

**\*\* WARNING \*\* WARNING \*\* WARNING \*\* WARNING \*\***

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

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



STATE OF CALIFORNIA  
DEPARTMENT OF TRANSPORTATION

---

**NOTICE TO CONTRACTORS  
AND  
SPECIAL PROVISIONS**

**FOR CONSTRUCTION ON STATE HIGHWAY IN**

**VENTURA COUNTY IN CAMARILLO ON ROUTE 101 FROM CALLEGUAS CREEK TO 0.4 km WEST OF  
ARNEILL ROAD OVERCROSSING AND ON ROUTE 34 FROM DAWSON DRIVE OVERHEAD TO 0.2 km  
NORTH OF DAILY DRIVE**

**DISTRICT 07, ROUTE 101,34**

---

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

---

**CONTRACT NO. 07-104954  
07-Ven-101,34-21.6/23.2,21.5/22.2**

**Federal Aid Project  
ACNH-P101(996)E**

**Bids Open: June 6, 2002  
Dated: April 22, 2002**

**OSD**

\*\*\*\*\*

# IMPORTANT SPECIAL NOTICES

\*\*\*\*\*

- The specifications for this project include Quality Control / Quality Assurance provisions for the contract item "Asphalt Concrete" in the Special Provisions. Asphalt concrete shall conform to the provisions in Section 11-1, "Quality Control / Quality Assurance," and the section entitled "Asphalt Concrete" in Section 10-1, "General," of the Special Provisions. Section 39, "Asphalt Concrete," of the Standard Specifications shall not apply to Type A and Type B asphalt concrete.
- The bidder's attention is directed to Section 5, containing specifications for "Dispute Review Board," of the Special Provisions, regarding establishing a Dispute Review Board (DRB) for the project.
- The Special Provisions for Federal-aid projects (with and without DBE goals) have been revised to incorporate changes made by new regulations governing the DBE Program (49 CFR Part 26).

Sections 2 and 5 incorporate the changes. Bidders should read these sections to become familiar with them. Attention is directed to the following significant changes:

Section 2, "Disadvantaged Business Enterprise (DBE)" revises the counting of participation by DBE primes, and the counting of trucking performed by DBE firms. The section also revises the information that must be submitted to the Department in order to receive credit for trucking.

Section 2, "Submission of DBE Information" revises the information required to be submitted to the Department to receive credit toward the DBE goal. It also revises the criteria to demonstrate good faith efforts.

Section 5, "Subcontractor and DBE Records" revises the information required to be reported at the end of the project, and information related to trucking that must be submitted throughout the project.

Section 5, "DBE Certification Status" adds new reporting requirements related to DBE certification.

Section 5, "Subcontracting" describes the efforts that must be made in the event a DBE subcontractor is terminated or fails to complete its work for any reason.

Section 5, "Prompt Progress Payment to Subcontractors" requires prompt payment to all subcontractors.

Section 5, "Prompt Payment of Withheld Funds to Subcontractors" requires the prompt payment of retention to all subcontractors.

- **Payment Bonds**  
Attention is directed to Section 5 of the Special Provisions, regarding contract bonds. The payment bond shall be in a sum not less than one hundred percent of the total amount payable by the terms of the contract.
- Federal minimum wage rates for this project are no longer included in the "Proposal and Contract" book. They will be available through the California Department of Transportation's Electronic Project Document Distribution Internet Web Site at <http://hqidoc1.dot.ca.gov/>. See Notice to Contractors.
- Attention is directed to Section 1, "Specifications and Plans," of these special provisions for Amendments To July 1999 Standard Specifications. Amendments to the various sections of the Standard Specification have been consolidated into Section 1 and dated to reflect the most recent revision.



# TABLE OF CONTENTS

|  |    |
|--|----|
| NOTICE TO CONTRACTORS.....   | 1  |
| COPY OF ENGINEER'S ESTIMATE .....  | 3  |
| SPECIAL PROVISIONS .....   | 15 |
| SECTION 1. SPECIFICATIONS AND PLANS .....                                      | 15 |
| AMENDMENTS TO JULY 1999 STANDARD SPECIFICATIONS .....                          | 15 |
| SECTION 2. PROPOSAL REQUIREMENTS AND CONDITIONS.....                           | 49 |
| 2-1.01 GENERAL.....  | 49 |
| 2-1.015 FEDERAL LOBBYING RESTRICTIONS.....                                     | 49 |
| 2-1.02 DISADVANTAGED BUSINESS ENTERPRISE (DBE).....                            | 50 |
| 2-1.02A DBE GOAL FOR THIS PROJECT.....   | 52 |
| 2-1.02B SUBMISSION OF DBE INFORMATION .....                                    | 52 |
| SECTION 3. AWARD AND EXECUTION OF CONTRACT.....                                | 53 |
| SECTION 4. BEGINNING OF WORK, TIME OF COMPLETION AND LIQUIDATED DAMAGES .....  | 53 |
| SECTION 5. GENERAL .....   | 54 |
| SECTION 5-1. MISCELLANEOUS .....   | 54 |
| 5-1.01 PLANS AND WORKING DRAWINGS .....  | 54 |
| 5-1.011 EXAMINATION OF PLANS, SPECIFICATIONS, CONTRACT, AND SITE OF WORK ..... | 54 |
| 5-1.012 DIFFERING SITE CONDITIONS.....   | 54 |
| 5-1.015 LABORATORY .....   | 54 |
| 5-1.017 CONTRACT BONDS .....   | 54 |
| 5-1.019 COST REDUCTION INCENTIVE.....  | 54 |
| 5-1.02 LABOR NONDISCRIMINATION.....  | 54 |
| 5-1.03 INTEREST ON PAYMENTS .....  | 55 |
| 5-1.031 FINAL PAYMENT AND CLAIMS.....  | 55 |
| 5-1.04 PUBLIC SAFETY .....   | 56 |
| 5-1.05 (BLANK).....  | 57 |
| 5-1.06 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES.....                       | 57 |
| 5-1.07 YEAR 2000 COMPLIANCE.....   | 57 |
| 5-1.075 BUY AMERICA REQUIREMENTS.....  | 57 |
| 5-1.08 SUBCONTRACTOR AND DBE RECORDS .....                                     | 57 |
| 5-1.083 DBE CERTIFICATION STATUS .....   | 58 |
| 5-1.086 PERFORMANCE OF DBE SUBCONTRACTORS AND SUPPLIERS .....                  | 58 |
| 5-1.09 SUBCONTRACTING.....   | 58 |
| 5-1.10 PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS .....                         | 59 |
| 5-1.102 PROMPT PAYMENT OF WITHHELD FUNDS TO SUBCONTRACTORS .....               | 59 |
| 5-1.11 PARTNERING .....  | 59 |
| 5-1.114 VALUE ANALYSIS .....   | 59 |
| 5-1.12 DISPUTE REVIEW BOARD .....  | 60 |
| 5-1.13 FORCE ACCOUNT PAYMENT.....  | 70 |
| 5-1.14 COMPENSATION ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS.....              | 71 |
| 5-1.15 AREAS FOR CONTRACTOR'S USE .....  | 71 |
| 5-1.16 PAYMENTS.....   | 72 |
| 5-1.17 SOUND CONTROL REQUIREMENTS.....   | 72 |
| 5-1.18 AERIALY DEPOSITED LEAD.....   | 73 |
| SECTION 6. (BLANK).....  | 73 |
| SECTION 7. (BLANK).....  | 73 |
| SECTION 8. MATERIALS .....   | 73 |
| SECTION 8-1. MISCELLANEOUS .....   | 73 |
| 8-1.01 SUBSTITUTION OF NON-METRIC MATERIALS AND PRODUCTS .....                 | 73 |
| 8-1.02 PREQUALIFIED AND TESTED SIGNING AND DELINEATION MATERIALS .....         | 80 |
| 8-1.03 STATE-FURNISHED MATERIALS .....   | 85 |
| 8-1.04 SLAG AGGREGATE.....   | 86 |
| 8-1.05 ENGINEERING FABRICS.....  | 86 |

|   |     |
|---|-----|
| SECTION 8-2. CONCRETE.....  | 86  |
| 8-2.01 PORTLAND CEMENT CONCRETE.....  | 86  |
| SECTION 8-3. WELDING.....   | 87  |
| 8-3.01 WELDING.....   | 87  |
| GENERAL.....  | 87  |
| WELDING QUALITY CONTROL.....  | 89  |
| PAYMENT.....  | 91  |
| SECTION 9. DESCRIPTION OF BRIDGE WORK.....                                      | 92  |
| SECTION 10. CONSTRUCTION DETAILS.....   | 92  |
| SECTION 10-1. GENERAL.....  | 92  |
| 10-1.00 CONSTRUCTION PROJECT INFORMATION SIGNS.....                             | 92  |
| 10-1.01 ORDER OF WORK.....  | 93  |
| 10-1.02 WATER POLLUTION CONTROL (STORM WATER POLLUTION PREVENTION PLAN).....    | 94  |
| STORM WATER POLLUTION PREVENTION PLAN PREPARATION, APPROVAL AND AMENDMENTS..... | 95  |
| COST BREAK-DOWN.....  | 96  |
| SWPPP IMPLEMENTATION.....   | 99  |
| MAINTENANCE.....  | 100 |
| REPORTING REQUIREMENTS.....   | 100 |
| PAYMENT.....  | 100 |
| 10-1.03 TEMPORARY FENCE.....  | 101 |
| 10-1.04 PRESERVATION OF PROPERTY.....   | 102 |
| 10-1.05 DAMAGE REPAIR.....  | 102 |
| 10-1.06 RELIEF FROM MAINTENANCE AND RESPONSIBILITY.....                         | 102 |
| 10-1.07 COOPERATION.....  | 102 |
| 10-1.08 EMISSIONS REDUCTION INCENTIVE PROGRAM.....                              | 103 |
| 10-1.09 PROGRESS SCHEDULE (CRITICAL PATH METHOD).....                           | 104 |
| DEFINITIONS.....  | 104 |
| GENERAL REQUIREMENTS.....   | 105 |
| COMPUTER SOFTWARE.....  | 106 |
| NETWORK DIAGRAMS, REPORTS AND DATA.....   | 106 |
| PRE-CONSTRUCTION SCHEDULING CONFERENCE.....                                     | 108 |
| BASELINE SCHEDULE.....  | 108 |
| UPDATE SCHEDULE.....  | 108 |
| TIME IMPACT ANALYSIS.....   | 109 |
| FINAL UPDATE SCHEDULE.....  | 109 |
| RETENTION.....  | 109 |
| PAYMENT.....  | 109 |
| 10-1.10 OVERHEAD.....   | 110 |
| 10-1.11 OBSTRUCTIONS.....   | 112 |
| 10-1.12 DUST CONTROL.....   | 113 |
| 10-1.13 MOBILIZATION.....   | 113 |
| 10-1.14 CONSTRUCTION AREA TRAFFIC CONTROL DEVICES.....                          | 113 |
| 10-1.15 CONSTRUCTION AREA SIGNS.....  | 114 |
| 10-1.16 MAINTAINING TRAFFIC.....  | 114 |
| 10-1.17 CLOSURE REQUIREMENTS AND CONDITIONS.....                                | 124 |
| CLOSURE SCHEDULE.....   | 124 |
| CONTINGENCY PLAN.....   | 124 |
| LATE REOPENING OF CLOSURES.....   | 125 |
| COMPENSATION.....   | 125 |
| 10-1.18 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE.....                            | 125 |
| STATIONARY LANE CLOSURE.....  | 125 |
| MOVING LANE CLOSURE.....  | 126 |
| PAYMENT.....  | 126 |
| 10-1.19 TEMPORARY PAVEMENT DELINEATION.....                                     | 126 |
| GENERAL.....  | 127 |
| TEMPORARY LANELINE AND CENTERLINE DELINEATION.....                              | 127 |
| TEMPORARY EDGELINE DELINEATION.....   | 127 |
| TEMPORARY TRAFFIC STRIPE (PAINT).....   | 128 |

|   |     |
|---|-----|
| MEASUREMENT AND PAYMENT .....   | 128 |
| 10-1.20 BARRICADE .....   | 128 |
| 10-1.21 PORTABLE CHANGEABLE MESSAGE SIGN .....                        | 129 |
| 10-1.22 TEMPORARY (STAGE) SIGNAL AND LIGHTING SYSTEM .....            | 129 |
| OPERATION .....   | 129 |
| MAINTAINING TEMPORARY (STAGE) SIGNAL SYSTEM.....                      | 129 |
| CONDUIT.....  | 129 |
| CONDUCTORS AND WIRING .....   | 130 |
| BONDING AND GROUNDING .....   | 130 |
| SERVICE.....  | 130 |
| DETECTORS .....   | 130 |
| SALVAGING TEMPORARY (STAGE) SIGNAL AND LIGHTING SYSTEM.....           | 130 |
| 10-1.23 MODIFY(STAGE) LIGHTING AND SIGN ILLUMINATION SYSTEM.....      | 130 |
| OPERATION.....  | 130 |
| MAINTAINING MODIFY (STAGE) LIGHTING AND SIGN ILLUMINATION SYSTEM..... | 130 |
| CONDUIT.....  | 130 |
| CONDUCTORS AND WIRING .....   | 131 |
| BONDING AND GROUNDING .....   | 131 |
| SERVICE.....  | 131 |
| SALVAGING (STAGE) LIGHTING AND SIGN ILLUMINATION SYSTEM .....         | 131 |
| 10-1.24 TEMPORARY RAILING (TYPE K).....                               | 131 |
| 10-1.25 CHANNELIZER (SURFACE MOUNTED).....                            | 131 |
| 10-1.26 TEMPORARY CRASH CUSHION MODULE.....                           | 131 |
| 10-1.27 EXISTING HIGHWAY FACILITIES .....                             | 133 |
| ABANDON CULVERT .....   | 133 |
| REMOVE METAL BEAM GUARD RAILING.....                                  | 133 |
| REMOVE SIGN STRUCTURE.....  | 133 |
| REMOVE PAVEMENT MARKER.....   | 134 |
| REMOVE WALL .....   | 134 |
| REMOVE-CHAIN LINK FENCE .....   | 134 |
| REMOVE TRAFFIC STRIPE AND PAVEMENT MARKING .....                      | 134 |
| REMOVE DRAINAGE FACILITY.....   | 136 |
| REMOVE ROADSIDE SIGN (WOOD POST) .....                                | 136 |
| REMOVE CURB.....  | 136 |
| REMOVE CONCRETE.....  | 136 |
| REMOVE CONCRETE BARRIER .....   | 136 |
| ADJUST INLET AND MANHOLE TO GRADE .....                               | 136 |
| OBLITERATE SURFACING .....  | 137 |
| REMOVE BASE AND SURFACING .....                                       | 137 |
| COLD PLANE ASPHALT CONCRETE PAVEMENT .....                            | 137 |
| CAP INLET .....   | 138 |
| EXISTING HIGHWAY IRRIGATION FACILITIES .....                          | 138 |
| BRIDGE REMOVAL.....   | 138 |
| CLEAN BRIDGE DECK .....   | 140 |
| REMOVE CRASH CUSHION (SAND FILLED) .....                              | 140 |
| 10-1.28 CLEARING AND GRUBBING.....                                    | 141 |
| 10-1.29 ARCHAEOLOGICAL MONITOR.....                                   | 141 |
| 10-1.30 DUST PALLIATIVE.....  | 141 |
| 10-1.31 EARTHWORK.....  | 141 |
| 10-1.32 HIGH-MODULUS GEOGRID .....                                    | 143 |
| 10-1.33 SUBGRADE ENHANCEMENT FABRIC.....                              | 144 |
| 10-1.34 CONTROLLED LOW STRENGTH MATERIAL .....                        | 145 |
| 10-1.35 MATERIAL CONTAINING AERIALY DEPOSITED LEAD .....              | 145 |
| LEAD COMPLIANCE PLAN .....  | 146 |
| EXCAVATION AND TRANSPORTATION PLAN .....                              | 146 |
| DUST CONTROL .....  | 147 |
| MATERIAL TRANSPORTATION .....   | 147 |
| DISPOSAL .....  | 147 |
| MEASUREMENT AND PAYMENT .....   | 147 |

|  |     |
|--|-----|
| 10-1.36 EROSION CONTROL (TYPE D).....  | 148 |
| MATERIALS.....   | 148 |
| APPLICATION .....  | 150 |
| MEASUREMENT AND PAYMENT .....  | 150 |
| 10-1.37 IRRIGATION CROSSTOPS .....   | 150 |
| 10-1.38 AGGREGATE SUBBASE.....   | 151 |
| 10-1.39 AGGREGATE BASE.....  | 151 |
| 10-1.40 LEAN CONCRETE BASE .....   | 152 |
| 10-1.41 ASPHALT CONCRETE .....   | 152 |
| 10-1.42 LIME TREATED AGGREGATES.....   | 152 |
| MATERIALS.....   | 152 |
| PROPORTIONING .....  | 153 |
| MIXING AND STORAGE.....  | 154 |
| PRODUCTION DATA COLLECTION.....  | 155 |
| CONTRACTOR QUALITY CONTROL.....  | 155 |
| PAYMENT .....  | 156 |
| 10-1.43 CONCRETE PAVEMENT (WITH DOWELED TRANSVERSE WEAKENED PLANE JOINTS).....               | 156 |
| GENERAL.....   | 156 |
| PREPAVING CONFERENCE.....  | 156 |
| TEST STRIP.....  | 156 |
| MATERIALS.....   | 157 |
| SUBMITTALS .....   | 158 |
| INSTALLING TIE BARS .....  | 158 |
| DOWEL PLACEMENT .....  | 159 |
| CORE DRILLING FOR DOWEL PLACEMENT ALIGNMENT ASSURANCE TESTING.....                           | 159 |
| PREFORMED COMPRESSION JOINT SEAL INSTALLATION .....  | 160 |
| CONSTRUCTING TRANSVERSE CONTACT JOINTS.....  | 160 |
| CONSTRUCTING LONGITUDINAL ISOLATION JOINTS .....   | 160 |
| MEASUREMENT AND PAYMENT .....  | 161 |
| 10-1.44 EXIT RAMP TERMINI .....  | 161 |
| 10-1.45 PILING .....   | 161 |
| GENERAL.....   | 161 |
| CAST-IN-DRILLED-HOLE CONCRETE PILES.....   | 162 |
| STEEL PIPE PILING .....  | 172 |
| MEASUREMENT AND PAYMENT (PILING) .....   | 173 |
| 10-1.46 PRESTRESSING CONCRETE.....   | 174 |
| 10-1.47 CONCRETE STRUCTURES.....   | 174 |
| GENERAL.....   | 174 |
| FALSEWORK .....  | 175 |
| COST REDUCTION INCENTIVE PROPOSALS FOR CAST-IN-PLACE PRESTRESSED BOX GIRDER<br>BRIDGES ..... | 176 |
| DECK CLOSURE POURS.....  | 177 |
| SLIDING BEARINGS.....  | 177 |
| ELASTOMERIC BEARING PADS.....  | 177 |
| DECK CRACK TREATMENT.....  | 177 |
| PRECAST PRESTRESSED CONCRETE BRIDGE MEMBERS.....   | 179 |
| MEASUREMENT AND PAYMENT .....  | 180 |
| 10-1.48 STRUCTURE APPROACH SLABS (TYPE N) AND (TYPE EQ) .....                                | 180 |
| GENERAL.....   | 180 |
| STRUCTURE APPROACH DRAINAGE SYSTEM .....   | 180 |
| ENGINEERING FABRICS.....   | 181 |
| TREATED PERMEABLE BASE UNDER APPROACH SLAB .....   | 181 |
| APPROACH SLABS.....  | 182 |
| JOINTS .....   | 183 |
| MEASUREMENT AND PAYMENT .....  | 183 |
| 10-1.49 STRUCTURE APPROACH SLABS (TYPE R).....   | 183 |
| GENERAL.....   | 183 |
| TEMPORARY ROADWAY STRUCTURAL SECTION .....   | 183 |
| REMOVING PORTIONS OF EXISTING STRUCTURES .....   | 184 |

|  |     |
|--|-----|
| REMOVING EXISTING PAVEMENT AND BASE MATERIALS .....                        | 184 |
| AGGREGATE BASE (APPROACH SLAB).....  | 184 |
| STRUCTURE APPROACH SLAB.....   | 184 |
| JOINTS .....   | 185 |
| MEASUREMENT AND PAYMENT .....  | 185 |
| 10-1.50 SOUND WALL .....   | 186 |
| DESCRIPTION.....   | 186 |
| SOUND WALL (MASONRY BLOCK).....  | 186 |
| ACCESS GATES.....  | 188 |
| MEASUREMENT AND PAYMENT .....  | 188 |
| 10-1.51 DRILL AND BOND DOWELS .....  | 188 |
| 10-1.52 CORE CONCRETE.....   | 188 |
| 10-1.53 SEALING JOINTS .....   | 189 |
| 10-1.54 ARCHITECTURAL SURFACE (TEXTURED CONCRETE) .....                    | 189 |
| TEST PANEL .....   | 189 |
| FORM LINERS .....  | 189 |
| RELEASING FORM LINERS .....  | 190 |
| CURING .....   | 190 |
| MEASUREMENT AND PAYMENT .....  | 190 |
| 10-1.55 REINFORCEMENT.....   | 191 |
| 10-1.56 TREAT BRIDGE DECKS.....  | 191 |
| 10-1.57 SIGN STRUCTURES.....   | 193 |
| HIGH-STRENGTH BOLTED CONNECTIONS .....                                     | 194 |
| 10-1.58 ROADSIDE SIGNS.....  | 199 |
| 10-1.59 INSTALL SIGN PANEL ON EXISTING FRAME.....                          | 200 |
| 10-1.60 CLEAN AND PAINT IRON BRIDGE RAILING AND WROUGHT IRON RAILING ..... | 200 |
| CLEANING .....   | 200 |
| PAINTING.....  | 201 |
| 10-1.61 REINFORCED CONCRETE PIPE .....                                     | 202 |
| 10-1.62 CORRUGATED METAL PIPE .....  | 203 |
| 10-1.63 EDGE DRAIN .....   | 203 |
| 10-1.64 OVERSIDE DRAIN .....   | 203 |
| 10-1.65 MISCELLANEOUS FACILITIES .....                                     | 203 |
| 10-1.66 GRATED LINE DRAIN .....  | 203 |
| 10-1.67 WELDED STEEL PIPE CASING (BRIDGE).....                             | 204 |
| WORKING DRAWINGS.....  | 204 |
| MATERIALS.....   | 204 |
| CONSTRUCTION.....  | 205 |
| MEASUREMENT AND PAYMENT .....  | 205 |
| 10-1.68 ROCK SLOPE PROTECTION .....  | 205 |
| 10-1.69 SLOPE PAVING .....   | 205 |
| 10-1.70 MISCELLANEOUS CONCRETE CONSTRUCTION .....                          | 205 |
| 10-1.71 MISCELLANEOUS IRON AND STEEL.....                                  | 206 |
| 10-1.72 MISCELLANEOUS METAL (BRIDGE).....                                  | 206 |
| 10-1.73 MISCELLANEOUS METAL (RESTRAINER-CABLE TYPE).....                   | 206 |
| 10-1.74 CHAIN LINK FENCE.....  | 206 |
| 10-1.75 VINYL COATED CHAIN LINK FENCE.....                                 | 207 |
| 10-1.76 CHAIN LINK GATE.....   | 207 |
| 10-1.77 MARKERS AND DELINEATORS .....                                      | 207 |
| 10-1.78 METAL BEAM GUARD RAILING .....                                     | 207 |
| TERMINAL SYSTEM (TYPE SRT) .....   | 207 |
| TERMINAL SYSTEM (TYPE CAT) .....   | 208 |
| 10-1.79 CHAIN LINK RAILING.....  | 208 |
| 10-1.80 METAL BRIDGE RAILING .....   | 208 |
| 10-1.81 IRON BRIDGE RAILING .....  | 208 |
| 10-1.82 WROUGHT IRON RAILING.....  | 209 |
| 10-1.83 CABLE RAILING .....  | 209 |
| 10-1.84 CONCRETE BARRIER.....  | 209 |
| 10-1.85 THERMOPLASTIC TRAFFIC STRIPE AND PAVEMENT MARKING .....            | 209 |

|  |     |
|--|-----|
| 10-1.86 PAINT TRAFFIC STRIPE AND PAVEMENT MARKING .....            | 209 |
| 10-1.87 PAINT STALL LINE AND PAVEMENT MARKING.....                 | 209 |
| 10-1.88 PAINT MEDIAN CURB.....                                     | 210 |
| 10-1.89 PAVEMENT MARKERS .....                                     | 210 |
| SECTION 10-2. HIGHWAY PLANTING AND IRRIGATION SYSTEMS .....        | 210 |
| 10-2.01 GENERAL.....   | 210 |
| PROGRESS INSPECTIONS.....  | 210 |
| COST BREAK-DOWN .....  | 211 |
| 10-2.02 EXISTING HIGHWAY PLANTING .....                            | 215 |
| MAINTAIN EXISTING PLANTS.....                                      | 215 |
| 10-2.03 EXISTING HIGHWAY IRRIGATION FACILITIES.....                | 215 |
| CHECK AND TEST EXISTING IRRIGATION FACILITIES.....                 | 215 |
| REMOVE EXISTING IRRIGATION FACILITIES.....                         | 215 |
| 10-2.04 HIGHWAY PLANTING.....                                      | 215 |
| HIGHWAY PLANTING MATERIALS .....                                   | 215 |
| ROADSIDE CLEARING .....  | 216 |
| PESTICIDES .....   | 216 |
| PREPARING PLANTING AREAS .....                                     | 217 |
| PREPARE HOLES .....  | 217 |
| PLANTING.....  | 217 |
| PLANT ESTABLISHMENT WORK.....                                      | 217 |
| 10-2.05 IRRIGATION SYSTEMS .....                                   | 218 |
| VALVE BOXES.....   | 218 |
| ELECTRIC AUTOMATIC IRRIGATION COMPONENTS .....                     | 219 |
| REMOTE CONTROL VALVE ACTUATOR SYSTEM .....                         | 220 |
| IRRIGATION SYSTEMS FUNCTIONAL TEST .....                           | 220 |
| OPEN TRENCHES IN EXISTING SURFACING .....                          | 220 |
| PIPE .....   | 221 |
| WATER METER.....   | 221 |
| RELOCATE WATER METER.....  | 221 |
| BACKFLOW PREVENTER ASSEMBLIES.....                                 | 222 |
| TESTING BACKFLOW PREVENTERS .....                                  | 222 |
| SPRINKLERS.....  | 222 |
| FLUSH VALVES .....   | 222 |
| BALL VALVES .....  | 222 |
| FILTER ASSEMBLY UNIT .....   | 222 |
| FINAL IRRIGATION SYSTEM CHECK .....                                | 222 |
| SECTION 10-3. SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS.....        | 223 |
| 10-3.01 DESCRIPTION .....  | 223 |
| 10-3.02 COST BREAK-DOWN.....                                       | 223 |
| 10-3.03 MAINTAINING EXISTING AND TEMPORARY ELECTRICAL SYSTEMS..... | 223 |
| 10-3.04 STANDARDS, STEEL PEDESTALS AND POSTS.....                  | 224 |
| 10-3.05 CONDUIT .....  | 224 |
| COMMUNICATION CONDUIT.....   | 224 |
| COMMUNICATION CONDUIT (BRIDGE).....                                | 225 |
| HANGERS AND CONCRETE SUPPORTS (BRIDGE).....                        | 225 |
| FIBERGLASS CONDUIT.....  | 225 |
| 10-3.06 EXPANSION-DEFLECTION FITTINGS .....                        | 226 |
| 10-3.07 SIZE 32 INNERDUCT.....                                     | 226 |
| 10-3.08 PULL BOXES .....   | 226 |
| COMMUNICATION PULL BOXES.....                                      | 227 |
| 10-3.09 CONDUCTORS AND WIRING.....                                 | 227 |
| SIGNAL INTERCONNECT CABLE.....                                     | 227 |
| TELEPHONE CABLE .....  | 227 |
| 10-3.10 SERVICE.....   | 227 |
| ELECTRIC SERVICE (IRRIGATION).....                                 | 228 |
| 10-3.11 NUMBERING ELECTRICAL EQUIPMENT.....                        | 228 |
| 10-3.12 STATE-FURNISHED CONTROLLER ASSEMBLIES .....                | 228 |
| 10-3.13 IRRIGATION CONTROLLER ENCLOSURE CABINET.....               | 228 |

