodified binder
2. Below 140 °F for HMA with modified binder
3. Below 200 °F for RHMA-G

If a vibratory roller is used as a finish roller, turn the vibrator off.

Do not use a pneumatic tired roller to compact RHMA-G.

For Standard and QC/QA, if a 3/4-inch aggregate grading is specified, you may use a 1/2-inch aggregate grading if the specified paved thickness is from 0.15 foot to 0.20 foot thick.

Spread and compact HMA under Section 39-3.03, "Spreading and Compacting Equipment," and Section 39-3.04, "Transporting, Spreading, and Compacting," for any of the following:

1. Specified paved thickness is less than 0.15 foot.
2. Specified paved thickness is less than 0.20 foot and a 3/4-inch aggregate grading is specified and used.
3. You spread and compact at:
  - 3.1. Asphalt concrete surfacing replacement areas
  - 3.2. Leveling courses
  - 3.3. Areas the Engineer determines conventional compaction and compaction measurement methods are impeded

Do not allow traffic on new HMA pavement until its mid-depth temperature is below 160 °F.

If you request in writing and the Engineer authorizes, you may cool HMA Type A and Type B with water when rolling activities are complete. Apply water under Section 17, "Watering."

Spread sand at a rate between 1 pound and 2 pounds per square yard on new RHMA-G, RHMA-O, and RHMA-O-HB pavement when finish rolling is complete. Sand must be free of clay or organic matter. Sand must comply with Section 90-3.03, "Fine Aggregate Grading." Keep traffic off the pavement until spreading sand is complete.

## **39-1.12 SMOOTHNESS**

### **39-1.12A General**

Determine HMA smoothness with a profilograph and a straightedge.

Smoothness specifications do not apply to OGFC placed on existing pavement not constructed under the same project.

If portland cement concrete is placed on HMA:

1. Cold plane the HMA finished surface to within specified tolerances if it is higher than the grade specified by the Engineer.
2. Remove and replace HMA if the finished surface is lower than 0.05 foot below the grade specified by the Engineer.

### **39-1.12B Straightedge**

The HMA pavement top layer must not vary from the lower edge of a 12-foot long straightedge:

1. More than 0.01 foot when the straight edge is laid parallel with the centerline
2. More than 0.02 foot when the straightedge is laid perpendicular to the centerline and extends from edge to edge of a traffic lane
3. More than 0.02 foot when the straightedge is laid within 24 feet of a pavement conform

### **39-1.12C Profilograph**

Under California Test 526, determine the zero (null) blanking band Profile Index ( $PI_0$ ) and must-grinds on the top layer of HMA Type A, Type B, and RHMA-G pavement. Take 2 profiles within each traffic lane, 3 feet from and parallel with the edge of each lane.

A must-grind is a deviation of 0.3 inch or more in a length of 25 feet. You must correct must-grinds.

For OGFC, only determine must-grinds when placed over HMA constructed under the same project. The top layer of the underlying HMA must comply with the smoothness specifications before placing OGFC.

Profile pavement in the Engineer's presence. Choose the time of profiling.

On tangents and horizontal curves with a centerline radius of curvature 2,000 feet or more, the  $PI_0$  must be at most 3 inches per 0.1-mile section.

On horizontal curves with a centerline radius of curvature between 1,000 feet and 2,000 feet including pavement within the superelevation transitions, the  $PI_0$  must be at most 6 inches per 0.1-mile section.

Before the Engineer accepts HMA pavement for smoothness, submit written final profilograms.

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

Smoothness@dot.ca.gov

The following HMA pavement areas do not require a  $PI_0$ . You must measure these areas with a 12-foot straightedge and determine must-grinds with a profilograph:

1. New HMA with a total thickness less than or equal to 0.25 foot
2. HMA sections of city or county streets and roads, turn lanes and collector lanes that are less than 1,500 feet in length

The following HMA pavement areas do not require a  $PI_0$ . You must measure these areas with a 12-foot straightedge:

1. Horizontal curves with a centerline radius of curvature less than 1,000 feet including pavement within the superelevation transitions of those curves
2. Within 12 feet of a transverse joint separating the pavement from:
  - 2.1. Existing pavement not constructed under the same project
  - 2.2. A bridge deck or approach slab
3. Exit ramp termini, truck weigh stations, and weigh-in-motion areas
4. If steep grades and superelevation rates greater than 6 percent are present on:
  - 4.1. Ramps
  - 4.2. Connectors
5. Turn lanes
6. Areas within 15 feet of manholes or drainage transitions
7. Acceleration and deceleration lanes for at-grade intersections
8. Shoulders and miscellaneous areas
9. HMA pavement within 3 feet from and parallel to the construction joints formed between curbs, gutters, or existing pavement

### **39-1.12D Smoothness Correction**

If the top layer of HMA Type A, Type B, or RHMA-G pavement does not comply with the smoothness specifications, grind the pavement to within tolerances, remove and replace it, or place a layer of HMA. The Engineer must authorize your choice of correction before the work begins.

Remove and replace the areas of OGFC not in compliance with the must-grind and straightedge specifications, except you may grind OGFC for correcting smoothness:

1. At a transverse joint separating the pavement from pavement not constructed under the same project
2. Within 12 feet of a transverse joint separating the pavement from a bridge deck or approach slab

Corrected HMA pavement areas must be uniform rectangles with edges:

1. Parallel to the nearest HMA pavement edge or lane line
2. Perpendicular to the pavement centerline

Measure the corrected HMA pavement surface with a profilograph and a 12-foot straightedge and correct the pavement to within specified tolerances. If a must-grind area or straightedged pavement cannot be corrected to within specified tolerances, remove and replace the pavement.

On ground areas not overlaid with OGFC, apply fog seal coat under Section 37-1, "Seal Coats."

### **39-1.13 MISCELLANEOUS AREAS AND DIKES**

Miscellaneous areas are outside the traveled way and include:

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

Spread miscellaneous areas in 1 layer and compact to the specified lines and grades.

For miscellaneous areas and dikes:

1. Do not submit a JMF.
2. Choose the 3/8-inch or 1/2-inch HMA Type A and Type B aggregate gradations.
3. Minimum asphalt binder content must be 6.8 percent for 3/8-inch aggregate and 6.0 percent for 1/2-inch aggregate. If you request in writing and the Engineer authorizes, you may reduce the minimum asphalt binder content.
4. Choose asphalt binder Grade PG 70-10 or the same grade specified for HMA.

### **39-1.14 RUMBLE STRIP**

Construct rumble strips by rolling or grinding indentations in the top layer of new HMA surfacing.

Select the method and equipment for constructing ground-in indentations.

Do not construct rumble strips on structures or approach slabs.

Construct rumble strips within 2 inches of the specified alignment. Roller or grinding equipment must be equipped with a sighting device enabling the operator to maintain the rumble strip alignment.

Rolled-in indentations must not vary from the specified dimensions by more than 10 percent.

Ground-in indentations must comply with the specified dimensions within 0.06 inch in depth or 10 percent in length and width.

The Engineer orders grinding or removal and replacement of noncompliant rumble strips to bring them within specified tolerances. Ground surface areas must be neat and uniform in appearance.

The grinding equipment must be equipped with a vacuum attachment to remove residue.

Dispose of removed material under Section 7-1.13, "Disposal of Material Outside the Highway Right of Way."

On ground areas, apply fog seal coat under Section 37-1, "Seal Coats."

## **39-2 STANDARD**

### **39-2.01 DESCRIPTION**

If HMA is specified as Standard, construct it under Section 39-1, "General," this Section 39-2, "Standard," and Section 39-5, "Measurement and Payment."

### **39-2.02 CONTRACTOR QUALITY CONTROL**

#### **39-2.02A Quality Control Plan**

Establish, implement, and maintain a Quality Control Plan (QCP) for HMA. The QCP must describe the organization and procedures you will use to:

1. Control the quality characteristics
2. Determine when corrective actions are needed (action limits)
3. Implement corrective actions

When you submit the proposed JMF, submit the written QCP. You and the Engineer must discuss the QCP during the prepaving conference.

The QCP must address the elements affecting HMA quality including:

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

The Engineer reviews each QCP within 5 business days from the submittal. Hold HMA production until the Engineer accepts the QCP in writing. The Engineer's QCP acceptance does not mean your compliance with the QCP will result in acceptable HMA. Section 39-1.05, "Engineer's Acceptance," specifies HMA acceptance.

#### **39-2.02B Quality Control Testing**

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

**Minimum Quality Control – Standard**

| Quality Characteristic  | Test Method          | Minimum Sampling and Testing Frequency                            | HMA Type                     |                              |                              |                              |
|---|----------------------|---|------------------------------|------------------------------|------------------------------|------------------------------|
|   |                      |   | A                            | B                            | RHMA-G                       | OGFC                         |
| Aggregate gradation <sup>a</sup>  | CT 202               | 1 per 750 tons and any remaining part                             | JMF ± Tolerance <sup>b</sup> |
| Sand equivalent (min.) <sup>c</sup>   | CT 217               |   | 47                           | 42                           | 47                           | --                           |
| Asphalt binder content (%)  | CT 379 or 382        |   | JMF ± 0.45                   | JMF ± 0.45                   | JMF ± 0.50                   | JMF ± 0.50                   |
| HMA moisture content (% max.)   | CT 226 or CT 370     | 1 per 2,500 tons but not less than 1 per paving day               | 1.0                          | 1.0                          | 1.0                          | 1.0                          |
| Percent of maximum theoretical density (%) <sup>d,e</sup>   | Quality control plan | 2 per business day (min.)   | 91 - 97                      | 91 - 97                      | 91 - 97                      | --                           |
| Stabilometer value (min.) <sup>e,f</sup><br>No. 4 and 3/8" gradings<br>1/2" and 3/4" gradings   | CT 366               | One per 4,000 tons or 2 per 5 business days, whichever is more    | 30                           | 30                           | --                           | --                           |
|   |                      |   | 37                           | 35                           | 23                           | --                           |
| Air voids content (%) <sup>c,g</sup>  | CT 367               |   | 4 ± 2                        | 4 ± 2                        | Specification ± 2            | --                           |
| Aggregate moisture content at continuous mixing plants and RAP moisture content at continuous mixing plants and batch mixing plants <sup>h</sup>  | CT 226 or CT 370     | 2 per day during production                                       | --                           | --                           | --                           | --                           |
| Percent of crushed particles coarse aggregate (% min.)<br>One fractured face<br>Two fractured faces<br>Fine aggregate (% min)<br>(Passing No. 4 sieve and retained on No. 8 sieve.)<br>One fractured face | CT 205               | As necessary and designated in the QCP. At least once per project | 90                           | 25                           | --                           | 90                           |
|   |                      |   | 75                           | --                           | 90                           | 75                           |
|   |                      |   | 70                           | 20                           | 70                           | 90                           |
| Los Angeles Rattler (% max.)<br>Loss at 100 rev.<br>Loss at 500 rev.  | CT 211               |   | 12<br>45                     | --<br>50                     | 12<br>40                     | 12<br>40                     |

|   |                        |                  |  |  |  |                                     |
|---|------------------------|------------------|--|--|--|-------------------------------------|
| Flat and elongated particles (% max. by weight @ 5:1)   | ASTM D 4791            |                  | Report only  | Report only  | Report only  | Report only                         |
| Fine aggregate angularity (% min.)  | AASHTO T 304, Method A |                  | 45   | 45   | 45   | --                                  |
| Voids filled with asphalt (%) <sup>i</sup><br>No. 4 grading<br>3/8" grading<br>1/2" grading<br>3/4" grading       | LP-3                   |                  | 76.0 – 80.0<br>73.0 – 76.0<br>65.0 – 75.0<br>65.0 – 75.0 | 76.0 – 80.0<br>73.0 – 76.0<br>65.0 – 75.0<br>65.0 – 75.0 | Report only  | --                                  |
| Voids in mineral aggregate (% min.) <sup>i</sup><br>No. 4 grading<br>3/8" grading<br>1/2" grading<br>3/4" grading | LP-2                   |                  | 17.0<br>15.0<br>14.0<br>13.0                             | 17.0<br>15.0<br>14.0<br>13.0                             | --<br>--<br>18.0 – 23.0 <sup>j</sup><br>18.0 – 23.0 <sup>j</sup> | --                                  |
| Dust proportion <sup>1</sup><br>No. 4 and 3/8" gradings<br>1/2" and 3/4" gradings                                 | LP-4                   |                  | 0.9 – 2.0<br>0.6 – 1.3                                   | 0.9 – 2.0<br>0.6 – 1.3                                   | Report only  | --                                  |
| Smoothness  | Section 39-1.12        | --               | 12-foot straightedge, must-grind, and PI <sub>0</sub>    | 12-foot straightedge, must-grind, and PI <sub>0</sub>    | 12-foot straightedge, must-grind, and PI <sub>0</sub>            | 12-foot straightedge and must-grind |
| Asphalt rubber binder viscosity @ 350 °F, centipoises   | Section 39-1.02D       | Section 39-1.04C | --   | --   | 1,500 – 4,000  | 1,500 – 4,000                       |
| Asphalt modifier  | Section 39-1.02D       | Section 39-1.04C | --   | --   | Section 39-1.02D   | Section 39-1.02D                    |
| Crumb rubber modifier   | Section 39-1.02D       | Section 39-1.04C | --   | --   | Section 39-1.02D   | Section 39-1.02D                    |

Notes:

<sup>a</sup> Determine combined aggregate gradation containing RAP under Laboratory Procedure LP-9.

<sup>b</sup> The tolerances must comply with the allowable tolerances in Section 39-1.02E, "Aggregate."

<sup>c</sup> Report the average of 3 tests from a single split sample.

<sup>d</sup> Required for HMA Type A, Type B, and RHMA-G if the specified paved thickness is at least 0.15 foot.

<sup>e</sup> Determine maximum theoretical density (California Test 309) at the frequency specified for Test Maximum Density under California Test 375, Part 5.D.

<sup>f</sup> Modify California Test 304, Part 2.B.2.c: "After compaction in the mechanical compactor, cool to 140 °F ± 5 °F by allowing the briquettes to cool at room temperature for 0.5 hour, then place the briquettes in the oven at 140 °F for a minimum of 2 hours and not more than 3 hours."

<sup>g</sup> Determine the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.

<sup>h</sup> For adjusting the plant controller at the HMA plant.

<sup>i</sup> Report only if the adjustment for asphalt binder content target value is less than or equal to ± 0.3 percent from OBC.

<sup>j</sup> Voids in mineral aggregate for RHMA-G must be within this range.

For any single quality characteristic except smoothness, if 2 consecutive quality control test results do not comply with the action limits or specifications:

1. Stop production.
2. Notify the Engineer in writing.
3. Take corrective action.

4. Demonstrate compliance with the specifications before resuming production and placement on the State highway.

**39-2.03 ENGINEER'S ACCEPTANCE**

**39-2.03A Testing**

The Engineer samples for acceptance testing and tests for:

**HMA Acceptance - Standard**

| Quality Characteristic   | Test Method                  | HMA Type                        |                                 |                                 |                                 |                |      |      |
|--|------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|----------------|------|------|
|  |                              | A                               | B                               | RHMA-G                          | OGFC                            |                |      |      |
| Aggregate gradation <sup>a</sup>   | CT 202                       | JMF ±<br>Tolerance <sup>c</sup> | JMF ±<br>Tolerance <sup>c</sup> | JMF ±<br>Tolerance <sup>c</sup> | JMF ±<br>Tolerance <sup>c</sup> |                |      |      |
| Sieve  |                              |                                 |                                 |                                 |                                 | 3/4"           | 1/2" | 3/8" |
| 1/2"   |                              |                                 |                                 |                                 |                                 | X <sup>b</sup> |      |      |
| 3/8"   |                              |                                 |                                 |                                 |                                 |                | X    |      |
| No. 4  |                              |                                 |                                 |                                 |                                 |                |      | X    |
| No. 8  |                              |                                 |                                 |                                 |                                 | X              | X    | X    |
| No. 200  | X                            | X                               | X                               |                                 |                                 |                |      |      |
| Sand equivalent (min.) <sup>d</sup>  | CT 217                       | 47                              | 42                              | 47                              | --                              |                |      |      |
| Asphalt binder content (%)   | CT 379 or<br>382             | JMF ± 0.45                      | JMF ± 0.45                      | JMF ± 0.50                      | JMF ± 0.50                      |                |      |      |
| HMA moisture content (%<br>max.)   | CT 226 or<br>CT 370          | 1.0                             | 1.0                             | 1.0                             | 1.0                             |                |      |      |
| Percent of maximum<br>theoretical density (%) <sup>e, f</sup>                      | CT 375                       | 91 – 97                         | 91 – 97                         | 91 – 97                         | --                              |                |      |      |
| Stabilometer value (min.) <sup>d, g</sup>  | CT 366                       | 30                              | 30                              | --                              | --                              |                |      |      |
| No. 4 and 3/8" gradings  |                              |                                 |                                 |                                 |                                 |                |      |      |
| 1/2" and 3/4" gradings   |                              | 37                              | 35                              | 23                              | --                              |                |      |      |
| Air voids content (%) <sup>d, h</sup>  | CT 367                       | 4 ± 2                           | 4 ± 2                           | Specification ±<br>2            | --                              |                |      |      |
| Percent of crushed particles<br>Coarse aggregate (%<br>min.)                       | CT 205                       | 90                              | 25                              | --                              | 90                              |                |      |      |
| One fractured face   |                              |                                 |                                 |                                 |                                 |                |      |      |
| Two fractured faces  |                              |                                 |                                 |                                 |                                 |                |      |      |
| Fine aggregate (%<br>min)<br>(Passing No. 4 sieve and<br>retained on No. 8 sieve.) |                              | 75                              | --                              | 90                              | 75                              |                |      |      |
| One fractured face   |                              | 70                              | 20                              | 70                              | 90                              |                |      |      |
| Percent of crushed particles<br>Coarse aggregate (%<br>min.)                       | CT 205                       | 90                              | 25                              | --                              | 90                              |                |      |      |
| One fractured face   |                              |                                 |                                 |                                 |                                 |                |      |      |
| Two fractured faces  |                              |                                 |                                 |                                 |                                 |                |      |      |
| Los Angeles Rattler (%<br>max.)  |                              | 75                              | --                              | 90                              | 75                              |                |      |      |
| Loss at 100 rev.   | CT 211                       | 12                              | --                              | 12                              | 12                              |                |      |      |
| Loss at 500 rev.   |                              | 45                              | 50                              | 40                              | 40                              |                |      |      |
| Fine aggregate angularity (%<br>min.)  | AASHTO<br>T 304,<br>Method A | 45                              | 45                              | 45                              | --                              |                |      |      |
| Flat and elongated particles<br>(%<br>max. by weight @ 5:1)                        | ASTM D<br>4791               | Report only                     | Report only                     | Report only                     | Report only                     |                |      |      |
| Voids filled with asphalt (%) <sup>i</sup>   | LP-3                         | 76.0 – 80.0                     | 76.0 – 80.0                     | Report only                     | --                              |                |      |      |
| No. 4 grading  |                              |                                 |                                 |                                 |                                 |                |      |      |
| 3/8" grading   |                              |                                 |                                 |                                 |                                 |                |      |      |
| 1/2" grading   |                              |                                 |                                 |                                 |                                 |                |      |      |
| 3/4" grading   |                              |                                 |                                 |                                 |                                 |                |      |      |
| Voids in mineral aggregate<br>(% min.) <sup>i</sup>                                | LP-2                         | 17.0                            | 17.0                            | --                              | --                              |                |      |      |
| No. 4 grading  |                              |                                 |                                 |                                 |                                 |                |      |      |
| 3/8" grading   |                              |                                 |                                 |                                 |                                 |                |      |      |
| 1/2" grading   |                              |                                 |                                 |                                 |                                 |                |      |      |
| 3/4" grading   |                              |                                 |                                 |                                 |                                 |                |      |      |
| Dust proportion <sup>1</sup>   | LP-4                         | 0.9 – 2.0                       | 0.9 – 2.0                       | Report only                     | --                              |                |      |      |
| No. 4 and 3/8" gradings  |                              |                                 |                                 |                                 |                                 |                |      |      |

| 1/2" and 3/4" gradings |                 | 0.6 – 1.3   | 0.6 – 1.3   |   |   |
|------------------------|-----------------|---|---|---|---|
| Smoothness             | Section 39-1.12 | 12-foot straightedge, must-grind, and PI <sub>0</sub> | 12-foot straightedge, must-grind, and PI <sub>0</sub> | 12-foot straightedge, must-grind, and PI <sub>0</sub> | 12-foot straightedge and must-grind     |
| Asphalt binder         | Various         | Section 92  | Section 92  | Section 92  | Section 92                              |
| Asphalt rubber binder  | Various         | --  | --  | Section 92-1.02(C) and Section 39-1.02D               | Section 92-1.02(C) and Section 39-1.02D |
| Asphalt modifier       | Various         | --  | --  | Section 39-1.02D                                      | Section 39-1.02D                        |
| Crumb rubber modifier  | Various         | --  | --  | Section 39-1.02D                                      | Section 39-1.02D                        |

<sup>a</sup> The Engineer determines combined aggregate gradations containing RAP under Laboratory Procedure LP-9.

<sup>b</sup> "X" denotes the sieves the Engineer considers for the specified aggregate gradation.

<sup>c</sup> The tolerances must comply with the allowable tolerances in Section 39-1.02E, "Aggregate."

<sup>d</sup> The Engineer reports the average of 3 tests from a single split sample.

<sup>e</sup> The Engineer determines percent of maximum theoretical density if the specified paved thickness is at least 0.15 foot under California Test 375 except the Engineer uses:

1. California Test 308, Method A, to determine in-place density of each density core instead of using the nuclear gauge in Part 4, "Determining In-Place Density By The Nuclear Density Device."
2. California Test 309 to determine maximum theoretical density instead of calculating test maximum density in Part 5, "Determining Test Maximum Density."

<sup>f</sup> The Engineer determines maximum theoretical density (California Test 309) at the frequency specified for Test Maximum Density under California Test 375, Part 5.D.

<sup>g</sup> Modify California Test 304, Part 2.B.2.c: "After compaction in the mechanical compactor, cool to 140 °F ±5 °F by allowing the briquettes to cool at room temperature for 0.5 hour, then place the briquettes in the oven at 140 °F for a minimum of 2 hours and not more than 3 hours."

<sup>h</sup> The Engineer determines the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.

<sup>i</sup> Report only if the adjustment for asphalt binder content target value is less than or equal to ± 0.3 percent from OBC.

<sup>j</sup> Voids in mineral aggregate for RHMA-G must be within this range.

No single test result may represent more than the smaller of 750 tons or 1 day's production.

For any single quality characteristic except smoothness, if 2 consecutive acceptance test results do not comply with the specifications:

1. Stop production.
2. Take corrective action.
3. In the Engineer's presence, take samples and split each sample into 4 parts. Test 1 part for compliance with the specifications and submit 3 parts to the Engineer. The Engineer tests 1 part for compliance with the specifications and reserves and stores 2 parts.
4. Demonstrate compliance with the specifications before resuming production and placement on the State highway.

The Engineer tests the density core you take from each 250 tons of HMA production. The Engineer determines the percent of maximum theoretical density for each density core by determining the density core's density and dividing by the maximum theoretical density.

If the specified total paved thickness is at least 0.15 foot and any layer is less than 0.15 foot, the Engineer determines the percent of maximum theoretical density from density cores taken from the final layer measured the full depth of the total paved HMA thickness.

For percent of maximum theoretical density, the Engineer determines a deduction for each test result outside the specifications in compliance with:

**Reduced Payment Factors for Percent of Maximum Theoretical Density**

| HMA Type A and B<br>and RHMA-G<br>Percent of Maximum<br>Theoretical Density | Reduced Payment<br>Factor | HMA Type A and B<br>and RHMA-G<br>Percent of Maximum<br>Theoretical Density | Reduced Payment<br>Factor |
|---|---------------------------|---|---------------------------|
| 91.0  | 0.0000                    | 97.0  | 0.0000                    |
| 90.9  | 0.0125                    | 97.1  | 0.0125                    |
| 90.8  | 0.0250                    | 97.2  | 0.0250                    |
| 90.7  | 0.0375                    | 97.3  | 0.0375                    |
| 90.6  | 0.0500                    | 97.4  | 0.0500                    |
| 90.5  | 0.0625                    | 97.5  | 0.0625                    |
| 90.4  | 0.0750                    | 97.6  | 0.0750                    |
| 90.3  | 0.0875                    | 97.7  | 0.0875                    |
| 90.2  | 0.1000                    | 97.8  | 0.1000                    |
| 90.1  | 0.1125                    | 97.9  | 0.1125                    |
| 90.0  | 0.1250                    | 98.0  | 0.1250                    |
| 89.9  | 0.1375                    | 98.1  | 0.1375                    |
| 89.8  | 0.1500                    | 98.2  | 0.1500                    |
| 89.7  | 0.1625                    | 98.3  | 0.1625                    |
| 89.6  | 0.1750                    | 98.4  | 0.1750                    |
| 89.5  | 0.1875                    | 98.5  | 0.1875                    |
| 89.4  | 0.2000                    | 98.6  | 0.2000                    |
| 89.3  | 0.2125                    | 98.7  | 0.2125                    |
| 89.2  | 0.2250                    | 98.8  | 0.2250                    |
| 89.1  | 0.2375                    | 98.9  | 0.2375                    |
| 89.0  | 0.2500                    | 99.0  | 0.2500                    |
| < 89.0  | Remove and Replace        | > 99.0  | Remove and Replace        |

**39-2.04 TRANSPORTING, SPREADING, AND COMPACTING**

Determine the number of rollers needed to obtain the specified density and surface finish.

**39-3 METHOD**

**39-3.01 DESCRIPTION**

If HMA is specified as Method, construct it under Section 39-1, "General," this Section 39-3, "Method," and Section 39-5, "Measurement and Payment."

**39-3.02 ENGINEER'S ACCEPTANCE**

**39-3.02A Testing**

The Engineer samples for acceptance testing and tests for:

**HMA Acceptance - Method**

| Quality Characteristic  | Test Method            | HMA Type                            |                                     |                                     |                                     |
|---|------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
|   |                        | A                                   | B                                   | RHMA-G                              | OGFC                                |
| Aggregate gradation <sup>a</sup>  | CT 202                 | JMF ± Tolerance <sup>b</sup>        |
| Sand equivalent (min.) <sup>c</sup>                                       | CT 217                 | 47                                  | 42                                  | 47                                  | --                                  |
| Asphalt binder content (%)  | CT 379 or 382          | JMF ± 0.45                          | JMF ± 0.45                          | JMF ± 0.50                          | JMF ± 0.50                          |
| HMA moisture content (% max.)   | CT 226 or CT 370       | 1.0                                 | 1.0                                 | 1.0                                 | 1.0                                 |
| Stabilometer value (min.) <sup>c, d</sup>                                 | CT 366                 |                                     |                                     |                                     |                                     |
| No. 4 and 3/8" gradings   |                        | 30                                  | 30                                  | --                                  | --                                  |
| 1/2" and 3/4" gradings  |                        | 37                                  | 35                                  | 23                                  | --                                  |
| Percent of crushed particles  | CT 205                 |                                     |                                     |                                     |                                     |
| Coarse aggregate (% min.)   |                        |                                     |                                     |                                     |                                     |
| One fractured face  |                        | 90                                  | 25                                  | --                                  | 90                                  |
| Two fractured faces   |                        | 75                                  | --                                  | 90                                  | 75                                  |
| Fine aggregate (% min) (Passing No. 4 sieve and retained on No. 8 sieve.) |                        |                                     |                                     |                                     |                                     |
| One fractured face  |                        | 70                                  | 20                                  | 70                                  | 90                                  |
| Los Angeles Rattler (% max.)  | CT 211                 |                                     |                                     |                                     |                                     |
| Loss at 100 rev.  |                        | 12                                  | --                                  | 12                                  | 12                                  |
| Loss at 500 rev.  |                        | 45                                  | 50                                  | 40                                  | 40                                  |
| Air voids content (%) <sup>c, e</sup>                                     | CT 367                 | 4 ± 2                               | 4 ± 2                               | Specification ± 2                   | --                                  |
| Fine aggregate angularity (% min.)  | AASHTO T 304, Method A | 45                                  | 45                                  | 45                                  | --                                  |
| Flat and elongated particles (% max. by weight @ 5:1)                     | ASTM D 4791            | Report only                         | Report only                         | Report only                         | Report only                         |
| Voids filled with asphalt (%) <sup>f</sup>                                | LP-3                   |                                     |                                     | Report only                         |                                     |
| No. 4 grading   |                        | 76.0 – 80.0                         | 76.0 – 80.0                         |                                     | --                                  |
| 3/8" grading  |                        | 73.0 – 76.0                         | 73.0 – 76.0                         |                                     |                                     |
| 1/2" grading  |                        | 65.0 – 75.0                         | 65.0 – 75.0                         |                                     |                                     |
| 3/4" grading  |                        | 65.0 – 75.0                         | 65.0 – 75.0                         |                                     |                                     |
| Voids in mineral aggregate (% min.) <sup>f</sup>                          | LP-2                   |                                     |                                     |                                     |                                     |
| No. 4 grading   |                        | 17.0                                | 17.0                                | --                                  | --                                  |
| 3/8" grading  |                        | 15.0                                | 15.0                                | --                                  | --                                  |
| 1/2" grading  |                        | 14.0                                | 14.0                                | 18.0 – 23.0 <sup>g</sup>            |                                     |
| 3/4" grading  |                        | 13.0                                | 13.0                                | 18.0 – 23.0 <sup>g</sup>            |                                     |
| Dust proportion <sup>f</sup>  | LP-4                   |                                     |                                     |                                     |                                     |
| No. 4 and 3/8" gradings   |                        | 0.9 – 2.0                           | 0.9 – 2.0                           | Report only                         | --                                  |
| 1/2" and 3/4" gradings  |                        | 0.6 – 1.3                           | 0.6 – 1.3                           |                                     |                                     |
| Smoothness  | Section 39-1.12        | 12-foot straightedge and must-grind |
| Asphalt binder  | Various                | Section 92                          | Section 92                          | Section 92                          | Section 92                          |
| Asphalt rubber binder   | Various                | --                                  | --                                  | Section 92-                         | Section 92-                         |

|                       |         |    |    |                                     |                                     |
|-----------------------|---------|----|----|-------------------------------------|-------------------------------------|
|                       |         |    |    | 1.02(C) and<br>Section 39-<br>1.02D | 1.02(C) and<br>Section 39-<br>1.02D |
| Asphalt modifier      | Various | -- | -- | Section 39-<br>1.02D                | Section 39-<br>1.02D                |
| Crumb rubber modifier | Various | -- | -- | Section 39-<br>1.02D                | Section 39-<br>1.02D                |

<sup>a</sup>The Engineer determines combined aggregate gradations containing RAP under Laboratory Procedure LP-9.

<sup>b</sup>The tolerances must comply with the allowable tolerances in Section 39-1.02E, "Aggregate."

<sup>c</sup>The Engineer reports the average of 3 tests from a single split sample.

<sup>d</sup>Modify California Test 304, Part 2.B.2.c: "After compaction in the mechanical compactor, cool to 140 °F ±5 °F by allowing the briquettes to cool at room temperature for 0.5 hour, then place the briquettes in the oven at 140 °F for a minimum of 2 hours and not more than 3 hours."

<sup>e</sup>The Engineer determines the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.

<sup>f</sup>Report only if the adjustment for asphalt binder content target value is less than or equal to ± 0.3 percent from OBC.

<sup>g</sup>Voids in mineral aggregate for RHMA-G must be within this range.

No single test result may represent more than the smaller of 750 tons or 1 day's production.

For any single quality characteristic except smoothness, if 2 consecutive acceptance test results do not comply with the specifications:

1. Stop production.
2. Take corrective action.
3. In the Engineer's presence, take samples and split each sample into 4 parts. Test 1 part for compliance with the specifications and submit 3 parts to the Engineer. The Engineer tests 1 part for compliance with the specifications and reserves and stores 2 parts.
4. Demonstrate compliance with the specifications before resuming production and placement on the State highway.

### 39-3.03 SPREADING AND COMPACTING EQUIPMENT

Each paver spreading HMA Type A and Type B must be followed by 3 rollers:

1. One vibratory roller specifically designed to compact HMA. The roller must be capable of at least 2,500 vibrations per minute and must be equipped with amplitude and frequency controls. The roller's gross static weight must be at least 7.5 tons.
2. One oscillating type pneumatic-tired roller at least 4 feet wide. Pneumatic tires must be of equal size, diameter, type, and ply. The tires must be inflated to 60 psi minimum and maintained so that the air pressure does not vary more than 5 psi.
3. One steel-tired, 2-axle tandem roller. The roller's gross static weight must be at least 7.5 tons.

Each roller must have a separate operator. Rollers must be self-propelled and reversible.

Compact RHMA-G under the specifications for compacting HMA Type A and Type B except do not use pneumatic-tired rollers.

Compact OGFC with steel-tired, 2-axle tandem rollers. If placing over 300 tons of OGFC per hour, use at least 3 rollers for each paver. If placing less than 300 tons of OGFC per hour, use at least 2 rollers for each paver. Each roller must weigh between 126 pounds to 172 pounds per linear inch of drum width. Turn the vibrator off.

### 39-3.04 TRANSPORTING, SPREADING, AND COMPACTING

Pave HMA in maximum 0.25-foot thick compacted layers.

If the surface to be paved is both in sunlight and shade, pavement surface temperatures are taken in the shade.

Spread HMA Type A and Type B only if atmospheric and surface temperatures are:

### Minimum Atmospheric and Surface Temperatures

| Compacted Layer Thickness, feet | Minimum Atmospheric and Surface Temperatures |                                      |                           |                                      |
|---------------------------------|--|--------------------------------------|---------------------------|--------------------------------------|
|                                 | Atmospheric, ° F                             |                                      | Surface, ° F              |                                      |
|                                 | Unmodified Asphalt Binder                    | Modified Asphalt Binder <sup>a</sup> | Unmodified Asphalt Binder | Modified Asphalt Binder <sup>a</sup> |
| < 0.15                          | 55   | 50                                   | 60                        | 55                                   |
| 0.15 – 0.25                     | 45   | 45                                   | 50                        | 50                                   |

Note:

<sup>a</sup> Except asphalt rubber binder.

If the asphalt binder for HMA Type A and Type B is:

1. Unmodified asphalt binder, complete:
  - 1.1. First coverage of breakdown compaction before the surface temperature drops below 250 °F
  - 1.2. Breakdown and intermediate compaction before the surface temperature drops below 200 °F
  - 1.3. Finish compaction before the surface temperature drops below 150 °F
2. Modified asphalt binder, complete:
  - 2.1. First coverage of breakdown compaction before the surface temperature drops below 240 °F
  - 2.2. Breakdown and intermediate compaction before the surface temperature drops below 180 °F
  - 2.3. Finish compaction before the surface temperature drops below 140 °F

For RHMA-G:

1. Only spread and compact if the atmospheric temperature is at least 55 °F and the surface temperature is at least 60 °F.
2. Complete the first coverage of breakdown compaction before the surface temperature drops below 280 °F.
3. Complete breakdown and intermediate compaction before the surface temperature drops below 250 °F.
4. Complete finish compaction before the surface temperature drops below 200 °F.
5. If the atmospheric temperature is below 70 °F, cover loads in trucks with tarpaulins. The tarpaulins must completely cover the exposed load until you transfer the mixture to the paver's hopper or to the pavement surface.

For OGFC with unmodified asphalt binder:

1. Only spread and compact if the atmospheric temperature is at least 55 °F and the surface temperature is at least 60 °F.
2. Complete first coverage using 2 rollers before the surface temperature drops below 240 °F.
3. Complete all compaction before the surface temperature drops below 200 °F.
4. If the atmospheric temperature is below 70 °F, cover loads in trucks with tarpaulins. The tarpaulins must completely cover the exposed load until you transfer the mixture to the paver's hopper or to the pavement surface.

For OGFC with modified asphalt binder except asphalt rubber binder:

1. Only spread and compact if the atmospheric temperature is at least 50 °F and the surface temperature is at least 50 °F.
2. Complete first coverage using 2 rollers before the surface temperature drops below 240 °F.
3. Complete all compaction before the surface temperature drops below 180 °F.
4. If the atmospheric temperature is below 70 °F, cover loads in trucks with tarpaulins. The tarpaulins must completely cover the exposed load until you transfer the mixture to the paver's hopper or to the pavement surface.

For RHMA-O and RHMA-O-HB:

1. Only spread and compact if the atmospheric temperature is at least 55 °F and surface temperature is at least 60 °F.
2. Complete the 1st coverage using 2 rollers before the surface temperature drops below 280 °F.
3. Complete compaction before the surface temperature drops below 250 °F.

4. If the atmospheric temperature is below 70 °F, cover loads in trucks with tarpaulins. The tarpaulins must completely cover the exposed load until the mixture is transferred to the paver's hopper or to the pavement surface.

For RHMA-G and OGFC, tarpaulins are not required if the time from discharge to truck until transfer to the paver's hopper or the pavement surface is less than 30 minutes.

HMA compaction coverage is the number of passes needed to cover the paving width. A pass is 1 roller's movement parallel to the paving in either direction. Overlapping passes are part of the coverage being made and are not a subsequent coverage. Do not start a coverage until completing the prior coverage.

Start rolling at the lower edge and progress toward the highest part.

Perform breakdown compaction of each layer of HMA Type A, Type B, and RHMA-G with 3 coverages using a vibratory roller. The speed of the vibratory roller in miles per hour must not exceed the vibrations per minute divided by 1,000. If the HMA layer thickness is less than 0.08 foot, turn the vibrator off. The Engineer may order fewer coverages if the HMA layer thickness is less than 0.15 foot.

Perform intermediate compaction of each layer of HMA Type A and Type B with 3 coverages using a pneumatic-tired roller at a speed not to exceed 5 mph.

Perform finish compaction of HMA Type A, Type B, and RHMA-G with 1 coverage using a steel-tired roller.