|   |     |
|---|-----|
| 10-3.14 VEHICLE SIGNAL FACES AND SIGNAL HEADS.....                | 229 |
| 10-3.15 LIGHT EMITTING DIODE SIGNAL MODULE .....                  | 229 |
| GENERAL.....  | 229 |
| PHOTOMETRIC REQUIREMENTS .....                                    | 231 |
| ELECTRICAL .....  | 233 |
| QUALITY CONTROL PROGRAM.....                                      | 233 |
| CERTIFICATE OF COMPLIANCE.....                                    | 234 |
| QUALITY ASSURANCE TESTING (RANDOM SAMPLE TESTING) .....           | 234 |
| WARRANTY .....  | 235 |
| 10-3.16 LIGHT EMITTING DIODE PEDESTRIAN SIGNAL FACE MODULES ..... | 235 |
| GENERAL.....  | 235 |
| PHOTOMETRIC REQUIREMENTS .....                                    | 236 |
| ELECTRICAL .....  | 236 |
| QUALITY CONTROL PROGRAM .....                                     | 237 |
| CERTIFICATE OF COMPLIANCE.....                                    | 238 |
| QUALITY ASSURANCE TESTING (RANDOM SAMPLE TESTING) .....           | 238 |
| WARRANTY .....  | 238 |
| 10-3.17 DETECTORS .....   | 238 |
| PREFORMED INDUCTIVE LOOPS .....                                   | 238 |
| 10-3.18 MODIFY AUTOMATIC VEHICLE CLASSIFICATION STATION.....      | 239 |
| 10-3.19 STATE FURNISHED PIEZO-ELECTRIC AXLE SENSORS.....          | 239 |
| 10-3.20 SCREENED TRANSMISSION CABLE .....                         | 240 |
| 10-3.21 PEDESTRIAN PUSH BUTTONS .....                             | 240 |
| 10-3.22 LUMINAIRES.....   | 240 |
| 10-3.23 SOFFIT AND WALL LUMINAIRES .....                          | 240 |
| 10-3.24 PEDESTRIAN OVERHEAD FIXTURES .....                        | 240 |
| 10-3.25 INTERNALLY ILLUMINATED STREET NAME SIGNS.....             | 242 |
| 10-3.26 PHOTOELECTRIC CONTROLS.....                               | 242 |
| 10-3.27 DISPOSING OF ELECTRICAL EQUIPMENT.....                    | 242 |
| 10-3.28 VIDEO IMAGING DETECTION SYSTEM .....                      | 242 |
| GENERAL.....  | 242 |
| SYSTEM SOFTWARE .....   | 242 |
| SYSTEM HARDWARE.....  | 243 |
| FUNCTIONAL CAPABILITIES .....                                     | 243 |
| VEHICLE DETECTION.....  | 244 |
| ACU HARDWARE.....   | 244 |
| IMAGE SENSOR (CAMERA) SYSTEM.....                                 | 245 |
| SUPERVISOR COMPUTER SYSTEM.....                                   | 247 |
| PHYSICAL AND ENVIRONMENTAL.....                                   | 248 |
| SYSTEM TESTING .....  | 249 |
| 10-3.29 PAYMENT .....   | 251 |
| SECTION 10-4. SEWER .....   | 252 |
| 10-4.01 GENERAL.....  | 252 |
| 10-4.02 MAINTENANCE OF FLOWS .....                                | 253 |
| 10-4.03 EXISTING SEWER FACILITIES .....                           | 253 |
| 10-4.04 TEMPORARY SEWER SYSTEM .....                              | 253 |
| 10-4.05 PIPING AND APPURTENANCES .....                            | 253 |
| 10-4.06 MATERIALS.....  | 254 |
| 10-4.07 EXCAVATION AND BACKFILL.....                              | 255 |
| 10-4.08 PIPE INSTALLATION .....                                   | 256 |
| 10-4.09 SEWER MANHOLES.....                                       | 257 |
| 10-4.10 FLUSHING WORK .....                                       | 258 |
| 10-4.11 CLEANING GRAVITY LINES.....                               | 258 |
| 10-4.12 SEWER PIPE TESTING REQUIREMENTS .....                     | 258 |
| 10-4.13 TRENCH RESURFACING.....                                   | 259 |
| 10-4.14 MEASUREMENT .....   | 259 |
| 10-4.15 PAYMENT .....   | 260 |
| SECTION 11. MODIFIED STANDARD SPECIFICATION SECTIONS .....        | 260 |
| SECTION 11-1. QUALITY CONTROL / QUALITY ASSURANCE .....           | 260 |

|   |     |
|---|-----|
| SECTION 39: ASPHALT CONCRETE.....   | 260 |
| 39-1 GENERAL.....   | 260 |
| 39-1.01 DESCRIPTION .....   | 260 |
| 39-2 MATERIALS.....   | 261 |
| 39-2.01 ASPHALTS .....  | 261 |
| 39-2.02 AGGREGATE.....  | 261 |
| 39-2.03 ASPHALT CONCRETE MIXTURE .....  | 262 |
| 39-2.04 PAVEMENT REINFORCING FABRIC .....   | 263 |
| 39-3 ASPHALT CONCRETE MIX DESIGN PROPOSAL AND REVIEW .....                                | 263 |
| 39-3.01 CONTRACTOR MIX DESIGN PROPOSAL .....  | 263 |
| 39-3.02 ENGINEER REVIEW OF ASPHALT CONCRETE MIX DESIGN .....                              | 264 |
| 39-4 CONTRACTOR QUALITY CONTROL.....  | 264 |
| 39-4.01 GENERAL.....  | 264 |
| 39-4.02 QUALITY CONTROL PLAN .....  | 264 |
| 39-4.03 CONTRACTOR QUALITY CONTROL INSPECTION, SAMPLING, AND TESTING.....                 | 265 |
| 39-4.04 CONTRACTOR PROCESS CONTROL .....  | 265 |
| 39-4.05 CONTRACTOR QUALITY CONTROL.....   | 266 |
| 39-4.06 CHARTS AND RECORDS.....   | 267 |
| 39-4.06A Compliance Charts.....   | 267 |
| 39-4.06B Records of Inspection and Testing.....   | 267 |
| 39-5 ENGINEER QUALITY ASSURANCE.....  | 268 |
| 39-5.01 GENERAL.....  | 268 |
| 39-5.02 SAMPLING AND TESTING FOR VERIFICATION .....                                       | 268 |
| 39-5.03 VERIFICATION .....  | 269 |
| 39-6 DISPUTE RESOLUTION .....   | 270 |
| 39-6.01 GENERAL.....  | 270 |
| 39-6.02 DURING THE ASPHALT CONCRETE MIX DESIGN REVIEW .....                               | 271 |
| 39-6.03 DURING THE PRODUCTION START-UP EVALUATION .....                                   | 271 |
| 39-6.04 DURING PRODUCTION .....   | 271 |
| 39-7 STORING, PROPORTIONING AND MIXING MATERIALS.....                                     | 272 |
| 39-7.01 STORAGE.....  | 272 |
| 39-7.01A Aggregate Cold Storage.....  | 272 |
| 39-7.01B Aggregate Hot Storage.....   | 272 |
| 39-7.01C Asphalt Binder Storage .....   | 272 |
| 39-7.02 DRYING.....   | 273 |
| 39-7.03 PROPORTIONING .....   | 273 |
| 39-7.03A Proportioning for Batch Mixing .....   | 273 |
| 39-7.03B Proportioning for Continuous Mixing .....  | 274 |
| 39-7.04 (BLANK).....  | 275 |
| 39-7.05 MIXING.....   | 275 |
| 39-7.05A Batch Mixing .....   | 275 |
| 39-7.05B Continuous Mixing .....  | 275 |
| 39-7.06 ASPHALT CONCRETE STORAGE.....   | 276 |
| 39-7.07 ASPHALT CONCRETE PLANTS .....   | 276 |
| 39-8 SUBGRADE, PRIME COAT, PAINT BINDER (TACK COAT), AND PAVEMENT REINFORCING FABRIC..... | 276 |
| 39-8.01 SUBGRADE.....   | 276 |
| 39-8.02 PRIME COAT AND PAINT BINDER (TACK COAT).....                                      | 276 |
| 39-8.03 PAVEMENT REINFORCING FABRIC .....   | 277 |
| 39-9 SPREADING AND COMPACTING EQUIPMENT .....   | 277 |
| 39-9.01 SPREADING EQUIPMENT .....   | 277 |
| 39-9.02 COMPACTING EQUIPMENT .....  | 278 |
| 39-10 SPREADING AND COMPACTING .....  | 278 |
| 39-10.01 GENERAL REQUIREMENTS .....   | 278 |
| 39-10.02 PRODUCTION START-UP EVALUATION AND NUCLEAR DENSITY TEST STRIPS .....             | 279 |
| 39-10.02A Production Start-Up Evaluation.....   | 279 |
| 39-10.02B Nuclear Density Test Strip.....   | 280 |
| 39-10.03 SPREADING .....  | 280 |
| 39-10.04 COMPACTING .....   | 281 |
| 39-11 ACCEPTANCE OF WORK .....  | 281 |

|  |     |
|--|-----|
| 39-11.01 GENERAL.....  | 281 |
| 39-11.02 STATISTICAL EVALUATION AND DETERMINATION OF PAY FACTOR .....      | 282 |
| 39-11.02A General.....   | 282 |
| 39-11.02B Statistical Evaluation .....                                     | 282 |
| 39-11.02C Pay Factor Determination and Compensation Adjustment.....        | 284 |
| 39-12 MEASUREMENT AND PAYMENT .....  | 289 |
| 39-12.01 MEASUREMENT .....   | 289 |
| 39-12.02 PAYMENT .....   | 289 |
| SECTION 13. RAILROAD RELATIONS AND INSURANCE REQUIREMENTS.....             | 291 |
| SECTION 14 FEDERAL REQUIREMENTS FOR FEDERAL-AID CONSTRUCTION PROJECTS..... | 306 |
| FEDERAL REQUIREMENT TRAINING SPECIAL PROVISIONS .....                      | 325 |

## STANDARD PLANS LIST

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

|           |   |
|-----------|---|
| A10A      | Abbreviations   |
| A10B      | Symbols   |
| A20A      | Pavement Markers and Traffic Lines, Typical Details                               |
| A20B      | Pavement Markers and Traffic Lines, Typical Details                               |
| A20C      | Pavement Markers and Traffic Lines, Typical Details                               |
| A20D      | Pavement Markers and Traffic Lines, Typical Details                               |
| A24A      | Pavement Markings - Arrows  |
| A24B      | Pavement Markings - Arrows  |
| A24C      | Pavement Markings - Symbols and Numerals  |
| A24D      | Pavement Markings - Words   |
| A24E      | Pavement Markings - Words and Crosswalks  |
| RSP A35B  | Portland Cement Concrete Pavement (Doweled Transverse Joints)                     |
| A35C      | Portland Cement Concrete Pavement Joint and End Anchor Details                    |
| A62A      | Excavation and Backfill - Miscellaneous Details                                   |
| A62B      | Limits of Payment for Excavation and Backfill - Bridge Surcharge and Wall         |
| A62C      | Limits of Payment for Excavation and Backfill - Bridge                            |
| A62D      | Excavation and Backfill - Concrete Pipe Culverts                                  |
| RSP A62DA | Excavation and Backfill - Concrete Pipe Culverts                                  |
| A62E      | Excavation and Backfill - Cast-In-Place Reinforced Concrete Box and Arch Culverts |
| A62F      | Excavation and Backfill - Metal and Plastic Culverts                              |
| A73A      | Object Markers  |
| A73B      | Markers   |
| RSP A73C  | Delineators, Channelizers and Barricades  |
| A75D      | Concrete Headlight Glare Screen   |
| A76A      | Concrete Barrier Type 60  |
| A76B      | Concrete Barrier Type 60  |
| A76G      | Concrete Barrier Type 60S   |
| A76H      | Concrete Barrier Type 60S   |
| A76I      | Concrete Barrier Type 60SE  |
| A77A      | Metal Beam Guard Railing – Typical Wood Post With Wood Block                      |
| A77AA     | Metal Beam Guard Railing – Typical Steel Post With Wood Block                     |
| A77B      | Metal Beam Guard Railing - Standard Hardware                                      |
| A77C      | Metal Beam Guard Railing – Wood Post and Wood Block Details                       |
| A77CA     | Metal Beam Guard Railing – Steel Post and Wood Block Details                      |

|          |  |
|----------|--|
| A77D     | Metal Beam Guard Railing – Typical Layouts   |
| A77E     | Metal Beam Guard Railing – Typical Layouts   |
| A77F     | Metal Beam Guard Railing – Typical Embankment Widening for End Treatments                  |
| A77FA    | Metal Beam Guard Railing – Typical Line Post Installation                                  |
| RSP A77G | Metal Beam Guard Railing – End Treatment, Terminal Anchor Assembly (Type SFT)              |
| A77H     | Metal Beam Guard Railing - Anchor Cable and Anchor Plate Details                           |
| A77J     | Metal Beam Guard Railing Connections to Bridge Railings, Retaining Walls and Abutments     |
| RSP A77L | Metal Beam Guard Railing and Single Faced Barrier Railing Terminal System - End Treatments |
| RSP A77M | Metal Beam Guard Railing and Single Faced Barrier Railing Terminal System - End Treatment  |
| RSP A77N | Metal Beam Guard Railing and Single Faced Barrier Railing Terminal System - End Treatment  |
| A82B     | Crash Cushion (Type ADIEM)   |
| A82D     | Crash Cushion (Type REACT 9SCBS)   |
| A82DA    | Crash Cushion (Type REACT 9SCBS) – Connection to Concrete Barrier                          |
| A85      | Chain Link Fence   |
| A87      | Curbs, Dikes and Driveways   |
| A88A     | Curb Ramp Details  |
| A88B     | Curb Ramp Details  |
| A90      | Accessible Parking   |
| RSP D72  | Drainage Inlets  |
| D73      | Drainage Inlets  |
| D74B     | Drainage Inlets  |
| D74C     | Drainage Inlet Details   |
| D77A     | Grate Details  |
| D78      | Gutter Depressions   |
| D80      | Cast-in-Place Reinforced Concrete Single Box Culvert                                       |
| D81      | Cast-in-Place Reinforced Concrete Double Box Culvert                                       |
| RSP D82  | Cast-in-Place Reinforced Concrete Culvert Miscellaneous Details                            |
| RSP D84  | Box Culvert Wingwalls - Types A, B and C   |
| D85      | Box Culvert Wingwalls - Types D and E  |
| D86B     | Pipe Culvert Headwalls, Endwalls and Warped Wingwalls                                      |
| D87A     | Corrugated Metal Pipe Downdrain Details  |
| D87D     | Overside Drains  |
| RSP D89  | Pipe Headwalls   |
| D90      | Pipe Culvert Headwalls, Endwalls and Wingwalls -Types A, B and C                           |
| D94A     | Metal and Plastic Flared End Sections  |
| D94B     | Concrete Flared End Sections   |
| D98C     | Grated Line Drain Details  |
| D99A     | Structural Section Drainage System Details   |
| D99B     | Edge Drain Outlet and Vent Details   |
| D99C     | Edge Drain Cleanout and Vent Details   |
| D99D     | Cross Drain Interceptor Details  |
| H1       | Planting and Irrigation - Abbreviations  |
| H2       | Planting and Irrigation - Symbols  |
| H3       | Planting and Irrigation Details  |
| H4       | Planting and Irrigation Details  |
| H5       | Planting and Irrigation Details  |
| H6       | Planting and Irrigation Details  |
| H7       | Planting and Irrigation Details  |
| H8       | Planting and Irrigation Details  |
| T1A      | Temporary Crash Cushion, Sand Filled (Unidirectional)                                      |
| T1B      | Temporary Crash Cushion, Sand Filled (Bidirectional)                                       |
| RSP T2   | Temporary Crash Cushion, Sand Filled (Shoulder Installations)                              |

|            |  |
|------------|--|
| T3         | Temporary Railing (Type K)   |
| T4         | Temporary Traffic Screen   |
| T7         | Construction Project Funding Identification Signs  |
| T10        | Traffic Control System for Lane Closure On Freeways and Expressways                      |
| T11        | Traffic Control System for Lane Closure On Multilane Conventional Highways               |
| T12        | Traffic Control System for Lane Closure On Multilane Conventional Highways               |
| T14        | Traffic Control System for Ramp Closure  |
| T15        | Traffic Control System for Moving Lane Closure On Multilane Highways                     |
| B0-1       | Bridge Details   |
| RSP B0-3   | Bridge Details   |
| B0-5       | Bridge Details   |
| B0-13      | Bridge Details   |
| B2-5       | Pile Details-Class 400 and Class 625   |
| B2-8       | Pile Details-Class 900 and Class 900C  |
| RSP B3-1   | Retaining Wall Type 1 - H=1200 Through 9100 mm   |
| RSP B3-7   | Retaining Wall Type 5  |
| RSP B3-8   | Retaining Wall Details No. 1   |
| B3-9       | Retaining Wall Details No. 2   |
| RSP B3-11  | Retaining Wall Type 6 - 1829 mm Maximum  |
| B6-1       | T-Beam Details   |
| B6-21      | Joint Seals (Maximum Movement Rating = 50 mm)  |
| B7-1       | Box Girder Details   |
| B7-6       | Deck Drains - Types D-1 and D-2  |
| B7-7       | Deck Drain - Type D-3  |
| B7-10      | Utility Opening - Box Girder   |
| B7-11      | Utility Details  |
| B8-5       | Cast-in-Place Prestressed Girder Details   |
| B11-7      | Chain Link Railing   |
| B11-47     | Cable Railing  |
| B11-51     | Tubular Hand Railing   |
| B11-52     | Chain Link Railing Type 7  |
| RSP B11-53 | Concrete Barrier Type 25   |
| B11-54     | Concrete Barrier Type 26   |
| B14-3      | Communication and Sprinkler Control Conduits (Conduit Less Than size 103)                |
| RS1        | Roadside Signs, Typical Installation Details No. 1                                       |
| RS2        | Roadside Signs - Wood Post, Typical Installation Details No. 2                           |
| RS3        | Roadside Signs - Laminated Wood Box Post Typical Installation Details No. 3              |
| RS4        | Roadside Signs, Typical Installation Details No. 4                                       |
| RSP S1     | Overhead Signs - Truss, Instructions and Examples  |
| RSP S2     | Overhead Signs - Truss, Single Post Type - Post Types II Thru VII                        |
| RSP S3     | Overhead Signs - Truss, Two Post Type - Post Types I-S Thru VII-S                        |
| S4         | Overhead Signs - Truss, Single Post Type - Structural Frame Members                      |
| RSP S5     | Overhead Signs - Truss Two Post Type - Structural Frame Members                          |
| RSP S6     | Overhead Signs - Truss, Structural Frame Details   |
| RSP S7     | Overhead Signs -Truss, Frame Juncture Details  |
| RSP S8A    | Overhead Signs - Steel Frames - Removable Sign Panel Frames                              |
| S8B        | Overhead Signs - Removable Sign Panel Frames - Overhead Formed Panel Mounting<br>Details |
| RSP S8C    | Overhead Signs - Truss, Sign Mounting Details, Laminated Panel - Type A                  |
| S9         | Overhead Signs - Walkway Details No. 1   |
| S10        | Overhead Signs - Walkway Details No. 2   |
| RSP S11    | Overhead Signs - Walkway Safety Railing Details  |
| RSP S13    | Overhead Signs - Truss, Pile Foundation  |
| S15        | Overhead Signs - Lightweight, Type A, Connection Details                                 |
| S18B       | Overhead Signs - Lightweight, Light Fixture Mounting Details                             |
| RSP S20A   | Overhead Signs - Lightweight, Post Details   |

|           |   |
|-----------|---|
| RSP S20B  | Overhead Signs - Lightweight, Foundation Details  |
| ES-1A     | Signal, Lighting and Electrical Systems - Symbols and Abbreviations   |
| ES-1B     | Signal, Lighting and Electrical Systems - Symbols and Abbreviations   |
| ES-2A     | Signal, Lighting and Electrical Systems - Service Equipment   |
| ES-2C     | Signal, Lighting and Electrical Systems - Service Equipment Notes, Type III Series                                |
| ES-2E     | Signal, Lighting and Electrical Systems - Service Equipment and Typical Wiring Diagram<br>Type III-B Series       |
| ES-2F     | Signal, Lighting and Electrical Systems - Service Equipment and Typical Wiring Diagram<br>Type III-C Series       |
| ES-3C     | Signal, Lighting and Electrical Systems - Controller Cabinet Details  |
| ES-3H     | Signal, Lighting and Electrical Systems - Irrigation Controller Enclosure Cabinet                                 |
| ES-4A     | Signal, Lighting and Electrical Systems - Signal Heads and Mountings  |
| ES-4B     | Signal, Lighting and Electrical Systems - Signal Heads and Mountings  |
| ES-4C     | Signal, Lighting and Electrical Systems - Signal Heads and Mountings  |
| ES-4D     | Signal, Lighting and Electrical Systems - Signal Heads and Mountings  |
| ES-4E     | Signal, Lighting and Electrical Systems - Signal Heads and Mountings  |
| ES-5A     | Signal, Lighting and Electrical Systems - Detectors   |
| ES-5B     | Signal, Lighting and Electrical Systems - Detectors   |
| ES-5C     | Signal, Lighting and Electrical Systems - Detectors   |
| ES-5D     | Signal, Lighting and Electrical Systems - Detectors   |
| ES-5E     | Signal, Lighting and Electrical Systems - Detectors   |
| RSP ES-6A | Lighting Standards - Types 15, 21 and 22  |
| RSP ES-6B | Lighting Standards - Types 15 AND 21, Barrier Rail Mounted Details  |
| RSP ES-6C | Lighting Standards - Type 15 Slip Base Insert   |
| ES-6D     | Lighting Standards - Types 15D, 21D and 22D Double Luminaire Arm  |
| ES-6E     | Lighting Standards - Types 30 and 31  |
| RSP ES-6F | Lighting Standards - Type 30 and 31 Base Plate Details  |
| ES-7A     | Signal Standards - Push Button Posts  |
| ES-7B     | Signal and Lighting Standards - Type 1 Standards and Equipment Numbering  |
| RSP ES-7E | Signal and Lighting Standards - Case 3 Arm Loading, Wind Velocity = 129 km/h, Arm<br>Lengths 4.6 m to 13.7 m      |
| ES-7F     | Signal and Lighting Standards - Case 4 Arm Loading, Wind Velocity = 129 km/h, Arm<br>Lengths 7.6 m to 13.7 m      |
| ES-7M     | Signal and Lighting Standards - Details No. 1   |
| ES-7N     | Signal and Lighting Standards - Details No. 2   |
| ES-7O     | Sign Illumination - Internally Illuminated Street Name Sign   |
| ES-8      | Signal, Lighting and Electrical Systems - Pull Box Details  |
| ES-9A     | Signal, Lighting and Electrical Systems - Electrical Details, Structure Installations                             |
| ES-9B     | Signal, Lighting and Electrical Systems - Electrical Details, Structure Installations                             |
| ES-9C     | Signal, Lighting and Electrical Systems - Electrical Details, Structure Installations                             |
| ES-9D     | Signal, Lighting and Electrical Systems - Electrical Details, Structure Installations                             |
| ES-9E     | Signal, Lighting and Electrical Systems - Electrical Details, Structure Installations                             |
| ES-9F     | Signal, Lighting and Electrical Systems - Flush Soffit Luminaire Modification Details,<br>Structure Installations |
| ES-10     | Signal, Lighting and Electrical Systems - Isolux Diagrams   |
| ES-11     | Signal, Lighting and Electrical Systems - Foundation Installations  |
| ES-12A    | Signal, Lighting and Electrical Systems - Pedestrian Overcrossing Fluorescent Lighting<br>Fixture                 |
| ES-13A    | Signal, Lighting and Electrical Systems - Splicing Details  |
| ES-13B    | Signal, Lighting and Electrical Systems - Wiring Details and Fuse Ratings   |
| ES-15A    | Sign Illumination - Mercury Vapor Sign Illumination Equipment   |
| ES-15B    | Sign Illumination - 915 mm Fluorescent Sign Illumination Equipment  |
| ES-15C    | Sign Illumination - Sign Illumination Equipment   |
| ES-15D    | Sign Illumination - Sign Illumination Control   |

DEPARTMENT OF TRANSPORTATION

---

**NOTICE TO CONTRACTORS**

---

**CONTRACT NO. 07-104954**

**07-Ven-101,34-21.6/23.2,21.5/22.2**

Sealed proposals for the work shown on the plans entitled:

**STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROJECT PLANS FOR CONSTRUCTION ON STATE HIGHWAY IN VENTURA COUNTY IN CAMARILLO ON ROUTE 101 FROM CALLEGUAS CREEK TO 0.4 km WEST OF ARNEILL ROAD OVERCROSSING AND ON ROUTE 34 FROM DAWSON DRIVE OVERHEAD TO 0.2 km NORTH OF DAILY DRIVE**

will be received at the Department of Transportation, 3347 Michelson Drive, Suite 100, Irvine, CA 92612-1692, until 2 o'clock p.m. on June 6, 2002, at which time they will be publicly opened and read in Room C - 1116 at the same address.

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

**STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROPOSAL AND CONTRACT FOR CONSTRUCTION ON STATE HIGHWAY IN VENTURA COUNTY IN CAMARILLO ON ROUTE 101 FROM CALLEGUAS CREEK TO 0.4 km WEST OF ARNEILL ROAD OVERCROSSING AND ON ROUTE 34 FROM DAWSON DRIVE OVERHEAD TO 0.2 km NORTH OF DAILY DRIVE**

General work description: Reconstruction and upgrade of the Route 101/34 Interchange.

This project has a goal of 20 percent disadvantaged business enterprise (DBE) participation. No prebid meeting is scheduled for this project.

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

Bids are required for the entire work described herein.

At the time this contract is awarded, the Contractor shall possess either a Class A license or one of the following Class C licenses: C-8, C-12.

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

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

Cross sections for this project are not available.