Compact OGFC with 2 coverages using steel-tired rollers.

### **39-4 QUALITY CONTROL / QUALITY ASSURANCE**

#### **39-4.01 DESCRIPTION**

If HMA is specified as Quality Control / Quality Assurance, construct it under Section 39-1, "General," this Section 39-4, "Quality Control / Quality Assurance," and Section 39-5, "Measurement and Payment."

#### **39-4.02 GENERAL**

The QC / QA construction process consists of:

1. Establishing, maintaining, and changing if needed a quality control system providing assurance the HMA complies with the specifications
2. Sampling and testing at specified intervals, or sublots, to demonstrate compliance and to control process
3. The Engineer sampling and testing at specified intervals to verify testing process and HMA quality
4. The Engineer using test results, statistical evaluation of verified quality control tests, and inspection to accept HMA for payment

A lot is a quantity of HMA. The Engineer designates a new lot when:

1. 20 sublots are complete
2. The JMF changes
3. Production stops for more than 30 days

Each lot consists of no more than 20 sublots. A subplot is 750 tons except HMA paved at day's end greater than 250 tons is a subplot. If HMA paved at day's end is less than 250 tons, you may either make this quantity a subplot or include it in the previous subplot's test results for statistical evaluation.

#### **39-4.03 CONTRACTOR QUALITY CONTROL**

##### **39-4.03A General**

Use a composite quality factor,  $QF_C$ , and individual quality factors,  $QF_{QCi}$ , to control your process and evaluate your quality control program. For quality characteristics without quality factors, use your quality control plan's action limits to control process.

Control HMA quality including:

1. Materials
2. Proportioning
3. Spreading and compacting
4. Finished roadway surface

Develop, implement, and maintain a quality control program that includes:

1. Inspection
2. Sampling
3. Testing

#### **39-4.03B Quality Control Plan**

With the JMF submittal, submit a written Quality Control Plan (QCP). The QCP must comply with the Department's Quality Control Manual for Hot Mix Asphalt Production and Placement. Discuss the QCP with the Engineer during the prepaving conference.

The Engineer reviews each QCP within 5 business days from the submittal. Hold HMA production until the Engineer accepts the QCP in writing. The Engineer's QCP acceptance does not mean your compliance with the QCP will result in acceptable HMA. Section 39-1.05, "Engineer's Acceptance," specifies HMA acceptance.

The QCP must include the name and qualifications of a Quality Control Manager. The Quality Control Manager administers the QCP and during paving must be at the job site within 3 hours of receiving notice. The Quality Control Manager must not be any of the following on the project:

1. Foreman
2. Production or paving crewmember
3. Inspector
4. Tester

The QCP must include action limits and details of corrective action you will take if a test result for any quality characteristic falls outside an action limit.

As work progresses, you must submit a written QCP supplement to change quality control procedures, personnel, tester qualification status, or laboratory accreditation status.

#### **39-4.03C Quality Control Inspection, Sampling, And Testing**

Sample, test, inspect, and manage HMA quality control.

Provide a roadway inspector while HMA paving activities are in progress. Provide a plant inspector during HMA production.

Inspectors must comply with the Department's Quality Control Manual for Hot Mix Asphalt Production and Placement.

Provide a testing laboratory and personnel for quality control testing. Provide the Engineer unrestricted access to the quality control activities. Before providing services for the project, the Engineer reviews, accredits, and qualifies the testing laboratory and personnel under the Department's Independent Assurance Program.

The minimum random sampling and testing for quality control is:

**Minimum Quality Control – QC / QA**

| Quality Characteristic   | Test Method      | Minimum Sampling and Testing Frequency                       | HMA Type                     |                              |                              | Location of Sampling              | Max. Reporting Time Allowance |
|--|------------------|--|------------------------------|------------------------------|------------------------------|-----------------------------------|-------------------------------|
|  |                  |  | A                            | B                            | RHMA-G                       |                                   |                               |
| Aggregate gradation <sup>a</sup>   | CT 202           | 1 per 750 tons   | JMF ± Tolerance <sup>b</sup> | JMF ± Tolerance <sup>b</sup> | JMF ± Tolerance <sup>b</sup> | CT 125                            | 24 hours                      |
| Asphalt binder content (%)   | CT 379 or 382    |  | JMF ±0.45                    | JMF ±0.45                    | JMF ±0.5                     | Loose Mix Behind Paver See CT 125 |                               |
| Percent of maximum theoretical density (%) <sup>c, d</sup>   | QC Plan          |  | 92 - 96                      | 92 - 96                      | 91 - 96                      | QC Plan                           |                               |
| Aggregate moisture content at continuous mixing plants and RAP moisture content at continuous mixing plants and batch mixing plants <sup>e</sup> | CT 226 or CT 370 | 2 per day during production                                  | --                           | --                           | --                           | Stock-piles or cold feed belts    | --                            |
| Sand equivalent (min.) <sup>f</sup>  | CT 217           | 1 per 750 tons   | 47                           | 42                           | 47                           | CT 125                            | 24 hours                      |
| HMA moisture content (% max.)  | CT 226 or CT 370 | 1 per 2,500 tons but not less than 1 per paving day          | 1.0                          | 1.0                          | 1.0                          | Loose Mix Behind Paver See CT 125 | 24 hours                      |
| Stabilometer Value (min.) <sup>f, g</sup><br>No. 4 and 3/8" gradings<br>1/2" and 3/4" gradings   | CT 366           | 1 per 4,000 tons or 2 per 5 business days, whichever is more | 30                           | 30                           | --                           |                                   | 48 hours                      |
|  |                  |  | 37                           | 35                           | 23                           |                                   |                               |
| Air voids content (%) <sup>f, h</sup>  | CT 367           |  | 4 ± 2                        | 4 ± 2                        | Specification ± 2            |                                   |                               |

|   |                        |  |  |  |  |                  |          |
|---|------------------------|--|--|--|--|------------------|----------|
| Percent of crushed particles coarse aggregate (% min.)<br>One fractured face<br>Two fractured faces               | CT 205                 | As necessary and designated in QCP. At least once per project. | 90   | 25   | --   | CT 125           | 48 hours |
| Fine aggregate (% min)<br>(Passing No. 4 sieve and retained on No. 8 sieve.)<br>One fractured face                |                        |  | 75   | --   | 90   |                  |          |
| Los Angeles Rattler (% max.)<br>Loss at 100 rev.<br>Loss at 500 rev.  | CT 211                 |  | 12<br>45   | --<br>50   | 12<br>40   |                  |          |
| Fine aggregate angularity (% min.)  | AASHTO T 304, Method A |  | 45   | 45   | 45   | CT 125           |          |
| Flat and elongated particle (% max. by weight @ 5:1)  | ASTM D 4791            |  | Report only  | Report only  | Report only  | CT 125           |          |
| Voids filled with asphalt (%) <sup>i</sup><br>No. 4 grading<br>3/8" grading<br>1/2" grading<br>3/4" grading       | LP-3                   |  | 76.0 – 80.0<br>73.0 – 76.0<br>65.0 – 75.0<br>65.0 – 75.0 | 76.0 – 80.0<br>73.0 – 76.0<br>65.0 – 75.0<br>65.0 – 75.0 | Report only  | LP-3             |          |
| Voids in mineral aggregate (% min.) <sup>i</sup><br>No. 4 grading<br>3/8" grading<br>1/2" grading<br>3/4" grading | LP-2                   |  | 17.0<br>15.0<br>14.0<br>13.0                             | 17.0<br>15.0<br>14.0<br>13.0                             | --<br>--<br>18.0 – 23.0 <sup>j</sup><br>18.0 – 23.0 <sup>j</sup> | LP-2             |          |
| Dust proportion <sup>1</sup><br>No. 4 and 3/8" gradings<br>1/2" and 3/4" gradings                                 | LP-4                   |  | 0.9 – 2.0<br>0.6 – 1.3                                   | 0.9 – 2.0<br>0.6 – 1.3                                   | Report only  | LP-4             |          |
| Smoothness  | Section 39-1.12        | --   | 12-foot straight-edge, must-grind, and PI <sub>0</sub>   | 12-foot straight-edge, must-grind, and PI <sub>0</sub>   | 12-foot straight-edge, must-grind, and PI <sub>0</sub>           | --               |          |
| Asphalt rubber binder viscosity @ 350 °F, centipoises   | Section 39-1.02D       | --   | --   | --   | 1,500 – 4,000  | Section 39-1.02D | 24 hours |
| Crumb rubber modifier   | Section 39-1.02D       | --   | --   | --   | Section 39-1.02D   | Section 39-1.02D | 48 hours |

Notes:

<sup>a</sup> Determine combined aggregate gradation containing RAP under Laboratory Procedure LP-9.

<sup>b</sup> The tolerances must comply with the allowable tolerances in Section 39-1.02E, "Aggregate."

<sup>c</sup> Required for HMA Type A, Type B, and RHMA-G if the specified paved thickness is at least 0.15 foot.

<sup>d</sup> Determine maximum theoretical density (California Test 309) at the frequency specified for test maximum density under California Test 375, Part 5 D.

<sup>e</sup> For adjusting the plant controller at the HMA plant.

<sup>f</sup> Report the average of 3 tests from a single split sample.

<sup>g</sup> Modify California Test 304, Part 2.B.2.c: "After compaction in the mechanical compactor, cool to 140 °F ± 5 °F by allowing the briquettes to cool at room temperature for 0.5 hour, then place the briquettes in the oven at 140 °F for a minimum of 2 hours and not more than 3 hours."

<sup>h</sup> Determine the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.

<sup>i</sup> Report only if the adjustment for asphalt binder content target value is less than or equal to ± 0.3 percent from OBC.

<sup>j</sup> Voids in mineral aggregate for RHMA-G must be within this range.

Within the specified reporting time, submit written test results including:

1. Sampling location, quantity, and time
2. Testing results
3. Supporting data and calculations

If test results for any quality characteristic are beyond the action limits in the QCP, take corrective actions. Document the corrective actions taken in the inspection records under Section 39-4.03E, "Records of Inspection and Testing."

Stop production, notify the Engineer in writing, take corrective action, and demonstrate compliance with the specifications before resuming production and placement on the State highway if:

1. A lot's composite quality factor,  $Q_{FC}$ , or an individual quality factor,  $Q_{FCi}$  for  $i = 3, 4, \text{ or } 5$ , is below 0.90 determined under Section 39-4.03F, "Statistical Evaluation"
2. An individual quality factor,  $Q_{FCi}$  for  $i = 1 \text{ or } 2$ , is below 0.75
3. Quality characteristics for which a quality factor,  $Q_{FCi}$ , is not determined has 2 consecutive acceptance or quality control tests not in compliance with the specifications

#### **39-4.03D Charts And Records**

Record sampling and testing results for quality control on forms provided in the "Quality Control Manual for Hot Mix Asphalt," or on forms you submit with the QCP. The QCP must also include form posting locations and submittal times.

Submit quality control test results using the Department's statistical evaluation program, HMAPay, available at

[www.dot.ca.gov/hq/construc/hma/index.htm](http://www.dot.ca.gov/hq/construc/hma/index.htm)

#### **39-4.03E Records Of Inspection And Testing**

During HMA production, submit in writing a daily:

1. HMA Construction Daily Record of Inspection. Also make this record available at the HMA plant and job site each day.
2. HMA Inspection and Testing Summary. Include in the summary:
  - 2.1. Test forms with the testers' signatures and Quality Control Manager's initials.
  - 2.2. Inspection forms with the inspectors' signatures and Quality Control Manager's initials.
  - 2.3. A list and explanation of deviations from the specifications or regular practices.
  - 2.4. A signed statement by the Quality Control Manager that says:

"It is hereby certified that the information contained in this record is accurate, and that information, tests, or calculations documented herein comply with the specifications of the contract and the standards set forth in the testing procedures. Exceptions to this certification are documented as part of this record."

Retain for inspection the records generated as part of quality control including inspection, sampling, and testing for at least 3 years after final acceptance.

### 39-4.03F Statistical Evaluation

#### General

Determine a lot's composite quality factor,  $QF_C$ , and the individual quality factors,  $QF_{QC_i}$ . Perform statistical evaluation calculations to determine these quality factors based on quality control test results for:

1. Aggregate gradation
2. Asphalt binder content
3. Percent of maximum theoretical density

The Engineer grants a waiver and you must use 1.0 as the individual quality factor for percent of maximum theoretical density,  $QF_{QCS}$ , for HMA paved in:

1. Areas where the specified paved thickness is less than 0.15 foot
2. Areas where the specified paved thickness is less than 0.20 foot and a 3/4-inch grading is specified and used
3. Dig outs
4. Leveling courses
5. Areas where, in the opinion of the Engineer, compaction or compaction measurement by conventional methods is impeded

#### Statistical Evaluation Calculations

Use the Variability-Unknown / Standard Deviation Method to determine the percentage of a lot not in compliance with the specifications. The number of significant figures used in the calculations must comply with AASHTO R-11, Absolute Method.

Determine the percentage of work not in compliance with the specification limits for each quality characteristic as follows:

1. Calculate the arithmetic mean ( $\bar{X}$ ) of the test values

$$\bar{X} = \frac{\sum x}{n}$$

where:

$x$  = individual test values  
 $n$  = number of test values

2. Calculate the standard deviation

$$s = \sqrt{\frac{n(\sum x^2) - (\sum x)^2}{n(n-1)}}$$

where:

$\sum(x^2)$  = sum of the squares of individual test values  
 $(\sum x)^2$  = sum of the individual test values squared  
 $n$  = number of test values

3. Calculate the upper quality index ( $Q_u$ )

$$Q_u = \frac{USL - \bar{X}}{s}$$

where:

USL = target value plus the production tolerance or upper specification limit  
 $s$  = standard deviation  
 $\bar{X}$  = arithmetic mean

4. Calculate the lower quality index (QL);

$$Q_L = \frac{\bar{X} - LSL}{s}$$

where:

LSL = target value minus production tolerance or lower specification limit  
s = standard deviation  
 $\bar{X}$  = arithmetic mean

5. From the table, Upper Quality Index  $Q_U$  or Lower Quality Index  $Q_L$ , of this Section 39-4.03F, "Statistical Evaluation", determine  $P_U$ ;

where:

$P_U$  = the estimated percentage of work outside the USL.  
 $P_U = 0$ , when USL is not specified.

6. From the table, Upper Quality Index  $Q_U$  or Lower Quality Index  $Q_L$ , of this Section 39-4.03F, "Statistical Evaluation," determine  $P_L$ ;

where:

$P_L$  = the estimated percentage of work outside the LSL.  
 $P_L = 0$ , when LSL is not specified.

7. Calculate the total estimated percentage of work outside the USL and LSL, percent defective

$$\text{Percent defective} = P_U + P_L$$

$P_U$  and  $P_L$  are determined from:

| P <sub>U</sub><br>or<br>P <sub>L</sub> | Upper Quality Index Q <sub>U</sub> or Lower Quality Index Q <sub>L</sub> |      |      |      |      |       |       |       |       |       |       |       |      |
|--|--|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|------|
|  | Sample Size (n)  |      |      |      |      |       |       |       |       |       |       |       |      |
|  | 5  | 6    | 7    | 8    | 9    | 10-11 | 12-14 | 15-17 | 18-22 | 23-29 | 30-42 | 43-66 | >66  |
| 0                                      | 1.72   | 1.88 | 1.99 | 2.07 | 2.13 | 2.20  | 2.28  | 2.34  | 2.39  | 2.44  | 2.48  | 2.51  | 2.56 |
| 1                                      | 1.64   | 1.75 | 1.82 | 1.88 | 1.91 | 1.96  | 2.01  | 2.04  | 2.07  | 2.09  | 2.12  | 2.14  | 2.16 |
| 2                                      | 1.58   | 1.66 | 1.72 | 1.75 | 1.78 | 1.81  | 1.84  | 1.87  | 1.89  | 1.91  | 1.93  | 1.94  | 1.95 |
| 3                                      | 1.52   | 1.59 | 1.63 | 1.66 | 1.68 | 1.71  | 1.73  | 1.75  | 1.76  | 1.78  | 1.79  | 1.80  | 1.81 |
| 4                                      | 1.47   | 1.52 | 1.56 | 1.58 | 1.60 | 1.62  | 1.64  | 1.65  | 1.66  | 1.67  | 1.68  | 1.69  | 1.70 |
| 5                                      | 1.42   | 1.47 | 1.49 | 1.51 | 1.52 | 1.54  | 1.55  | 1.56  | 1.57  | 1.58  | 1.59  | 1.59  | 1.60 |
| 6                                      | 1.38   | 1.41 | 1.43 | 1.45 | 1.46 | 1.47  | 1.48  | 1.49  | 1.50  | 1.50  | 1.51  | 1.51  | 1.52 |
| 7                                      | 1.33   | 1.36 | 1.38 | 1.39 | 1.40 | 1.41  | 1.41  | 1.42  | 1.43  | 1.43  | 1.44  | 1.44  | 1.44 |
| 8                                      | 1.29   | 1.31 | 1.33 | 1.33 | 1.34 | 1.35  | 1.35  | 1.36  | 1.36  | 1.37  | 1.37  | 1.37  | 1.38 |
| 9                                      | 1.25   | 1.27 | 1.28 | 1.28 | 1.29 | 1.29  | 1.30  | 1.30  | 1.30  | 1.31  | 1.31  | 1.31  | 1.31 |
| 10                                     | 1.21   | 1.23 | 1.23 | 1.24 | 1.24 | 1.24  | 1.25  | 1.25  | 1.25  | 1.25  | 1.25  | 1.26  | 1.26 |
| 11                                     | 1.18   | 1.18 | 1.19 | 1.19 | 1.19 | 1.19  | 1.20  | 1.20  | 1.20  | 1.20  | 1.20  | 1.20  | 1.20 |
| 12                                     | 1.14   | 1.14 | 1.15 | 1.15 | 1.15 | 1.15  | 1.15  | 1.15  | 1.15  | 1.15  | 1.15  | 1.15  | 1.15 |
| 13                                     | 1.10   | 1.10 | 1.10 | 1.10 | 1.10 | 1.10  | 1.11  | 1.11  | 1.11  | 1.11  | 1.11  | 1.11  | 1.11 |
| 14                                     | 1.07   | 1.07 | 1.07 | 1.06 | 1.06 | 1.06  | 1.06  | 1.06  | 1.06  | 1.06  | 1.06  | 1.06  | 1.06 |
| 15                                     | 1.03   | 1.03 | 1.03 | 1.03 | 1.02 | 1.02  | 1.02  | 1.02  | 1.02  | 1.02  | 1.02  | 1.02  | 1.02 |
| 16                                     | 1.00   | 0.99 | 0.99 | 0.99 | 0.99 | 0.98  | 0.98  | 0.98  | 0.98  | 0.98  | 0.98  | 0.98  | 0.98 |
| 17                                     | 0.97   | 0.96 | 0.95 | 0.95 | 0.95 | 0.95  | 0.94  | 0.94  | 0.94  | 0.94  | 0.94  | 0.94  | 0.94 |
| 18                                     | 0.93   | 0.92 | 0.92 | 0.92 | 0.91 | 0.91  | 0.91  | 0.91  | 0.90  | 0.90  | 0.90  | 0.90  | 0.90 |
| 19                                     | 0.90   | 0.89 | 0.88 | 0.88 | 0.88 | 0.87  | 0.87  | 0.87  | 0.87  | 0.87  | 0.87  | 0.87  | 0.87 |
| 20                                     | 0.87   | 0.86 | 0.85 | 0.85 | 0.84 | 0.84  | 0.84  | 0.83  | 0.83  | 0.83  | 0.83  | 0.83  | 0.83 |
| 21                                     | 0.84   | 0.82 | 0.82 | 0.81 | 0.81 | 0.81  | 0.80  | 0.80  | 0.80  | 0.80  | 0.80  | 0.80  | 0.79 |
| 22                                     | 0.81   | 0.79 | 0.79 | 0.78 | 0.78 | 0.77  | 0.77  | 0.77  | 0.76  | 0.76  | 0.76  | 0.76  | 0.76 |
| 23                                     | 0.77   | 0.76 | 0.75 | 0.75 | 0.74 | 0.74  | 0.74  | 0.73  | 0.73  | 0.73  | 0.73  | 0.73  | 0.73 |
| 24                                     | 0.74   | 0.73 | 0.72 | 0.72 | 0.71 | 0.71  | 0.70  | 0.70  | 0.70  | 0.70  | 0.70  | 0.70  | 0.70 |
| 25                                     | 0.71   | 0.70 | 0.69 | 0.69 | 0.68 | 0.68  | 0.67  | 0.67  | 0.67  | 0.67  | 0.67  | 0.67  | 0.66 |
| 26                                     | 0.68   | 0.67 | 0.67 | 0.65 | 0.65 | 0.65  | 0.64  | 0.64  | 0.64  | 0.64  | 0.64  | 0.64  | 0.63 |
| 27                                     | 0.65   | 0.64 | 0.63 | 0.62 | 0.62 | 0.62  | 0.61  | 0.61  | 0.61  | 0.61  | 0.61  | 0.61  | 0.60 |
| 28                                     | 0.62   | 0.61 | 0.60 | 0.59 | 0.59 | 0.59  | 0.58  | 0.58  | 0.58  | 0.58  | 0.58  | 0.58  | 0.57 |
| 29                                     | 0.59   | 0.58 | 0.57 | 0.57 | 0.56 | 0.56  | 0.55  | 0.55  | 0.55  | 0.55  | 0.55  | 0.55  | 0.54 |
| 30                                     | 0.56   | 0.55 | 0.54 | 0.54 | 0.53 | 0.53  | 0.52  | 0.52  | 0.52  | 0.52  | 0.52  | 0.52  | 0.52 |
| 31                                     | 0.53   | 0.52 | 0.51 | 0.51 | 0.50 | 0.50  | 0.50  | 0.49  | 0.49  | 0.49  | 0.49  | 0.49  | 0.49 |
| 32                                     | 0.50   | 0.49 | 0.48 | 0.48 | 0.48 | 0.47  | 0.47  | 0.47  | 0.46  | 0.46  | 0.46  | 0.46  | 0.46 |
| 33                                     | 0.47   | 0.48 | 0.45 | 0.45 | 0.45 | 0.44  | 0.44  | 0.44  | 0.44  | 0.43  | 0.43  | 0.43  | 0.43 |
| 34                                     | 0.45   | 0.43 | 0.43 | 0.42 | 0.42 | 0.42  | 0.41  | 0.41  | 0.41  | 0.41  | 0.41  | 0.41  | 0.40 |
| 35                                     | 0.42   | 0.40 | 0.40 | 0.39 | 0.39 | 0.39  | 0.38  | 0.38  | 0.38  | 0.38  | 0.38  | 0.38  | 0.38 |
| 36                                     | 0.39   | 0.38 | 0.37 | 0.37 | 0.36 | 0.36  | 0.36  | 0.36  | 0.36  | 0.36  | 0.36  | 0.36  | 0.36 |
| 37                                     | 0.36   | 0.35 | 0.34 | 0.34 | 0.34 | 0.33  | 0.33  | 0.33  | 0.33  | 0.33  | 0.33  | 0.33  | 0.32 |
| 38                                     | 0.33   | 0.32 | 0.32 | 0.31 | 0.31 | 0.31  | 0.30  | 0.30  | 0.30  | 0.30  | 0.30  | 0.30  | 0.30 |
| 39                                     | 0.30   | 0.30 | 0.29 | 0.28 | 0.28 | 0.28  | 0.28  | 0.28  | 0.28  | 0.28  | 0.28  | 0.28  | 0.28 |
| 40                                     | 0.28   | 0.25 | 0.25 | 0.25 | 0.25 | 0.25  | 0.25  | 0.25  | 0.25  | 0.25  | 0.25  | 0.25  | 0.25 |
| 41                                     | 0.25   | 0.23 | 0.23 | 0.23 | 0.23 | 0.23  | 0.23  | 0.23  | 0.23  | 0.23  | 0.23  | 0.23  | 0.23 |
| 42                                     | 0.23   | 0.20 | 0.20 | 0.20 | 0.20 | 0.20  | 0.20  | 0.20  | 0.20  | 0.20  | 0.20  | 0.20  | 0.20 |
| 43                                     | 0.18   | 0.18 | 0.18 | 0.18 | 0.18 | 0.18  | 0.18  | 0.18  | 0.18  | 0.18  | 0.18  | 0.18  | 0.18 |
| 44                                     | 0.16   | 0.15 | 0.15 | 0.15 | 0.15 | 0.15  | 0.15  | 0.15  | 0.15  | 0.15  | 0.15  | 0.15  | 0.15 |
| 45                                     | 0.13   | 0.13 | 0.13 | 0.13 | 0.13 | 0.13  | 0.13  | 0.13  | 0.13  | 0.13  | 0.13  | 0.13  | 0.13 |
| 46                                     | 0.10   | 0.10 | 0.10 | 0.10 | 0.10 | 0.10  | 0.10  | 0.10  | 0.10  | 0.10  | 0.10  | 0.10  | 0.10 |
| 47                                     | 0.08   | 0.08 | 0.08 | 0.08 | 0.08 | 0.08  | 0.08  | 0.08  | 0.08  | 0.08  | 0.08  | 0.08  | 0.08 |
| 48                                     | 0.05   | 0.05 | 0.05 | 0.05 | 0.05 | 0.05  | 0.05  | 0.05  | 0.05  | 0.05  | 0.05  | 0.05  | 0.05 |
| 49                                     | 0.03   | 0.03 | 0.03 | 0.03 | 0.03 | 0.03  | 0.03  | 0.03  | 0.03  | 0.03  | 0.03  | 0.03  | 0.03 |
| 50                                     | 0.00   | 0.00 | 0.00 | 0.00 | 0.00 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00 |

1. If the value of Q<sub>U</sub> or Q<sub>L</sub> does not correspond to a value in the table, use the next lower value.
2. If Q<sub>U</sub> or Q<sub>L</sub> are negative values, P<sub>U</sub> or P<sub>L</sub> is equal to 100 minus the table value for P<sub>U</sub> or P<sub>L</sub>.

### Quality Factor Determination

Determine individual quality factors,  $QF_{QC_i}$ , using percent defective =  $P_U + P_L$  and:

| Quality Factor | Quality Factors                                     |    |    |    |    |       |       |       |       |       |       |       |     |
|----------------|---|----|----|----|----|-------|-------|-------|-------|-------|-------|-------|-----|
|                | Maximum Allowable Percent Defective ( $P_U + P_L$ ) |    |    |    |    |       |       |       |       |       |       |       |     |
|                | Sample Size (n)                                     |    |    |    |    |       |       |       |       |       |       |       |     |
|                | 5   | 6  | 7  | 8  | 9  | 10-11 | 12-14 | 15-17 | 18-22 | 23-29 | 30-42 | 43-66 | >66 |
| 1.05           |   |    |    | 0  | 0  | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0   |
| 1.04           |   |    | 0  | 1  | 3  | 5     | 4     | 4     | 4     | 3     | 3     | 3     | 3   |
| 1.03           |   | 0  | 2  | 4  | 6  | 8     | 7     | 7     | 6     | 5     | 5     | 4     | 4   |
| 1.02           |   | 1  | 3  | 6  | 9  | 11    | 10    | 9     | 8     | 7     | 7     | 6     | 6   |
| 1.01           | 0   | 2  | 5  | 8  | 11 | 13    | 12    | 11    | 10    | 9     | 8     | 8     | 7   |
| 1.00           | 22  | 20 | 18 | 17 | 16 | 15    | 14    | 13    | 12    | 11    | 10    | 9     | 8   |
| 0.99           | 24  | 22 | 20 | 19 | 18 | 17    | 16    | 15    | 14    | 13    | 11    | 10    | 9   |
| 0.98           | 26  | 24 | 22 | 21 | 20 | 19    | 18    | 16    | 15    | 14    | 13    | 12    | 10  |
| 0.97           | 28  | 26 | 24 | 23 | 22 | 21    | 19    | 18    | 17    | 16    | 14    | 13    | 12  |
| 0.96           | 30  | 28 | 26 | 25 | 24 | 22    | 21    | 19    | 18    | 17    | 16    | 14    | 13  |
| 0.95           | 32  | 29 | 28 | 26 | 25 | 24    | 22    | 21    | 20    | 18    | 17    | 16    | 14  |
| 0.94           | 33  | 31 | 29 | 28 | 27 | 25    | 24    | 22    | 21    | 20    | 18    | 17    | 15  |
| 0.93           | 35  | 33 | 31 | 29 | 28 | 27    | 25    | 24    | 22    | 21    | 20    | 18    | 16  |
| 0.92           | 37  | 34 | 32 | 31 | 30 | 28    | 27    | 25    | 24    | 22    | 21    | 19    | 18  |
| 0.91           | 38  | 36 | 34 | 32 | 31 | 30    | 28    | 26    | 25    | 24    | 22    | 21    | 19  |
| 0.90           | 39  | 37 | 35 | 34 | 33 | 31    | 29    | 28    | 26    | 25    | 23    | 22    | 20  |
| 0.89           | 41  | 38 | 37 | 35 | 34 | 32    | 31    | 29    | 28    | 26    | 25    | 23    | 21  |
| 0.88           | 42  | 40 | 38 | 36 | 35 | 34    | 32    | 30    | 29    | 27    | 26    | 24    | 22  |
| 0.87           | 43  | 41 | 39 | 38 | 37 | 35    | 33    | 32    | 30    | 29    | 27    | 25    | 23  |
| 0.86           | 45  | 42 | 41 | 39 | 38 | 36    | 34    | 33    | 31    | 30    | 28    | 26    | 24  |
| 0.85           | 46  | 44 | 42 | 40 | 39 | 38    | 36    | 34    | 33    | 31    | 29    | 28    | 25  |
| 0.84           | 47  | 45 | 43 | 42 | 40 | 39    | 37    | 35    | 34    | 32    | 30    | 29    | 27  |
| 0.83           | 49  | 46 | 44 | 43 | 42 | 40    | 38    | 36    | 35    | 33    | 31    | 30    | 28  |
| 0.82           | 50  | 47 | 46 | 44 | 43 | 41    | 39    | 38    | 36    | 34    | 33    | 31    | 29  |
| 0.81           | 51  | 49 | 47 | 45 | 44 | 42    | 41    | 39    | 37    | 36    | 34    | 32    | 30  |
| 0.80           | 52  | 50 | 48 | 46 | 45 | 44    | 42    | 40    | 38    | 37    | 35    | 33    | 31  |
| 0.79           | 54  | 51 | 49 | 48 | 46 | 45    | 43    | 41    | 39    | 38    | 36    | 34    | 32  |
| 0.78           | 55  | 52 | 50 | 49 | 48 | 46    | 44    | 42    | 41    | 39    | 37    | 35    | 33  |
| 0.77           | 56  | 54 | 52 | 50 | 49 | 47    | 45    | 43    | 42    | 40    | 38    | 36    | 34  |
| 0.76           | 57  | 55 | 53 | 51 | 50 | 48    | 46    | 44    | 43    | 41    | 39    | 37    | 35  |
| 0.75           | 58  | 56 | 54 | 52 | 51 | 49    | 47    | 46    | 44    | 42    | 40    | 38    | 36  |
| Reject         | 60  | 57 | 55 | 53 | 52 | 51    | 48    | 47    | 45    | 43    | 41    | 40    | 37  |
|                | 61  | 58 | 56 | 55 | 53 | 52    | 50    | 48    | 46    | 44    | 43    | 41    | 38  |
|                | 62  | 59 | 57 | 56 | 54 | 53    | 51    | 49    | 47    | 45    | 44    | 42    | 39  |
|                | 63  | 61 | 58 | 57 | 55 | 54    | 52    | 50    | 48    | 47    | 45    | 43    | 40  |
|                | 64  | 62 | 60 | 58 | 57 | 55    | 53    | 51    | 49    | 48    | 46    | 44    | 41  |

Reject Values Greater Than Those Shown Above

Notes:

- To obtain a quality factor when the estimated percent outside specification limits from table, "Upper Quality Index  $Q_U$  or Lower Quality Index  $Q_L$ ," does not correspond to a value in the table, use the next larger value.

Compute the composite of single quality factors,  $QF_C$ , for a lot using:

$$QF_C = \sum_{i=1}^5 w_i QF_{QC_i}$$

where:

- $QF_c$  = the composite quality factor for the lot rounded to 2 decimal places.  
 $QF_{QC_i}$  = the quality factor for the individual quality characteristic.  
 $w$  = the weighting factor listed in the table HMA Acceptance – QC / QA.  
 $i$  = the quality characteristic index number in the table HMA Acceptance – QC / QA.

### 39-4.04 ENGINEER'S QUALITY ASSURANCE

#### 39-4.04A General

The Engineer assures quality by:

1. Reviewing mix designs and proposed JMF
2. Inspecting procedures
3. Conducting oversight of quality control inspection and records
4. Verification sampling and testing during production and paving

#### 39-4.04B Verification Sampling And Testing

##### General

The Engineer samples:

1. Aggregate to verify gradation
2. HMA to verify asphalt binder content

##### Verification

For aggregate gradation and asphalt binder content, the ratio of verification testing frequency to the minimum quality control testing frequency is 1:5. The Engineer performs at least 3 verification tests per lot.

Using the t-test, the Engineer compares quality control tests results for aggregate gradation and asphalt binder content with corresponding verification test results. The Engineer uses the average and standard deviation of up to 20 sequential sublots for the comparison. The Engineer uses production start-up evaluation tests to represent the first sublot. When there are less than 20 sequential sublots, the Engineer uses the maximum number of sequential sublots available. The 21st sublot becomes the 1st sublot ( $n = 1$ ) in the next lot.

The t-value for a group of test data is computed as follows:

$$t = \frac{|\bar{X}_c - \bar{X}_v|}{S_p \sqrt{\frac{1}{n_c} + \frac{1}{n_v}}} \quad \text{and} \quad S_p^2 = \frac{S_c^2(n_c - 1) + S_v^2(n_v - 1)}{n_c + n_v - 2}$$

where:

- $n_c$  = Number of quality control tests (2 minimum, 20 maximum).  
 $n_v$  = Number of verification tests (minimum of 1 required).  
 $\bar{X}_c$  = Mean of quality control tests.  
 $\bar{X}_v$  = Mean of verification tests.  
 $S_p$  = Pooled standard deviation (When  $n_v = 1$ ,  $S_p = S_c$ ).  
 $S_c$  = Standard deviation of quality control tests.  
 $S_v$  = Standard deviation of verification tests (when  $n_v > 1$ ).

The comparison of quality control test results and the verification test results is at a level of significance of  $\alpha = 0.025$ . The Engineer computes t and compares it to the critical t-value,  $t_{crit}$ , from:

**Critical T-Value**

| Degrees of freedom<br>( $n_c+n_v-2$ ) | $t_{crit}$<br>(for $\alpha = 0.025$ ) | Degrees of freedom<br>( $n_c+n_v-2$ ) | $t_{crit}$<br>(for $\alpha = 0.025$ ) |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| 1                                     | 24.452                                | 18                                    | 2.445                                 |
| 2                                     | 6.205                                 | 19                                    | 2.433                                 |
| 3                                     | 4.177                                 | 20                                    | 2.423                                 |
| 4                                     | 3.495                                 | 21                                    | 2.414                                 |
| 5                                     | 3.163                                 | 22                                    | 2.405                                 |
| 6                                     | 2.969                                 | 23                                    | 2.398                                 |
| 7                                     | 2.841                                 | 24                                    | 2.391                                 |
| 8                                     | 2.752                                 | 25                                    | 2.385                                 |
| 9                                     | 2.685                                 | 26                                    | 2.379                                 |
| 10                                    | 2.634                                 | 27                                    | 2.373                                 |
| 11                                    | 2.593                                 | 28                                    | 2.368                                 |
| 12                                    | 2.560                                 | 29                                    | 2.364                                 |
| 13                                    | 2.533                                 | 30                                    | 2.360                                 |
| 14                                    | 2.510                                 | 40                                    | 2.329                                 |
| 15                                    | 2.490                                 | 60                                    | 2.299                                 |
| 16                                    | 2.473                                 | 120                                   | 2.270                                 |
| 17                                    | 2.458                                 | $\infty$                              | 2.241                                 |

If the t-value computed is less than or equal to  $t_{crit}$ , quality control test results are verified.

If the t-value computed is greater than  $t_{crit}$  and both  $\bar{X}_v$  and  $\bar{X}_c$  comply with acceptance specifications, the quality control tests are verified. You may continue to produce and place HMA with the following allowable differences:

1.  $|\bar{X}_v - \bar{X}_c| \leq 1.0$  percent for any grading
2.  $|\bar{X}_v - \bar{X}_c| \leq 0.1$  percent for asphalt binder content

If the t-value computed is greater than  $t_{crit}$  and the  $|\bar{X}_v - \bar{X}_c|$  for grading and asphalt binder content are greater than the allowable differences, quality control test results are not verified and:

1. The Engineer notifies you in writing.
2. You and the Engineer must investigate why the difference exist.
3. If the reason for the difference cannot be found and corrected, the Engineer's test results are used for acceptance and pay.

**39-4.05 ENGINEER'S ACCEPTANCE**

**39-4.05A Testing**

The Engineer samples for acceptance testing and tests for:

**HMA Acceptance – QC / QA**

| Index (i) | Quality Characteristic                                     |                |      |      | Weight -ing Factor (w) | Test Method            | HMA Type                     |             |                   |
|-----------|--|----------------|------|------|------------------------|------------------------|------------------------------|-------------|-------------------|
|           |  |                |      |      |                        |                        | A                            | B           | RHMA-G            |
|           | Aggregate gradation <sup>a</sup>                           |                |      |      |                        | CT 202                 | JMF ± Tolerance <sup>c</sup> |             |                   |
|           | Sieve  | 3/4"           | 1/2" | 3/8" |                        |                        |                              |             |                   |
| 1         | 1/2"   | X <sup>b</sup> | --   | --   | 0.05                   |                        |                              |             |                   |
| 1         | 3/8"   | --             | X    | --   | 0.05                   |                        |                              |             |                   |
| 1         | No. 4  | --             | --   | X    | 0.05                   |                        |                              |             |                   |
| 2         | No. 8  | X              | X    | X    | 0.10                   |                        |                              |             |                   |
| 3         | No. 200  | X              | X    | X    | 0.15                   |                        |                              |             |                   |
| 4         | Asphalt binder content (%)                                 |                |      |      | 0.30                   | CT 379 or 382          | JMF ± 0.45                   | JMF ± 0.45  | JMF ± 0.5         |
| 5         | Percent of maximum theoretical density (%) <sup>d, e</sup> |                |      |      | 0.40                   | CT 375                 | 92 – 96                      | 92 – 96     | 91 – 96           |
|           | Sand equivalent (min.) <sup>f</sup>                        |                |      |      |                        | CT 217                 | 47                           | 42          | 47                |
|           | Stabilometer value (min.) <sup>f, g</sup>                  |                |      |      |                        | CT 366                 |                              |             |                   |
|           | No. 4 and 3/8" gradings                                    |                |      |      |                        |                        | 30                           | 30          | --                |
|           | 1/2" and 3/4" gradings                                     |                |      |      |                        |                        | 37                           | 35          | 23                |
|           | Air voids content (%) <sup>f, h</sup>                      |                |      |      |                        | CT 367                 | 4 ± 2                        | 4 ± 2       | Specification ± 2 |
|           | Percent of crushed particles coarse aggregate (% min.)     |                |      |      |                        | CT 205                 |                              |             |                   |
|           | One fractured face   |                |      |      |                        |                        | 90                           | 25          | --                |
|           | Two fractured faces  |                |      |      |                        |                        | 70                           | --          | 90                |
|           | Fine aggregate (% min)                                     |                |      |      |                        |                        |                              |             |                   |
|           | (Passing No. 4 sieve and retained on No. 8 sieve.)         |                |      |      |                        |                        |                              |             |                   |
|           | One fractured face   |                |      |      |                        |                        | 70                           | 20          | 70                |
|           | HMA moisture content (% max.)                              |                |      |      |                        | CT 226 or CT 370       | 1.0                          | 1.0         | 1.0               |
|           | Los Angeles Rattler (% max.)                               |                |      |      |                        | CT 211                 |                              |             |                   |
|           | Loss at 100 rev.   |                |      |      |                        |                        | 12                           | --          | 12                |
|           | Loss at 500 rev.   |                |      |      |                        |                        | 45                           | 50          | 45                |
|           | Fine aggregate angularity (% min.)                         |                |      |      |                        | AASHTO T 304, Method A | 45                           | 45          | 45                |
|           | Flat and elongated particle (% max. by weight @ 5:1)       |                |      |      |                        | ASTM D 4791            | Report only                  | Report only | Report only       |
|           | Voids in mineral aggregate (% min.) <sup>1</sup>           |                |      |      |                        |                        |                              |             | (Note j)          |
|           | No. 4 grading  |                |      |      |                        |                        | 17.0                         | 17.0        | --                |
|           | 3/8" grading   |                |      |      |                        | LP-2                   | 15.0                         | 15.0        | --                |
|           | 1/2" grading   |                |      |      |                        |                        | 14.0                         | 14.0        | 18.0 - 23.0       |
|           | 3/4" grading   |                |      |      |                        |                        | 13.0                         | 13.0        | 18.0 - 23.0       |
|           | Voids filled with asphalt (%) <sup>1</sup>                 |                |      |      |                        |                        |                              |             |                   |
|           | No. 4 grading  |                |      |      |                        | LP-3                   | 76.0 - 80.0                  | 76.0 - 80.0 | Report only       |
|           | 3/8" grading   |                |      |      |                        |                        | 73.0 - 76.0                  | 73.0 - 76.0 |                   |
|           | 1/2" grading   |                |      |      |                        |                        | 65.0 - 75.0                  | 65.0 - 75.0 |                   |
|           | 3/4" grading   |                |      |      |                        |                        | 65.0 - 75.0                  | 65.0 - 75.0 |                   |
|           | Dust proportion <sup>1</sup>                               |                |      |      |                        | LP-4                   |                              |             |                   |
|           | No. 4 and 3/8" gradings                                    |                |      |      |                        |                        | 0.9 - 2.0                    | 0.9 - 2.0   | Report only       |
|           | 1/2" and 3/4" gradings                                     |                |      |      |                        |                        | 0.6 - 1.3                    | 0.6 - 1.3   |                   |

|  |                       |  |                 |  |  |  |
|--|-----------------------|--|-----------------|--|--|--|
|  | Smoothness            |  | Section 39-1.12 | 12-foot straight-edge, must-grind, and PI <sub>0</sub> | 12-foot straight-edge, must-grind, and PI <sub>0</sub> | 12-foot straight-edge, must-grind, and PI <sub>0</sub> |
|  | Asphalt binder        |  | Various         | Section 92   | Section 92   | Section 92   |
|  | Asphalt rubber binder |  | Various         | --   | --   | Section 92-1.02(C) and Section 39-1.02D                |
|  | Asphalt modifier      |  | Various         | --   | --   | Section 39-1.02D                                       |
|  | Crumb rubber modifier |  | Various         | --   | --   | Section 39-1.02D                                       |

Notes:

<sup>a</sup> The Engineer determines combined aggregate gradations containing RAP under Laboratory Procedure LP-9.

<sup>b</sup> "X" denotes the sieves the Engineer considers for the specified aggregate gradation.

<sup>c</sup> The tolerances must comply with the allowable tolerances in Section 39-1.02E, "Aggregate."

<sup>d</sup> The Engineer determines percent of maximum theoretical density if the specified paved thickness is at least 0.15 foot under California Test 375 except the Engineer uses:

1. California Test 308, Method A, to determine in-place density of each density core instead of using the nuclear gauge in Part 4, "Determining In-Place Density By The Nuclear Density Device."
2. California Test 309 to determine maximum theoretical density instead of calculating test maximum density in Part 5, "Determining Test Maximum Density."

<sup>e</sup> The Engineer determines maximum theoretical density (California Test 309) at the frequency specified for Test Maximum Density under California Test 375, Part 5.D.

<sup>f</sup> The Engineer reports the average of 3 tests from a single split sample.

<sup>g</sup> Modify California Test 304, Part 2.B.2.c: "After compaction in the mechanical compactor, cool to 140 °F ± 5 °F by allowing the briquettes to cool at room temperature for 0.5 hour, then place the briquettes in the oven at 140 °F for a minimum of 2 hours and not more than 3 hours."

<sup>h</sup> The Engineer determines the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.

<sup>i</sup> Report only if the adjustment for asphalt binder content target value is less than or equal to ± 0.3 percent from OBC.

<sup>j</sup> Voids in mineral aggregate for RHMA-G must be within this range.

The Engineer determines the percent of maximum theoretical density from the average density of 3 density cores you take from every 750 tons of production or part thereof divided by the maximum theoretical density.

If the specified total paved thickness is at least 0.15 foot and any layer is less than 0.15 foot, the Engineer determines the percent of maximum theoretical density from density cores taken from the final layer measured the full depth of the total paved HMA thickness.

The Engineer stops production and terminates a lot if:

1. The lot's composite quality factor, Q<sub>FC</sub>, or an individual quality factor, QF<sub>QC<sub>i</sub></sub> for i = 3, 4, or 5, is below 0.90 determined under Section 39-4.03F, "Statistical Evaluation"
2. An individual quality factor, QF<sub>QC<sub>i</sub></sub> for i = 1 or 2, is below 0.75
3. Quality characteristics for which a quality factor, QF<sub>QC<sub>i</sub></sub>, is not determined has 2 consecutive acceptance or quality control tests not in compliance with the specifications

For any single quality characteristic for which a quality factor, QF<sub>QC<sub>i</sub></sub>, is not determined, except smoothness, if 2 consecutive acceptance test results do not comply with specifications:

1. Stop production.
2. Take corrective action.

3. In the Engineer's presence, take samples and split each sample into 4 parts. Test 1 part for compliance with the specifications and submit 3 parts to the Engineer. The Engineer tests 1 part for compliance with the specifications and reserves and stores 2 parts.
4. Demonstrate compliance with the specifications before resuming production and placement on the State highway.

### 39-4.05B Statistical Evaluation, Determination Of Quality Factors And Acceptance

#### Statistical Evaluation and Determination of Quality Factors

To determine the individual quality factor,  $QF_{QC_i}$ , for any quality factor  $i = 1$  through 5 or a lot's composite quality factor,  $QF_C$ , for acceptance and payment adjustment, the Engineer uses the evaluation specifications under Section 39-4.03F, "Statistical Evaluation," and:

1. Verified quality control test results for aggregate gradation
2. Verified quality control test results for asphalt binder content
3. The Engineer's test results for percent of maximum theoretical density

#### Lot Acceptance Based on Quality Factors

The Engineer accepts a lot based on the quality factors determined for aggregate gradation and asphalt binder content,  $QF_{QC_i}$  for  $i = 1$  through 4, using the total number of verified quality control test result values and the total percent defective ( $P_U + P_L$ ).

The Engineer accepts a lot based on the quality factor determined for maximum theoretical density,  $QF_{QC_5}$ , using the total number of test result values from density cores and the total percent defective ( $P_U + P_L$ ).

The Engineer calculates the quality factor for the lot,  $QF_C$ , which is a composite of weighted individual quality factors,  $QF_{QC_i}$ , determined for each quality characteristic in the HMA Acceptance – QC / QA table in Section 39-4.05A, "Testing."

The Engineer accepts a lot based on quality factors if:

1. The current composite quality factor,  $QF_C$ , is 0.90 or greater
2. Each individual quality factor,  $QF_{QC_i}$  for  $i = 3, 4,$  and  $5,$  is 0.90 or greater
3. Each individual quality factor,  $QF_{QC_i}$  for  $i = 1$  and  $2,$  is 0.75 or greater

No single quality characteristic test may represent more than the smaller of 750 tons or 1 day's production.

#### Payment Adjustment

If a lot is accepted, the Engineer adjusts payment with the following formula:

$$PA = \sum_{i=1}^n HMA CP * w_i * [QF_{QC_i} * (HMATT - WHMATT_i) + WHMATT_i] - (HMA CP * HMATT)$$

where:

|               |   |
|---------------|---|
| $PA =$        | Payment adjustment rounded to 2 decimal places.   |
| $HMA CP =$    | HMA contract price.   |
| $HMATT =$     | HMA total tons represented in the lot.  |
| $WHMATT_i =$  | Total tons of waived quality characteristic HMA.  |
| $QF_{QC_i} =$ | Running quality factor for the individual quality characteristic.<br>$QF_{QC_i}$ for $i = 1$ through 4 must be from verified Contractor's QC results. $QF_{QC_5}$ must be determined from the Engineer's results on density cores taken for percent of maximum theoretical density determination. |
| $w =$         | Weighting factor listed in the HMA acceptance table.  |
| $i =$         | Quality characteristic index number in the HMA acceptance table.  |

If the payment adjustment is a negative value, the Engineer deducts this amount from payment. If the payment adjustment is a positive value, the Engineer adds this amount to payment.

The 21st subplot becomes the 1st subplot ( $n = 1$ ) in the next lot. When the 21st sequential subplot becomes the 1st subplot, the previous 20 sequential sublots become a lot for which the Engineer determines a quality factor. The Engineer uses this quality factor to pay for the HMA in the lot. If the next lot consists of less than 8 sublots, these sublots must be added to the previous lot for quality factor determination using 21 to 27 sublots.

### **39-4.05C Dispute Resolution**

For a lot, if you or the Engineer dispute any quality factor,  $QF_{QCi}$ , or verification test result, every subplot in that lot must be retested.

Referee tests must be performed under the specifications for acceptance testing.

Any quality factor,  $QF_{QCi}$ , must be determined using the referee tests.

For any quality factor,  $QF_{QCi}$ , for  $i = 1$  through 5, dispute resolution:

1. If the difference between the quality factors for  $QF_{QCi}$  using the referee test result and the disputed test result is less than or equal to 0.01, the original test result is correct.
2. If the difference between the quality factor for  $QF_{QCi}$  using the referee test result and the disputed test result is more than 0.01, the quality factor determined from the referee tests supersedes the previously determined quality factor.

## **39-5 MEASUREMENT AND PAYMENT**

### **39-5.01 MEASUREMENT**

The contract item for HMA is measured by weight. The weight of each HMA mixture designated in the Engineer's Estimate must be the combined mixture weight.

If tack coat, asphalt binder, and asphaltic emulsion are paid with separate contract items, their contract items are measured under Section 92, "Asphalts," or Section 94, "Asphaltic Emulsions," as the case may be.

If recorded batch weights are printed automatically, the contract item for HMA is measured by using the printed batch weights, provided:

1. Total aggregate and supplemental fine aggregate weight per batch is printed. If supplemental fine aggregate is weighed cumulatively with the aggregate, the total aggregate batch weight must include the supplemental fine aggregate weight.
2. Total asphalt binder weight per batch is printed.
3. Each truckload's zero tolerance weight is printed before weighing the first batch and after weighing the last batch.
4. Time, date, mix number, load number and truck identification is correlated with a load slip.
5. A copy of the recorded batch weights is certified by a licensed weighmaster and submitted to the Engineer.

The contract item for placing HMA dike is measured by the linear foot along the completed length. The contract item for placing HMA in miscellaneous areas is measured as the in-place compacted area in square yards. In addition to the quantities measured on a linear foot or square yard basis, the HMA for dike and miscellaneous areas are measured by weight.

The contract item for geosynthetic pavement interlayer is measured by the square yard for the actual pavement area covered.

### **39-5.02 PAYMENT**

The contract prices paid per ton for hot mix asphalt as designated in the Engineer's Estimate include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all the work involved in constructing hot mix asphalt, complete in place, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

If HMA is specified to comply with Section 39-4, "Quality Control / Quality Assurance," the Engineer adjusts payment under that section.

Full compensation for the Quality Control Plan and prepaving conference is included in the contract prices paid per ton for hot mix asphalt as designated in the Engineer's Estimate and no additional compensation will be allowed therefor.

Full compensation for performing and submitting mix designs and for Contractor sampling, testing, inspection, testing facilities, and preparation and submittal of results is included in the contract prices paid per ton for HMA as designated in the Engineer's Estimate and no additional compensation will be allowed therefor.

Full compensation for reclaimed asphalt pavement is included in the contract prices paid per ton for HMA as designated in the Engineer's Estimate and no additional compensation will be allowed therefor.

The contract price paid per ton for hot mix asphalt (leveling) includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all the work involved in hot mix asphalt (leveling), complete in place, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

The State pays for HMA dike at the contract price per linear foot for place HMA dike and by the ton for HMA. The contract prices paid per linear foot for place hot mix asphalt dike as designated in the Engineer's Estimate include full compensation for furnishing all labor, tools, equipment, and incidentals, and for doing all the work involved in placing HMA dike, complete in place, including excavation, backfill, and preparation of the area to receive the dike, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.









**In Section 51-1.12F in the 6th paragraph, replace the table with:**

| Movement Rating (MR)     | Seal Type   |
|--------------------------|---|
| MR ≤ 1 inch              | Type A or Type B                                    |
| 1 inch < MR ≤ 2 inches   | Type B  |
| 2 inches < MR ≤ 4 inches | Joint Seal Assembly (Strip Seal)                    |
| MR > 4 inches            | Joint Seal Assembly (Modular Unit) or Seismic Joint |

**In Section 51-1.12F(3)(a) replace the 1st and 2nd paragraphs with:**

The sealant must consist of a 2-component silicone sealant that will withstand up to ±50 percent movement. Silicone sealants must be tested under California Test 435 and must comply with the following:

| Specification   | Requirement                               |
|---|---|
| Modulus at 150 percent elongation                                     | 8-75 psi                                  |
| Recovery  | 21/32 inch max.                           |
| Notch Test  | Notched or loss of bond 1/4 inch, max.    |
| Water Resistance  | Notched or loss of bond 1/4 inch, max.    |
| Ultraviolet Exposure<br>ASTM Designation: G 154, Table X2.1, Cycle 2. | No more than slight checking or cracking. |
| Cone Penetration  | 4.5-12.0 mm                               |

**In Section 51-1.12F(3)(a) delete the 3rd and 8th paragraphs.**

**In Section 51-1.12F(3)(a) replace the 10th paragraph with:**

A Certificate of Compliance accompanied by a certified test report must be furnished for each batch of silicone sealant in conformance with the provisions in Section 6-1.07, "Certificates of Compliance."

**In Section 51-1.12F(3)(b) replace the 2nd paragraph with:**

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

1. The seal must consist of a multichannel, nonporous, homogeneous material furnished in a finished extruded form.
2. The minimum depth of the seal measured at the contact surface must be at least 95 percent of the minimum uncompressed width of the seal as designated by the manufacturer.
3. When tested in conformance with the requirements in California Test 673 for Type B seals, joint seals must provide a movement rating (MR) of not less than that shown on the plans.
4. The top and bottom edges of the joint seal must maintain continuous contact with the sides of the groove over the entire range of joint movement.
5. The seal must be furnished full length for each joint with no more than 1 shop splice in any 60-foot length of seal.
6. The Contractor must demonstrate the adequacy of the procedures to be used in the work before installing seals in the joints.
7. One field splice per joint may be made at locations and by methods approved by the Engineer. The seals are to be manufactured full length for the intended joint, then cut at the approved splice section and rematched before splicing. The Contractor must submit splicing details prepared by the joint seal manufacturer for approval before beginning splicing work.
8. Shop splices and field splices must have no visible offset of exterior surfaces and must show no evidence of bond failure.
9. At all open ends of the seal that would admit water or debris, each cell must be filled to a depth of 3 inches with commercial quality open cell polyurethane foam or closed by other means subject to approval by the Engineer.

**In Section 51-1.12F(3)(b) replace the 7th paragraph with:**

The joint seal must be installed full length for each joint with equipment that does not twist or distort the seal, elongate the seal longitudinally, or otherwise cause damage to the seal or to the concrete forming the groove.

**In Section 51-1.12F(3)(b) in the 11th paragraph, replace the 1st sentence with:**

Samples of the prefabricated joint seals, not less than 3 feet in length, will be taken by the Engineer from each lot of material.

**In Section 51-1.12H(1) in the 6th paragraph, replace the 4th and 5th sentences with:**

Each ply of fabric shall have a breaking strength of not less than 800 pounds per inch of width in each thread direction when 3" x 36" samples are tested on split drum grips. The bond between double plies shall have a minimum peel strength of 20 pounds per inch.

**In Section 51-1.12H(1) in the 8th paragraph in the table, replace the hardness (Type A) requirements with:**

|                   |                       |       |
|-------------------|-----------------------|-------|
| Hardness (Type A) | D 2240 with 2kg mass. | 55 ±5 |
|-------------------|-----------------------|-------|

**In Section 51-1.12H(2) in the 1st paragraph in item A, replace the 1st and 2nd sentences with:**

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 0.075 inch (14 gage).