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

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

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

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

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

DEPARTMENT OF TRANSPORTATION

Deputy Director Transportation Engineering

Dated April 22, 2002

ASF

**COPY OF ENGINEER'S ESTIMATE**  
**(NOT TO BE USED FOR BIDDING PURPOSES)**

**07-104954**

| Item      | Item Code | Item  | Unit of Measure | Estimated Quantity |
|-----------|-----------|---|-----------------|--------------------|
| 1         | 070012    | PROGRESS SCHEDULE (CRITICAL PATH METHOD)      | LS              | LUMP SUM           |
| 2         | 070018    | TIME-RELATED OVERHEAD                         | WDAY            | 500                |
| 3         | 071301    | TEMPORARY FENCE                               | M               | 130                |
| 4         | 074019    | PREPARE STORM WATER POLLUTION PREVENTION PLAN | LS              | LUMP SUM           |
| 5         | 074020    | WATER POLLUTION CONTROL                       | LS              | LUMP SUM           |
| 6<br>(S)  | 120090    | CONSTRUCTION AREA SIGNS                       | LS              | LUMP SUM           |
| 7<br>(S)  | 120100    | TRAFFIC CONTROL SYSTEM                        | LS              | LUMP SUM           |
| 8<br>(S)  | 120120    | TYPE III BARRICADE                            | EA              | 69                 |
| 9<br>(S)  | 120159    | TEMPORARY TRAFFIC STRIPE (PAINT)              | M               | 33 300             |
| 10<br>(S) | 120165    | CHANNELIZER (SURFACE MOUNTED)                 | EA              | 390                |
| 11<br>(S) | 129000    | TEMPORARY RAILING (TYPE K)                    | M               | 6970               |
| 12<br>(S) | 129100    | TEMPORARY CRASH CUSHION MODULE                | EA              | 450                |
| 13        | 150206    | ABANDON CULVERT                               | M               | 150                |
| 14        | 150305    | OBLITERATE SURFACING                          | M2              | 1590               |
| 15<br>(S) | 150608    | REMOVE CHAIN LINK FENCE                       | M               | 1130               |
| 16<br>(S) | 150662    | REMOVE METAL BEAM GUARD RAILING               | M               | 220                |
| 17        | 150668    | REMOVE FLARED END SECTION                     | EA              | 1                  |
| 18<br>(S) | 150701    | REMOVE YELLOW PAINTED TRAFFIC STRIPE          | M               | 11 300             |
| 19<br>(S) | 150704    | REMOVE YELLOW THERMOPLASTIC TRAFFIC STRIPE    | M               | 2700               |
| 20<br>(S) | 150705    | REMOVE YELLOW THERMOPLASTIC PAVEMENT MARKING  | M2              | 37                 |

| Item      | Item Code | Item   | Unit of Measure | Estimated Quantity |
|-----------|-----------|--|-----------------|--------------------|
| 21<br>(S) | 150711    | REMOVE PAINTED TRAFFIC STRIPE                            | M               | 12 000             |
| 22<br>(S) | 150714    | REMOVE THERMOPLASTIC TRAFFIC STRIPE                      | M               | 700                |
| 23<br>(S) | 150715    | REMOVE THERMOPLASTIC PAVEMENT MARKING                    | M2              | 300                |
| 24<br>(S) | 023846    | TEST YELLOW TRAFFIC STRIPES AND YELLOW PAVEMENT MARKINGS | LS              | LUMP SUM           |
| 25<br>(S) | 150722    | REMOVE PAVEMENT MARKER                                   | EA              | 2740               |
| 26<br>(S) | 023847    | REMOVE ROADSIDE SIGN (ONE POST)                          | EA              | 93                 |
| 27<br>(S) | 023848    | REMOVE ROADSIDE SIGN (TWO POST)                          | EA              | 23                 |
| 28<br>(S) | 150760    | REMOVE SIGN STRUCTURE                                    | EA              | 2                  |
| 29        | 150772    | REMOVE CURB  | M               | 1300               |
| 30        | 150801    | REMOVE OVERSIDE DRAIN                                    | EA              | 1                  |
| 31        | 150806    | REMOVE PIPE  | M               | 140                |
| 32        | 150820    | REMOVE INLET   | EA              | 10                 |
| 33<br>(S) | 150824    | REMOVE SEWER MANHOLE                                     | EA              | 4                  |
| 34        | 023849    | REMOVE WALL  | M               | 200                |
| 35<br>(S) | 150841    | REMOVE SEWER PIPE  | M               | 220                |
| 36        | 150860    | REMOVE BASE AND SURFACING                                | M3              | 1070               |
| 37        | 152430    | ADJUST INLET   | EA              | 14                 |
| 38        | 152440    | ADJUST MANHOLE TO GRADE                                  | EA              | 10                 |
| 39<br>(S) | 153154    | COLD PLANE ASPHALT CONCRETE PAVEMENT (60 MM MAXIMUM)     | M2              | 3320               |
| 40        | 153210    | REMOVE CONCRETE  | M3              | 300                |

| Item      | Item Code | Item   | Unit of Measure | Estimated Quantity |
|-----------|-----------|--|-----------------|--------------------|
| 41        | 153229    | REMOVE CONCRETE BARRIER (TYPE K)                         | M               | 250                |
| 42        | 153235    | CLEAN BRIDGE DECK  | M2              | 6660               |
| 43        | 153531    | ACCESS OPENING, SOFFIT                                   | EA              | 4                  |
| 44        | 155003    | CAP INLET  | EA              | 4                  |
| 45        | 156590    | REMOVE CRASH CUSHION (SAND FILLED)                       | EA              | 1                  |
| 46        | 157551    | BRIDGE REMOVAL, LOCATION A                               | LS              | LUMP SUM           |
| 47        | 157552    | BRIDGE REMOVAL, LOCATION B                               | LS              | LUMP SUM           |
| 48        | 157553    | BRIDGE REMOVAL, LOCATION C                               | LS              | LUMP SUM           |
| 49        | 157560    | BRIDGE REMOVAL (PORTION)                                 | LS              | LUMP SUM           |
| 50        | 160101    | CLEARING AND GRUBBING                                    | LS              | LUMP SUM           |
| 51        | 190101    | ROADWAY EXCAVATION                                       | M3              | 71 100             |
| 52        | 190103    | ROADWAY EXCAVATION (TYPE Y) (AERIALY DEPOSITED LEAD)     | M3              | 1100               |
| 53        | 190110    | LEAD COMPLIANCE PLAN                                     | LS              | LUMP SUM           |
| 54<br>(F) | 192003    | STRUCTURE EXCAVATION (BRIDGE)                            | M3              | 1407               |
| 55<br>(F) | 192037    | STRUCTURE EXCAVATION (RETAINING WALL)                    | M3              | 7270               |
| 56<br>(F) | 192052    | STRUCTURE EXCAVATION (TYPE Z-1) (AERIALY DEPOSITED LEAD) | M3              | 13                 |
| 57<br>(F) | 193003    | STRUCTURE BACKFILL (BRIDGE)                              | M3              | 837                |
| 58<br>(F) | 193013    | STRUCTURE BACKFILL (RETAINING WALL)                      | M3              | 5045               |
| 59<br>(F) | 193031    | PERVIOUS BACKFILL MATERIAL (RETAINING WALL)              | M3              | 445                |
| 60        | 193114    | SAND BACKFILL  | M3              | 59                 |

| Item      | Item Code | Item   | Unit of Measure | Estimated Quantity |
|-----------|-----------|--|-----------------|--------------------|
| 61        | 194001    | DITCH EXCAVATION                                 | M3              | 56                 |
| 62        | 198200    | SUBGRADE ENHANCEMENT FABRIC                      | M2              | 22 000             |
| 63        | 023850    | HIGH MODULUS GEOGRID                             | M2              | 690                |
| 64<br>(S) | 200001    | HIGHWAY PLANTING                                 | LS              | LUMP SUM           |
| 65<br>(S) | 203003    | STRAW (EROSION CONTROL)                          | TONN            | 1.6                |
| 66<br>(S) | 203014    | FIBER (EROSION CONTROL)                          | KG              | 380                |
| 67<br>(S) | 203024    | COMPOST (EROSION CONTROL)                        | KG              | 1510               |
| 68<br>(S) | 203045    | PURE LIVE SEED (EROSION CONTROL)                 | KG              | 9                  |
| 69<br>(S) | 203061    | STABILIZING EMULSION (EROSION CONTROL)           | KG              | 76                 |
| 70<br>(S) | 204099    | PLANT ESTABLISHMENT WORK                         | LS              | LUMP SUM           |
| 71<br>(S) | 208000    | IRRIGATION SYSTEM                                | LS              | LUMP SUM           |
| 72<br>(S) | 023851    | RELOCATE WATER METER                             | EA              | 3                  |
| 73        | 208723    | 100 MM ALTERNATIVE CONDUIT                       | M               | 8                  |
| 74        | 208724    | 200 MM ALTERNATIVE CONDUIT                       | M               | 35                 |
| 75<br>(S) | 208798    | 200 MM WELDED STEEL PIPE CONDUIT (6.35 MM THICK) | M               | 25                 |
| 76        | 250401    | CLASS 4 AGGREGATE SUBBASE                        | M3              | 9780               |
| 77        | 260201    | CLASS 2 AGGREGATE BASE                           | M3              | 6550               |
| 78        | 260301    | CLASS 3 AGGREGATE BASE                           | M3              | 5490               |
| 79        | 280000    | LEAN CONCRETE BASE                               | M3              | 3620               |
| 80        | 390154    | ASPHALT CONCRETE (TYPE B)                        | TONN            | 13 200             |

| Item       | Item Code | Item   | Unit of Measure | Estimated Quantity |
|------------|-----------|--|-----------------|--------------------|
| 81         | 394040    | PLACE ASPHALT CONCRETE DIKE (TYPE A)         | M               | 830                |
| 82         | 394044    | PLACE ASPHALT CONCRETE DIKE (TYPE C)         | M               | 130                |
| 83         | 394048    | PLACE ASPHALT CONCRETE DIKE (TYPE E)         | M               | 650                |
| 84         | 394049    | PLACE ASPHALT CONCRETE DIKE (TYPE F)         | M               | 60                 |
| 85         | 401000    | CONCRETE PAVEMENT                            | M3              | 4240               |
| 86         | 401066    | CONCRETE PAVEMENT (RAMP TERMINI)             | M3              | 420                |
| 87<br>(S)  | 490655    | 400 MM CAST-IN-DRILLED-HOLE CONCRETE PILING  | M               | 520                |
| 88<br>(S)  | 048992    | 1.68 M CAST-IN-DRILLED HOLE CONCRETE PILING  | M               | 86                 |
| 89         | 490700    | FURNISH PILING (CLASS 900) (ALTERNATIVE W)   | M               | 4407               |
| 90<br>(S)  | 490701    | DRIVE PILE (CLASS 900) (ALTERNATIVE W)       | EA              | 324                |
| 91         | 490772    | FURNISH PILING (CLASS 625) (ALTERNATIVE W)   | M               | 1935               |
| 92<br>(S)  | 490773    | DRIVE PILE (CLASS 625) (ALTERNATIVE W)       | EA              | 150                |
| 93         | 491007    | FURNISH PILING (CLASS 400)                   | M               | 411                |
| 94<br>(S)  | 491008    | DRIVE PILE (CLASS 400)                       | EA              | 39                 |
| 95<br>(S)  | 500001    | PRESTRESSING CAST-IN-PLACE CONCRETE          | LS              | LUMP SUM           |
| 96<br>(F)  | 510051    | STRUCTURAL CONCRETE, BRIDGE FOOTING          | M3              | 512                |
| 97<br>(F)  | 510053    | STRUCTURAL CONCRETE, BRIDGE                  | M3              | 3260               |
| 98<br>(F)  | 510060    | STRUCTURAL CONCRETE, RETAINING WALL          | M3              | 2261               |
| 99<br>(F)  | 510085    | STRUCTURAL CONCRETE, APPROACH SLAB (TYPE EQ) | M3              | 37                 |
| 100<br>(F) | 510086    | STRUCTURAL CONCRETE, APPROACH SLAB (TYPE N)  | M3              | 98                 |

| Item      | Item Code | Item  | Unit of Measure | Estimated Quantity |
|-----------|-----------|---|-----------------|--------------------|
| 101       | 510087    | STRUCTURAL CONCRETE, APPROACH SLAB (TYPE R)               | M3              | 210                |
| 102       | 510127    | CLASS 2 CONCRETE (STRUCTURE)                              | M3              | 394                |
| 103 (F)   | 510502    | MINOR CONCRETE (MINOR STRUCTURE)                          | M3              | 140                |
| 104 (F)   | 048993    | MINOR CONCRETE (ENTRY COLUMN)                             | EA              | 10                 |
| 105 (F)   | 048994    | FORMED RELIEF TEXTURE                                     | M2              | 46                 |
| 106       | 511106    | DRILL AND BOND DOWEL                                      | M               | 630                |
| 107       | 512232    | FURNISH PRECAST PRESTRESSED CONCRETE GIRDER (20 M - 25 M) | EA              | 8                  |
| 108 (S)   | 512500    | ERECT PRECAST PRESTRESSED CONCRETE GIRDER                 | EA              | 8                  |
| 109 (S)   | 515072    | CORE CONCRETE (0 - 50 MM)                                 | M               | 46                 |
| 110 (S-F) | 048995    | SOUND WALL (RETAINING WALL) (MASONRY BLOCK)               | M2              | 200                |
| 111 (S-F) | 518002    | SOUND WALL (MASONRY BLOCK)                                | M2              | 272                |
| 112 (S)   | 519144    | JOINT SEAL (MR 50 MM)                                     | M               | 290                |
| 113 (S-F) | 520101    | BAR REINFORCING STEEL                                     | KG              | 57 096             |
| 114 (S-F) | 520102    | BAR REINFORCING STEEL (BRIDGE)                            | KG              | 629 800            |
| 115 (F)   | 520103    | BAR REINFORCING STEEL (RETAINING WALL)                    | KG              | 162 996            |
| 116 (F)   | 540102    | TREAT BRIDGE DECK   | M2              | 6654               |
| 117       | 540108    | FURNISH BRIDGE DECK TREATMENT MATERIAL                    | L               | 2660               |
| 118       | 560203    | FURNISH SIGN STRUCTURE (BRIDGE MOUNTED WITH WALKWAY)      | KG              | 1520               |
| 119 (S)   | 560204    | INSTALL SIGN STRUCTURE (BRIDGE MOUNTED WITH WALKWAY)      | KG              | 1520               |
| 120 (F)   | 560218    | FURNISH SIGN STRUCTURE (TRUSS)                            | KG              | 22 520             |

| Item         | Item Code | Item   | Unit of Measure | Estimated Quantity |
|--------------|-----------|--|-----------------|--------------------|
| 121<br>(S-F) | 560219    | INSTALL SIGN STRUCTURE (TRUSS)                                 | KG              | 22 520             |
| 122<br>(S)   | 561008    | 760 MM CAST-IN-DRILLED-HOLE CONCRETE PILE<br>(SIGN FOUNDATION) | M               | 8                  |
| 123<br>(S)   | 561009    | 920 MM CAST-IN-DRILLED-HOLE CONCRETE PILE<br>(SIGN FOUNDATION) | M               | 6                  |
| 124          | 023852    | ROADSIDE SIGN (WOOD POST) - ONE POST                           | EA              | 73                 |
| 125          | 023853    | ROADSIDE SIGN (METAL POST) - ONE POST                          | EA              | 34                 |
| 126          | 023854    | ROADSIDE SIGN (METAL POST) - TWO POST                          | EA              | 2                  |
| 127          | 023855    | ROADSIDE SIGN (WOOD POST) - TWO POST                           | EA              | 28                 |
| 128          | 568001    | INSTALL SIGN (STRAP AND SADDLE BRACKET<br>METHOD)              | EA              | 54                 |
| 129          | 568016    | INSTALL SIGN PANEL ON EXISTING FRAME                           | M2              | 8                  |
| 130          | 650068    | 375 MM REINFORCED CONCRETE PIPE                                | M               | 76                 |
| 131          | 650069    | 450 MM REINFORCED CONCRETE PIPE                                | M               | 120                |
| 132          | 650075    | 600 MM REINFORCED CONCRETE PIPE                                | M               | 170                |
| 133          | 650076    | 675 MM REINFORCED CONCRETE PIPE                                | M               | 55                 |
| 134          | 650079    | 900 MM REINFORCED CONCRETE PIPE                                | M               | 180                |
| 135          | 650081    | 1050 MM REINFORCED CONCRETE PIPE                               | M               | 14                 |
| 136          | 650084    | 1200 MM REINFORCED CONCRETE PIPE                               | M               | 24                 |
| 137          | 664012    | 375 MM CORRUGATED STEEL PIPE (2.01 MM<br>THICK)                | M               | 0.7                |
| 138          | 664015    | 450 MM CORRUGATED STEEL PIPE (2.01 MM<br>THICK)                | M               | 24                 |
| 139          | 665733    | 450 MM SLOTTED CORRUGATED STEEL PIPE (2.01<br>MM THICK)        | M               | 6                  |
| 140          | 681134    | 80 MM PLASTIC PIPE (EDGE DRAIN)                                | M               | 1560               |

| Item      | Item Code | Item   | Unit of Measure | Estimated Quantity |
|-----------|-----------|--|-----------------|--------------------|
| 141       | 681137    | 80 MM PLASTIC PIPE (EDGE DRAIN OUTLET)                 | M               | 240                |
| 142       | 690166    | 450 MM CORRUGATED STEEL PIPE DOWNDRAIN (2.01 MM THICK) | M               | 35                 |
| 143       | 703233    | GRATED LINE DRAIN                                      | M               | 210                |
| 144       | 703273    | 450 MM CORRUGATED STEEL PIPE RISER (4.27 MM THICK)     | M               | 2                  |
| 145       | 048996    | 610 MM WELDED STEEL PIPE CASING (BRIDGE)               | M               | 36                 |
| 146       | 705222    | 450 MM CONCRETE FLARED END SECTION                     | EA              | 1                  |
| 147       | 705224    | 600 MM CONCRETE FLARED END SECTION                     | EA              | 2                  |
| 148       | 707244    | 900 MM PRECAST CONCRETE PIPE MANHOLE                   | M               | 3                  |
| 149       | 707247    | 1200 MM PRECAST CONCRETE PIPE MANHOLE                  | M               | 1.5                |
| 150 (S)   | 023856    | 200 MM VITRIFIED CLAY PIPE                             | M               | 90                 |
| 151 (S)   | 719190    | SEWER MANHOLE FRAME AND COVER                          | EA              | 4                  |
| 152 (S)   | 719200    | SEWER MANHOLE  | EA              | 4                  |
| 153       | 719589    | MINOR CONCRETE (BACKFILL)                              | M3              | 27                 |
| 154       | 721009    | ROCK SLOPE PROTECTION (FACING, METHOD B)               | M3              | 26                 |
| 155 (F)   | 721810    | SLOPE PAVING (CONCRETE)                                | M3              | 64                 |
| 156       | 731501    | MINOR CONCRETE (CURB)                                  | M3              | 50                 |
| 157       | 731502    | MINOR CONCRETE (MISCELLANEOUS CONSTRUCTION)            | M3              | 7                  |
| 158       | 731504    | MINOR CONCRETE (CURB AND GUTTER)                       | M3              | 180                |
| 159       | 731521    | MINOR CONCRETE (SIDEWALK)                              | M3              | 320                |
| 160 (S-F) | 750001    | MISCELLANEOUS IRON AND STEEL                           | KG              | 15 106             |

| Item         | Item Code | Item  | Unit of Measure | Estimated Quantity |
|--------------|-----------|---|-----------------|--------------------|
| 161<br>(S-F) | 750501    | MISCELLANEOUS METAL (BRIDGE)                  | KG              | 3228               |
| 162<br>(S-F) | 750498    | MISCELLANEOUS METAL (RESTRAINER - CABLE TYPE) | KG              | 920                |
| 163<br>(S-F) | 048997    | MISCELLANEOUS METAL (RESTRAINER BAR)          | KG              | 4830               |
| 164<br>(S)   | 800391    | CHAIN LINK FENCE (TYPE CL-1.8)                | M               | 560                |
| 165<br>(S)   | 023858    | VINYL COATED CHAIN LINK FENCE (TYPE CL - 3.1) | M               | 36                 |
| 166<br>(S)   | 802589    | 1.5 M CHAIN LINK GATE (TYPE CL-1.8)           | EA              | 4                  |
| 167          | 820107    | DELINEATOR (CLASS 1)                          | EA              | 39                 |
| 168          | 820130    | OBJECT MARKER                                 | EA              | 19                 |
| 169<br>(S)   | 832003    | METAL BEAM GUARD RAILING (WOOD POST)          | M               | 360                |
| 170<br>(S)   | 023857    | WROUGHT IRON RAILING                          | M               | 39                 |
| 171<br>(S-F) | 833032    | CHAIN LINK RAILING (TYPE 7)                   | M               | 199                |
| 172<br>(S-F) | 833034    | CHAIN LINK RAILING (TYPE 7L)                  | M               | 576                |
| 173<br>(S-F) | 048998    | IRON RAILING                                  | M               | 128                |
| 174<br>(S-F) | 833088    | TUBULAR HANDRAILING                           | M               | 48                 |
| 175<br>(F)   | 833125    | CONCRETE BARRIER (TYPE 25)                    | M               | 371                |
| 176          | 833140    | CONCRETE BARRIER (TYPE 26)                    | M               | 14                 |
| 177<br>(F)   | 833141    | CONCRETE BARRIER (TYPE 26A)                   | M               | 48                 |
| 178<br>(F)   | 833142    | CONCRETE BARRIER (TYPE 26 MODIFIED)           | M               | 216                |
| 179          | 839489    | CONCRETE BARRIER (TYPE 50D)                   | M               | 430                |
| 180<br>(S-F) | 839521    | CABLE RAILING                                 | M               | 271                |

| Item       | Item Code | Item   | Unit of Measure | Estimated Quantity |
|------------|-----------|--|-----------------|--------------------|
| 181<br>(S) | 839565    | TERMINAL SYSTEM (TYPE SRT)                                       | EA              | 4                  |
| 182<br>(S) | 839566    | TERMINAL SYSTEM (TYPE CAT)                                       | EA              | 4                  |
| 183<br>(S) | 839567    | TERMINAL SYSTEM (TYPE CAT) BACKUP                                | EA              | 4                  |
| 184<br>(S) | 839568    | TERMINAL ANCHOR ASSEMBLY (TYPE SFT)                              | EA              | 3                  |
| 185        | 839701    | CONCRETE BARRIER (TYPE 60)                                       | M               | 51                 |
| 186        | 839704    | CONCRETE BARRIER (TYPE 60D)                                      | M               | 210                |
| 187        | 839710    | CONCRETE BARRIER (TYPE 60S)                                      | M               | 15                 |
| 188        | 839713    | CONCRETE BARRIER (TYPE 60SE)                                     | M               | 45                 |
| 189<br>(S) | 840515    | THERMOPLASTIC PAVEMENT MARKING                                   | M2              | 720                |
| 190<br>(S) | 840561    | 100 MM THERMOPLASTIC TRAFFIC STRIPE                              | M               | 14 300             |
| 191<br>(S) | 840562    | 150 MM THERMOPLASTIC TRAFFIC STRIPE                              | M               | 250                |
| 192<br>(S) | 840563    | 200 MM THERMOPLASTIC TRAFFIC STRIPE                              | M               | 3270               |
| 193<br>(S) | 840564    | 200 MM THERMOPLASTIC TRAFFIC STRIPE<br>(BROKEN 3.66 M - 0.92 M)  | M               | 880                |
| 194<br>(S) | 840567    | 100 MM THERMOPLASTIC TRAFFIC STRIPE<br>(BROKEN 1.83 M - 0.30 M)  | M               | 235                |
| 195<br>(S) | 840570    | 100 MM THERMOPLASTIC TRAFFIC STRIPE<br>(BROKEN 10.98 M - 3.66 M) | M               | 6250               |
| 196<br>(S) | 840571    | 100 MM THERMOPLASTIC TRAFFIC STRIPE<br>(BROKEN 5.18 M - 2.14 M)  | M               | 2580               |
| 197<br>(S) | 840651    | PAINTED STALL LINES AND PAVEMENT<br>MARKINGS                     | M               | 960                |
| 198<br>(S) | 840666    | PAINT PAVEMENT MARKING (2-COAT)                                  | M2              | 39                 |
| 199<br>(S) | 850101    | PAVEMENT MARKER (NON-REFLECTIVE)                                 | EA              | 1435               |
| 200<br>(S) | 850111    | PAVEMENT MARKER (RETROREFLECTIVE)                                | EA              | 3400               |

| Item       | Item Code | Item   | Unit of Measure | Estimated Quantity |
|------------|-----------|--|-----------------|--------------------|
| 201<br>(S) | 023859    | TWO SIZE 103 COMMUNICATION CONDUIT<br>(TRENCH IN PAVEMENT)   | M               | 85                 |
| 202<br>(S) | 860251    | SIGNAL AND LIGHTING<br>(LOCATION 1)  | LS              | LUMP SUM           |
| 203<br>(S) | 860252    | SIGNAL AND LIGHTING<br>(LOCATION 2)  | LS              | LUMP SUM           |
| 204<br>(S) | 023860    | MODIFY SIGNAL AND LIGHTING (CITY STREET<br>LOCATION 1)   | LS              | LUMP SUM           |
| 205<br>(S) | 860302    | SIGNAL AND LIGHTING (CITY STREET LOCATION<br>2)  | LS              | LUMP SUM           |
| 206<br>(S) | 023861    | PEDESTRIAN OVERHEAD LIGHTING   | LS              | LUMP SUM           |
| 207<br>(S) | 023862    | LIGHTING (CITY PARKING LOT)  | LS              | LUMP SUM           |
| 208<br>(S) | 860640    | IRRIGATION CONTROLLER ENCLOSURE CABINET  | EA              | 7                  |
| 209<br>(S) | 860767    | SIZE 32 INNERDUCT  | M               | 525                |
| 210<br>(S) | 023863    | COMMUNICATION CONDUIT (PLACED IN BOX<br>GIRDER)  | M               | 150                |
| 211<br>(S) | 023864    | COMMUNICATION CONDUIT (SUSPENDED FROM<br>BRIDGE)   | M               | 25                 |
| 212<br>(S) | 860797    | ELECTRIC SERVICE (IRRIGATION)  | LS              | LUMP SUM           |
| 213<br>(S) | 023865    | MODIFY AUTOMATIC VEHICLE CLASSIFICATION<br>STATION   | LS              | LUMP SUM           |
| 214<br>(S) | 861101    | RAMP METERING SYSTEM (LOCATION 1)  | LS              | LUMP SUM           |
| 215<br>(S) | 861102    | RAMP METERING SYSTEM (LOCATION 2)  | LS              | LUMP SUM           |
| 216<br>(S) | 861499    | MODIFY SIGNAL AND LIGHTING (LOCATION 3)  | LS              | LUMP SUM           |
| 217<br>(S) | 861500    | MODIFY SIGNAL AND LIGHTING (LOCATION 4)  | LS              | LUMP SUM           |
| 218<br>(S) | 861504    | MODIFY LIGHTING AND SIGN ILLUMINATION  | LS              | LUMP SUM           |
| 219<br>(S) | 023866    | AUTOMATIC VEHICLE CLASSIFIERS, PIEZO-ELE CTRIC<br>AXLE SENSOR UNITS AND EPOXY SEALANT FOR PIEZO<br>AXLE SENSOR | LS              | LUMP SUM           |
| 220<br>(S) | 869039    | COMMUNICATION PULL BOX   | EA              | 2                  |

| Item | Item Code | Item         | Unit of Measure | Estimated Quantity |
|------|-----------|--------------|-----------------|--------------------|
| 221  | 999990    | MOBILIZATION | LS              | LUMP SUM           |

**STATE OF CALIFORNIA  
DEPARTMENT OF TRANSPORTATION**

---

**SPECIAL PROVISIONS**

**Annexed to Contract No. 07-104954**

**SECTION 1. SPECIFICATIONS AND PLANS**

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

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

**AMENDMENTS TO JULY 1999 STANDARD  
SPECIFICATIONS**

**UPDATED MARCH 12, 2002**

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

**SECTION 2: PROPOSAL REQUIREMENTS AND CONDITIONS**

Issue Date: December 31, 2001

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

- Where the Department has made investigations of site conditions, including subsurface conditions in areas where work is to be performed under the contract, or in other areas, some of which may constitute possible local material sources, bidders or Contractors may, upon written request, inspect the records of the Department as to those investigations subject to and upon the conditions hereinafter set forth.