**In Section 51-1.135 replace the 1st paragraph with:**

Mortar shall be composed of cementitious material, sand, and water proportioned and mixed as specified in this Section 51-1.135.

**In Section 51-1.135 replace the 3rd paragraph with:**

The proportion of cementitious material to sand, measured by volume, shall be 1 to 2 unless otherwise specified.

**In Section 51-1.17 in 4th paragraph, replace the 3rd sentence with:**

The surfaces shall have a profile trace showing no high points in excess of 0.25 inch, and the portions of the surfaces within the traveled way shall have a profile count of 5 or less in any 100 foot section.

**Add:**

**51-1.17A Deck Crack Treatment**

The Contractor shall use all means necessary to minimize the development of shrinkage cracks.

The Contractor shall remove all equipment and materials from the deck and clean the surface as necessary for the Engineer to measure the surface crack intensity. Surface crack intensity will be determined by the Engineer after completion of concrete cure, before prestressing, and before the release of falsework. In any 500 square foot portion of deck within the limits of the new concrete deck, should the intensity of cracking be such that there are more than 16 feet of cracks whose width at any location exceeds 0.02 inch, the deck shall be treated with methacrylate resin. The area of deck to be treated shall have a width that extends for the entire width of new deck inside the concrete barriers and a length that extends at least 5 feet beyond the furthest single continuous crack outside the 500 square foot portion, measured from where that crack exceeds 0.02 inch in width, as determined by the Engineer.

Deck crack treatment shall include furnishing, testing, and application of methacrylate resin and sand. If grinding is required, deck treatment shall take place before grinding.

**51-1.17A(1) Submittals**

Before starting deck treatment, the Contractor shall submit plans in conformance with Section 5-1.02, "Plans and Working Drawings," for the following:

1. Public safety plan for the use of methacrylate resin

2. Placement plan for the construction operation

The plans shall identify materials, equipment, and methods to be used.

The public safety plan for the use of methacrylate resin shall include details for the following:

1. Shipping
2. Storage
3. Handling
4. Disposal of residual methacrylate resin and the containers

The placement plan for construction shall include the following:

1. Schedule of deck treatment for each bridge. The schedule shall be consistent with "Maintaining Traffic" of the special provisions and shall include time for the Engineer to perform California Test 342.
2. Methods and materials to be used, including the following:
  - 2.1. Description of equipment for applying the resin
  - 2.2. Description of equipment for applying the sand
  - 2.3. Gel time range and final cure time for the resin

If the measures proposed in the safety plan are inadequate to provide for public safety associated with the use of methacrylate resin, the Engineer will reject the plan and direct the Contractor to revise the plan. Directions for revisions will be in writing and include detailed comments. The Engineer will notify the Contractor of the approval or rejection of a submitted or revised plan within 15 days of receipt of that plan.

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."

**51-1.17A(2) Materials**

Before using methacrylate resin, a Material Safety Data Sheet shall be submitted for each shipment of resin.

Methacrylate resin shall be low odor and have a high molecular weight. Before adding initiator, the resin shall have a maximum volatile content of 30 percent when tested in conformance with the requirements in ASTM Designation: D 2369, and shall conform to the following:

| PROPERTY   | REQUIREMENT  | TEST METHOD                                     |
|--|--|---|
| * Viscosity  | 25 cP, maximum,<br>(Brookfield RVT<br>with UL adaptor, 50<br>RPM at 77°F | ASTM D 2196                                     |
| * Specific Gravity                                 | 0.90 minimum,<br>at 77°F   | ASTM D 1475                                     |
| * Flash Point                                      | 180°F, minimum   | ASTM D 3278                                     |
| * Vapor Pressure                                   | 1.0 mm Hg,<br>maximum, at 77°F   | ASTM D 323                                      |
| Tack-free Time                                     | 400 minutes,<br>maximum at 25°C  | Specimen prepared<br>per California Test<br>551 |
| PCC Saturated<br>Surface-Dry Bond<br>Strength      | 3.5 MPa, minimum<br>at 24 hours and<br>21±1°C                            | California Test 551                             |
| * Test shall be performed before adding initiator. |  |   |

### **51-1.17A(3) Testing**

The Contractor shall allow 20 days for sampling and testing by the Engineer of the methacrylate resin before proposed use. If bulk resin is to be used, the Contractor shall notify the Engineer in writing at least 15 days before the delivery of the bulk resin to the job site. Bulk resin is any resin stored in containers in excess of 55 gallons.

Before starting production treatment, the Contractor shall treat a test area of approximately 500 square feet that is within the project limits and at a location approved by the Engineer. When available the test area shall be outside of the traveled way. Weather and pavement conditions during the test treatment shall be similar to those expected on the deck. Equipment used for testing shall be similar to those used for deck treating operations.

During test and production deck treatment, test tiles shall be used to evaluate the resin cure time. The Contractor shall coat at least one 4" x 4" commercial quality smooth glazed tile for each batch of methacrylate resin. The coated tile shall be placed adjacent to the corresponding treated area. Sand shall not be applied to the test tiles.

The acceptance criteria for a treated area is as follows:

1. The test tiles are dry to the touch.
2. The treated deck surface is tack free (non-oily).
3. The sand cover adheres and resists brushing by hand.
4. Excess sand has been removed by vacuuming or sweeping.
5. The coefficient of friction is at least 0.35 when tested in conformance with California Test 342.

Deck treatment on the test area shall demonstrate that the methods and materials meet the acceptance criteria and that the production work will be completed within the specified time for maintaining traffic.

If a test or production area fails to meet the acceptance criteria, as determined by the Engineer, the treatment will be rejected, and the treatment shall be removed and replaced until the area complies with the acceptance criteria.

### **51-1.17A(4) Construction**

Equipment shall be fitted with suitable traps, filters, drip pans, or other devices as necessary to prevent oil or other deleterious material from being deposited on the deck.

Before deck treatment with methacrylate resin, the bridge deck surface shall be cleaned by abrasive blasting, and all loose material shall be blown from visible cracks using high-pressure air. Concrete curing seals shall be cleaned from the deck surface to be treated, and the deck shall be dry when blast cleaning is performed. If the deck surface becomes contaminated at any time before placing the resin, the deck surface shall be cleaned by abrasive blasting.

Where abrasive blasting is being performed within 10 feet of a lane occupied by public traffic, the residue including dust shall be removed immediately after contact between the abrasive and the surface being treated. The removal shall be by a vacuum attachment operating concurrently with the abrasive blasting operation.

A compatible promoter/initiator system shall be capable of providing the resin gel time range shown on the placement plan. Gel time shall be adjusted to compensate for the changes in temperature throughout treatment application.

Resin shall be applied by machine and by using a two-part resin system with a promoted resin for one part and an initiated resin for the other part. This two-part resin system shall be combined at equal volumes to the spray bars through separate positive displacement pumps. Combining of the 2 components shall be by either static in-line mixers or by external intersecting spray fans. The pump pressure at the spray bars shall not be great enough to cause appreciable atomization of the resin. Compressed air shall not be used to produce the spray. A shroud shall be used to enclose the spray bar apparatus.

At the Contractor's option, manual application may be used. For manual application, (1) the quantity of resin mixed with promoter and initiator shall be limited to 5 gallons at a time, and (2) the resin shall be distributed by squeegees and brooms within 10 minutes after application.

The Contractor shall apply methacrylate resin only to the specified area. Barriers, railing, joints, and drainage facilities shall be adequately protected to prevent contamination by the treatment material. Contaminated items shall be repaired at the Contractor's expense.

The relative humidity shall be less than 90 percent at the time of treatment. The prepared area shall be dry and the surface temperature shall be at least 50 °F and not more than 100 °F when the resin is applied. The rate of application of promoted/initiated resin shall be approximately 90 square feet per gallon; the exact rate shall be determined by the Engineer.

The deck surfaces to be treated shall be completely covered with resin so the resin penetrates and fills all cracks. The resin shall be applied within 5 minutes after complete mixing. A significant increase in viscosity shall be cause for rejection. Excess material shall be redistributed by squeegees or brooms within 10 minutes after application. For textured deck surfaces, including grooved surfaces, excess material shall be removed from the texture indentations.

After the resin has been applied, at least 20 minutes shall elapse before applying sand. The sand shall be commercial quality dry blast sand. At least 95 percent of the sand shall pass the No. 8 sieve and at least 95 percent shall be retained on



















| Stud Diameter<br>(inches) | Sustained<br>Tension Test<br>Load<br>(pounds) |
|---------------------------|---|
| *3/4                      | 5,000   |
| 5/8                       | 4,100   |
| 1/2                       | 3,200   |
| 3/8                       | 2,100   |
| 1/4                       | 1,000   |

\* Maximum stud diameter permitted for mechanical expansion anchors.

Resin capsule anchors shall, when installed in accordance with the manufacturer's instructions and these specifications and tested in conformance with the requirements in California Test 681, withstand the application of a sustained tension test load of at least the following values for at least 48 hours with a movement not greater than 0.010 inch:

| Stud Diameter<br>(inches) | Sustained<br>Tension Test<br>Load<br>(pounds) |
|---------------------------|---|
| 1-1/4                     | 31,000  |
| 1                         | 17,900  |
| 7/8                       | 14,400  |
| 3/4                       | 5,000   |
| 5/8                       | 4,100   |
| 1/2                       | 3,200   |
| 3/8                       | 2,100   |
| 1/4                       | 1,000   |

At least 25 days before use, the Contractor shall submit one sample of each resin capsule anchor per lot to the Transportation Laboratory for testing. A lot of resin capsule anchors is 100 units, or fraction thereof, of the same brand and product name.

**In Section 75-1.03 replace the 20th paragraph with:**

The Pre-Qualified Products List for concrete anchorage devices has been developed from data previously furnished by suppliers or manufacturers for each type and size. Approval of additional anchorage device types and sizes is contingent upon the Contractor submitting to the Engineer one sample of each type of concrete anchorage device, manufacturer's installation instructions, and certified results of tests, either by a private testing laboratory or the manufacturer, indicating compliance with the above requirements.

**In Section 75-1.03 replace the 24th paragraph with:**

Sealing compound, for caulking and adhesive sealing, shall be a polysulfide or polyurethane material conforming to the requirements in ASTM Designation: C 920, Type S, Grade NS, Class 25, Use O.

**In Section 75-1.035 in the 3rd paragraph, replace the 1st sentence with:**

Cables shall be 3/4 inch preformed, 6 x 19, wire strand core or independent wire rope core (IWRC), galvanized in conformance with the requirements in Federal Specification RR-W-410, right regular lay, manufactured of improved plow steel with a minimum breaking strength of 23 tons.

**In Section 75-1.035 in the 4th paragraph, replace item C with:**

- C. Nuts shall conform to the requirements in ASTM Designation: A 563 including Appendix X1, except lubrication is not required.



**In Section 83-1.02B in the 24th paragraph in the 8th subparagraph, replace the 1st sentence with:**

Anchor cable shall be 3/4 inch preformed, 6 x 19, wire strand core or independent wire rope core (IWRC), galvanized in conformance with the requirements in Federal Specification RR-W-410, right regular lay, manufactured of improved plow steel with a minimum breaking strength of 23 tons.

**In Section 83-1.02E in the 6th paragraph, replace the 2nd sentence with:**

Cable shall be galvanized in conformance with the requirements in Federal Specification RR-W-410.

**In Section 83-1.02I replace the 5th paragraph with:**

Where shown on the plans, cables used in the frame shall be 5/16 inch in diameter, wire rope, with a minimum breaking strength of 5,000 pounds and shall be galvanized in conformance with the requirements in Federal Specification RR-W-410.

**In Section 83-1.02I replace the 14th paragraph with:**

Chain link fabric shall be 11-gage conforming to one of the following:

1. AASHTO Designation: M181, Type I, Class C
2. AASHTO Designation: M181, Type IV, Class A
3. ASTM F 1345, Class 2

**In Section 83-2.02B replace the 14th paragraph with:**

All metal work shall be fabricated in the shop and galvanized after fabrication, 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.

**In Section 83-2.02D(1) replace the 5th paragraph with:**

When concrete barriers are to be constructed on existing structures, the dowels shall be bonded in holes drilled in the existing concrete. Drilling of holes and bonding of dowels shall conform to the following:

1. The bonding materials shall be either magnesium phosphate concrete, modified high alumina based concrete or portland cement based concrete. Magnesium phosphate concrete shall be either single component (water activated) or dual component (with a prepackaged liquid activator). Modified high alumina based concrete and portland cement based concrete shall be water activated. Bonding materials shall conform to the following requirements:

| Property                            | Test Method                | Requirements |
|-------------------------------------|----------------------------|--------------|
| Compressive Strength                |                            |              |
| at 3 hours, MPa                     | California Test 551        | 21 min.      |
| at 24 hours, MPa                    | California Test 551        | 35 min.      |
| Flexure Strength                    |                            |              |
| at 24 hours, MPa                    | California Test 551        | 3.5 min.     |
| Bond Strength: at 24 hours          |                            |              |
| SSD Concrete, MPa                   | California Test 551        | 2.1 min.     |
| Dry Concrete, MPa                   | California Test 551        | 2.8 min.     |
| Water Absorption, %                 | California Test 551        | 10 max.      |
| Abrasion Resistance                 |                            |              |
| at 24 hours, grams                  | California Test 550        | 25 max.      |
| Drying Shrinkage at 4 days, %       | ASTM Designation:<br>C 596 | 0.13 max.    |
| Soluble Chlorides by weight, %      | California Test 422        | 0.05 max.    |
| Water Soluble Sulfates by weight, % | California Test 417        | 0.25 max.    |





**In Section 86-2.07 replace the 5th paragraph with:**

Concrete placed around and under traffic pull boxes as shown on the plans shall be minor concrete conforming to the provisions in Section 90-10, "Minor Concrete."

**In Section 86-2.08A in the table, replace the traffic signal controller cabinet requirements with:**

|                    |                              |     |      |       |   |
|--------------------|------------------------------|-----|------|-------|---|
| Traffic Signal     | Ungrounded Circuit Conductor | Blk | None | CON-1 | 6 |
| Controller Cabinet | Grounded Circuit Conductor   | Wht | None | CON-2 | 6 |

**In Section 86-4.06 in the 1st paragraph, replace the 1st sentence with:**

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" and the "California MUTCD."

**In Section 86-4.07 in the 10th paragraph, replace the 2nd sentence with:**

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" and the "California MUTCD."

**In Section 86-5.01A(5) in section "Elastomeric Sealant" in the 1st paragraph, replace the 2nd sentence with:**

Sealant shall be suitable for use in both hot mix asphalt and portland cement concrete.

**In Section 86-5.01A(5) in section "Asphatic Emulsion Sealant" in the 1st paragraph, replace the 1st sentence with:**

Asphatic emulsion sealant shall conform to the requirements in State Specification 8040-41A-15 and shall be used only for filling slots in hot mix asphalt pavement.

**In Section 86-5.01A(5) in section "Hot-Melt Rubberized Asphalt Sealant" in the 1st paragraph, replace the 3rd sentence with:**

Sealant shall be suitable for use in both hot mix asphalt and portland cement concrete.

**In Section 86-5.01A(5) in section "Hot-Melt Rubberized Asphalt Sealant," replace the 10th paragraph with:**

If hot mix asphalt surfacing is to be placed, the loop conductors shall be installed prior to placing the uppermost layer of hot mix asphalt. The conductors shall be installed, as shown on the plans, in the compacted layer of hot mix asphalt immediately below the uppermost layer. Installation details shall be as shown on the plans, except the sealant shall fill the slot flush to the surface.

**In Section 86-5.01D replace the 1st paragraph with:**

When a foundation for a pressure-sensitive vehicle detector is to be removed, the hole left by removing the detector frame and foundation shall be filled with minor concrete, except the roadway surface shall be reconstructed with material to match existing surfacing. Minor concrete shall conform to the provisions in Section 90-10, "Minor Concrete," except that the concrete shall contain not less than 420 pounds of cementitious material per cubic yard for hot mix asphalt surfaced roadways and not less than 590 pounds of cementitious material per cubic yard for portland cement concrete surfaced roadways.

**In Section 86-8.01 replace the 1st paragraph with:**

The contract lump sum price or prices paid for signal, ramp metering, flashing beacon, lighting, sign illumination, traffic monitoring station, highway advisory radio systems, closed circuit television systems, or combinations thereof; for modifying or removing those systems; for temporary systems; or the lump sum or unit prices paid for various units of those systems; or the lump sum or per foot price paid for conduit of the various sizes, types and installation methods listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in furnishing and installing, modifying, or removing the systems, combinations or units thereof, as shown



| <b>Filter Fabric</b>  |        |               |         |         |
|---|--------|---------------|---------|---------|
| Property  | ASTM   | Specification |         |         |
|   |        | Class A       | Class B | Class C |
| Grab breaking load, 1-inch grip, lb minimum in each direction               | D 4632 | 157           |         |         |
| Apparent elongation, percent minimum in each direction                      | D 4632 | 50            |         |         |
| Hydraulic bursting strength, psi minimum                                    | D 3786 | 210           |         |         |
| Ultraviolet resistance, percent minimum retained grab breaking load, 500 hr | D 4355 | 70            |         |         |
| Permittivity, sec <sup>-1</sup> minimum                                     | D 4491 | 0.5           | 0.2     | 0.1     |
| Apparent opening size, average roll value, U.S. Standard sieve size maximum | D 4751 | 40            | 60      | 70      |

### 88-1.03 DRAINAGE

Geocomposite wall drain must consist of a polymeric core with filter fabric integrally bonded to 1 or both sides of the core creating a stable drainage void.

Filter fabric must comply with Section 88-1.02, "Filtration."

Geocomposite wall drain must comply with:

| <b>Geocomposite Wall Drain</b>  |        |               |
|---|--------|---------------|
| Property  | ASTM   | Specification |
| Thickness with fabric, inches maximum                                 | --     | 2             |
| Transmissivity, gradient = 1.0, normal stress = 5,000 psf, gal/min/ft | D 4716 | 4             |

### 88-1.04 REINFORCEMENT

#### 88-1.04A General

Geosynthetic used for geotechnical subsurface reinforcement must be either of the following:

1. Geotextile
2. Geogrid

Geotextile permittivity must be at least 0.05 sec<sup>-1</sup> determined under ASTM D 4491.

Geogrid must have a regular and defined open area. The open area must be from 50 to 90 percent of the total grid area.

#### 88-1.04B Long Term Design Strength

Long Term Design Strength (LTDS) of geosynthetic reinforcement is the ultimate tensile strength in the primary strength direction divided by reduction factors. Calculate the LTDS from the guidelines in Geosynthetic Research Institute (GRI) Standard Practice GG4a, GRI GG4b, or GRI GT7.

The product of the appropriate reduction factors must be at least 1.30. Determine the reduction factor for creep using a 75-year design life for permanent applications and a 5-year design life for temporary applications. Determine the installation damage reduction factor based on the characteristics of the backfill materials used.

If test data is not available, use default values of reduction factors in the GRI Standard Practice to calculate LTDS.

Submit the LTDS and its supporting calculations at least 15 days before placing geosynthetic reinforcement. Do not install before the Engineer's approval. The LTDS must be signed by an engineer who is registered as a civil engineer in the State.

**88-1.05 WATER POLLUTION CONTROL**

Geosynthetics used for water pollution control must comply with:

**Water Pollution Control Geosynthetics**

| Property  | ASTM   | Application |           |                     |                    |                 |
|---|--------|-------------|-----------|---------------------|--------------------|-----------------|
|   |        | Silt Fence  |           | Sediment Filter Bag | Gravel-Filled Bags | Temporary Cover |
|   |        | Woven       | Non-woven |                     |                    |                 |
| Grab breaking load, 1-inch grip, lb<br>minimum in each direction              | D 4632 | 120         | 120       | 255                 | 205                | 200             |
| Apparent elongation, percent<br>minimum, in each direction                    | D 4632 | 15          | 50        | 50                  | 50                 | 50              |
| Water flow rate, gallons per minute/square foot<br>maximum average roll value | D 4491 | 10 - 50     | 100 - 150 | 80 - 200            | 80 - 150           | 75 - 120        |
| Permittivity, sec <sup>-1</sup><br>minimum                                    | D 4491 | 0.05        | 0.05      | 1.5                 | 1.2                | 0.08            |
| Apparent opening size, U.S. Standard sieve size<br>maximum average roll value | D 4751 | 30          | 30        | 20 - 40             | 40 - 80            | 100             |
| Ultraviolet resistance, percent minimum retained grab breaking load, 500 hr.  | D 4355 | 70          | 70        | 70                  | 70                 | 70              |

**88-1.06 CHANNEL AND SHORE PROTECTION**

Rock slope protection (RSP) fabric must be a permeable, nonwoven, needle-punched geotextile. RSP fabric consists of 1 of the following:

1. Polyester
2. Polypropylene
3. Combined polyester and polypropylene

Polymers must be either virgin compounds or clean reworked material. Do not subject virgin compounds to use or processing other than required for initial manufacture. Clean reworked material must be previously processed material from the processor's own production that has been reground, pelletized, or solvated. RSP fabric must not consist of more than 20 percent by weight of clean reworked material. Do not use recycled materials from either post-consumer or post-industrial sources.

Class 8 or Class 10 RSP fabric must comply with:

**Rock Slope Protection Fabric**

| Property   | ASTM   | Specification |          |
|--|--------|---------------|----------|
|  |        | Class 8       | Class 10 |
| Weight, oz/yd <sup>2</sup><br>minimum  | D 5261 | 7.5           | 9.5      |
| Grab breaking load, lb<br>1-inch grip, min. in each<br>direction                   | D 4632 | 200           | 250      |
| Apparent elongation, percent<br>min., in each direction                            | D 4632 | 50            | 50       |
| Permittivity, sec <sup>-1</sup> ,<br>minimum                                       | D 4491 | 1.0           | 0.70     |
| Apparent opening size, U.S.<br>Standard sieve size<br>minimum and maximum          | D 4751 | 70 - 100      | 70 - 100 |
| Ultraviolet resistance, percent<br>minimum retained grab<br>breaking load, 500 hr. | D4355  | 70            | 70       |

**88-1.07 PAVEMENT INTERLAYER**

**88-1.07A Paving Fabric**

Geosynthetics used for paving fabric must be nonwoven. Paving fabric must comply with:

**Geosynthetic Paving Fabric**

| Property  | ASTM   | Specification |
|---|--------|---------------|
| Mass per unit area, oz/yd <sup>2</sup><br>minimum                 | D 5261 | 4.1           |
| Grab breaking load, lb<br>1-inch grip, minimum, in each direction | D 4632 | 100           |
| Apparent elongation, percent<br>minimum in each direction         | D 4632 | 50            |
| Hydraulic bursting strength, psi<br>minimum                       | D 3786 | 200           |
| Melting point, °F<br>minimum                                      | D 276  | 325           |
| Asphalt retention, gal/yd <sup>2</sup><br>minimum                 | D 6140 | 0.2           |

**88-1.07B Paving Mat**

Geosynthetics used for paving mat must be a nonwoven fiberglass and polyester hybrid material. Paving mat must comply with:

**Geosynthetic Paving Mat**

| Property  | ASTM   | Specification |
|---|--------|---------------|
| Breaking force, lb/2 inches<br>minimum            | D 5035 | 45            |
| Ultimate elongation, percent<br>maximum           | D 5035 | 5             |
| Mass per unit area, oz/ sq yd<br>minimum          | D 5261 | 3.7           |
| Melting point, °F<br>minimum                      | D 276  | 400           |
| Asphalt retention, gal/yd <sup>2</sup><br>minimum | D 6140 | 0.10          |



**Replace Section 90 with:**

**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.

Class 1 concrete shall contain not less than 675 pounds of cementitious material per cubic yard.

Class 2 concrete shall contain not less than 590 pounds of cementitious material per cubic yard.

Class 3 concrete shall contain not less than 505 pounds of cementitious material per cubic yard.

Class 4 concrete shall contain not less than 420 pounds of cementitious material per cubic yard.

Minor concrete shall contain not less than 550 pounds of cementitious material per cubic yard 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 yard of concrete in structures or portions of structures shall conform to the following:

| Use  | Cementitious Material Content<br>(Pounds/CY) |
|--|--|
| Concrete designated by compressive strength:     |  |
| Deck slabs and slab spans of bridges             | 675 min., 800 max.                           |
| Roof sections of exposed top box culverts        | 675 min., 800 max.                           |
| Other portions of structures                     | 590 min., 800 max.                           |
| Concrete not designated by compressive strength: |  |
| Deck slabs and slab spans of bridges             | 675 min.                                     |
| Roof sections of exposed top box culverts        | 675 min.                                     |
| Prestressed members                              | 675 min.                                     |
| Seal courses                                     | 675 min.                                     |
| Other portions of structures                     | 590 min.                                     |
| Concrete for precast members                     | 590 min., 925 max.                           |

Whenever the 28-day compressive strength shown on the plans is greater than 3,600 pounds per square inch, the concrete shall be designated by compressive strength. If the plans show a 28-day compressive strength that is 4,000 pounds per square inch 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 3,600 pounds per square inch 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.

Concrete shall be proportioned to conform to the following shrinkage limitations when tested in conformance with the requirements of AASHTO Designation: T 160, modified as follows:

| Condition            | Maximum Shrinkage of Laboratory Cast<br>Specimens at 28 days Drying (average of 3, %) |
|----------------------|---|
| Paving concrete      | 0.050   |
| Bridge deck concrete | 0.045   |

Note: Shrinkage requirement is waived for concrete that is used for precast elements.

Shrinkage tests shall be either:

- A. Performed by a laboratory accredited to perform AASHTO Designation: T 160, or
- B. Performed by a laboratory that maintains a current rating of 3 or better for the Cement and Concrete Reference Laboratory (CCRL) concrete proficiency sample program.

Laboratory cast specimens shall have a 4" x 4" cross section. Specimens shall be removed from the molds 23 ± 1 hours after mixing the concrete and placed in lime water at 73 ± 3 °F to 7 days age. A comparator reading shall be taken at 7 days

age and recorded as the initial reading. Specimens then shall be stored in a humidity controlled room maintained at  $73 \pm 3$  °F and  $50 \pm 4$  percent relative humidity for the remainder of the test. Subsequent readings shall be taken at 7, 14, 21, and 28 days drying.

Test data verifying conformance to the shrinkage limitations shall be submitted with the mix design. Shrinkage testing data accepted by the Engineer no more than 3 years prior to the first working day of this contract will be acceptable for this entire contract, provided the data was for concrete with similar proportions and the same materials and material sources to be used on this contract. Concrete shall be considered to have similar proportions if, when compared to concrete to be used on this project, no more than 2 mix design elements are varied. Varied mix design elements shall fall within the tolerances in the following table:

| Mix Design Element                          | Tolerance ( $\pm$ ) |
|---|---------------------|
| Water to cementitious material ratio        | 0.03                |
| Total water content                         | 5 %                 |
| Coarse aggregate (weight per cubic yard)    | 10 %                |
| Fine aggregate (weight per cubic yard)      | 10 %                |
| Supplementary cementitious material content | 5 %                 |
| Admixture (as originally dosed)             | 25 %                |

Note: Admixtures must be of the same brand.

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, supplementary cementitious material 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 supplementary cementitious material 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 \$0.25 for each pound of cementitious material, portland cement, or supplementary cementitious material 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 CEMENTITIOUS MATERIALS**

Unless otherwise specified, cementitious material shall be either a combination of Type II or Type V portland cement and a supplementary cementitious material, or a blended cement.

Cementitious materials used in cast-in-place concrete for exposed surfaces of like elements of a structure shall be from the same sources and of the same proportions.

Cementitious materials shall be protected from moisture until used. Sacked cementitious materials shall be piled to permit access for tallying, inspecting, and identifying each shipment.

Facilities shall be provided to ensure that cementitious materials meeting this Section 90-2.01 are kept separate from other cementitious materials. Sampling cementitious materials shall be in conformance with California Test 125.

The Contractor shall furnish a Certificate of Compliance for cementitious materials in conformance with the provisions in Section 6-1.07, "Certificates of Compliance." The Certificate of Compliance shall indicate the source by name and location (including country, state, and city). If cementitious material is delivered directly to the job site, the Certificate of Compliance shall be signed by the cementitious material supplier. If the cementitious material 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.

#### **90-2.01A Cement**

Portland cement shall conform to the requirements in ASTM Designation: C 150 except the  $C_3S$  content of Type II cement shall not exceed 65 percent.

Blended cement shall conform to the requirements for Portland Blast-Furnace Slag Cement, Type IS (MS) or Portland-Pozzolan Cement, Type IP (MS) in AASHTO Designation: M 240 and shall be comprised of an intimate and uniform blend

of Type II or Type V cement and supplementary cementitious material in an amount conforming to the requirements in Section 90-2.01C, "Required Use of Supplementary Cementitious Materials."

In addition, blended cement, Type II portland cement, and Type V portland cement shall conform to the following requirements:

- A. The cement shall not contain more than 0.60-percent by mass of alkalis, calculated as the percentage of Na<sub>2</sub>O plus 0.658 times the percentage of K<sub>2</sub>O, when determined by methods as required in AASHTO Designation: T 105; and
- B. The autoclave expansion shall not exceed 0.50-percent

Type III portland cement shall be used only as specified in the special provisions or with the approval of the Engineer. Type III portland cement shall conform to the additional requirements listed above for Type II portland cement.

#### **90-2.01B Supplementary Cementitious Materials (SCM)**

Fly ash shall conform to the requirements in AASHTO Designation: M 295, Class F, and the following:

- A. Calcium oxide content shall not exceed 10 percent.
- B. The available alkali, 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, as sodium oxide equivalent, shall not exceed 5.0 percent when determined in conformance with the requirements in AASHTO Designation: T 105.
- C. Commingling of fly ash from different sources at uncontrolled ratios is permissible only if the following criteria are satisfied:
  - 1. Sources of fly ash to be commingled shall be on the approved list of materials for use in concrete.
  - 2. Testing of the commingled product is the responsibility of the fly ash supplier.
  - 3. Each fly ash's running average of density shall not differ from any other by more than 0.01-pound per cubic inch at the time of commingling.
  - 4. Each fly ash's running average of loss on ignition shall not differ from any other by more than one percent at the time of commingling.
  - 5. The final product of commingled fly ash shall conform to the requirement in AASHTO Designation: M 295.

Raw or calcined natural pozzolans shall conform to the requirements in AASHTO Designation: M 295, Class N and the following requirements:

- A. Calcium oxide content shall not exceed 10 percent.
- B. The available alkali, 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, as sodium oxide equivalent, shall not exceed 5.0 percent when determined in conformance with the requirements in AASHTO Designation: T 105.

Ground Granulated Blast Furnace Slag (GGBFS) shall conform to the requirements in AASHTO Designation: M 302, Grade 100 or Grade 120.

Silica Fume shall conform to the requirements of AASHTO Designation: M 307, with reduction in mortar expansion of 80 percent, minimum, using the cement from the proposed mix design.

#### **90-2.01C Required Use Of Supplementary Cementitious Materials**

The amount of portland cement and SCM used in portland cement concrete shall conform to the minimum cementitious material content provisions in Section 90-1.01, "Description," or Section 90-4.05, "Optional Use of Chemical Admixtures," and the following:

- A. If a blended cement conforming to the provisions in Section 90-2.01A, "Cement," is used, the minimum amount of SCM incorporated into the cement shall conform to the provisions in this Section 90-2.01C.
- B. Fly ash or natural pozzolan, silica fume, or GGBFS shall not be used with Type IP or Type IS cements.

Use of SCMs shall conform to the following:

- A. If fly ash or natural pozzolan is used:

1. The minimum amount of portland cement shall not be less than 75 percent by weight of the specified minimum cementitious material content.
2. The minimum amount of fly ash or natural pozzolan shall be 25 percent by weight of the total amount of cementitious material.
3. The total amount of fly ash or natural pozzolan shall not exceed 35 percent by weight of the total amount of cementitious material to be used in the mix. If Section 90-1.01, "Description," specifies a maximum cementitious material content in pounds per cubic yard, the total weight of portland cement and fly ash or natural pozzolan per cubic yard shall not exceed the specified maximum cementitious material content.

B. If silica fume is used:

1. The amount of silica fume shall not be less than 10 percent by weight of the total amount of cementitious material.
2. The amount of portland cement shall not be less than 75 percent by weight of the specified minimum cementitious material content.
3. If Section 90-1.01, "Description," specifies a maximum cementitious material content in pounds per cubic yard, the total weight of portland cement and silica fume per cubic yard shall not exceed the specified maximum cementitious material content.

C. If GGBFS is used:

1. The minimum amount of GGBFS shall be either:
  - a. Forty percent of the total cementitious material to be used, if the aggregates used in the concrete are on the Department's list of "Approved Aggregates For Use in Concrete with Reduced Fly Ash."
  - b. No less than 50 percent.
2. The amount of GGBFS shall not exceed 60 percent by weight of the total amount of cementitious materials to be used.

## **90-2.02 AGGREGATES**

Aggregates shall be free from deleterious coatings, clay balls, roots, bark, sticks, rags, and other extraneous material.

The Contractor 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 \$3.50 per cubic yard for paving concrete and \$5.50 per cubic yard 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 \$3.50 per cubic yard for paving concrete and \$5.50 per cubic yard 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 are 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 300 cubic yards 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, reclaimed aggregate, 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.

Reclaimed aggregate is aggregate that has been recovered from plastic concrete by washing away the cementitious material. Reclaimed aggregate shall conform to all aggregate requirements.

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:

- A. Coarse aggregate sampled at the completion of processing at the aggregate production plant had a Cleanness Value of not less than 82 when tested in conformance with the requirements in California Test 227; and
- B. 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 <sup>a</sup> |
| 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:

- A. 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

- B. 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 1,000 parts per million of chlorides as Cl, when tested in conformance with California Test 422, nor more than 1,300 parts per million of sulfates as SO<sub>4</sub>, 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 1,300 parts per million of sulfates as SO<sub>4</sub>, 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 nonreinforced concrete work, the water for curing, for washing aggregates and for mixing shall be free from oil and shall not contain more than 2,000 parts per million of chlorides as Cl, when tested in conformance with California Test 422, or more than 1,500 parts per million of sulfates as SO<sub>4</sub>, 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<sub>2</sub>O + 0.658 K<sub>2</sub>O) 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.

**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 |
|--------------------------------|------------|------------------------------|
| 1 1/2" x 3/4"                  | 1"         | 19 - 41                      |
| 1" x No. 4                     | 3/4"       | 52 - 85                      |
| 1" x No. 4                     | 3/8"       | 15 - 38                      |
| 1/2" x No. 4                   | 3/8"       | 40 - 78                      |
| 3/8" x No. 8                   | 3/8"       | 50 - 85                      |
| Fine Aggregate                 | No. 16     | 55 - 75                      |
| Fine Aggregate                 | No. 30     | 34 - 46                      |
| Fine Aggregate                 | No. 50     | 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:

| Sieve Sizes | Percentage Passing Primary Aggregate Nominal Sizes |                     |                 |                     |                 |                     |                 |                     |
|-------------|--|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|---------------------|
|             | 1 1/2" x 3/4"                                      |                     | 1" x No. 4      |                     | 1/2" x No. 4    |                     | 3/8" x No. 8    |                     |
|             | Operating Range                                    | Contract Compliance | Operating Range | Contract Compliance | Operating Range | Contract Compliance | Operating Range | Contract Compliance |
| 2"          | 100  | 100                 | —               | —                   | —               | —                   | —               | —                   |
| 1 1/2"      | 88 - 100   | 85 - 100            | 100             | 100                 | —               | —                   | —               | —                   |
| 1"          | X ±18  | X ±25               | 88 - 100        | 86 - 100            | —               | —                   | —               | —                   |
| 3/4"        | 0 - 17   | 0 - 20              | X ±15           | X ±22               | 100             | 100                 | —               | —                   |
| 1/2"        | —  | —                   | —               | —                   | 82 - 100        | 80 - 100            | 100             | 100                 |
| 3/8"        | 0 - 7  | 0 - 9               | X ±15           | X ±22               | X ±15           | X ±22               | X ±15           | X ±20               |
| No. 4       | —  | —                   | 0 - 16          | 0 - 18              | 0 - 15          | 0 - 18              | 0 - 25          | 0 - 28              |
| No. 8       | —  | —                   | 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 1 1/2 inch, 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 one inch, 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 1" x No. 4 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 |
| 3/8"        | 100                | 100                 |
| No. 4       | 95 - 100           | 93 - 100            |
| No. 8       | 65 - 95            | 61 - 99             |
| No. 16      | X ±10              | X ±13               |
| No. 30      | X ±9               | X ±12               |
| No. 50      | X ±6               | X ±9                |
| No. 100     | 2 - 12             | 1 - 15              |
| No. 200     | 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 No. 16 sieve and the total percentage passing the No. 30 sieve shall be between 10 and 40, and the difference between the percentage passing the No. 30 and No. 50 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 1 1/2 inch, maximum grading, or the 1 inch, maximum grading, at the option of the Contractor.

Grading Limits of Combined Aggregates

| Sieve Sizes | Percentage Passing |          |           |           |
|-------------|--------------------|----------|-----------|-----------|
|             | 1 1/2" Max.        | 1" Max.  | 1/2" Max. | 3/8" Max. |
| 2"          | 100                | —        | —         | —         |
| 1 1/2"      | 90 - 100           | 100      | —         | —         |
| 1"          | 50 - 86            | 90 - 100 | —         | —         |
| 3/4"        | 45 - 75            | 55 - 100 | 100       | —         |
| 1/2"        | —                  | —        | 90 - 100  | 100       |
| 3/8"        | 38 - 55            | 45 - 75  | 55 - 86   | 50 - 100  |
| No. 4       | 30 - 45            | 35 - 60  | 45 - 63   | 45 - 63   |
| No. 8       | 23 - 38            | 27 - 45  | 35 - 49   | 35 - 49   |
| No. 16      | 17 - 33            | 20 - 35  | 25 - 37   | 25 - 37   |
| No. 30      | 10 - 22            | 12 - 25  | 15 - 25   | 15 - 25   |
| No. 50      | 4 - 10             | 5 - 15   | 5 - 15    | 5 - 15    |
| No. 100     | 1 - 6              | 1 - 8    | 1 - 8     | 1 - 8     |
| No. 200     | 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 weight of admixture, as determined by California Test 415, shall not be used.