**SECTION 5: CONTROL OF WORK**

Contract No. <Dist>-<Contract\_No>

Issue Date: December 31, 2001

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

**5-1.02A Excavation Safety Plans**

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

**SECTION 19: EARTHWORK**

Issue Date: December 31, 2001

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

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

**SECTION 42: GROOVE AND GRIND PAVEMENT**

Issue Date: December 31, 2001

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

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

**SECTION 49: PILING**

Issue Date: December 31, 2001

Section 49-1.05, "Driving Equipment," of the Standard Specifications is amended by adding the following paragraph after the seventh paragraph:

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

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

- Cast-in-place concrete piles shall consist of one of the following:
  - A. Steel shells driven permanently to the required bearing value and penetration and filled with concrete.
  - B. Steel casings installed permanently to the required penetration and filled with concrete.
  - C. Drilled holes filled with concrete.
  - D. Rock sockets filled with concrete.

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

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

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

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

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

## **SECTION 50: PRESTRESSING CONCRETE**

Issue Date: December 31, 2001

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

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

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

- Prestressing steel shall be high-tensile wire conforming to the requirements in ASTM Designation: A 421, including Supplement I; high-tensile seven-wire strand conforming to the requirements in ASTM Designation: A 416; or uncoated high-strength steel bars conforming to the requirements in ASTM Designation: A 722, including all supplementary requirements. The maximum mass requirement of ASTM Designation: A 722 will not apply.

- In addition to the requirements of ASTM Designation: A 722, for deformed bars, the reduction of area shall be determined from a bar from which the deformations have been removed. The bar shall be machined no more than necessary to remove the deformations over a length of 300 mm, and reduction will be based on the area of the machined portion.

- In addition to the requirements specified herein, epoxy-coated seven-wire prestressing steel strand shall be grit impregnated and filled in conformance with the requirements in ASTM Designation: A 882/A 882M, including Supplement I, and the following:

- A. The coating material shall be on the Department's list of approved coating materials for epoxy-coated strand, available from the Transportation Laboratory.
- B. The film thickness of the coating after curing shall be 381  $\mu\text{m}$  to 1143  $\mu\text{m}$ .
- C. Prior to coating the strand, the Contractor shall furnish to the Transportation Laboratory a representative 230-g sample from each batch of epoxy coating material to be used. Each sample shall be packaged in an airtight container identified with the manufacturer's name and batch number.

- D. Prior to use of the epoxy-coated strand in the work, written certifications referenced in ASTM Designation: A 882/A 882M, including a representative load-elongation curve for each size and grade of strand to be used and a copy of the quality control tests performed by the manufacturer, shall be furnished to the Engineer.
- E. In addition to the requirements in Section 50-1.10, "Samples for Testing," four 1.5-m long samples of coated strand and one 1.5-m long sample of uncoated strand of each size and reel shall be furnished to the Engineer for testing. These samples, as selected by the Engineer, shall be representative of the material to be used in the work.
- F. Epoxy-coated strand shall be cut using an abrasive saw.
- G. All visible damage to coatings caused by shipping and handling, or during installation, including cut ends, shall be repaired in conformance with the requirements in ASTM Designation: A 882/A 882M. The patching material shall be furnished by the manufacturer of the epoxy powder and shall be applied in conformance with the manufacturer's written recommendations. The patching material shall be compatible with the original epoxy coating material and shall be inert in concrete.
  - All bars in any individual member shall be of the same grade, unless otherwise permitted by the Engineer.
  - When bars are to be extended by the use of couplers, the assembled units shall have a tensile strength of not less than the manufacturer's minimum guaranteed ultimate tensile strength of the bars. Failure of any one sample to meet this requirement will be cause for rejection of the heat of bars and lot of couplers. The location of couplers in the member shall be subject to approval by the Engineer.
    - Wires shall be straightened if necessary to produce equal stress in all wires or wire groups or parallel lay cables that are to be stressed simultaneously or when necessary to ensure proper positioning in the ducts.
    - Where wires are to be button-headed, the buttons shall be cold formed symmetrically about the axes of the wires. The buttons shall develop the minimum guaranteed ultimate tensile strength of the wire. No cold forming process shall be used that causes indentations in the wire. Buttonheads shall not contain wide open splits, more than 2 splits per head, or splits not parallel with the axis of the wire.
    - Prestressing steel shall be protected against physical damage and rust or other results of corrosion at all times from manufacture to grouting or encasing in concrete. Prestressing steel that has sustained physical damage at any time shall be rejected. The development of visible rust or other results of corrosion shall be cause for rejection, when ordered by the Engineer.
    - Epoxy-coated prestressing steel strand shall be covered with an opaque polyethylene sheeting or other suitable protective material to protect the strand from exposure to sunlight, salt spray, and weather. For stacked coils, the protective covering shall be draped around the perimeter of the stack. The covering shall be adequately secured; however, it should allow for air circulation around the strand to prevent condensation under the covering. Epoxy-coated strand shall not be stored within 300 m of ocean or tidal water for more than 2 months.
    - Prestressing steel shall be packaged in containers or shipping forms for the protection of the steel against physical damage and corrosion during shipping and storage. Except for epoxy-coated strand, a corrosion inhibitor which prevents rust or other results of corrosion, shall be placed in the package or form, or shall be incorporated in a corrosion inhibitor carrier type packaging material, or when permitted by the Engineer, may be applied directly to the steel. The corrosion inhibitor shall have no deleterious effect on the steel or concrete or bond strength of steel to concrete. Packaging or forms damaged from any cause shall be immediately replaced or restored to original condition.
      - The shipping package or form shall be clearly marked with a statement that the package contains high-strength prestressing steel, and the type of corrosion inhibitor used, including the date packaged.
      - Prestressing steel for post-tensioning which is installed in members prior to placing and curing of the concrete, and which is not epoxy-coated, shall be continuously protected against rust or other results of corrosion, until grouted, by means of a corrosion inhibitor placed in the ducts or applied to the steel in the duct. The corrosion inhibitor shall conform to the provisions specified herein.
      - When steam curing is used, prestressing steel for post-tensioning shall not be installed until the steam curing is completed.
      - Water used for flushing ducts shall contain either quick lime (calcium oxide) or slaked lime (calcium hydroxide) in the amount of 0.01-kg/L. Compressed air used to blow out ducts shall be oil free.
      - When prestressing steel for post-tensioning is installed in the ducts after completion of concrete curing, and if stressing and grouting are completed within 10 days after the installation of the prestressing steel, rust which may form during those 10 days will not be cause for rejection of the steel. Prestressing steel installed, tensioned, and grouted in this manner, all within 10 days, will not require the use of a corrosion inhibitor in the duct following installation of the prestressing steel. Prestressing steel installed as above but not grouted within 10 days shall be subject to all the requirements in this section pertaining to corrosion protection and rejection because of rust. The requirements in this section pertaining to tensioning and grouting within 10 days shall not apply to epoxy-coated prestressing steel strand.
      - Any time prestressing steel for pretensioning is placed in the stressing bed and is exposed to the elements for more than 36 hours prior to encasement in concrete, adequate measures shall be taken by the Contractor, as approved by the Engineer, to protect the steel from contamination or corrosion.

- After final fabrication of the seven-wire prestressing steel strand, no electric welding of any form shall be performed on the prestressing steel. Whenever electric welding is performed on or near members containing prestressing steel, the welding ground shall be attached directly to the steel being welded.
- Pretensioned prestressing steel shall be cut off flush with the end of the member. For epoxy-coated prestressing steel, only abrasive saws shall be used to cut the steel. The exposed ends of the prestressing steel and a 25-mm strip of adjoining concrete shall be cleaned and painted. Cleaning shall be by wire brushing or abrasive blast cleaning to remove all dirt and residue on the metal or concrete surfaces. Immediately after cleaning, the surfaces shall be covered with one application of unthinned zinc-rich primer (organic vehicle type) conforming to the provisions in Section 91, "Paint," except that 2 applications shall be applied to surfaces which will not be covered by concrete or mortar. Aerosol cans shall not be used. The paint shall be thoroughly mixed at the time of application and shall be worked into any voids in the prestressing tendons.

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

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

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

- The following samples of materials and tendons, selected by the Engineer from the prestressing steel at the plant or jobsite, shall be furnished by the Contractor to the Engineer well in advance of anticipated use:  
 For wire or bars, one 2-m long sample and for strand, one 1.5-m long sample, of each size shall be furnished for each heat or reel.  
 For epoxy-coated strand, one 1.5-m long sample of uncoated strand of each size shall be furnished for each reel.  
 If the prestressing tendon is a bar, one 2-m long sample shall be furnished and in addition, if couplers are to be used with the bar, two 1.25-m long samples of bar, equipped with one coupler and fabricated to fit the coupler, shall be furnished.

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

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

## **SECTION 51: CONCRETE STRUCTURES**

Issue Date: December 31, 2001

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

- The Contractor shall submit to the Engineer working drawings and design calculations for falsework proposed for use at bridges. For bridges where the height of any portion of the falsework, as measured from the ground line to the soffit of the superstructure, exceeds 4.25 m; or where any individual falsework clear span length exceeds 4.85 m; or where provision for vehicular, pedestrian, or railroad traffic through the falsework is made; the drawings shall be signed by an engineer who is registered as a Civil Engineer in the State of California. Six sets of the working drawings and 2 copies of the design calculations shall be furnished. Additional working drawings and design calculations shall be submitted to the Engineer when specified in "Railroad Relations and Insurance" of the special provisions.
- The falsework drawings shall include details of the falsework erection and removal operations showing the methods and sequences of erection and removal and the equipment to be used. The details of the falsework erection and removal operations shall demonstrate the stability of all or any portions of the falsework during all stages of the erection and removal operations.

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

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

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

- If structural composite lumber is proposed for use, the falsework drawings shall clearly identify the structural composite lumber members by grade (E value), species, and type. The Contractor shall provide technical data from the manufacturer showing the tabulated working stress values of the composite lumber. The Contractor shall furnish a certificate of compliance as specified in Section 6-1.07, "Certificates of Compliance," for each delivery of structural composite lumber to the project site.

- For falsework piles with a calculated loading capacity greater than 900 kN, the falsework piles shall be designed by an engineer who is registered as either a Civil Engineer or a Geotechnical Engineer in the State of California, and the calculations shall be submitted to the Engineer.

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

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

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

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

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

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

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

- For falsework piles with a calculated loading capacity greater than 900 kN, the Contractor shall conduct dynamic monitoring of pile driving and conduct penetration and bearing analyses based on a wave equation analysis. These analyses shall be signed by an engineer who is registered as a Civil Engineer in the State of California and submitted to the Engineer prior to completion of falsework erection.

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

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

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

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

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

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

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

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

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

**SECTION 52: REINFORCEMENT**

Issue Date: December 31, 2001

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

- A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," shall also be furnished for each shipment of epoxy-coated bar reinforcement or wire reinforcement certifying that the coated reinforcement conforms to the requirements in ASTM Designation: A 775/A 775M or A 884/A 884M, respectively, and the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement." The Certificate of Compliance shall include all of the certifications specified in ASTM Designation: A 775/A 775M or A 884/A 884M respectively, and a statement that the coating material has been prequalified by acceptance testing performed by the Valley Forge Laboratories, Inc., Devon, Pennsylvania.

The third paragraph in Section 52-1.08C, "Mechanical Butt Splices," of the Standard Specifications is amended to read:

- The total slip of the reinforcing bars within the splice sleeve after loading in tension to 200 MPa and relaxing to 20 MPa shall not exceed the values listed in the following table. The slip shall be measured between gage points that are clear of the splice sleeve.

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

The first paragraph in Section 52-1.08C(5), "Sleeve-Lockshear Bolt Mechanical Butt Splices," of the Standard Specifications is amended to read:

- The sleeve-lockshear bolt type of mechanical butt splices shall consist of a seamless steel sleeve, center hole with centering pin, and bolts that are tightened until the bolt heads shear off with the bolt ends left embedded in the reinforcing bars. The seamless steel sleeve shall be either formed into a V configuration or shall have 2 serrated steel strips welded to the inside of the sleeve.

Section 52-1.08F, "Nondestructive Splice Tests," of the Standard Specifications is amended by deleting the seventh paragraph.

## SECTION 55: STEEL STRUCTURES

Issue Date: December 31, 2001

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

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

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

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

## SECTION 56: SIGNS

Issue Date: December 31, 2001

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

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

- High-strength bolted connections, where shown on the plans, shall conform to the provisions in Section 55-3.14, "Bolted Connections," except that only fastener assemblies consisting of a high-strength bolt, nut, hardened washer, and direct tension indicator shall be used.
  - High-strength fastener assemblies, and any other bolts, nuts, and washers attached to sign structures shall be zinc-coated by the mechanical deposition process.
    - An alternating snugging and tensioning pattern for anchor bolts and high-strength bolted splices shall be used. Once tensioned, high-strength fastener components and direct tension indicators shall not be reused.
    - For bolt diameters less than 10 mm, the diameter of the bolt hole shall be not more than 0.80-mm larger than the nominal bolt diameter. For bolt diameters greater than or equal to 10 mm, the diameter of the bolt hole shall be not more than 1.6 mm larger than the nominal bolt diameter.
    - Sign structures shall be fabricated into the largest practical sections prior to galvanizing.
    - Ribbed sheet metal panels for box beam closed truss sign structures shall be fastened to the truss members by cap screws or bolts as shown on the plans, or by 4.76 mm stainless steel blind rivets conforming to Industrial Fasteners Institute, Standard IFI-114, Grade 51. The outside diameter of the large flange rivet head shall be not less than 15.88 mm in diameter. Web splices in ribbed sheet metal panels may be made with similar type blind rivets of a size suitable for the thickness of material being connected.
      - Spalling or chipping of concrete structures shall be repaired by the Contractor at the Contractor's expense.
      - Overhead sign supports shall have an aluminum identification plate permanently attached near the base, adjacent to the traffic side on one of the vertical posts, using either stainless steel rivets or stainless steel screws. As a minimum, the information on the plate shall include the name of the manufacturer, the date of manufacture and the contract number.

## SECTION 59: PAINTING

Issue Date: December 31, 2001

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

- Unless otherwise specified, no painting Contractors or subcontractors will be permitted to commence work without having the following current "SSPC: The Society for Protective Coatings" (formerly the Steel Structures Painting Council) certifications in good standing:
  - A. For cleaning and painting structural steel in the field, certification in conformance with the requirements in Qualification Procedure No. 1, "Standard Procedure For Evaluating Painting Contractors (Field Application to Complex Industrial Structures)" (SSPC-QP 1).
  - B. For removing paint from structural steel, certification in conformance with the requirements in Qualification Procedure No. 2, "Standard Procedure For Evaluating Painting Contractors (Field Removal of Hazardous Coatings from Complex Structures)" (SSPC-QP 2).
  - C. For cleaning and painting structural steel in a permanent painting facility, certification in conformance with the requirements in Qualification Procedure No. 3, "Standard Procedure For Evaluating Qualifications of Shop Painting Applicators" (SSPC-QP 3). The AISC's Sophisticated Paint Endorsement (SPE) quality program will be considered equivalent to SSPC-QP 3.

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

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

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

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

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

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

## SECTION 75: MISCELLANEOUS METAL

Issue Date: December 31, 2001

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

| Material  | Specification  |
|---|--|
| Steel bars, plates and shapes   | ASTM Designation: A 36/A 36M or A 575, A 576 (AISI or M Grades 1016 through 1030 except Grade 1017)  |
| Steel fastener components for general applications:                                       |  |
| Bolts and studs   | ASTM Designation: A 307  |
| Headed anchor bolts   | ASTM Designation: A 307, Grade B, including S1 supplementary requirements  |
| Nonheaded anchor bolts  | ASTM Designation: A 307, Grade C, including S1 supplementary requirements and S1.6 of AASHTO Designation: M 314 supplementary requirements or AASHTO Designation: M 314, Grade 36 or 55, including S1 supplementary requirements |
| High-strength bolts and studs, threaded rods, and nonheaded anchor bolts                  | ASTM Designation: A 449, Type 1  |
| Nuts  | ASTM Designation: A 563, including Appendix X1*  |
| Washers   | ASTM Designation: F 844  |
| Components of high-strength steel fastener assemblies for use in structural steel joints: |  |
| Bolts   | ASTM Designation: A 325, Type 1  |
| Tension control bolts   | ASTM Designation: F 1852, Type 1   |
| Nuts  | ASTM Designation: A 563, including Appendix X1*  |
| Hardened washers  | ASTM Designation: F 436, Type 1, Circular, including S1 supplementary requirements   |
| Direct tension indicators   | ASTM Designation: F 959, Type 325, zinc-coated   |
| Stainless steel fasteners (Alloys 304 & 316) for general applications:                    |  |
| Bolts, screws, studs, threaded rods, and nonheaded anchor bolts                           | ASTM Designation: F 593 or F 738M  |
| Nuts  | ASTM Designation: F 594 or F 836M  |
| Washers   | ASTM Designation: A 240/A 240M and ANSI B 18.22M   |
| Carbon-steel castings   | ASTM Designation: A 27/A 27M, Grade 65-35 [450-240], Class 1   |
| Malleable iron castings   | ASTM Designation: A 47, Grade 32510 or A 47M, Grade 22010  |
| Gray iron castings  | ASTM Designation: A 48, Class 30B  |
| Ductile iron castings   | ASTM Designation: A 536, Grade 65-45-12  |
| Cast iron pipe  | Commercial quality   |
| Steel pipe  | Commercial quality, welded or extruded   |
| Other parts for general applications  | Commercial quality   |

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

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

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

\* Maximum stud diameter permitted for mechanical expansion anchors.

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

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

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

Installation Torque Values, (newton meters)

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

**SECTION 86: SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS**

Issue Date: February 28, 2002

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

- Forms shall be true to line and grade. Tops of foundations for posts and standards, except special foundations, shall be finished to curb or sidewalk grade or as directed by the Engineer. Forms shall be rigid and securely braced in place.

Conduit ends and anchor bolts shall be placed in proper position and to proper height, and anchor bolts shall be held in place by means of rigid templates. Anchor bolts shall not be installed more than 1:40 from vertical.

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

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

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

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

**SECTION 88: ENGINEERING FABRIC**

Issue Date: January 15, 2002

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

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

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

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

**SECTION 90: PORTLAND CEMENT CONCRETE**

Issue Date: March 12, 2002

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

**SECTION 90: PORTLAND CEMENT CONCRETE**

**90-1 GENERAL**

**90-1.01 DESCRIPTION**

- Portland cement concrete shall be composed of cementitious material, fine aggregate, coarse aggregate, admixtures if used, and water, proportioned and mixed as specified in these specifications.

- The Contractor shall determine the mix proportions for all concrete except pavement concrete. The Engineer will determine the mix proportions for pavement concrete. Concrete for which the mix proportions are determined either by the Contractor or the Engineer shall conform to the requirements of this Section 90.

- Unless otherwise specified, cementitious material shall be a combination of cement and mineral admixture. Cementitious material shall be either:

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

- Type III portland cement shall be used only as allowed in the special provisions or with the approval of the Engineer.

- Class 1 concrete shall contain not less than 400 kg of cementitious material per cubic meter.
- Class 2 concrete shall contain not less than 350 kg of cementitious material per cubic meter.
- Class 3 concrete shall contain not less than 300 kg of cementitious material per cubic meter.
- Class 4 concrete shall contain not less than 250 kg of cementitious material per cubic meter.
- Minor concrete shall contain not less than 325 kg of cementitious material per cubic meter unless otherwise specified in these specifications or the special provisions.

- Unless otherwise designated on the plans or specified in these specifications or the special provisions, the amount of cementitious material used per cubic meter of concrete in structures or portions of structures shall conform to the following:

| Use  | Cementitious Material Content (kg/m <sup>3</sup> ) |
|--|--|
| Concrete designated by compressive strength:     |  |
| Deck slabs and slab spans of bridges             | 400 min., 475 max.                                 |
| Roof sections of exposed top box culverts        | 400 min., 475 max.                                 |
| Other portions of structures                     | 350 min., 475 max.                                 |
| Concrete not designated by compressive strength: |  |
| Deck slabs and slab spans of bridges             | 400 min.   |
| Roof sections of exposed top box culverts        | 400 min.   |
| Prestressed members                              | 400 min.   |
| Seal courses                                     | 400 min.   |
| Other portions of structures                     | 350 min.   |
| Concrete for precast members                     | 350 min., 550 max.                                 |

- Whenever the 28-day compressive strength shown on the plans is greater than 25 MPa, the concrete shall be designated by compressive strength. If the plans show a 28-day compressive strength that is 28 MPa or greater, an additional 14 days will be allowed to obtain the specified strength. The 28-day compressive strengths shown on the plans that are 25 MPa or less are shown for design information only and are not a requirement for acceptance of the concrete.

- Concrete designated by compressive strength shall be proportioned such that the concrete will attain the strength shown on the plans or specified in the special provisions.

- Before using concrete for which the mix proportions have been determined by the Contractor, or in advance of revising those mix proportions, the Contractor shall submit in writing to the Engineer a copy of the mix design.

- Compliance with cementitious material content requirements will be verified in conformance with procedures described in California Test 518 for cement content. For testing purposes, mineral admixture shall be considered to be cement. Batch proportions shall be adjusted as necessary to produce concrete having the specified cementitious material content.

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

- The requirements of the preceding paragraph shall not apply to minor concrete or commercial quality concrete.

## 90-2 MATERIALS

### 90-2.01 CEMENT

- Unless otherwise specified, cement shall be either "Type IP (MS) Modified" cement, "Type II Modified" portland cement or Type V portland cement.

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

- "Type II Modified" portland cement shall conform to the requirements for Type II portland cement in ASTM Designation: C 150.

- In addition, "Type IP (MS) Modified" cement and "Type II Modified" portland cement shall conform to the following requirements:

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

- Type III and Type V portland cements shall conform to the requirements in ASTM Designation: C 150 and the additional requirements listed above for "Type II Modified" portland cement, except that when tested in conformance with California Test 527, mortar containing Type III portland cement shall not contract in air more than 0.075 percent.

- Cement used in the manufacture of cast-in-place concrete for exposed surfaces of like elements of a structure shall be from the same cement mill.

- Cement shall be protected from exposure to moisture until used. Sacked cement shall be piled to permit access for tally, inspection, and identification of each shipment.

- Adequate facilities shall be provided to assure that cement meeting the provisions specified in this Section 90-2.01 shall be kept separate from other cement in order to prevent any but the specified cement from entering the work. Safe and suitable facilities for sampling cement shall be provided at the weigh hopper or in the feed line immediately in advance of the hopper, in conformance with California Test 125.

- If cement is used prior to sampling and testing as provided in Section 6-1.07, "Certificates of Compliance," and the cement is delivered directly to the site of the work, the Certificate of Compliance shall be signed by the cement manufacturer or supplier of the cement. If the cement is used in ready-mixed concrete or in precast concrete products purchased as such by the Contractor, the Certificate of Compliance shall be signed by the manufacturer of the concrete or product.

- Cement furnished without a Certificate of Compliance shall not be used in the work until the Engineer has had sufficient time to make appropriate tests and has approved the cement for use.

### 90-2.02 AGGREGATES

- Aggregates shall be free from deleterious coatings, clay balls, roots, bark, sticks, rags, and other extraneous material.

- Natural aggregates shall be thoroughly and uniformly washed before use.

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

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

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

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

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

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

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

- No single Cleanness Value, Sand Equivalent or aggregate grading test shall represent more than 250 m<sup>3</sup> of concrete or one day's pour, whichever is smaller.

- Aggregates specified for freeze-thaw resistance shall pass the freezing and thawing test, California Test 528.

- The Contractor shall notify the Engineer of the proposed source of freeze-thaw resistant concrete aggregates at least 4 months before intended use. Should the Contractor later propose a different source of concrete aggregates, the Contractor shall again notify the Engineer at least 4 months before intended use. Blending of fine or coarse aggregates from untested sources with acceptable aggregates will not be permitted. Provisions for the time of submission of samples as provided in Section 40-1.015, "Cement Content," are superseded by the foregoing.

- Concurrently with notification of proposed sources of freeze-thaw resistant concrete aggregates, the Contractor shall furnish samples in the quantity ordered by the Engineer. The samples shall be secured under the direct supervision of the Engineer. Samples from existing stockpiles of processed aggregate shall be taken from washed materials and shall be visibly damp. Samples from materials in place in a material source shall be taken at depths from the existing surface that will ensure the presence of the full quantity of ground water. Excavations for the purpose of securing samples shall be made to the full depth of intended source operations. Samples shall be protected against loss of contained water until they are delivered to the Engineer.

- The Engineer will waive the above freeze-thaw test and the 4-month advance notice, required in this Section, provided aggregates are to be obtained from sources that have previously passed this test and test results are currently applicable.

- No extension of contract time will be allowed for the time required to perform the freezing and thawing test.

- When the source of an aggregate is changed, except for pavement concrete, the Contractor shall adjust the mix proportions and submit in writing to the Engineer a copy of the mix design before using the aggregates. When the source of an aggregate is changed for pavement concrete, the Engineer shall be allowed sufficient time to adjust the mix, and the aggregates shall not be used until necessary adjustments are made.

**90-2.02A Coarse Aggregate**

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

- Coarse aggregate shall conform to the following quality requirements:

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

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

- coarse aggregate sampled at the completion of processing at the aggregate production plant had a Cleanness Value of not less than 82 when tested by California Test 227; and
- 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:

- 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
- prequalification tests performed in conformance with California Test 549 indicated that the aggregate would develop a relative strength of not less than 95 percent and would have a relative shrinkage not greater than 105 percent, based on concrete.

**90-2.03 WATER**

- In conventionally reinforced concrete work, the water for curing, for washing aggregates, and for mixing shall be free from oil and shall not contain more than 1000 parts per million of chlorides as Cl, when tested in conformance with California Test 422, nor more than 1300 parts per million of sulfates as SO<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 1300 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 non-reinforced concrete work, the water for curing, for washing aggregates and for mixing shall be free from oil and shall not contain more than 2000 parts per million of chlorides as Cl, when tested in conformance with California Test 422, or more than 1500 parts per million of sulfates as SO<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 ( $\text{Na}_2\text{O} + 0.658 \text{K}_2\text{O}$ ) as determined on the filtrate. The specific gravity of the water shall not exceed 1.03 and shall not vary more than  $\pm 0.010$  during a day's operations.

**90-2.04 ADMIXTURE MATERIALS**

- Admixture materials shall conform to the requirements in the following ASTM Designations:
  - A. Chemical Admixtures—ASTM Designation: C 494.
  - B. Air-entraining Admixtures—ASTM Designation: C 260.
  - C. Calcium Chloride—ASTM Designation: D 98.
  - D. Mineral Admixtures—Coal fly ash; raw or calcined natural pozzolan as specified in ASTM Designation: C618; silica fume conforming to the requirements in ASTM Designation: C1240, with reduction of mortar expansion of 80 percent, minimum, using the cement from the proposed mix design.
- Unless otherwise specified in the special provisions, mineral admixtures shall be used in conformance with the provisions in Section 90-4.08, "Required Use of Mineral Admixtures."

**90-3 AGGREGATE GRADINGS**

**90-3.01 GENERAL**

- Before beginning concrete work, the Contractor shall submit in writing to the Engineer the gradation of the primary aggregate nominal sizes that the Contractor proposes to furnish. If a primary coarse aggregate or the fine aggregate is separated into 2 or more sizes, the proposed gradation shall consist of the gradation for each individual size, and the proposed proportions of each individual size, combined mathematically to indicate one proposed gradation. The proposed gradation shall meet the grading requirements shown in the table in this section, and shall show the percentage passing each of the sieve sizes used in determining the end result.
  - The Engineer may waive, in writing, the gradation requirements in this Section 90-3.01 and in Sections 90-3.02, "Coarse Aggregate Grading," 90-3.03, "Fine Aggregate Grading," and 90-3.04, "Combined Aggregate Gradings," if, in the Engineer's opinion, furnishing the gradation is not necessary for the type or amount of concrete work to be constructed.
  - Gradations proposed by the Contractor shall be within the following percentage passing limits:

| Primary Aggregate Nominal Size | Sieve Size         | Limits of Proposed Gradation |
|--------------------------------|--------------------|------------------------------|
| 37.5-mm x 19-mm                | 25-mm              | 19 - 41                      |
| 25-mm x 4.75-mm                | 19-mm              | 52 - 85                      |
| 25-mm x 4.75-mm                | 9.5-mm             | 15 - 38                      |
| 12.5-mm x 4.75-mm              | 9.5-mm             | 40 - 78                      |
| 9.5-mm x 2.36-mm               | 9.5-mm             | 50 - 85                      |
| Fine Aggregate                 | 1.18-mm            | 55 - 75                      |
| Fine Aggregate                 | 600- $\mu\text{m}$ | 34 - 46                      |
| Fine Aggregate                 | 300- $\mu\text{m}$ | 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 |                     |                 |                     |                   |                     |                  |                     |
|-------------|--|---------------------|-----------------|---------------------|-------------------|---------------------|------------------|---------------------|
|             | 37.5-mm x 19-mm                                    |                     | 25-mm x 4.75-mm |                     | 12.5-mm x 4.75-mm |                     | 9.5-mm x 2.36-mm |                     |
|             | Operating Range                                    | Contract Compliance | Operating Range | Contract Compliance | Operating Range   | Contract Compliance | Operating Range  | Contract Compliance |
| 50-mm       | 100  | 100                 | —               | —                   | —                 | —                   | —                | —                   |
| 37.5-mm     | 88-100   | 85-100              | 100             | 100                 | —                 | —                   | —                | —                   |
| 25-mm       | x ± 18   | X ± 25              | 88-100          | 86-100              | —                 | —                   | —                | —                   |
| 19-mm       | 0-17   | 0-20                | X ± 15          | X ± 22              | 100               | 100                 | —                | —                   |
| 12.5-mm     | —  | —                   | —               | —                   | 82-100            | 80-100              | 100              | 100                 |
| 9.5-mm      | 0-7  | 0-9                 | X ± 15          | X ± 22              | X ± 15            | X ± 22              | X ± 15           | X ± 20              |
| 4.75-mm     | —  | —                   | 0-16            | 0-18                | 0-15              | 0-18                | 0-25             | 0-28                |
| 2.36-mm     | —  | —                   | 0-6             | 0-7                 | 0-6               | 0-7                 | 0-6              | 0-7                 |

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

Coarse aggregate for the 37.5-mm, maximum, combined aggregate grading as provided in Section 90-3.04, "Combined Aggregate Gradings," shall be furnished in 2 or more primary aggregate nominal sizes. Each primary aggregate nominal size may be separated into 2 sizes and stored separately, provided that the combined material conforms to the grading requirements for that particular primary aggregate nominal size.

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

### 90-3.03 FINE AGGREGATE GRADING

- Fine aggregate shall be graded within the following limits:

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

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

In addition to the above required grading analysis, the distribution of the fine aggregate sizes shall be such that the difference between the total percentage passing the 1.18-mm sieve and the total percentage passing the 600-µm sieve shall be between 10 and 40, and the difference between the percentage passing the 600-µm and 300-µm sieves shall be between 10 and 40.

Fine aggregate may be separated into 2 or more sizes and stored separately, provided that the combined material conforms to the grading requirements specified in this Section 90-3.03.

### 90-3.04 COMBINED AGGREGATE GRADINGS

Combined aggregate grading limits shall be used only for the design of concrete mixes. Concrete mixes shall be designed so that aggregates are combined in proportions that shall produce a mixture within the grading limits for combined aggregates as specified herein. Within these limitations, the relative proportions shall be as ordered by the Engineer, except as otherwise provided in Section 90-1.01, "Description."

The combined aggregate grading used in portland cement concrete pavement shall be the 37.5-mm, maximum grading.

- The combined aggregate grading used in concrete for structures and other concrete items, except when specified otherwise in these specifications or the special provisions, shall be either the 37.5-mm, maximum grading, or the 25-mm, maximum grading, at the option of the Contractor.

**Grading Limits of Combined Aggregates**

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

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

## **90-4 ADMIXTURES**

### **90-4.01 GENERAL**

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

### **90-4.02 MATERIALS**

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

### **90-4.03 ADMIXTURE APPROVAL**

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

- If a mineral admixture is delivered directly to the site of the work, the Certificate of Compliance shall be signed by the manufacturer or supplier of the mineral admixture. If the mineral admixture is used in ready-mix concrete or in precast concrete products purchased as such by the Contractor, the Certificate of Compliance shall be signed by the manufacturer of the concrete or product.

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

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

#### **90-4.05 OPTIONAL USE OF CHEMICAL ADMIXTURES**

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

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

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

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

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

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

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

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

- Unless otherwise specified, mineral admixture shall be combined with cement to make cementitious material.
- The calcium oxide content of mineral admixtures shall not exceed 10 percent and the available alkali, as sodium oxide equivalent, shall not exceed 1.5 percent when determined in conformance with the requirements in ASTM Designation: C 618.
- The amounts of cement and mineral admixture used in cementitious material shall be sufficient to satisfy the minimum cementitious material content requirements specified in Section 90-1.01, "Description," or Section 90-4.05, "Optional Use of Chemical Admixtures," and shall conform to the following:
  - A. The minimum amount of cement shall not be less than 75 percent by mass of the specified minimum cementitious material content;
  - B. The minimum amount of mineral admixture to be combined with cement shall be determined using one of the following criteria:
    1. When the calcium oxide content of a mineral admixture is equal to or less than 2 percent by mass, the amount of mineral admixture shall not be less than 15 percent by mass of the total amount of cementitious material to be used in the mix;

2. When the calcium oxide content of a mineral admixture is greater than 2 percent, the amount of mineral admixture shall not be less than 25 percent by mass of the total amount of cementitious material to be used in the mix;
  3. When a mineral admixture that conforms to the provisions for silica fume in Section 90-2.04, "Admixture Materials," is used, the amount of mineral admixture shall not be less than 10 percent by mass of the total amount of cementitious material to be used in the mix
- C. The total amount of mineral admixture shall not exceed 35 percent by mass of the total amount of cementitious material to be used in the mix. Where Section 90-1.01, "Description," specifies a maximum cementitious content in kilograms per cubic meter, the total mass of cement and mineral admixture per cubic meter shall not exceed the specified maximum cementitious material content.

#### **90-4.09 BLANK**

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

- Chemical admixtures and air-entraining admixtures shall be dispensed in liquid form. Dispensers for liquid admixtures shall have sufficient capacity to measure at one time the prescribed quantity required for each batch of concrete. Each dispenser shall include a graduated measuring unit into which liquid admixtures are measured to within  $\pm 5$  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.

- When automatic proportioning devices are required for concrete pavement, dispensers for liquid admixtures shall operate automatically with the batching control equipment. The dispensers shall be equipped with an automatic warning system in good operating condition that will provide a visible or audible signal at the point at which proportioning operations are controlled when the quantity of admixture measured for each batch of concrete varies from the preselected dosage by more than 5 percent, or when the entire contents of the measuring unit are not emptied from the dispenser into each batch of concrete.

- Unless liquid admixtures are added to premeasured water for the batch, their discharge into the batch shall be arranged to flow into the stream of water so that the admixtures are well dispersed throughout the batch, except that air-entraining admixtures may be dispensed directly into moist sand in the batching bins provided that adequate control of the air content of the concrete can be maintained.

- Liquid admixtures requiring dosages greater than  $2.5 \text{ L/m}^3$  shall be considered to be water when determining the total amount of free water as specified in Section 90-6.06, "Amount of Water and Penetration."

- Special admixtures, such as "high range" water reducers that may contribute to a high rate of slump loss, shall be measured and dispensed as recommended by the admixture manufacturer and as approved by the Engineer.

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

- Mineral admixtures shall be protected from exposure to moisture until used. Sacked material shall be piled to permit access for tally, inspection and identification for each shipment.

- Adequate facilities shall be provided to assure that mineral admixtures meeting the specified requirements are kept separate from other mineral admixtures in order to prevent any but the specified mineral admixtures from entering the work. Safe and suitable facilities for sampling mineral admixtures shall be provided at the weigh hopper or in the feed line immediately in advance of the hopper.

- Mineral admixtures shall be incorporated into concrete using equipment conforming to the requirements for cement weigh hoppers, and charging and discharging mechanisms in ASTM Designation: C 94, in Section 90-5.03, "Proportioning," and in this Section 90-4.11.

- When concrete is completely mixed in stationary paving mixers, the mineral admixture shall be weighed in a separate weigh hopper conforming to the provisions for cement weigh hoppers and charging and discharging mechanisms in Section 90-5.03A, "Proportioning for Pavement," and the mineral admixture and cement shall be introduced simultaneously into the mixer proportionately with the aggregate. If the mineral admixture is not weighed in a separate weigh hopper, the Contractor shall provide certification that the stationary mixer is capable of mixing the cement, admixture, aggregates and water uniformly prior to discharge. Certification shall contain the following:

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

## **90-5 PROPORTIONING**

### **90-5.01 STORAGE OF AGGREGATES**

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

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

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

### **90-5.02 PROPORTIONING DEVICES**

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

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

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

- Equipment for cumulative weighing of aggregate shall have a zero tolerance of  $\pm 0.5$  percent of the designated total batch mass of the aggregate. For systems with individual weigh hoppers for the various sizes of aggregate, the zero tolerance shall be  $\pm 0.5$  percent of the individual batch mass designated for each size of aggregate. Equipment for cumulative weighing of cement and mineral admixtures shall have a zero tolerance of  $\pm 0.5$  percent of the designated total batch mass of the cement and mineral admixture. Equipment for weighing cement or mineral admixture separately shall have a zero tolerance of

±0.5 percent of their designated individual batch masses. Equipment for measuring water shall have a zero tolerance of ±0.5 percent of its designated mass or volume.

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

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

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

### **90-5.03 PROPORTIONING**

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

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

- Should separate supplies of aggregate material of the same size group, but of different moisture content or specific gravity or surface characteristics affecting workability, be available at the proportioning plant, withdrawals shall be made from one supply exclusively and the materials therein completely exhausted before starting upon another.

- Bulk "Type IP (MS) Modified" cement shall be weighed in an individual hopper and shall be kept separate from the aggregates until the ingredients are released for discharge into the mixer.

- Bulk cement and mineral admixture may be weighed in separate, individual weigh hoppers or may be weighed in the same weigh hopper and shall be kept separate from the aggregates until the ingredients are released for discharge into the mixer. If the cement and mineral admixture are weighed cumulatively, the cement shall be weighed first.

- When cement and mineral admixtures are weighed in separate weigh hoppers, the weigh systems for the proportioning of the aggregate, the cement, and the mineral admixture shall be individual and distinct from all other weigh systems. Each weigh system shall be equipped with a hopper, a lever system, and an indicator to constitute an individual and independent material weighing device. The cement and the mineral admixture shall be discharged into the mixer simultaneously with the aggregate.

- The scales and weigh hoppers for bulk weighing cement, mineral admixture, or cement plus mineral admixture shall be separate and distinct from the aggregate weighing equipment.

- For batches with a volume of one cubic meter or more, the batching equipment shall conform to one of the following combinations:

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

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

#### **90-5.03A Proportioning for Pavement**

- Aggregates and bulk cement, mineral admixture, and cement plus mineral admixture for use in pavement shall be proportioned by mass by means of automatic proportioning devices of approved type conforming to these specifications.

- The Contractor shall install and maintain in operating condition an electronically actuated moisture meter that will indicate, on a readily visible scale, changes in the moisture content of the fine aggregate as it is batched within a sensitivity of 0.5 percent by mass of the fine aggregate.

- The batching of cement, mineral admixture, or cement plus mineral admixture and aggregate shall be interlocked so that a new batch cannot be started until all weigh hoppers are empty, the proportioning devices are within zero tolerance, and the discharge gates are closed. The interlock shall permit no part of the batch to be discharged until all aggregate hoppers and the cement and mineral admixture hoppers or the cement plus mineral admixture hopper are charged with masses that are within the tolerances specified in Section 90-5.02, "Proportioning Devices."
- When interlocks are required for cement and mineral admixture charging mechanisms and cement and mineral admixtures are weighed cumulatively, their charging mechanisms shall be interlocked to prevent the introduction of mineral admixture until the mass of cement in the cement weigh hopper is within the tolerances specified in Section 90-5.02, "Proportioning Devices."
- The discharge gate on the cement and mineral admixture hoppers or the cement plus mineral admixture hopper shall be designed to permit regulating the flow of cement, mineral admixture, or cement plus mineral admixture into the aggregate as directed by the Engineer.
- When separate weigh boxes are used for each size of aggregate, the discharge gates shall permit regulating the flow of each size of aggregate as directed by the Engineer.
- Material discharged from the several bins shall be controlled by gates or by mechanical conveyors. The means of withdrawal from the several bins, and of discharge from the weigh box, shall be interlocked so that not more than one bin can discharge at a time, and so that the weigh box cannot be tripped until the required quantity from each of the several bins has been deposited therein. Should a separate weigh box be used for each size of aggregate, all may be operated and discharged simultaneously.
- When the discharge from the several bins is controlled by gates, each gate shall be actuated automatically so that the required mass is discharged into the weigh box, after which the gate shall automatically close and lock.
- The automatic weighing system shall be designed so that all proportions required may be set on the weighing controller at the same time.

## 90-6 MIXING AND TRANSPORTING

### 90-6.01 GENERAL

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

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

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

### 90-6.02 MACHINE MIXING

- Concrete mixers may be of the revolving drum or the revolving blade type, and the mixing drum or blades shall be operated uniformly at the mixing speed recommended by the manufacturer. Mixers and agitators that have an accumulation of hard concrete or mortar shall not be used.
- The temperature of mixed concrete, immediately before placing, shall be not less than 10°C or more than 32°C. Aggregates and water shall be heated or cooled as necessary to produce concrete within these temperature limits. Neither

aggregates nor mixing water shall be heated to exceed 65°C. If ice is used to cool the concrete, discharge of the mixer will not be permitted until all ice is melted.

- The batch shall be so charged into the mixer that some water will enter in advance of cementitious materials and aggregates. All water shall be in the drum by the end of the first one - fourth of the specified mixing time.
- Cementitious materials shall be batched and charged into the mixer by means that will not result either in loss of cementitious materials due to the effect of wind, in accumulation of cementitious materials on surfaces of conveyors or hoppers, or in other conditions that reduce or vary the required quantity of cementitious material in the concrete mixture.
- Paving and stationary mixers shall be operated with an automatic timing device. The timing device and discharge mechanism shall be interlocked so that during normal operation no part of the batch will be discharged until the specified mixing time has elapsed.
  - The total elapsed time between the intermingling of damp aggregates and all cementitious materials and the start of mixing shall not exceed 30 minutes.
  - The size of batch shall not exceed the manufacturer's guaranteed capacity.
  - When producing concrete for pavement or base, suitable batch counters shall be installed and maintained in good operating condition at jobsite batching plants and stationary mixers. The batch counters shall indicate the exact number of batches proportioned and mixed.
    - Concrete shall be mixed and delivered to the jobsite by means of one of the following combinations of operations:
      - A. Mixed completely in a stationary mixer and the mixed concrete transported to the point of delivery in truck agitators or in non-agitating hauling equipment (central-mixed concrete).
      - B. Mixed partially in a stationary mixer, and the mixing completed in a truck mixer (shrink-mixed concrete).
      - C. Mixed completely in a truck mixer (transit-mixed concrete).
      - D. Mixed completely in a paving mixer.
- Agitators may be truck mixers operating at agitating speed or truck agitators. Each mixer and agitator shall have attached thereto in a prominent place a metal plate or plates on which is plainly marked the various uses for which the equipment is designed, the manufacturer's guaranteed capacity of the drum or container in terms of the volume of mixed concrete and the speed of rotation of the mixing drum or blades.
  - Truck mixers shall be equipped with electrically or mechanically actuated revolution counters by which the number of revolutions of the drum or blades may readily be verified.
  - When shrink-mixed concrete is furnished, concrete that has been partially mixed at a central plant shall be transferred to a truck mixer and all requirements for transit-mixed concrete shall apply. No credit in the number of revolutions at mixing speed shall be allowed for partial mixing in a central plant.

### **90-6.03 TRANSPORTING MIXED CONCRETE**

- Mixed concrete may be transported to the delivery point in truck agitators or truck mixers operating at the speed designated by the manufacturer of the equipment as agitating speed, or in non-agitating hauling equipment, provided the consistency and workability of the mixed concrete upon discharge at the delivery point is suitable for adequate placement and consolidation in place, and provided the mixed concrete after hauling to the delivery point conforms to the provisions in Section 90-6.01, "General."
  - Truck agitators shall be loaded not to exceed the manufacturer's guaranteed capacity and shall maintain the mixed concrete in a thoroughly mixed and uniform mass during hauling.
    - Bodies of non-agitating hauling equipment shall be constructed so that leakage of the concrete mix, or any part thereof, will not occur at any time.
    - Concrete hauled in open-top vehicles shall be protected during hauling against rain or against exposure to the sun for more than 20 minutes when the ambient temperature exceeds 24°C.
    - No additional mixing water shall be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer. If the Engineer authorizes additional water to be incorporated into the concrete, the drum shall be revolved not less than 30 revolutions at mixing speed after the water is added and before discharge is commenced.
      - The rate of discharge of mixed concrete from truck mixer-agitators shall be controlled by the speed of rotation of the drum in the discharge direction with the discharge gate fully open.
      - When a truck mixer or agitator is used for transporting concrete to the delivery point, discharge shall be completed within 1.5 hours or before 250 revolutions of the drum or blades, whichever occurs first, after the introduction of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 30°C or above, the time allowed may be less than 1.5 hours.
      - When non-agitating hauling equipment is used for transporting concrete to the delivery point, discharge shall be completed within one hour after the addition of the cement to the aggregates. Under conditions contributing to quick

stiffening of the concrete, or when the temperature of the concrete is 30°C or above, the time between the introduction of cement to the aggregates and discharge shall not exceed 45 minutes.

- Each load of concrete delivered at the jobsite shall be accompanied by a weighmaster certificate showing the mix identification number, non-repeating load number, date and time at which the materials were batched, the total amount of water added to the load, and for transit-mixed concrete, the reading of the revolution counter at the time the truck mixer is charged with cement. This weighmaster certificate shall also show the actual scale masses (kilograms) for the ingredients batched. Theoretical or target batch masses shall not be used as a substitute for actual scale masses.

- Weighmaster certificates shall be provided in printed form, or if approved by the Engineer, the data may be submitted in electronic media. Electronic media shall be presented in a tab-delimited format on a 90 mm diskette with a capacity of at least 1.4 megabytes. Captured data, for the ingredients represented by each batch shall be "line feed, carriage return" (LFCR) and "one line, separate record" with allowances for sufficient fields to satisfy the amount of data required by these specifications.

- The Contractor may furnish a weighmaster certificate accompanied by a separate certificate that lists the actual batch masses or measurements for a load of concrete provided that both certificates are imprinted with the same non-repeating load number that is unique to the contract and delivered to the jobsite with the load.

- Weighmaster certificates furnished by the Contractor shall conform to the provisions in Section 9-1.01, "Measurement of Quantities."

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

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

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

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

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

#### **90-6.05 HAND-MIXING**

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

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

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

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

- The amount of free water used in concrete shall not exceed  $183 \text{ kg/m}^3$ , plus 20 kg for each required 100 kg of cementitious material in excess of  $325 \text{ kg/m}^3$ .
- The term free water is defined as the total water in the mixture minus the water absorbed by the aggregates in reaching a saturated surface-dry condition.
- Where there are adverse or difficult conditions that affect the placing of concrete, the above specified penetration and free water content limitations may be exceeded providing the Contractor is granted permission by the Engineer in writing to increase the cementitious material content per cubic meter of concrete. The increase in water and cementitious material shall be at a ratio not to exceed 30 kg of water per added 100 kg of cementitious material per cubic meter. The cost of additional cementitious material and water added under these conditions shall be at the Contractor's expense and no additional compensation will be allowed therefor.
- The equipment for supplying water to the mixer shall be constructed and arranged so that the amount of water added can be measured accurately. Any method of discharging water into the mixer for a batch shall be accurate within 1.5 percent of the quantity of water required to be added to the mix for any position of the mixer. Tanks used to measure water shall be designed so that water cannot enter while water is being discharged into the mixer and discharge into the mixer shall be made rapidly in one operation without dribbling. All equipment shall be arranged so as to permit checking the amount of water delivered by discharging into measured containers.

## 90-7 CURING CONCRETE

### 90-7.01 METHODS OF CURING

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

#### 90-7.01A Water Method

- The concrete shall be kept continuously wet by the application of water for a minimum curing period of 7 days after the concrete has been placed.
- When a curing medium consisting of cotton mats, rugs, carpets, or earth or sand blankets is to be used to retain the moisture, the entire surface of the concrete shall be kept damp by applying water with a nozzle that so atomizes the flow that a mist and not a spray is formed, until the surface of the concrete is covered with the curing medium. The moisture from the nozzle shall not be applied under pressure directly upon the concrete and shall not be allowed to accumulate on the concrete in a quantity sufficient to cause a flow or wash the surface. At the expiration of the curing period, the concrete surfaces shall be cleared of all curing mediums.
- When concrete bridge decks and flat slabs are to be cured without the use of a curing medium, the entire surface of the bridge deck or slab shall be kept damp by the application of water with an atomizing nozzle as specified in the preceding paragraph, until the concrete has set, after which the entire surface of the concrete shall be sprinkled continuously with water for a period of not less than 7 days.

#### 90-7.01B Curing Compound Method

- Surfaces of the concrete that are exposed to the air shall be sprayed uniformly with a curing compound.
- Curing compounds to be used shall be as follows:
  1. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class B, except the resin type shall be poly-alpha-methylstyrene.
  2. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class B.
  3. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class A.
  4. Non-pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 1, Class B.
  5. Non-pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 1, Class A.

6. Non-pigmented curing compound with fugitive dye conforming to the requirements in ASTM Designation: C 309, Type 1-D, Class A.

- The infrared scan for the dried vehicle from curing compound (1) shall match the infrared scan on file at the Transportation Laboratory.

- The loss of water for each type of curing compound, when tested in conformance with the requirements in California Test 534, shall not be more than 0.15-kg/m<sup>2</sup> in 24 hours or more than 0.45-kg/m<sup>2</sup> in 72 hours.

- The curing compound to be used will be specified elsewhere in these specifications or in the special provisions.

- When the use of curing compound is required or permitted elsewhere in these specifications or in the special provisions and no specific kind is specified, any of the curing compounds listed above may be used.

- Curing compound shall be applied at a nominal rate of 3.7 m<sup>2</sup>/L, unless otherwise specified.

- At any point, the application rate shall be within ±1.2 m<sup>2</sup>/L of the nominal rate specified, and the average application rate shall be within ±0.5 m<sup>2</sup>/L of the nominal rate specified when tested in conformance with the requirements in California Test 535. Runs, sags, thin areas, skips, or holidays in the applied curing compound shall be evidence that the application is not satisfactory.

- Curing compounds shall be applied using power operated spray equipment. The power operated spraying equipment shall be equipped with an operational pressure gage and a means of controlling the pressure. Hand spraying of small and irregular areas that are not reasonably accessible to mechanical spraying equipment, in the opinion of the Engineer, may be permitted.

- The curing compound shall be applied to the concrete following the surface finishing operation, immediately before the moisture sheen disappears from the surface, but before any drying shrinkage or craze cracks begin to appear. In the event of any drying or cracking of the surface, application of water with an atomizing nozzle as specified in Section 90-7.01A, "Water Method," shall be started immediately and shall be continued until application of the compound is resumed or started; however, the compound shall not be applied over any resulting freestanding water. Should the film of compound be damaged from any cause before the expiration of 7 days after the concrete is placed in the case of structures and 72 hours in the case of pavement, the damaged portion shall be repaired immediately with additional compound.

- At the time of use, compounds containing pigments shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. A paddle shall be used to loosen all settled pigment from the bottom of the container, and a power driven agitator shall be used to disperse the pigment uniformly throughout the vehicle.

- Agitation shall not introduce air or other foreign substance into the curing compound.

- The manufacturer shall include in the curing compound the necessary additives for control of sagging, pigment settling, leveling, de-emulsification, or other requisite qualities of a satisfactory working material. Pigmented curing compounds shall be manufactured so that the pigment does not settle badly, does not cake or thicken in the container, and does not become granular or curdled. Settlement of pigment shall be a thoroughly wetted, soft, mushy mass permitting the complete and easy vertical penetration of a paddle. Settled pigment shall be easily redispersed, with minimum resistance to the sideways manual motion of the paddle across the bottom of the container, to form a smooth uniform product of the proper consistency.

- Curing compounds shall remain sprayable at temperatures above 4°C and shall not be diluted or altered after manufacture.

- The curing compound shall be packaged in clean 210-L barrels or round 19-L containers or 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 210-L barrels shall have removable lids and airtight fasteners. The 19-L containers shall be round and have standard full open head and bail. Lids with bungholes shall not be permitted. On-site storage tanks shall be kept clean and free of contaminants. Each tank shall have a permanent system designed to completely redisperse settled material without introducing air or other foreign substances.

- Steel containers and lids shall be lined with a coating that will prevent destructive action by the compound or chemical agents in the air space above the compound. The coating shall not come off the container or lid as skins. Containers shall be filled in a manner that will prevent skinning. Plastic containers shall not react with the compound.

- Each container shall be labeled with the manufacturer's name, kind of curing compound, batch number, volume, date of manufacture, and volatile organic compound (VOC) content. The label shall also warn that the curing compound containing pigment shall be well stirred before use. Precautions concerning the handling and the application of curing compound shall be shown on the label of the curing compound containers in conformance with the Construction Safety Orders and General Industry Safety Orders of the State of California.

- Containers of curing compound shall be labeled to indicate that the contents fully comply with the rules and regulations concerning air pollution control in the State of California.

- When the curing compound is shipped in tanks or tank trucks, a shipping invoice shall accompany each load. The invoice shall contain the same information as that required herein for container labels.

- Curing compound will be sampled by the Engineer at the source of supply or at the jobsite or at both locations.

- Curing compound shall be formulated so as to maintain the specified properties for a minimum of one year. The Engineer may require additional testing before use to determine compliance with these specifications if the compound has not been used within one year or whenever the Engineer has reason to believe the compound is no longer satisfactory.
- Tests will be conducted in conformance with the latest ASTM test methods and methods in use by the Transportation Laboratory.

#### **90-7.01C Waterproof Membrane Method**

- The exposed finished surfaces of concrete shall be sprayed with water, using a nozzle that so atomizes the flow that a mist and not a spray is formed, until the concrete has set, after which the curing membrane shall be placed. The curing membrane shall remain in place for a period of not less than 72 hours.
- Sheeting material for curing concrete shall conform to the requirements in AASHTO Designation: M 171 for white reflective materials.
- The sheeting material shall be fabricated into sheets of such width as to provide a complete cover for the entire concrete surface. Joints in the sheets shall be securely cemented together in such a manner as to provide a waterproof joint. The joint seams shall have a minimum lap of 100 mm.
- The sheets shall be securely weighted down by placing a bank of earth on the edges of the sheets or by other means satisfactory to the Engineer.
- Should any portion of the sheets be broken or damaged before the expiration of 72 hours after being placed, the broken or damaged portions shall be immediately repaired with new sheets properly cemented into place.
- Sections of membrane that have lost their waterproof qualities or have been damaged to such an extent as to render them unfit for curing the concrete shall not be used.

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

- Formed surfaces of concrete may be cured by retaining the forms in place. The forms shall remain in place for a minimum period of 7 days after the concrete has been placed, except that for members over 0.5-m in least dimension the forms shall remain in place for a minimum period of 5 days.
- Joints in the forms and the joints between the end of forms and concrete shall be kept moisture tight during the curing period. Cracks in the forms and cracks between the forms and the concrete shall be resealed by methods subject to the approval of the Engineer.

### **90-7.02 CURING PAVEMENT**

- The entire exposed area of the pavement, including edges, shall be cured by the waterproof membrane method, or curing compound method using curing compound (1) or (2) as the Contractor may elect. Should the side forms be removed before the expiration of 72 hours following the start of curing, the exposed pavement edges shall also be cured. If the pavement is cured by means of the curing compound method, the sawcut and all portions of the curing compound that have been disturbed by sawing operations shall be restored by spraying with additional curing compound.
- Curing shall commence as soon as the finishing process provided in Section 40-1.10, "Final Finishing," has been completed. The method selected shall conform to the provisions in Section 90-7.01, "Methods of Curing."
- When the curing compound method is used, the compound shall be applied to the entire pavement surface by mechanical sprayers. Spraying equipment shall be of the fully atomizing type equipped with a tank agitator that provides for continual agitation of the curing compound during the time of application. The spray shall be adequately protected against wind, and the nozzles shall be so oriented or moved mechanically transversely as to result in the minimum specified rate of coverage being applied uniformly on exposed faces. Hand spraying of small and irregular areas, and areas inaccessible to mechanical spraying equipment, in the opinion of the Engineer, will be permitted. When the ambient air temperature is above 15°C, the Contractor shall fog the surface of the concrete with a fine spray of water as specified in Section 90-7.01A, "Water Method." The surface of the pavement shall be kept moist between the hours of 10:00 a.m. and 4:30 p.m. on the day the concrete is placed. However, the fogging done after the curing compound has been applied shall not begin until the compound has set sufficiently to prevent displacement. Fogging shall be discontinued if ordered in writing by the Engineer.

### **90-7.03 CURING STRUCTURES**

- Newly placed concrete for cast-in-place structures, other than highway bridge decks, shall be cured by the water method, the forms-in-place method, or, as permitted herein, by the curing compound method, in conformance with the provisions in Section 90-7.01, "Methods of Curing."
- The curing compound method using a pigmented curing compound may be used on concrete surfaces of construction joints, surfaces that are to be buried underground, and surfaces where only Ordinary Surface Finish is to be applied and on which a uniform color is not required and that will not be visible from a public traveled way. If the Contractor elects to use the curing compound method on the bottom slab of box girder spans, the curing compound shall be curing compound (1).

- The top surface of highway bridge decks shall be cured by both the curing compound method and the water method. The curing compound shall be curing compound (1).
- Concrete surfaces of minor structures, as defined in Section 51-1.02, "Minor Structures," shall be cured by the water method, the forms-in-place method or the curing compound method.
- When deemed necessary by the Engineer during periods of hot weather, water shall be applied to concrete surfaces being cured by the curing compound method or by the forms-in-place method, until the Engineer determines that a cooling effect is no longer required. Application of water for this purpose will be paid for as extra work as provided in Section 4-1.03D, "Extra Work."

#### **90-7.04 CURING PRECAST CONCRETE MEMBERS**

- Precast concrete members shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing." Curing shall be provided for the minimum time specified for each method or until the concrete reaches its design strength, whichever is less. Steam curing may also be used for precast members and shall conform to the following provisions:
  - A. After placement of the concrete, members shall be held for a minimum 4-hour presteaming period. If the ambient air temperature is below 10°C, steam shall be applied during the presteaming period to hold the air surrounding the member at a temperature between 10°C and 32°C.
  - B. To prevent moisture loss on exposed surfaces during the presteaming period, members shall be covered as soon as possible after casting or the exposed surfaces shall be kept wet by fog spray or wet blankets.
  - C. Enclosures for steam curing shall allow free circulation of steam about the member and shall be constructed to contain the live steam with a minimum moisture loss. The use of tarpaulins or similar flexible covers will be permitted, provided they are kept in good repair and secured in such a manner as to prevent the loss of steam and moisture.
  - D. Steam at the jets shall be at low pressure and in a saturated condition. Steam jets shall not impinge directly on the concrete, test cylinders, or forms. During application of the steam, the temperature rise within the enclosure shall not exceed 22°C per hour. The curing temperature throughout the enclosure shall not exceed 65°C and shall be maintained at a constant level for a sufficient time necessary to develop the required transfer strength. Control cylinders shall be covered to prevent moisture loss and shall be placed in a location where temperature is representative of the average temperature of the enclosure.
  - E. Temperature recording devices that will provide an accurate, continuous, permanent record of the curing temperature shall be provided. A minimum of one temperature recording device per 60 m of continuous bed length will be required for checking temperature.
  - F. Members in pretension beds shall be detensioned immediately after the termination of steam curing while the concrete and forms are still warm, or the temperature under the enclosure shall be maintained above 15°C until the stress is transferred to the concrete.
  - G. Curing of precast concrete will be considered completed after termination of the steam curing cycle.

#### **90-7.05 CURING PRECAST PRESTRESSED CONCRETE PILES**

- Newly placed concrete for precast prestressed concrete piles shall be cured in conformance with the provisions in Section 90-7.04, "Curing Precast Concrete Members," except that piles with a class designation ending in C (corrosion resistant) shall be cured as follows:
  - A. Piles shall be either steam cured or water cured. If water curing is used, the piles shall be kept continuously wet by the application of water in conformance with the provisions in Section 90-7.01A, "Water Method."
  - B. If steam curing is used, the steam curing provisions in Section 90-7.04, "Curing Precast Concrete Members," shall apply except that the piles shall be kept continuously wet for their entire length for a period of not less than 3 days, including the holding and steam curing periods.

#### **90-7.06 CURING SLOPE PROTECTION**

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

### **90-7.07 CURING MISCELLANEOUS CONCRETE WORK**

- Exposed surfaces of curbs shall be cured by pigmented curing compounds as specified in Section 90-7.01B, "Curing Compound Method."
- Concrete sidewalks, gutter depressions, island paving, curb ramps, driveways, and other miscellaneous concrete areas shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing."
- Shotcrete shall be cured for at least 72 hours by spraying with water, or by a moist earth blanket, or by any of the methods provided in Section 90-7.01, "Methods of Curing."
- Mortar and grout shall be cured by keeping the surface damp for 3 days.
- After placing, the exposed surfaces of sign structure foundations, including pedestal portions, if constructed, shall be cured for at least 72 hours by spraying with water, or by a moist earth blanket, or by any of the methods provided in Section 90-7.01, "Methods of Curing."

## **90-8 PROTECTING CONCRETE**

### **90-8.01 GENERAL**

- In addition to the provisions in Section 7-1.16, "Contractor's Responsibility for the Work and Materials," the Contractor shall protect concrete as provided in this Section 90-8.
- Concrete shall not be placed on frozen or ice-coated ground or subgrade nor on ice-coated forms, reinforcing steel, structural steel, conduits, precast members, or construction joints.
- Under rainy conditions, placing of concrete shall be stopped before the quantity of surface water is sufficient to damage surface mortar or cause a flow or wash of the concrete surface, unless the Contractor provides adequate protection against damage.
- Concrete that has been frozen or damaged by other causes, as determined by the Engineer, shall be removed and replaced by the Contractor at the Contractor's expense.

### **90-8.02 PROTECTING CONCRETE STRUCTURES**

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

### **90-8.03 PROTECTING CONCRETE PAVEMENT**

- Pavement concrete shall be maintained at a temperature of not less than 4°C for 72 hours. When required by the Engineer, the Contractor shall submit a written outline of the proposed methods for protecting the concrete.
- Except as provided in Section 7-1.08, "Public Convenience," the Contractor shall protect concrete pavement against construction and other activities that abrade, scar, discolor, reduce texture depth, lower coefficient of friction, or otherwise damage the surface. Stockpiling, drifting, or excessive spillage of soil, gravel, petroleum products, and concrete or asphalt mixes on the surface of concrete pavement is prohibited unless otherwise specified in these specifications, the special provisions or permitted by the Engineer.
  - When ordered by the Engineer or shown on the plans or specified in the special provisions, pavement crossings shall be constructed for the convenience of public traffic. The material and work necessary for the construction of the crossings, and their subsequent removal and disposal, will be paid for at the contract unit prices for the items of work involved and if there are no contract items for the work involved, payment for pavement crossings will be made by extra work as provided in Section 4-1.03D, "Extra Work." Where public traffic will be required to cross over the new pavement, Type III portland cement may be used in concrete, if permitted in writing by the Engineer. The pavement may be opened to traffic as soon as the concrete has developed a modulus of rupture of 3.8 MPa. The modulus of rupture will be determined by California Test 523.
  - No traffic or Contractor's equipment, except as hereinafter provided, will be permitted on the pavement before a period of 10 days has elapsed after the concrete has been placed, nor before the concrete has developed a modulus of rupture of at least 3.8 MPa. Concrete that fails to attain a modulus of rupture of 3.8 MPa within 10 days shall not be opened to traffic until directed by the Engineer.
  - Equipment for sawing weakened plane joints will be permitted on the pavement as specified in Section 40-1.08B, "Weakened Plane Joints."
  - When requested in writing by the Contractor, the tracks on one side of paving equipment will be permitted on the pavement after a modulus of rupture of 2.4 MPa has been attained, provided that:
    - A. Unit pressure exerted on the pavement by the paver shall not exceed 135 kPa;

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

- In case of visible cracking of, or other damage to the pavement, operation of the paving equipment on the pavement shall be immediately discontinued.
- Damage to the pavement resulting from early use of pavement by the Contractor's equipment as provided above shall be repaired by the Contractor at the Contractor's expense.
- The State will furnish the molds and machines for testing the concrete for modulus of rupture, and the Contractor, at the Contractor's expense, shall furnish the material and whatever labor the Engineer may require.

## **90-9 COMPRESSIVE STRENGTH**

### **90-9.01 GENERAL**

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

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

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

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

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

- No single compressive strength test shall represent more than 250 m<sup>3</sup>.
- When a precast concrete member is steam cured, the compressive strength of the concrete will be determined from test cylinders that have been handled and stored in conformance with Method 3 of California Test 540. The compressive strength of steam cured concrete will be evaluated on the basis of individual tests representing specific portions of production. When the concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete shall be considered to be acceptable whenever its compressive strength reaches the specified 28-day compressive

strength provided that strength is reached in not more than the maximum number of days specified or allowed after the member is cast.

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

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

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

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

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

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

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

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

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

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

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

## **90-10 MINOR CONCRETE**

### **90-10.01 GENERAL**

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

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

### **90-10.02 MATERIALS**

- Minor concrete shall conform to the following requirements:

#### **90-10.02A Cementitious Material**

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

#### **90-10.02B Aggregate**

- Aggregate shall be clean and free from deleterious coatings, clay balls, roots, and other extraneous materials.
- The Contractor shall submit to the Engineer for approval, a grading of the combined aggregate proposed for use in the minor concrete. After acceptance of the grading, aggregate furnished for minor concrete shall conform to that grading, unless a change is authorized in writing by the Engineer.
- The Engineer may require the Contractor to furnish periodic test reports of the aggregate grading furnished. The maximum size of aggregate used shall be at the option of the Contractor, but in no case shall the maximum size be larger than 37.5 mm or smaller than 19 mm.
- The Engineer may waive, in writing, the gradation requirements in this Section 90-10.02B, if, in the Engineer's opinion, the furnishing of the gradation is not necessary for the type or amount of concrete work to be constructed.

#### **90-10.02C Water**

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

#### **90-10.02D Admixtures**

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

#### **90-10.03 PRODUCTION**

• Cementitious material, water, aggregate, and admixtures shall be stored, proportioned, mixed, transported, and discharged in conformance with recognized standards of good practice that will result in concrete that is thoroughly and uniformly mixed, that is suitable for the use intended, and that conforms to requirements specified herein. Recognized standards of good practice are outlined in various industry publications such as are issued by American Concrete Institute, AASHTO, or the Department.

• The cementitious material content of minor concrete shall conform to the provisions in Section 90-1.01, "Description."

• The amount of water used shall result in a consistency of concrete conforming to the provisions in Section 90-6.06, "Amount of Water and Penetration." Additional mixing water shall not be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer.

• Discharge of ready-mixed concrete from the transporting vehicle shall be made while the concrete is still plastic and before stiffening occurs. An elapsed time of 1.5 hours (one hour in non-agitating hauling equipment), or more than 250 revolutions of the drum or blades, after the introduction of the cementitious material to the aggregates, or a temperature of concrete of more than 32°C will be considered conditions contributing to the quick stiffening of concrete. The Contractor shall take whatever action is necessary to eliminate quick stiffening, except that the addition of water will not be permitted.

• The required mixing time in stationary mixers shall be not less than 50 seconds or more than 5 minutes.

• The minimum required revolutions at mixing speed for transit-mixed concrete shall be not less than that recommended by the mixer manufacturer, and shall be increased, if necessary, to produce thoroughly and uniformly mixed concrete.

• Each load of ready-mixed concrete shall be accompanied by a weighmaster certificate that shall be delivered to the Engineer at the discharge location of the concrete, unless otherwise directed by the Engineer. The weighmaster certificate shall be clearly marked with the date and time of day when the load left the batching plant and, if hauled in truck mixers or agitators, the time the mixing cycle started.

• A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," shall be furnished to the Engineer, prior to placing minor concrete from a source not previously used on the contract, stating that minor concrete to be furnished meets contract requirements, including minimum cementitious material content specified.

#### **90-10.04 CURING MINOR CONCRETE**

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

#### **90-10.05 PROTECTING MINOR CONCRETE**

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

#### **90-10.06 MEASUREMENT AND PAYMENT**

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

## **90-11 MEASUREMENT AND PAYMENT**

### **90-11.01 MEASUREMENT**

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

### **90-11.02 PAYMENT**

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

# **END OF AMENDMENTS**

## **SECTION 2. PROPOSAL REQUIREMENTS AND CONDITIONS**

### **2-1.01 GENERAL**

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

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

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

Submit request for substitution of an "or equal" item, and the data substantiating the request to the Department of Transportation, Construction Division Chief, 120 S. Spring Street, Room 232, Los Angeles, CA 90012, so that the request is received by the Department by close of business on the fourth day, not including Saturdays, Sundays and legal holidays, following bid opening.

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

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

### **2-1.015 FEDERAL LOBBYING RESTRICTIONS**

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

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

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

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

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

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

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

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

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

- A. A DBE must be a small business concern as defined pursuant to Section 3 of U.S. Small Business Act and relevant regulations promulgated pursuant thereto.
- B. A DBE may participate as a prime contractor, subcontractor, joint venture partner with a prime or subcontractor, vendor of material or supplies, or as a trucking company.
- C. A DBE bidder, not bidding as a joint venture with a non-DBE, will be required to document one or a combination of the following:
  - 1. The bidder will meet the goal by performing work with its own forces.
  - 2. The bidder will meet the goal through work performed by DBE subcontractors, suppliers or trucking companies.
  - 3. The bidder, prior to bidding, made adequate good faith efforts to meet the goal.
- D. A DBE joint venture partner must be responsible for specific contract items of work, or portions thereof. Responsibility means actually performing, managing and supervising the work with its own forces. The DBE joint venture partner must share in the capital contribution, control, management, risks and profits of the joint venture. The DBE joint venturer must submit the joint venture agreement with the proposal or the DBE Information form required in the Section entitled "Submission of DBE Information" of these special provisions.
- E. A DBE must perform a commercially useful function, i.e., must be responsible for the execution of a distinct element of the work and must carry out its responsibility by actually performing, managing and supervising the work.
- F. DBEs must be certified by either the California Department of Transportation, or by a participating State of California or local agency which certifies in conformance with Title 49, Code of Federal Regulations, Part 26, as of the date of bid opening. It is the Contractor's responsibility to verify that DBEs are certified. Listings of DBEs certified by the Department are available from the following sources:
  - 1. The Department's DBE Directory, which is published quarterly. This Directory may be obtained from the Department of Transportation, Materiel Operations Branch, Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, California 95815, Telephone: (916) 445-3520.

2. The Department's Electronic Information Bulletin Board Service, which is accessible by modem and is updated weekly. The Bulletin Board may be accessed by first contacting the Department's Business Enterprise Program at Telephone: (916) 227-8937 and obtaining a user identification and password.
3. The Department's web site at <http://www.dot.ca.gov/hq/bep/index.htm>.
4. The organizations listed in the Section entitled "DBE Goal for this Project" of these special provisions.

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

1. If the materials or supplies are obtained from a DBE manufacturer, 100 percent of the cost of the materials or supplies will count toward the DBE goal. A DBE manufacturer is a firm that operates or maintains a factory or establishment that produces, on the premises, the materials, supplies, articles, or equipment required under the contract and of the general character described by the specifications.
2. If the materials or supplies are purchased from a DBE regular dealer, 60 percent of the cost of the materials or supplies will count toward the DBE goal. A DBE regular dealer is a firm that owns, operates, or maintains a store, warehouse, or other establishment in which the materials, supplies, articles or equipment of the general character described by the specifications and required under the contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business. To be a DBE regular dealer, the firm must be an established, regular business that engages, as its principal business and under its own name, in the purchase and sale or lease of the products in question. A person may be a DBE regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone, or asphalt without owning, operating, or maintaining a place of business as provided in this paragraph G.2. if the person both owns and operates distribution equipment for the products. Any supplementing of regular dealers' own distribution equipment shall be by a long-term lease agreement and not on an ad hoc or contract-by-contract basis. Packagers, brokers, manufacturers' representatives, or other persons who arrange or expedite transactions are not DBE regular dealers within the meaning of this paragraph G.2.
3. Credit for materials or supplies purchased from a DBE which is neither a manufacturer nor a regular dealer will be limited to the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on a job site, provided the fees are reasonable and not excessive as compared with fees charged for similar services.

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

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

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

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

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

Disadvantaged Business Enterprise (DBE): 20 percent

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

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

|   |   |
|---|---|
| <p>Districts 04, 05 (except San Luis Obispo and Santa Barbara Counties), 06 (except Kern County) and 10:</p> <hr/> <p>Triaxial Management Services, Inc.<br/>- Oakland</p> <p>1545 Willow Street, 1st Floor<br/>Oakland, CA 94607<br/>Telephone - (510) 286-1313<br/>FAX No. - (510) 286-6792</p>                     | <p>Districts 08, 11 and 12:</p> <hr/> <p>Triaxial Management Services, Inc.<br/>- San Diego<br/>2725 Congress Street,<br/>Suite 1-D<br/>San Diego, CA 92110<br/>Telephone - (619) 543-5109<br/>FAX No. - (619) 543-5108</p> |
| <p>Districts 07 and 08;<br/>in San Luis Obispo and Santa Barbara Counties in District 05; and in Kern County in District 06:</p> <hr/> <p>Triaxial Management Services, Inc.<br/>- Los Angeles<br/>2594 Industry Way, Suite 101<br/>Lynwood, CA 90262<br/>Telephone - (310) 537-6677<br/>FAX No. - (310) 637-0128</p> | <p>Districts 01, 02, 03 and 09:</p> <hr/> <p>Triaxial Management Services, Inc.<br/>- Sacramento<br/>930 Alhambra Blvd., #205<br/>Sacramento, CA 95816<br/>Telephone - (916) 553-4172<br/>FAX No. - (916) 553-4173</p>      |

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

The required DBE information shall be submitted on the "CALTRANS BIDDER - DBE INFORMATION" form included in the Proposal. If the DBE information is not submitted with the bid, the DBE Information form shall be removed from the documents prior to submitting the bid.

It is the bidder's responsibility to make enough work available to DBEs and to select those portions of the work or material needs consistent with the available DBEs to meet the goal for DBE participation or to provide information to establish that, prior to bidding, the bidder made adequate good faith efforts to do so.

If DBE information is not submitted with the bid, the apparent successful bidder (low bidder), the second low bidder and the third low bidder shall submit DBE information to the Department of Transportation, 1120 N Street, Room 0200, MS #26, Sacramento, California 95814 so the information is received by the Department no later than 4:00 p.m. on the fourth day, not including Saturdays, Sundays and legal holidays, following bid opening. DBE information sent by U.S. Postal Service certified mail with return receipt and certificate of mailing and mailed on or before the third day, not including Saturdays, Sundays and legal holidays, following bid opening will be accepted even if it is received after the fourth day following bid opening. Failure to submit the required DBE information by the time specified will be grounds for finding the bid or proposal nonresponsive. Other bidders need not submit DBE information unless requested to do so by the Department.

The bidder's DBE information shall establish that good faith efforts to meet the DBE goal have been made. To establish good faith efforts, the bidder shall demonstrate that the goal will be met or that, prior to bidding, adequate good faith efforts to meet the goal were made.

Bidders are cautioned that even though their submittal indicates they will meet the stated DBE goal, their submittal should also include their adequate good faith efforts information along with their DBE goal information to protect their eligibility for award of the contract in the event the Department, in its review, finds that the goal has not been met.

The bidder's DBE information shall include the names, addresses and phone numbers of DBE firms that will participate, with a complete description of work or supplies to be provided by each, the dollar value of each DBE transaction, and a

written confirmation from the DBE that it is participating in the contract. A copy of the DBE's quote will serve as written confirmation that the DBE is participating in the contract. When 100 percent of a contract item of work is not to be performed or furnished by a DBE, a description of the exact portion of that work to be performed or furnished by that DBE shall be included in the DBE information, including the planned location of that work. The work that a DBE prime contractor has committed to performing with its own forces as well as the work that it has committed to be performed by DBE subcontractors, suppliers and trucking companies will count toward the goal.

The information necessary to establish the bidder's adequate good faith efforts to meet the DBE goal should include:

- A. The names and dates of each publication in which a request for DBE participation for this project was placed by the bidder.
- B. The names and dates of written notices sent to certified DBEs soliciting bids for this project and the dates and methods used for following up initial solicitations to determine with certainty whether the DBEs were interested.
- C. The items of work which the bidder made available to DBE firms, including, where appropriate, any breaking down of the contract work items (including those items normally performed by the bidder with its own forces) into economically feasible units to facilitate DBE participation. It is the bidder's responsibility to demonstrate that sufficient work to meet the DBE goal was made available to DBE firms.
- D. The names, addresses and phone numbers of rejected DBE firms, the firms selected for that work, and the reasons for the bidder's choice.
- E. Efforts made to assist interested DBEs in obtaining bonding, lines of credit or insurance, and any technical assistance or information related to the plans, specifications and requirements for the work which was provided to DBEs.
- F. Efforts made to assist interested DBEs in obtaining necessary equipment, supplies, materials, or related assistance or services, excluding supplies and equipment the DBE subcontractor purchases or leases from the prime contractor or its affiliate.
- G. The names of agencies contacted to provide assistance in contacting, recruiting and using DBE firms.
- H. Any additional data to support a demonstration of good faith efforts.

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

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

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

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

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

Attention is directed to the provisions in Sections 8-1.03, "Beginning of Work," 8-1.06, "Time of Completion," 8-1.07, "Liquidated Damages," and 20-4.08, "Plant Establishment Work," of the Standard Specifications and these special provisions.

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

The work (except plant establishment work) shall be diligently prosecuted to completion before the expiration of **500 WORKING DAYS** beginning on the fifteenth calendar day after approval of the contract.

The Contractor shall pay to the State of California the sum of \$5,800 per day, for each and every calendar day's delay in finishing the work (except plant establishment work) in excess of the number of working days prescribed above.

The Contractor shall diligently prosecute all work (including plant establishment) to completion before the expiration of **750 WORKING DAYS** beginning on the fifteenth calendar day after approval of the contract.

The Contractor shall pay to the State of California the sum of \$250 per day, for each and every calendar day's delay in completing the work in excess of the number of working days prescribed above.

In no case will liquidated damages of more than \$5,800 per day be assessed.

## SECTION 5. GENERAL

### SECTION 5-1. MISCELLANEOUS

#### 5-1.01 PLANS AND WORKING DRAWINGS

When the specifications require working drawings to be submitted to the Division of Structure Design, the drawings shall be submitted to: Division of Structure Design, Documents Unit, Mail Station 9, 1801 30th Street, Sacramento, CA 95816, Telephone 916 227-8252.

#### 5-1.011 EXAMINATION OF PLANS, SPECIFICATIONS, CONTRACT, AND SITE OF WORK

Attention is directed to "Differing Site Conditions" of these special provisions regarding physical conditions at the site which may differ from those indicated in "Materials Information," log of test borings or other geotechnical information obtained by the Department's investigation of site conditions.

#### 5-1.012 DIFFERING SITE CONDITIONS

Attention is directed to Section 5-1.116, "Differing Site Conditions," of the Standard Specifications.

During the progress of the work, if subsurface or latent conditions are encountered at the site differing materially from those indicated in the "Materials Information," log of test borings, other geotechnical data obtained by the Department's investigation of subsurface conditions, or an examination of the conditions above ground at the site, the party discovering those conditions shall promptly notify the other party in writing of the specific differing conditions before they are disturbed and before the affected work is performed.

The Contractor will be allowed 15 days from the notification of the Engineer's determination of whether or not an adjustment of the contract is warranted, in which to file a notice of potential claim in conformance with the provisions of Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications and as specified herein; otherwise the decision of the Engineer shall be deemed to have been accepted by the Contractor as correct. The notice of potential claim shall set forth in what respects the Contractor's position differs from the Engineer's determination and provide any additional information obtained by the Contractor, including but not limited to additional geotechnical data. The notice of potential claim shall be accompanied by the Contractor's certification that the following were made in preparation of the bid: a review of the contract, a review of the "Materials Information," a review of the log of test borings and other records of geotechnical data to the extent they were made available to bidders prior to the opening of bids, and an examination of the conditions above ground at the site. Supplementary information, obtained by the Contractor subsequent to the filing of the notice of potential claim, shall be submitted to the Engineer in an expeditious manner.

#### 5-1.015 LABORATORY

When a reference is made in the specifications to the "Laboratory," the reference shall mean the Division of Materials Engineering and Testing Services and the Division of Structural Foundations of the Department of Transportation, or established laboratories of the various Districts of the Department, or other laboratories authorized by the Department to test materials and work involved in the contract. When a reference is made in the specifications to the "Transportation Laboratory," the reference shall mean the Division of Materials Engineering and Testing Services and the Division of Structural Foundations, located at 5900 Folsom Boulevard, Sacramento, CA 95819, Telephone (916) 227-7000.

#### 5-1.017 CONTRACT BONDS

Attention is directed to Section 3-1.02, "Contract Bonds," of the Standard Specifications and these special provisions.

The payment bond shall be in a sum not less than one hundred percent of the total amount payable by the terms of the contract.

#### 5-1.019 COST REDUCTION INCENTIVE

Attention is directed to Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications.

Prior to preparing a cost reduction proposal, the Contractor shall request a meeting with the Engineer to discuss the proposal in concept and to determine the merit of the cost reduction proposal. Items of discussion will also include permit issues, impact on other projects, impact on the project schedule, peer reviews, and review times required by the Department and other agencies.

#### 5-1.02 LABOR NONDISCRIMINATION

Attention is directed to the following Notice that is required by Chapter 5 of Division 4 of Title 2, California Code of Regulations.

## NOTICE OF REQUIREMENT FOR NONDISCRIMINATION PROGRAM

### (GOV. CODE, SECTION 12990)

Your attention is called to the "Nondiscrimination Clause", set forth in Section 7-1.01A(4), "Labor Nondiscrimination," of the Standard Specifications, which is applicable to all nonexempt State contracts and subcontracts, and to the "Standard California Nondiscrimination Construction Contract Specifications" set forth therein. The specifications are applicable to all nonexempt State construction contracts and subcontracts of \$5000 or more.

#### 5-1.03 INTEREST ON PAYMENTS

Interest shall be payable on progress payments, payments after acceptance, final payments, extra work payments, and claim payments as follows:

- A. Unpaid progress payments, payment after acceptance, and final payments shall begin to accrue interest 30 days after the Engineer prepares the payment estimate.
- B. Unpaid extra work bills shall begin to accrue interest 30 days after preparation of the first pay estimate following receipt of a properly submitted and undisputed extra work bill. To be properly submitted, the bill must be submitted within 7 days of the performance of the extra work and in conformance with the provisions in Section 9-1.03C, "Records," and Section 9-1.06, "Partial Payments," of the Standard Specifications. An undisputed extra work bill not submitted within 7 days of performance of the extra work will begin to accrue interest 30 days after the preparation of the second pay estimate following submittal of the bill.
- C. The rate of interest payable for unpaid progress payments, payments after acceptance, final payments, and extra work payments shall be 10 percent per annum.
- D. The rate of interest payable on a claim, protest or dispute ultimately allowed under this contract shall be 6 percent per annum. Interest shall begin to accrue 61 days after the Contractor submits to the Engineer information in sufficient detail to enable the Engineer to ascertain the basis and amount of said claim, protest or dispute.

The rate of interest payable on any award in arbitration shall be 6 percent per annum if allowed under the provisions of Civil Code Section 3289.

#### 5-1.031 FINAL PAYMENT AND CLAIMS

Attention is directed to Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications.

If the Contractor files a timely written statement of claims in response to the proposed final estimate, the District that administers the contract will submit a claim position letter to the Contractor by hand delivery or deposit in the U.S. mail within 135 days of acceptance of the contract. The claim position letter will delineate the District's position on the Contractor's claims. If the Contractor disagrees with the claim position letter, the Contractor shall submit a written notification of its disagreement to be received by the District not later than 15 days after the Contractor's receipt of the claim position letter. The written notification of disagreement shall set forth the basis for the Contractor's disagreement and be submitted to the office designated in the claim position letter. The Contractor's failure to provide a timely, written notification of disagreement shall constitute the Contractor's acceptance and agreement with the determinations provided in the claim position letter and with final payment pursuant to the claim position letter.

If the Contractor files a timely notification of disagreement with the District claim position letter, the board of review designated by the District Director to review claims that remain in dispute will meet with the Contractor within 45 days after receipt by the District of the notification of disagreement. Attendance by the Contractor at the board of review meeting shall be mandatory.

If the District fails to submit a claim position letter to the Contractor within 135 days after the acceptance of the contract and the Contractor has claims that remain in dispute, the Contractor may request a meeting with the board of review designated by the District Director to review claims that remain in dispute. The Contractor's request for a meeting shall identify the claims that remain in dispute. If the Contractor files a request for a meeting, the board of review will meet with the Contractor within 45 days after the District receives the request for the meeting. Attendance by the Contractor at the District Director's board of review meeting shall be mandatory.

Failure of the Contractor to file a timely written statement of claims in response to the proposed final estimate, or to file a timely notification of disagreement with the District claim position letter, or to attend the District Director's board of review meeting shall constitute a failure to pursue diligently and exhaust the administrative procedures in the contract and shall be a bar to arbitration in conformance with the requirements in Section 10240.2 of the California Public Contract Code.

**5-1.04 PUBLIC SAFETY**

The Contractor shall provide for the safety of traffic and the public in conformance with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications and these special provisions.

The Contractor shall install temporary railing (Type K) between a lane open to public traffic and an excavation, obstacle or storage area when the following conditions exist:

- A. Excavations.—The near edge of the excavation is 3.6 m or less from the edge of the lane, except:
  - 1. Excavations covered with sheet steel or concrete covers of adequate thickness to prevent accidental entry by traffic or the public.
  - 2. Excavations less than 0.3-m deep.
  - 3. Trenches less than 0.3-m wide for irrigation pipe or electrical conduit, or excavations less than 0.3-m in diameter.
  - 4. Excavations parallel to the lane for the purpose of pavement widening or reconstruction.
  - 5. Excavations in side slopes, where the slope is steeper than 1:4 (vertical:horizontal).
  - 6. Excavations protected by existing barrier or railing.
- B. Temporarily Unprotected Permanent Obstacles.—The work includes the installation of a fixed obstacle together with a protective system, such as a sign structure together with protective railing, and the Contractor elects to install the obstacle prior to installing the protective system; or the Contractor, for the Contractor's convenience and with permission of the Engineer, removes a portion of an existing protective railing at an obstacle and does not replace such railing complete in place during the same day.
- C. Storage Areas.—Material or equipment is stored within 3.6 m of the lane and the storage is not otherwise prohibited by the provisions of the Standard Specifications and these special provisions.

The approach end of temporary railing (Type K), installed in conformance with the provisions in this section "Public Safety" and in Section 7-1.09, "Public Safety," of the Standard Specifications, shall be offset a minimum of 4.6 m from the edge of the traffic lane open to public traffic. The temporary railing shall be installed on a skew toward the edge of the traffic lane of not more than 0.3-m transversely to 3 m longitudinally with respect to the edge of the traffic lane. If the 4.6-m minimum offset cannot be achieved, the temporary railing shall be installed on the 10 to 1 skew to obtain the maximum available offset between the approach end of the railing and the edge of the traffic lane, and an array of temporary crash cushion modules shall be installed at the approach end of the temporary railing.

Temporary railing (Type K) shall conform to the provisions in Section 12-3.08, "Temporary Railing (Type K)," of the Standard Specifications. Temporary railing (Type K), conforming to the details shown on 1999 Standard Plan T3, may be used. Temporary railing (Type K) fabricated prior to January 1, 1993, and conforming to 1988 Standard Plan B11-30 may be used, provided the fabrication date is printed on the required Certificate of Compliance.

Temporary crash cushion modules shall conform to the provisions in "Temporary Crash Cushion Module" of these special provisions.

Except for installing, maintaining and removing traffic control devices, whenever work is performed or equipment is operated in the following work areas, the Contractor shall close the adjacent traffic lane unless otherwise provided in the Standard Specifications and these special provisions:

| Approach Speed of Public Traffic (Posted Limit)<br>(Kilometers Per Hour) | Work Areas   |
|--|--|
| Over 72 (45 Miles Per Hour)  | Within 1.8 m of a traffic lane but not on a traffic lane |
| 56 to 72 (35 to 45 Miles Per Hour)                                       | Within 0.9-m of a traffic lane but not on a traffic lane |

The lane closure provisions of this section shall not apply if the work area is protected by permanent or temporary railing or barrier.

When traffic cones or delineators are used to delineate a temporary edge of a traffic lane, the line of cones or delineators shall be considered to be the edge of the traffic lane, however, the Contractor shall not reduce the width of an existing lane to less than 3 m without written approval from the Engineer.

When work is not in progress on a trench or other excavation that required closure of an adjacent lane, the traffic cones or portable delineators used for the lane closure shall be placed off of and adjacent to the edge of the traveled way. The spacing of the cones or delineators shall be not more than the spacing used for the lane closure.

Suspended loads or equipment shall not be moved nor positioned over public traffic or pedestrians.

Full compensation for conforming to the provisions in this section "Public Safety," including furnishing and installing temporary railing (Type K) and temporary crash cushion modules, shall be considered as included in the contract prices paid for the various items of work involved and no additional compensation will be allowed therefor.

#### **5-1.05 (BLANK)**

#### **5-1.06 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES**

When the presence of asbestos or hazardous substances are not shown on the plans or indicated in the specifications and the Contractor encounters materials which the Contractor reasonably believes to be asbestos or a hazardous substance as defined in Section 25914.1 of the Health and Safety Code, and the asbestos or hazardous substance has not been rendered harmless, the Contractor may continue work in unaffected areas reasonably believed to be safe. The Contractor shall immediately cease work in the affected area and report the condition to the Engineer in writing.

In conformance with Section 25914.1 of the Health and Safety Code, removal of asbestos or hazardous substances including exploratory work to identify and determine the extent of the asbestos or hazardous substance will be performed by separate contract.

If delay of work in the area delays the current controlling operation, the delay will be considered a right of way delay and the Contractor will be compensated for the delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

#### **5-1.07 YEAR 2000 COMPLIANCE**

This contract is subject to Year 2000 Compliance for automated devices in the State of California.

Year 2000 compliance for automated devices in the State of California is achieved when embedded functions have or create no logical or mathematical inconsistencies when dealing with dates prior to and beyond 1999. The year 2000 is recognized and processed as a leap year. The product shall operate accurately in the manner in which the product was intended for date operation without requiring manual intervention.

The Contractor shall provide the Engineer a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for all automated devices furnished for the project.

#### **5-1.075 BUY AMERICA REQUIREMENTS**

Attention is directed to the "Buy America" requirements of the Surface Transportation Assistance Act of 1982 (Section 165) and the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) Sections 1041(a) and 1048(a), and the regulations adopted pursuant thereto. In conformance with the law and regulations, all manufacturing processes for steel and iron materials furnished for incorporation into the work on this project shall occur in the United States; with the exception that pig iron and processed, pelletized and reduced iron ore manufactured outside of the United States may be used in the domestic manufacturing process for such steel and iron materials. The application of coatings, such as epoxy coating, galvanizing, painting, and other coatings that protect or enhance the value of steel or iron materials shall be considered a manufacturing process subject to the "Buy America" requirements.

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished for steel and iron materials. The certificates, in addition to certifying that the materials comply with the specifications, shall specifically certify that all manufacturing processes for the materials occurred in the United States, except for the above exceptions.

The requirements imposed by the law and regulations do not prevent a minimal use of foreign steel and iron materials if the total combined cost of the materials used does not exceed one-tenth of one percent (0.1 percent) of the total contract cost or \$2500, whichever is greater. The Contractor shall furnish the Engineer acceptable documentation of the quantity and value of the foreign steel and iron prior to incorporating the materials into the work.

#### **5-1.08 SUBCONTRACTOR AND DBE RECORDS**

The Contractor shall maintain records showing the name and business address of each first-tier subcontractor. The records shall also show the name and business address of every DBE subcontractor, DBE vendor of materials and DBE trucking company, regardless of tier. The records shall show the date of payment and the total dollar figure paid to all of these firms. DBE prime contractors shall also show the date of work performed by their own forces along with the corresponding dollar value of the work.

Upon completion of the contract, a summary of these records shall be prepared on Form CEM-2402 (F) and certified correct by the Contractor or the Contractor's authorized representative, and shall be furnished to the Engineer. The form shall be furnished to the Engineer within 90 days from the date of contract acceptance. \$10,000 will be withheld from payment

until the Form CEM-2402 (F) is submitted. The amount will be returned to the Contractor when a satisfactory Form CEM-2402 (F) is submitted.

Prior to the fifteenth of each month, the Contractor shall submit documentation to the Engineer showing the amount paid to DBE trucking companies listed in the Contractor's DBE information. This monthly documentation shall indicate the portion of the revenue paid to DBE trucking companies which is claimed toward DBE participation. The Contractor shall also obtain and submit documentation to the Engineer showing the amount paid by DBE trucking companies to all firms, including owner-operators, for the leasing of trucks. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission it receives as a result of the lease arrangement. The records must confirm that the amount of credit claimed toward DBE participation conforms with Section 2-1.02, "Disadvantaged Business Enterprise," of these special provisions.

The Contractor shall also obtain and submit documentation to the Engineer showing the truck number, owner's name, California Highway Patrol CA number, and if applicable, the DBE certification number of the owner of the truck for all trucks used during that month for which DBE participation will be claimed. This documentation shall be submitted on Form CEM-2404 (F).

#### **5-1.083 DBE CERTIFICATION STATUS**

If a DBE subcontractor is decertified during the life of the project, the decertified subcontractor shall notify the Contractor in writing with the date of decertification. If a subcontractor becomes a certified DBE during the life of the project, the subcontractor shall notify the Contractor in writing with the date of certification. The Contractor shall furnish the written documentation to the Engineer.

Upon completion of the contract, Form CEM-2403 (F) indicating the DBE's existing certification status shall be signed and certified correct by the Contractor. The certified form shall be furnished to the Engineer within 90 days from the date of contract acceptance.

#### **5-1.086 PERFORMANCE OF DBE SUBCONTRACTORS AND SUPPLIERS**

The DBEs listed by the Contractor in response to the provisions in Section 2-1.02B, "Submission of DBE Information," and Section 3, "Award and Execution of Contract," of these special provisions, which are determined by the Department to be certified DBEs, shall perform the work and supply the materials for which they are listed, unless the Contractor has received prior written authorization to perform the work with other forces or to obtain the materials from other sources.

Authorization to use other forces or sources of materials may be requested for the following reasons:

- A. The listed DBE, after having had a reasonable opportunity to do so, fails or refuses to execute a written contract, when such written contract, based upon the general terms, conditions, plans and specifications for the project, or on the terms of such subcontractor's or supplier's written bid, is presented by the Contractor.
- B. The listed DBE becomes bankrupt or insolvent.
- C. The listed DBE fails or refuses to perform the subcontract or furnish the listed materials.
- D. The Contractor stipulated that a bond was a condition of executing a subcontract and the listed DBE subcontractor fails or refuses to meet the bond requirements of the Contractor.
- E. The work performed by the listed subcontractor is substantially unsatisfactory and is not in substantial conformance with the plans and specifications, or the subcontractor is substantially delaying or disrupting the progress of the work.
- F. It would be in the best interest of the State.

The Contractor shall not be entitled to any payment for such work or material unless it is performed or supplied by the listed DBE or by other forces (including those of the Contractor) pursuant to prior written authorization of the Engineer.

#### **5-1.09 SUBCONTRACTING**

Attention is directed to the provisions in Section 8-1.01, "Subcontracting," of the Standard Specifications, and Section 2, "Proposal Requirements and Conditions," and Section 3, "Award and Execution of Contract," of these special provisions.

Pursuant to the provisions of Section 1777.1 of the Labor Code, the Labor Commissioner publishes and distributes a list of contractors ineligible to perform work as a subcontractor on a public works project. This list of debarred contractors is available from the Department of Industrial Relations web site at:

<http://www.dir.ca.gov/DLSE/Debar.html>.

The provisions in the third paragraph of Section 8-1.01, "Subcontracting," of the Standard Specifications, that the Contractor shall perform with the Contractor's own organization contract work amounting to not less than 50 percent of the original contract price, is not changed by the Federal Aid requirement specified under "Required Contract Provisions Federal-

Contract No. <<Dist>>-<<Contract\_No>>

Aid Construction Contracts" in Section 14 of these special provisions that the Contractor perform not less than 30 percent of the original contract work with the Contractor's own organization.

Each subcontract and any lower tier subcontract that may in turn be made shall include the "Required Contract Provisions Federal-Aid Construction Contracts" in Section 14 of these special provisions. This requirement shall be enforced as follows:

- A. Noncompliance shall be corrected. Payment for subcontracted work involved will be withheld from progress payments due, or to become due, until correction is made. Failure to comply may result in termination of the contract.

In conformance with the Federal DBE regulations Sections 26.53(f)(1) and 26.53(f)(2) Part 26, Title 49 CFR:

- A. The Contractor shall not terminate for convenience a DBE subcontractor listed in response to Section 2-1.02B, "Submission of DBE Information," and then perform that work with its own forces, or those of an affiliate without the written consent of the Department, and
- B. If a DBE subcontractor is terminated or fails to complete its work for any reason, the Contractor will be required to make good faith efforts to substitute another DBE subcontractor for the original DBE subcontractor, to the extent needed to meet the contract goal.

The requirement in Section 2-1.02, "Disadvantaged Business Enterprise (DBE)," of these special provisions that DBEs must be certified on the date bids are opened does not apply to DBE substitutions after award of the contract.

#### **5-1.10 PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS**

Attention is directed to the provisions in Sections 10262 and 10262.5 of the Public Contract Code and Section 7108.5 of the Business and Professions Code concerning prompt payment to subcontractors.

#### **5-1.102 PROMPT PAYMENT OF WITHHELD FUNDS TO SUBCONTRACTORS**

The Contractor shall return all moneys withheld in retention from the subcontractor within 30 days after receiving payment for work satisfactorily completed, even if the other contract work is not completed and has not been accepted in conformance with Section 7-1.17, "Acceptance of Contract," of the Standard Specifications. This requirement shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise available to the Contractor or subcontractor in the event of a dispute involving late payment or nonpayment by the Contractor or deficient subcontract performance or noncompliance by a subcontractor.

#### **5-1.11 PARTNERING**

The State will promote the formation of a "Partnering" relationship with the Contractor in order to effectively complete the contract to the benefit of both parties. The purpose of this relationship is to maintain a cooperative communication and to mutually resolve conflicts at the lowest responsible management level.

The Contractor may request the formation of a "Partnering" relationship by submitting a request in writing to the Engineer after approval of the contract. If the Contractor's request for "Partnering" is approved by the Engineer, scheduling of a "Partnering Workshop," selecting the "Partnering" facilitator and workshop site, and other administrative details shall be as agreed to by both parties. If agreed to by the parties, additional "Partnering Workshops" will be conducted as needed throughout the life of the contract.

The costs involved in providing the "Partnering Workshop" facilitator and workshop site will be borne equally by the State and the Contractor. The division of cost will be made by determining the cost in providing the "Partnering Workshop" facilitator and workshop site in conformance with the provisions in Section 9-1.03B, "Work Performed by Special Forces or Other Special Services," of the Standard Specifications, and paying to the Contractor one-half of that cost, except no markups will be allowed.

All other costs associated with "Partnering Workshops" will be borne separately by the party incurring the costs, such as wages and travel expenses, and no additional compensation will be allowed therefor.

The establishment of a "Partnering" relationship will not change or modify the terms and conditions of the contract and will not relieve either party of the legal requirements of the contract.

#### **5-1.114 VALUE ANALYSIS**

The Contractor may submit to the Engineer, in writing, a request for a "Value Analysis" workshop. The purpose for having a workshop is to identify value enhancing opportunities and to consider modifications to the plans and specifications that will reduce either the total cost, time of construction or traffic congestion, without impairing, in any manner, the essential

functions or characteristics of the project including, but not limited to, service life, economy of operation, ease of maintenance, benefits to the travelling public, desired appearance, or design and safety standards.

To maximize the potential benefits of a workshop, the request should be submitted to the Engineer early in the project after approval of the contract. If the Contractor's request for a "Value Analysis" workshop is approved by the Engineer, scheduling of a workshop, selecting the facilitator and workshop site, and other administrative details shall be determined cooperatively by the Contractor and the Engineer.

The workshop shall be conducted in conformance with the methodology described in the Department's "Value Analysis Team Guide" available at the Department's web site at:

<http://www.dot.ca.gov/hq/oppd/value/>

The facilitator shall be a Certified Value Specialist (CVS) as recognized by the Society of American Value Engineers (SAVE) International, which may be contacted as follows:

SAVE International, 60 Revere Drive, Northbrook, IL 60062  
Telephone 1-847-480-1730, FAX 1-847-480-9282

The Contractor may submit recommendations resulting from a "Value Analysis" workshop for approval by the Engineer as cost reduction incentive proposals in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications.

The costs involved in providing the "Value Analysis" facilitator and workshop site will be borne equally by the State and the Contractor. The division of cost will be made by determining the cost in providing the "Value Analysis" facilitator and workshop site in conformance with the provisions in Section 9-1.03B, "Work Performed by Special Forces or Other Special Services," of the Standard Specifications, and paying to the Contractor one-half of that cost, except no markups will be allowed.

All other costs associated with the "Value Analysis" workshop will be borne separately by the party incurring the costs, such as wages and travel expenses, and no additional compensation will be allowed therefor.

## **5-1.12 DISPUTE REVIEW BOARD**

### **GENERAL**

To assist in the resolution of disputes or potential claims arising out of the work of this project, a Dispute Review Board, hereinafter referred to as the "DRB," shall be established by the Engineer and Contractor cooperatively upon approval of the contract. The DRB is intended to assist the contract administrative claims resolution process as specified in the provisions in Section 9-1.04, "Notice of Potential Claim," and Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications and these special provisions. The DRB shall not serve as a substitute for provisions in the specifications in regard to filing potential claims. The requirements and procedures established in this section shall be a prerequisite to filing a claim, filing for arbitration, or filing for litigation prior or subsequent to project completion.

The DRB shall be utilized when dispute or potential claim resolution at the project level is unsuccessful. The DRB shall function as specified herein until the day of acceptance of the contract, at which time the work of the DRB will cease except for completion of unfinished reports. No 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 and these special provisions. The State will review those claims in conformance with the provisions in Section 9-1.07B of the Standard Specifications and these special provisions. Following the adherence to and completion of the State's 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 State as specified in these special provisions. Whenever the term "dispute" or "disputes" is used herein, it shall be deemed to include potential claims as well as disputes.

The DRB shall serve as an advisory body to assist in the resolution of disputes between the State and the Contractor, hereinafter referred to as the "parties." The DRB shall consider disputes referred to it, and furnish written reports containing findings and recommendations pertaining to those disputes, to the parties to aid in resolution of the differences between them. DRB findings and recommendations are not binding on the parties.

## **SELECTION PROCESS, DISCLOSURE AND APPOINTMENTS**

The DRB shall consist of one member selected by the State and approved by the Contractor, one member selected by the Contractor and approved by the State, and a third member selected by the first 2 members and approved by both the State and the Contractor. The third member shall act as the DRB Chairperson.

DRB members shall be especially knowledgeable in the type of construction and contract documents potentially anticipated by the contract. DRB members shall discharge their responsibilities impartially as an independent body, considering the facts and circumstances related to the matters under consideration, applicable laws and regulations, and the pertinent provisions of the contract.

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 written disclosure statement.

Prior to finalizing DRB appointments, the first 2 prospective DRB members shall submit complete disclosure statements to both the State and the Contractor. 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 three DRB members who fail to fully comply at all times with all required employment and financial disclosure conditions of DRB membership as described in the Dispute Review Board Agreement and as specified herein. A copy of the Dispute Review Board Agreement is included in this section.

The Contractor, the State, and the 3 members of the DRB shall complete and adhere to the Dispute Review Board Agreement in administration of this DRB within 15 days of the parties' concurrence in the selection of the third member. No DRB meeting shall take place until the Dispute Review Board Agreement has been signed by all parties. The State

authorizes the Engineer to execute and administer the terms of the Agreement. The person(s) designated by the Contractor as authorized to execute contract change orders shall be authorized to execute and administer the terms of this agreement, or to delegate the authority in writing. The operation of the DRB shall be in conformance with the terms of the Dispute Review Board Agreement.

### **COMPENSATION**

The State and the Contractor shall bear the costs and expenses of the DRB equally. Each DRB member shall be compensated at an agreed rate of \$1,200 per day if time spent per meeting, including on-site time plus one hour of travel time, is greater than 4 hours. Each DRB member shall be compensated at an agreed rate of \$700 per day if time spent per meeting, including on-site time plus one hour of travel time, is less than or equal to 4 hours. The agreed rates shall be considered full compensation for on-site time, travel expenses, transportation, lodging, time for travel and incidentals for each day, or portion thereof, that the DRB member is at an authorized DRB meeting. No additional compensation will be made for time spent by DRB members in review and research activities outside the official DRB meetings unless that time, (such as time spent evaluating and preparing recommendations on specific issues presented to the DRB), has been specifically agreed to in advance by the State and Contractor. Time away from the project, which has been specifically agreed to in advance by the parties, will be compensated at an agreed rate of \$125 per hour. The agreed amount of \$125 per hour shall include all incidentals including expenses for telephone, fax, and computer services. Members serving on more than one DRB involving the Department, regardless of the number of meetings per day, shall not be paid more than the all inclusive rate per day or rate per hour for an individual project. The State will provide, at no cost to the Contractor, administrative services such as conference facilities and secretarial services to the DRB. These special provisions and the Dispute Review Board Agreement state the provisions for compensation and expenses of the DRB. DRB members shall be compensated at the same daily and hourly rate. The Contractor shall make direct payments to each DRB member for their participation in authorized meetings and approved hourly rate charges from invoices submitted by each DRB member. The State will reimburse the Contractor for its share of the costs. There will be no markups applied to expenses connected with the DRB, either by the DRB members or by the Contractor when requesting payment of the State's share of DRB expenses. Regardless of the DRB recommendation, neither party shall be entitled to reimbursement of DRB costs from the other party.

### **REPLACEMENT OF DRB MEMBERS**

Service of a DRB member may be terminated at any time with not less than 15 days notice as follows:

- A. The State may terminate service of the State appointed member.
- B. The Contractor may terminate service of the Contractor appointed member.
- C. Upon the written recommendation of the State and Contractor members for the removal of the third member.
- D. Upon resignation of a member.
- E. The State or Contractor may terminate the service of any member who fails to fully comply with all required employment and financial disclosure conditions of DRB membership

When a member of the DRB is replaced, the replacement member shall be appointed in the same manner as the replaced member was appointed. The appointment of a replacement DRB member will begin promptly upon determination of the need for replacement and shall be completed within 15 days. Changes in either of the DRB members chosen by the two parties will not require re-selection of the third member, unless both parties agree to such re-selection in writing. The Dispute Review Board Agreement shall be amended to reflect the change of a DRB member.

### **OPERATION**

The following procedure shall be used for dispute resolution:

- A. If the Contractor objects to any decision, act or order of the Engineer, the Contractor shall give written notice of potential claim in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications and these special provisions, including the provision of applicable cost documentation; or file written protests or notices in conformance with the provisions in the Standard Specifications and these special provisions.
- B. The Engineer will respond, in writing, to the Contractor's written protest or notice within 15 days of receipt of the written protest or 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 the Contractor's objection to the Engineer's decision, 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 reply 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 State's written reply, 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 will 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 meeting, with due consideration for the needs and preferences of the parties while recognizing the paramount importance of a speedy resolution of the dispute.
- H. There shall be no participation of either party's attorneys at DRB 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, applicable laws and regulations, the pertinent provisions of the contract and the 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 by both parties, the DRB will 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 will consider any clarification request only if submitted within 10 days of receipt of the DRB's report, and if submitted simultaneously in writing to both the DRB and the other party. Each party may submit only one request for clarification for any individual DRB report. The DRB shall respond, in writing, to requests for clarification within 10 days of receipt of such requests.
- L. The DRB's recommendations, stated in the DRB's reports, are not binding on either party. Either party may seek a reconsideration of a recommendation of the DRB. The DRB shall only grant a reconsideration based upon submission of new evidence and if the request is submitted within the 30-day time limit specified for response to the DRB's written report. Each party may submit only one request for reconsideration regarding an individual DRB recommendation.
- M. If the State and the Contractor are able to resolve their dispute with the aid of the DRB's report, the State and Contractor shall promptly accept and implement the recommendations of the DRB. If the parties cannot agree on compensation within 60 days of the acceptance by both parties of the DRB's recommendation, either party may request the DRB to make a recommendation regarding compensation.
- N. The State or the Contractor shall not call DRB members who served on the DRB for this contract as witnesses in arbitration proceedings which may arise from this contract, and all documents created by the DRB shall be inadmissible as evidence in subsequent arbitration proceedings, except the DRB's final written reports on each issue brought before it.
- O. The State and Contractor shall jointly indemnify and hold harmless the DRB members from and against all claims, damages, losses, and expenses, including but not limited to attorney's fees, arising out of and resulting from the findings and recommendations of the DRB.
- P. The DRB members shall have no claim against the State or the Contractor, or both, from claimed harm arising out of the parties' evaluations of the DRB's report.

## **DISPUTES INVOLVING SUBCONTRACTOR POTENTIAL CLAIMS**

For purposes of this section, a "subcontractor potential claim" shall include any potential claim by a subcontractor (including also any pass through potential claims by a lower tier subcontractor or supplier) against the Contractor that is actionable by the Contractor against the Department which arises from the work, services, or materials provided or to be provided in connection with the contract. If the Contractor determines to pursue a dispute against the Department that includes a subcontractor potential claim, the dispute shall be processed and resolved in conformance with these special provisions and in conformance with the following:

- A. The Contractor shall identify clearly in submissions pursuant to this section, that portion of the dispute that involves a subcontractor potential claim or potential claims.
- B. The Contractor shall include, as part of its submission pursuant to Step D above, a certification (False Claims Act Certification) by the subcontractor's or supplier's officer, partner, or authorized representative with authority to bind the subcontractor and with direct knowledge of the facts underlying the subcontractor potential claim. The Contractor shall submit a certification that the subcontractor potential claim is acknowledged and forwarded by the Contractor. The form for these certifications is available from the Engineer.
- C. At any DRB meeting on a dispute that includes one or more subcontractor potential claims, the Contractor shall require that each subcontractor that is 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 Department by the Contractor on account of such subcontractor potential claim.
- E. The Contractor shall include in all subcontracts under this contract that subcontractors and suppliers of any tier (a) agree to submit subcontractor potential claims to the Contractor in a proper form and in sufficient time to allow processing by the Contractor in conformance with the Dispute Review Board resolution specifications; (b) agree to be bound by the terms of the Dispute Review Board provisions to the extent applicable to subcontractor potential claims; (c) agree that, to the extent a subcontractor potential claim is involved, completion of all steps required under these Dispute Review Board special provisions shall be a condition precedent to pursuit by the subcontractor of other remedies permitted by law, including without limitation of a lawsuit against the Contractor; and (d) agree that the existence of a dispute resolution process for disputes involving subcontractor potential claims shall not be deemed to create any claim, right, or cause of action by any subcontractor or supplier against the Department.

Notwithstanding the foregoing, this Dispute Review Board special provision shall not apply to, and the DRB shall not have the authority to consider, subcontractor potential claims between the subcontractor(s) or supplier(s) and the Contractor that are not actionable by the Contractor against the Department.

## **RETENTION**

Failure of the Contractor to nominate and approve DRB members in conformance with the terms and conditions of the Dispute Review Board Agreement and these special provisions shall result in the retention of 25 percent of the estimated value of all work performed during each estimate period in which the Contractor fails to comply with the requirements of this section as determined by the Engineer. DRB retentions will be released for payment on the next monthly estimate for partial payment following the date that the Contractor has nominated and approved DRB members and no interest will be due the Contractor.

## **DISPUTE REVIEW BOARD AGREEMENT**

A copy of the "Dispute Review Board Agreement" to be executed by the Contractor, State and the 3 DRB members after approval of the contract follows:

**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 the pertinent contract provisions, and the facts and circumstances involved in the dispute. 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, 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 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 complete and furnish a completed "Summary of Dispute Review Board Recommendation" form along with a copy of the written recommendation report to the DRB Coordinator, Division of Construction, MS 44, P.O. Box 942874, Sacramento, CA 94274. The "Summary of Dispute Review Board Recommendation" form is available through the Engineer.

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 will 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.

Contract No. «Dist»-«Contract\_No»

## **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 AGREEMENT, THE DRB, AND 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: \_\_\_\_\_

**5-1.13 FORCE ACCOUNT PAYMENT**

The second, third and fourth paragraphs of Section 9-1.03A, "Work Performed by Contractor," in the Standard Specifications, shall not apply.

Attention is directed to "Overhead" of these special provisions.

To the total of the direct costs for work performed on a force account basis, computed as provided in Sections 9-1.03A(1), "Labor," 9-1.03A(2), "Materials," and 9-1.03A(3), "Equipment Rental," of the Standard Specifications, there will be added the following markups:

| Cost             | Percent Markup |
|------------------|----------------|
| Labor            | 28             |
| Materials        | 10             |
| Equipment Rental | 10             |

The above markups shall be applied to all work performed on a force account basis, regardless of whether the work revises the current contract completion date.

The above markups, together with payments made for time-related overhead pursuant to "Overhead" of these special provisions, shall constitute full compensation for all overhead costs for work performed on a force account basis. These overhead costs shall be deemed to include all items of expense not specifically designated as cost or equipment rental in conformance with the provisions in Sections 9-1.03A(1), "Labor," 9-1.03A(2), "Materials," and 9-1.03A(3), "Equipment Rental," of the Standard Specifications. The total payment made as provided above and in the first paragraph of Section 9-1.03A, "Work Performed by Contractor," of the Standard Specifications shall be deemed to be the actual cost of the work performed on a force account basis, and shall constitute full compensation therefor. Full compensation for all overhead costs for work performed on a force account basis, and for which no adjustment is made to the quantity of time-related overhead pursuant to "Overhead" of these special provisions, shall be considered as included in the markups specified above, and no additional compensation will be allowed therefor.

When extra work to be paid for on a force account basis is performed by a subcontractor, approved in conformance with the provisions in Section 8-1.01, "Subcontracting," of the Standard Specifications, an additional markup of 7 percent will be added to the total cost of that extra work including all markups specified in this section "Force Account Payment". The additional 7 percent markup shall reimburse the Contractor for additional administrative costs, and no other additional payment will be made by reason of performance of the extra work by a subcontractor.

**5-1.14 COMPENSATION ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS**

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

| ITEM CODE | ITEM                      |
|-----------|---------------------------|
| 390154    | ASPHALT CONCRETE (TYPE B) |

The compensation payable for asphalt concrete will be increased or decreased in conformance with the provisions of this section for paving asphalt price fluctuations exceeding 10 percent (Iu/Ib is greater than 1.10 or less than 0.90) which occur during performance of the work.

The adjustment in compensation will be determined in conformance with the following formulae when the item of asphalt concrete is included in a monthly estimate:

- A. Total monthly adjustment = AQ
- B. For an increase in paving asphalt price index exceeding 10 percent:

$$A = 0.90 (1.1023) (Iu/Ib - 1.10) Ib$$

- C. For a decrease in paving asphalt price index exceeding 10 percent:

$$A = 0.90 (1.1023) (Iu/Ib - 0.90) Ib$$

- D. Where:

A = Adjustment in dollars per tonne of paving asphalt used to produce asphalt concrete 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 tonnes of paving asphalt that was used in producing the quantity of asphalt concrete shown under "This Estimate" on the monthly estimate using the amount of asphalt determined by the Engineer.

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 paving asphalt 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, Mobil, and Unocal for the Buena Vista, Huntington Beach, Kern River, Long Beach, Midway Sunset, and Wilmington 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.

**5-1.15 AREAS FOR CONTRACTOR'S USE**

Attention is directed to the provisions in Section 7-1.19, "Rights in Land and Improvements," of the Standard Specifications and these special provisions.

The highway right of way shall be used only for purposes that are necessary to perform the required work. The Contractor shall not occupy the right of way, or allow others to occupy the right of way, for purposes which are not necessary to perform the required work.

No State-owned parcels adjacent to the right of way are available for the exclusive use of the Contractor within the contract limits. The Contractor shall secure, at the Contractor's own expense, areas required for plant sites, storage of equipment or materials, or for other purposes.

No area is available within the contract limits for the exclusive use of the Contractor. However, temporary storage of equipment and materials on State property may be arranged with the Engineer, subject to the prior demands of State maintenance forces and to other contract requirements. Use of the Contractor's work areas and other State-owned property shall be at the Contractor's own risk, and the State shall not be held liable for damage to or loss of materials or equipment located within such areas.

#### **5-1.16 PAYMENTS**

Attention is directed to Sections 9-1.06, "Partial Payments," and 9-1.07, "Payment After Acceptance," of the Standard Specifications and these special provisions.

For the purpose of making partial payments pursuant to Section 9-1.06, "Partial Payments," of the Standard Specifications, the amount set forth for the contract items of work hereinafter listed shall be deemed to be the maximum value of the contract item of work which will be recognized for progress payment purposes:

|   |               |
|---|---------------|
| A. Clearing and Grubbing                    | \$15,000.00   |
| B. Progress Schedule (Critical Path Method) | \$17,000.00   |
| C. Lead Compliance Plan                     | \$5,000.00    |
| D. Bridge Removal, Location B               | \$ 112,000.00 |

After acceptance of the contract pursuant to the provisions in Section 7-1.17, "Acceptance of Contract," of the Standard Specifications, the amount, if any, payable for a contract item of work in excess of the maximum value for progress payment purposes hereinabove listed for the item, will be included for payment in the first estimate made after acceptance of the contract.

In determining the partial payments to be made to the Contractor, only the following listed materials will be considered for inclusion in the payment as materials furnished but not incorporated in the work:

- A. Piling
- B. Irrigation System
- C. Precast Concrete Members
- D. Sound Wall
- E. Joint Seals
- F. Bar Reinforcing Steel
- G. Metal Sign Structures
- H. Miscellaneous Bridge Metal
- I. Culvert Pipe
- J. Fences and Gates
- K. Railings
- L. Welded Steel Pipe Conduit
- M. Edge Drain Pipe
- N. Miscellaneous Drainage Facilities
- O. Welded Steel Pipe
- P. Sewer Pipes and Appurtenances
- Q. Miscellaneous Iron and Steel
- R. Pavement Markers

#### **5-1.17 SOUND CONTROL REQUIREMENTS**

Sound control shall conform to the provisions in Section 7-1.01I, "Sound Control Requirements," of the Standard Specifications and these special provisions.

The noise level from the Contractor's operations, between the hours of 9:00 p.m. and 7:00 a.m., shall not exceed 86 dBa at a distance of 15 m. This requirement shall not relieve the Contractor from responsibility for complying with local ordinances regulating noise level.

The noise level requirement shall apply to the equipment on the job or related to the job, including but not limited to trucks, transit mixers or transient equipment that may or may not be owned by the Contractor. The use of loud sound signals shall be avoided in favor of light warnings except those required by safety laws for the protection of personnel.

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

During construction, operations in proximity to residential areas shall be minimized. Activities shall be directed away from residents to ensure the greatest distance between noise sources and the residents. Equipment with exhaust systems shall have mufflers installed and maintained. The noisiest construction operations shall be arranged together to avoid continuous periods of annoyance.

**5-1.18 AERIALY DEPOSITED LEAD**

Aerially deposited lead is present within the project limits. Aerially deposited lead is lead deposited within unpaved areas or formerly unpaved areas, primarily due to vehicle emissions.

Attention is directed to "Material Containing Aerially Deposited Lead" of these special provisions.

Portions of the Site Investigation Report are included in the "Material Information" handout. The complete report, entitled "Report of Limited Soil Investigation (Work Order #10458-029-001-0001" and "Hazardous Waste Site Investigation of 101/34 Interchange Modification EA Work Order 0071-05-01-0004", are available for inspection at the Department of Transportation, District 7, Office of Construction, 801 South Grand Avenue, 4th floor, Los Angeles, California 90017-4613, Telephone (213) 897-0054.

The Department has received from the California Department of Toxic Substances Control (DTSC) a Variance regarding the use of material containing aerially deposited lead. This project is subject to the conditions of the Variance, as amended. The Variance is available for inspection at the Department of Transportation, District 7, Office of Construction, 801 South Grand Avenue, 4th floor, Los Angeles, California 90017-4613, Telephone (213) 897-0054.

Once the Contractor has completed the placement of material containing aerially deposited lead in conformance with these special provisions and as directed by the Engineer, the Contractor shall have no responsibility for such materials in place. The Department will not consider the Contractor a generator of such contaminated materials. Further cleanup, removal or remedial actions for such materials will not be required if handled or disposed of as specified herein.

Excavation, reuse, and disposal of material with aerially deposited lead shall be in conformance with all rules and regulations including, but not limited to, those of the following agencies:

- United States Department of Transportation (USDOT)
- United States Environmental Protection Agency (USEPA)
- California Environmental Protection Agency (Cal-EPA)
- California Department of Health Services
- Department of Toxic Substances Control (DTSC), Region 3
- California Division of Occupational Safety and Health Administration (Cal-OSHA)
- Integrated Waste Management Board
- Regional Water Quality Control Board (RWQCB), Region 4
- State Air Resources Control Board

Ventura County Air Pollution Control District Materials containing hazardous levels of lead shall be transported and disposed of in conformance with Federal and State laws and regulations, as amended, and county and municipal ordinances and regulations, as amended. Laws and regulations that govern this work include, but are not limited to:

- Health and Safety Code, Division 20, Chapter 6.5 (California Hazardous Waste Control Act)
- Title 22, California Code of Regulations, Division 4.5 (Environmental Health Standards for the Management of Hazardous Waste)
- Title 8, California Code of Regulations

**SECTION 6. (BLANK)**

**SECTION 7. (BLANK)**

**SECTION 8. MATERIALS**

**SECTION 8-1. MISCELLANEOUS**

**8-1.01 SUBSTITUTION OF NON-METRIC MATERIALS AND PRODUCTS**

Only materials and products conforming to the requirements of the specifications shall be incorporated in the work. When metric materials and products are not available, and when approved by the Engineer, and at no cost to the State, materials and products in the United States Standard Measures which are of equal quality and of the required properties and

characteristics for the purpose intended, may be substituted for the equivalent metric materials and products, subject to the following provisions:

- A. Materials and products shown on the plans or in the special provisions as being equivalent may be substituted for the metric materials and products specified or detailed on the plans.
- B. Before other non-metric materials and products will be considered for use, the Contractor shall furnish, at the Contractor's expense, evidence satisfactory to the Engineer that the materials and products proposed for use are equal to or better than the materials and products specified or detailed on the plans. The burden of proof as to the quality and suitability of substitutions shall be upon the Contractor and the Contractor shall furnish necessary information as required by the Engineer. The Engineer will be the sole judge as to the quality and suitability of the substituted materials and products and the Engineer's decision will be final.
- C. When the Contractor elects to substitute non-metric materials and products, including materials and products shown on the plans or in the special provisions as being equivalent, the list of sources of material specified in Section 6-1.01, "Source of Supply and Quality of Materials," of the Standard Specification shall include a list of substitutions to be made and contract items involved. In addition, for a change in design or details, the Contractor shall submit plans and working drawings in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The plans and working drawings shall be submitted at least 7 days before the Contractor intends to begin the work involved.

Unless otherwise specified, the following substitutions of materials and products will be allowed:

SUBSTITUTION TABLE FOR SIZES OF HIGH STRENGTH STEEL FASTENERS  
ASTM Designation: A 325M

| METRIC SIZE SHOWN ON THE PLANS<br>mm x thread pitch | SIZE TO BE SUBSTITUTED<br>inch |
|---|--------------------------------|
| M16 x 2   | 5/8                            |
| M20 x 2.5   | 3/4                            |
| M22 x 2.5   | 7/8                            |
| M24 x 3   | 1                              |
| M27 x 3   | 1-1/8                          |
| M30 x 3.5   | 1-1/4                          |
| M36 x 4   | 1-1/2                          |

**SUBSTITUTION TABLE FOR PLAIN WIRE REINFORCEMENT**

ASTM Designation: A 82

| METRIC SIZE SHOWN ON THE PLANS<br>mm <sup>2</sup> | SIZE TO BE SUBSTITUTED<br>inch <sup>2</sup> x 100 |
|---|---|
| MW9   | W1.4  |
| MW10  | W1.6  |
| MW13  | W2.0  |
| MW15  | W2.3  |
| MW19  | W2.9  |
| MW20  | W3.1  |
| MW22  | W3.5  |
| MW25  | W3.9, except W3.5 in piles only                   |
| MW26  | W4.0  |
| MW30  | W4.7  |
| MW32  | W5.0  |
| MW35  | W5.4  |
| MW40  | W6.2  |
| MW45  | W6.5  |
| MW50  | W7.8  |
| MW55  | W8.5, except W8.0 in piles only                   |
| MW60  | W9.3  |
| MW70  | W10.9, except W11.0 in piles only                 |
| MW80  | W12.4   |
| MW90  | W14.0   |
| MW100   | W15.5   |

**SUBSTITUTION TABLE FOR BAR REINFORCEMENT**

| METRIC BAR DESIGNATION<br>NUMBER <sup>1</sup> SHOWN ON THE PLANS | BAR DESIGNATION<br>NUMBER <sup>2</sup> TO BE SUBSTITUTED |
|--|--|
| 10   | 3  |
| 13   | 4  |
| 16   | 5  |
| 19   | 6  |
| 22   | 7  |
| 25   | 8  |
| 29   | 9  |
| 32   | 10   |
| 36   | 11   |
| 43   | 14   |
| 57   | 18   |

<sup>1</sup>Bar designation numbers approximate the number of millimeters of the nominal diameter of the bars.

<sup>2</sup>Bar numbers are based on the number of eighths of an inch included in the nominal diameter of the bars.

No adjustment will be required in spacing or total number of reinforcing bars due to a difference in minimum yield strength between metric and non-metric bars.

SUBSTITUTION TABLE FOR SIZES OF:

(1) STEEL FASTENERS FOR GENERAL APPLICATIONS (ASTM Designation: A 307 or AASHTO Designation: M 314, Grade 36 or 55), and

(2) HIGH STRENGTH STEEL FASTENERS (ASTM Designation: A 325 or A 449)

| METRIC SIZE SHOWN ON THE PLANS<br>mm | SIZE TO BE SUBSTITUTED<br>inch |
|--------------------------------------|--------------------------------|
| 6 or 6.35                            | 1/4                            |
| 8 or 7.94                            | 5/16                           |
| 10 or 9.52                           | 3/8                            |
| 11 or 11.11                          | 7/16                           |
| 13 or 12.70                          | 1/2                            |
| 14 or 14.29                          | 9/16                           |
| 16 or 15.88                          | 5/8                            |
| 19 or 19.05                          | 3/4                            |
| 22 or 22.22                          | 7/8                            |
| 24, 25, or 25.40                     | 1                              |
| 29 or 28.58                          | 1-1/8                          |
| 32 or 31.75                          | 1-1/4                          |
| 35 or 34.93                          | 1-3/8                          |
| 38 or 38.10                          | 1-1/2                          |
| 44 or 44.45                          | 1-3/4                          |
| 51 or 50.80                          | 2                              |
| 57 or 57.15                          | 2-1/4                          |
| 64 or 63.50                          | 2-1/2                          |
| 70 or 69.85                          | 2-3/4                          |
| 76 or 76.20                          | 3                              |
| 83 or 82.55                          | 3-1/4                          |
| 89 or 88.90                          | 3-1/2                          |
| 95 or 95.25                          | 3-3/4                          |
| 102 or 101.60                        | 4                              |

**SUBSTITUTION TABLE FOR NOMINAL THICKNESS OF SHEET METAL**

| UNCOATED HOT AND COLD ROLLED SHEETS          |                                   | HOT-DIPPED ZINC COATED SHEETS<br>(GALVANIZED) |                                   |
|--|-----------------------------------|---|-----------------------------------|
| METRIC THICKNESS<br>SHOWN ON THE PLANS<br>mm | GAGE TO BE<br>SUBSTITUTED<br>inch | METRIC THICKNESS<br>SHOWN ON THE PLANS<br>mm  | GAGE TO BE<br>SUBSTITUTED<br>inch |
| 7.94   | 0.3125                            | 4.270   | 0.1681                            |
| 6.07   | 0.2391                            | 3.891   | 0.1532                            |
| 5.69   | 0.2242                            | 3.510   | 0.1382                            |
| 5.31   | 0.2092                            | 3.132   | 0.1233                            |
| 4.94   | 0.1943                            | 2.753   | 0.1084                            |
| 4.55   | 0.1793                            | 2.372   | 0.0934                            |
| 4.18   | 0.1644                            | 1.994   | 0.0785                            |
| 3.80   | 0.1495                            | 1.803   | 0.0710                            |
| 3.42   | 0.1345                            | 1.613   | 0.0635                            |
| 3.04   | 0.1196                            | 1.461   | 0.0575                            |
| 2.66   | 0.1046                            | 1.311   | 0.0516                            |
| 2.28   | 0.0897                            | 1.158   | 0.0456                            |
| 1.90   | 0.0747                            | 1.006 or 1.016                                | 0.0396                            |
| 1.71   | 0.0673                            | 0.930   | 0.0366                            |
| 1.52   | 0.0598                            | 0.853   | 0.0336                            |
| 1.37   | 0.0538                            | 0.777   | 0.0306                            |
| 1.21   | 0.0478                            | 0.701   | 0.0276                            |
| 1.06   | 0.0418                            | 0.627   | 0.0247                            |
| 0.91   | 0.0359                            | 0.551   | 0.0217                            |
| 0.84   | 0.0329                            | 0.513   | 0.0202                            |
| 0.76   | 0.0299                            | 0.475   | 0.0187                            |
| 0.68   | 0.0269                            | -----   | -----                             |
| 0.61   | 0.0239                            | -----   | -----                             |
| 0.53   | 0.0209                            | -----   | -----                             |
| 0.45   | 0.0179                            | -----   | -----                             |
| 0.42   | 0.0164                            | -----   | -----                             |
| 0.38   | 0.0149                            | -----   | -----                             |

**SUBSTITUTION TABLE FOR WIRE**

| METRIC THICKNESS<br>SHOWN ON THE PLANS<br>mm | WIRE THICKNESS<br>TO BE SUBSTITUTED<br>inch | GAGE NO. |
|--|---|----------|
| 6.20   | 0.244                                       | 3        |
| 5.72   | 0.225                                       | 4        |
| 5.26   | 0.207                                       | 5        |
| 4.88   | 0.192                                       | 6        |
| 4.50   | 0.177                                       | 7        |
| 4.11   | 0.162                                       | 8        |
| 3.76   | 0.148                                       | 9        |
| 3.43   | 0.135                                       | 10       |
| 3.05   | 0.120                                       | 11       |
| 2.69   | 0.106                                       | 12       |
| 2.34   | 0.092                                       | 13       |
| 2.03   | 0.080                                       | 14       |
| 1.83   | 0.072                                       | 15       |
| 1.57   | 0.062                                       | 16       |
| 1.37   | 0.054                                       | 17       |
| 1.22   | 0.048                                       | 18       |
| 1.04   | 0.041                                       | 19       |
| 0.89   | 0.035                                       | 20       |

**SUBSTITUTION TABLE FOR PIPE PILES**

| METRIC SIZE<br>SHOWN ON THE PLANS<br>mm x mm | SIZE<br>TO BE SUBSTITUTED<br>inch x inch |
|--|--|
| PP 360 x 4.55                                | NPS 14 x 0.179                           |
| PP 360 x 6.35                                | NPS 14 x 0.250                           |
| PP 360 x 9.53                                | NPS 14 x 0.375                           |
| PP 360 x 11.12                               | NPS 14 x 0.438                           |
| PP 406 x 12.70                               | NPS 16 x 0.500                           |
| PP 460 x T                                   | NPS 18 x T"                              |
| PP 508 x T                                   | NPS 20 x T"                              |
| PP 559 x T                                   | NPS 22 x T"                              |
| PP 610 x T                                   | NPS 24 x T"                              |
| PP 660 x T                                   | NPS 26 x T"                              |
| PP 711 x T                                   | NPS 28 x T"                              |
| PP 762 x T                                   | NPS 30 x T"                              |
| PP 813 x T                                   | NPS 32 x T"                              |
| PP 864 x T                                   | NPS 34 x T"                              |
| PP 914 x T                                   | NPS 36 x T"                              |
| PP 965 x T                                   | NPS 38 x T"                              |
| PP 1016 x T                                  | NPS 40 x T"                              |
| PP 1067 x T                                  | NPS 42 x T"                              |
| PP 1118 x T                                  | NPS 44 x T"                              |
| PP 1219 x T                                  | NPS 48 x T"                              |
| PP 1524 x T                                  | NPS 60 x T"                              |

The thickness in millimeters (T) represents an exact conversion of the thickness in inches (T").

**SUBSTITUTION TABLE FOR STRUCTURAL TIMBER AND LUMBER**

| METRIC MINIMUM<br>DRESSED DRY,<br>SHOWN ON THE PLANS<br>mm x mm | METRIC MINIMUM<br>DRESSED GREEN,<br>SHOWN ON THE PLANS<br>mm x mm | NOMINAL<br>SIZE<br>TO BE SUBSTITUTED<br>inch x inch |
|---|---|---|
| 19x89   | 20x90   | 1x4   |
| 38x89   | 40x90   | 2x4   |
| 64x89   | 65x90   | 3x4   |
| 89x89   | 90x90   | 4x4   |
| 140x140   | 143x143   | 6x6   |
| 140x184   | 143x190   | 6x8   |
| 184x184   | 190x190   | 8x8   |
| 235x235   | 241x241   | 10x10   |
| 286x286   | 292x292   | 12x12   |

**SUBSTITUTION TABLE FOR NAILS AND SPIKES**

| METRIC COMMON NAIL,<br>SHOWN ON THE PLANS<br><br>Length, mm<br>Diameter, mm | METRIC BOX NAIL,<br>SHOWN ON THE PLANS<br><br>Length, mm<br>Diameter, mm | METRIC SPIKE,<br>SHOWN ON THE<br>PLANS<br>Length, mm<br>Diameter, mm | SIZE<br>TO BE<br>SUBSTITUTED<br>Penny-weight |
|---|--|--|--|
| 50.80<br>2.87   | 50.80<br>2.51  | ————   | 6d   |
| 63.50<br>3.33   | 63.50<br>2.87  | ————   | 8d   |
| 76.20<br>3.76   | 76.20<br>3.25  | 76.20<br>4.88  | 10d  |
| 82.55<br>3.76   | 82.55<br>3.25  | 82.55<br>4.88  | 12d  |
| 88.90<br>4.11   | 88.90<br>3.43  | 88.90<br>5.26  | 16d  |
| 101.60<br>4.88  | 101.60<br>3.76   | 101.60<br>5.72   | 20d  |
| 114.30<br>5.26  | 114.30<br>3.76   | 114.30<br>6.