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.

Chemical admixtures shall be used in conformance with the manufacturer's written recommendations.

### 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.

If 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.

#### **90-4.04 REQUIRED USE OF CHEMICAL ADMIXTURES**

If the use of a chemical admixture 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.

#### **90-4.05 OPTIONAL USE OF CHEMICAL ADMIXTURES**

The Contractor may 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. If 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 weight, except that the resultant cementitious material content shall be not less than 505 pounds per cubic yard; 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.

#### **90-4.08 BLANK**

#### **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  $\pm 5$  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, unless it is demonstrated that a different sequence improves performance.

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 one-half gallon per cubic yard 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."

## **90-4.11 BLANK**

### **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 the various sizes shall not become intermixed before proportioning.

Aggregates shall be stored or stockpiled and handled in a manner that 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 supplementary cementitious material for one batch of concrete is a single operation of a switch or starter.

Proportioning devices shall be tested 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 weight of each batch of material shall not vary from the weight designated by the Engineer by more than the tolerances specified herein.

Equipment for cumulative weighing of aggregate shall have a zero tolerance of  $\pm 0.5$  percent of the designated total batch weight of the aggregate. For systems with individual weigh hoppers for the various sizes of aggregate, the zero tolerance shall be  $\pm 0.5$  percent of the individual batch weight designated for each size of aggregate. Equipment for cumulative weighing of cement and supplementary cementitious material shall have a zero tolerance of  $\pm 0.5$  percent of the designated total batch weight of the cement and supplementary cementitious material. Equipment for weighing cement or supplementary cementitious material separately shall have a zero tolerance of  $\pm 0.5$  percent of their designated individual batch weights. Equipment for measuring water shall have a zero tolerance of  $\pm 0.5$  percent of its designated weight or volume.

The weight 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 weight of the aggregate. Aggregates weighed individually shall be within 1.5 percent of their respective designated batch weights; and
- B. Cement shall be 99 to 102 percent of its designated batch weight. When weighed individually, supplementary cementitious material shall be 99 to 102 percent of its designated batch weight. When supplementary cementitious material and cement are permitted to be weighed cumulatively, cement shall be weighed first to 99 to 102 percent of

its designated batch weight, and the total for cement and supplementary cementitious material shall be 99 to 102 percent of the sum of their designated batch weights; and

- C. Water shall be within 1.5 percent of its designated weight or volume.

Each scale graduation shall be approximately 0.001 of the total capacity of the scale. The capacity of scales for weighing cement, supplementary cementitious material, or cement plus supplementary cementitious material and aggregates shall not exceed that of commercially available scales having single graduations indicating a weight not exceeding the maximum permissible weight variation above, except that no scale shall be required having a capacity of less than 1,000 pounds, with one pound 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 cementitious material and water as provided in these specifications. Aggregates shall be proportioned by weight.

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 weight.

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) 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 supplementary cementitious material 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 supplementary cementitious material are weighed cumulatively, the cement shall be weighed first.

If cement and supplementary cementitious material are weighed in separate weigh hoppers, the weigh systems for the proportioning of the aggregate, the cement, and the supplementary cementitious material 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 supplementary cementitious material shall be discharged into the mixer simultaneously with the aggregate.

The scales and weigh hoppers for bulk weighing cement, supplementary cementitious material, or cement plus supplementary cementitious material shall be separate and distinct from the aggregate weighing equipment.

For batches of one cubic yard 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 weights, the gross weight and tare weight 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 on scales designated by the Engineer.

#### **90-5.03A Proportioning For Pavement**

Aggregates and bulk supplementary cementitious material for use in pavement shall be proportioned by weight 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 weight of the fine aggregate.

The batching of cement, supplementary cementitious material, or cement plus supplementary cementitious material 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 supplementary cementitious material hoppers or the cement plus supplementary cementitious material hopper are charged with weights that are within the tolerances specified in Section 90-5.02, "Proportioning Devices."

If interlocks are required for cement and supplementary cementitious material charging mechanisms and cement and supplementary cementitious material are weighed cumulatively, their charging mechanisms shall be interlocked to prevent the introduction of mineral admixture until the weight of cement in the cement weigh hopper is within the tolerances specified in Section 90-5.02, "Proportioning Devices."

If concrete is completely mixed in stationary paving mixers, the supplementary cementitious materials shall be weighed in a separate weigh hopper and the supplementary cementitious material and cement shall be introduced simultaneously into the mixer proportionately with the aggregate. If the Contractor provides certification that the stationary mixer is capable of mixing the cement, supplementary cementitious material, aggregates, and water uniformly before discharge, weighing the supplementary cementitious material cumulatively with the cement is permitted. 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 before discharge that are required to produce a mix that meets the requirements above.

The discharge gate on the cement and supplementary cementitious material hoppers or the cement plus supplementary cementitious material hopper shall be designed to permit regulating the flow of cement, supplementary cementitious material, or cement plus supplementary cementitious material into the aggregate as directed by the Engineer.

If 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.

If 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 1/3 cubic yard 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 cementitious material.

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 1/2-inch. 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 170 pounds per cubic yard of concrete.

| Average Slump         | Maximum Permissible Difference |
|-----------------------|--------------------------------|
| Less than 4"          | 1"                             |
| 4" to 6"              | 1 1/2"                         |
| Greater than 6" to 9" | 2"                             |

The Contractor 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 50° F or more than 90° F. 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 150° F. 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 job site 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 job site 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 nonagitating 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 will 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 nonagitating 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 75° F.

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.

If 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 if the temperature of the concrete is 85° F or above, the time allowed may be less than 1.5 hours. If an admixture is used to retard the set time, the temperature of the concrete shall not exceed 85° F, the time limit shall be 2 hours, and the revolution limitation shall be 300.

If nonagitating 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 85° F 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 job site shall be accompanied by a weighmaster certificate showing the mix identification number, nonrepeating 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 weights (pounds) for the ingredients batched. Theoretical or target batch weights shall not be used as a substitute for actual scale weights.

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 3 1/2-inch 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" (LF CR) 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 weights or measurements for a load of concrete provided that both certificates are imprinted with the same nonrepeating 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."

When a high range water-reducing admixture is added to the concrete at the job site, the total number of revolutions shall not exceed 300.

#### **90-6.05 HAND-MIXING**

Hand-mixed concrete shall be made in batches of not more than 1/3 cubic yard 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 one foot in total depth. On this mixture shall be spread the dry cementitious materials 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. If Type F or Type G chemical admixtures are added to the mix, the penetration requirements shall not apply and the slump shall not exceed 9 inches after the chemical admixtures are added.

| Type of Work                       | Nominal              |                | Maximum              |                |
|------------------------------------|----------------------|----------------|----------------------|----------------|
|                                    | Penetration (inches) | Slump (inches) | Penetration (inches) | Slump (inches) |
| Concrete Pavement                  | 0 - 1                | —              | 1 1/2                | —              |
| Non-reinforced concrete facilities | 0 - 1 1/2            | —              | 2                    | —              |
| Reinforced concrete structures     |                      |                |                      |                |
| Sections over 12 inches thick      | 0 - 1 1/2            | —              | 2 1/2                | —              |
| Sections 12 inches thick or less   | 0 - 2                | —              | 3                    | —              |
| Concrete placed under water        | —                    | 6 - 8          | —                    | 9              |
| Cast-in-place concrete piles       | 2 1/2 - 3 1/2        | 5 - 7          | 4                    | 8              |

The amount of free water used in concrete shall not exceed 310 pounds per cubic yard, plus 20 pounds for each required 100 pounds of cementitious material in excess of 550 pounds per cubic yard.

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.

If 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 yard of concrete. The increase in water and cementitious material shall be at a ratio not to exceed 30 pounds of water per added 100 pounds of cementitious material per cubic yard. Full compensation for additional cementitious material and water added under these conditions shall be considered as included in the contract price paid for the concrete work involved 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.

Cotton mats, rugs, carpets, or earth or sand blankets may be used as a curing medium to retain the moisture during the curing period.

If a curing medium consisting of cotton mats, rugs, carpets, polyethylene sheeting, polyethylene sheeting on burlap, 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 media.

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 4-mil, and shall be extruded onto 10-ounce 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 10-mil achieved in a single layer of material.

If the Contractor chooses to use polyethylene sheeting or polyethylene sheeting on burlap as a curing medium, these media and any joints therein shall be secured as necessary to provide moisture retention and shall be within 3 inches of the concrete at all points along the surface being cured. When these media are used, the temperature of the concrete shall be monitored during curing. If the temperature of the concrete cannot be maintained below 140° F, use of these curing media shall be disallowed.

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 above, 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. Nonpigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 1, Class B.
5. Nonpigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 1, Class A.
6. Nonpigmented 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 0.28-pounds per square yard in 24 hours.

The curing compound to be used will be specified elsewhere in these specifications or in the special provisions.

If 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 one gallon per 150 square feet, unless otherwise specified.

At any point, the application rate shall be within  $\pm 50$  square feet per gallon of the nominal rate specified, and the average application rate shall be within  $\pm 25$  square feet per gallon 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 40° F and shall not be diluted or altered after manufacture.

The curing compound shall be packaged in clean 274-gallon totes, 55-gallon barrels or 5-gallon 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 274-gallon totes and the 55-gallon barrels shall have removable lids and airtight fasteners. The 5-gallon pails shall be round and have standard full open head and bail. Lids with bungholes will 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.

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.

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, at the job site, 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 0.33-foot.

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 20 inches 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 60° F, 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 50° F, steam shall be applied during the presteaming period to hold the air surrounding the member at a temperature between 50° F and 90° F.
- 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 40° F per hour. The curing temperature throughout the enclosure shall not exceed 150° F 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 200 feet 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 60° F 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," 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, 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, 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. If required by the Engineer, the Contractor shall submit a written outline of the proposed methods for protecting the concrete.

The Contractor shall protect concrete from damage from any cause, which shall include, but not be limited to: rain, heat, cold, wind, Contractor's actions, and actions of others.

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 45° F for 72 hours after placing and at not less than 40° F for an additional 4 days.

### **90-8.03 PROTECTING CONCRETE PAVEMENT**

Pavement concrete shall be maintained at a temperature of not less than 40° F for 72 hours.

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.

If 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 550 pounds per square inch. 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 550 pounds per square inch. Concrete that fails to attain a modulus of rupture of 550 pounds per square inch 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 350 pounds per square inch has been attained, provided that:

- A. Unit pressure exerted on the pavement by the paver shall not exceed 20 pounds per square inch;
- 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 one foot 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.

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

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 \$10 for each in-place cubic yard 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 \$15 for each in-place cubic yard 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 320 cubic yards.

If 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. If 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 580 pounds per square inch 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 yards and the weight, type, and source of all ingredients used.
- D. Penetration or slump (if the concrete will be placed under water or placed in cast-in-place concrete piles) 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.

Use of crushed concrete or reclaimed aggregate is acceptable only if the aggregate satisfies all aggregate requirements.

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 1 1/2-inch or smaller than 3/4-inch.

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





### **92-1.01 DESCRIPTION**

Asphalt is refined petroleum or a mixture of refined liquid asphalt and refined solid asphalt that are prepared from crude petroleum. Asphalt is:

1. Free from residues caused by the artificial distillation of coal, coal tar, or paraffin
2. Free from water
3. Homogeneous

### **92-1.02 MATERIALS**

#### **GENERAL**

Furnish asphalt under the Department's "Certification Program for Suppliers of Asphalt." The Department maintains the program requirements, procedures, and a list of approved suppliers at:

<http://www.dot.ca.gov/hq/esc/Translab/fpm/fpmcoc.htm>

Transport, store, use, and dispose of asphalt safely.

Prevent the formation of carbonized particles caused by overheating asphalt during manufacturing or construction.

#### **GRADES**

Performance graded (PG) asphalt binder is:

Performance Graded Asphalt Binder

| Property  | AASHTO Test Method | Specification           |                         |                         |                         |                         |
|---|--------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
|   |                    | Grade                   |                         |                         |                         |                         |
|   |                    | PG 58-22 <sup>a</sup>   | PG 64-10                | PG 64-16                | PG 64-28                | PG 70-10                |
| Original Binder   |                    |                         |                         |                         |                         |                         |
| Flash Point, Minimum °C   | T 48               | 230                     | 230                     | 230                     | 230                     | 230                     |
| Solubility, Minimum % <sup>b</sup>  | T 44               | 99                      | 99                      | 99                      | 99                      | 99                      |
| Viscosity at 135°C, <sup>c</sup><br>Maximum, Pa·s                                   | T 316              | 3.0                     | 3.0                     | 3.0                     | 3.0                     | 3.0                     |
| Dynamic Shear,<br>Test Temp. at 10 rad/s, °C<br>Minimum G*/sin(delta), kPa          | T 315              | 58<br>1.00              | 64<br>1.00              | 64<br>1.00              | 64<br>1.00              | 70<br>1.00              |
| RTFO Test, <sup>e</sup><br>Mass Loss, Maximum, %                                    | T 240              | 1.00                    | 1.00                    | 1.00                    | 1.00                    | 1.00                    |
| RTFO Test Aged Binder   |                    |                         |                         |                         |                         |                         |
| Dynamic Shear,<br>Test Temp. at 10 rad/s, °C<br>Minimum G*/sin(delta), kPa          | T 315              | 58<br>2.20              | 64<br>2.20              | 64<br>2.20              | 64<br>2.20              | 70<br>2.20              |
| Ductility at 25°C<br>Minimum, cm  | T 51               | 75                      | 75                      | 75                      | 75                      | 75                      |
| PAV <sup>f</sup> Aging,<br>Temperature, °C  | R 28               | 100                     | 100                     | 100                     | 100                     | 110                     |
| RTFO Test and PAV Aged Binder   |                    |                         |                         |                         |                         |                         |
| Dynamic Shear,<br>Test Temp. at 10 rad/s, °C<br>Maximum G*/sin(delta), kPa          | T 315              | 22 <sup>d</sup><br>5000 | 31 <sup>d</sup><br>5000 | 28 <sup>d</sup><br>5000 | 22 <sup>d</sup><br>5000 | 34 <sup>d</sup><br>5000 |
| Creep Stiffness,<br>Test Temperature, °C<br>Maximum S-value, Mpa<br>Minimum M-value | T 313              | -12<br>300<br>0.300     | 0<br>300<br>0.300       | -6<br>300<br>0.300      | -18<br>300<br>0.300     | 0<br>300<br>0.300       |

Notes:

- a. Use as asphalt rubber base stock for high mountain and high desert area.
- b. The Engineer waives this specification if the supplier is a Quality Supplier as defined by the Department's "Certification Program for Suppliers of Asphalt."
- c. The Engineer waives this specification if the supplier certifies the asphalt binder can be adequately pumped and mixed at temperatures meeting applicable safety standards.
- d. Test the sample at 3°C higher if it fails at the specified test temperature. G\*/sin(delta) remains 5000 kPa maximum.
- e. "RTFO Test" means the asphaltic residue obtained using the Rolling Thin Film Oven Test, AASHTO Test Method T 240 or ASTM Designation: D 2872. The residue from mass change determination may be used for other tests.
- f. "PAV" means Pressurized Aging Vessel.

Performance graded polymer modified asphalt binder (PG Polymer Modified) is:

Performance Graded Polymer Modified Asphalt Binder <sup>a</sup>

| Property  | AASHTO Test Method | Specification Grade |                     |                     |
|---|--------------------|---------------------|---------------------|---------------------|
|   |                    | PG 58-34 PM         | PG 64-28 PM         | PG 76-22 PM         |
| <b>Original Binder</b>  |                    |                     |                     |                     |
| Flash Point, Minimum °C   | T 48               | 230                 | 230                 | 230                 |
| Solubility, Minimum % <sup>b</sup>  | T 44 <sup>c</sup>  | 98.5                | 98.5                | 98.5                |
| Viscosity at 135°C, <sup>d</sup><br>Maximum, Pa·s                                   | T 316              | 3.0                 | 3.0                 | 3.0                 |
| Dynamic Shear,<br>Test Temp. at 10 rad/s, °C<br>Minimum G*/sin(delta), kPa          | T 315              | 58<br>1.00          | 64<br>1.00          | 76<br>1.00          |
| RTFO Test ,<br>Mass Loss, Maximum, %  | T 240              | 1.00                | 1.00                | 1.00                |
| <b>RTFO Test Aged Binder</b>  |                    |                     |                     |                     |
| Dynamic Shear,<br>Test Temp. at 10 rad/s, °C<br>Minimum G*/sin(delta), kPa          | T 315              | 58<br>2.20          | 64<br>2.20          | 76<br>2.20          |
| Dynamic Shear,<br>Test Temp. at 10 rad/s, °C<br>Maximum (delta), %                  | T 315              | Note e<br>80        | Note e<br>80        | Note e<br>80        |
| Elastic Recovery <sup>f</sup> ,<br>Test Temp., °C<br>Minimum recovery, %            | T 301              | 25<br>75            | 25<br>75            | 25<br>65            |
| PAV <sup>g</sup> Aging,<br>Temperature, °C  | R 28               | 100                 | 100                 | 110                 |
| <b>RTFO Test and PAV Aged Binder</b>  |                    |                     |                     |                     |
| Dynamic Shear,<br>Test Temp. at 10 rad/s, °C<br>Maximum G*/sin(delta), kPa          | T 315              | 16<br>5000          | 22<br>5000          | 31<br>5000          |
| Creep Stiffness,<br>Test Temperature, °C<br>Maximum S-value, MPa<br>Minimum M-value | T 313              | -24<br>300<br>0.300 | -18<br>300<br>0.300 | -12<br>300<br>0.300 |

Notes:

- a. Do not modify PG Polymer Modified using acid modification.
- b. The Engineer waives this specification if the supplier is a Quality Supplier as defined by the Department's "Certification Program for Suppliers of Asphalt."
- c. The Department allows ASTM D 5546 instead of AASHTO T 44
- d. The Engineer waives this specification if the supplier certifies the asphalt binder can be adequately pumped and mixed at temperatures meeting applicable safety standards.
- e. Test temperature is the temperature at which G\*/sin(delta) is 2.2 kPa. A graph of log G\*/sin(delta) plotted against temperature may be used to determine the test temperature when G\*/sin(delta) is 2.2 kPa. A graph of (delta) versus temperature may be used to determine delta at the temperature when G\*/sin(delta) is 2.2 kPa. The Engineer also accepts direct measurement of (delta) at the temperature when G\*/sin(delta) is 2.2 kPa.
- f. Tests without a force ductility clamp may be performed.
- g. "PAV" means Pressurized Aging Vessel.

**SAMPLING**

Provide a sampling device in the asphalt feed line connecting the plant storage tanks to the asphalt weighing system or spray bar. Make the sampling device accessible between 24 and 30 inches above the platform. Provide a receptacle for flushing the sampling device.

Include with the sampling device a valve:

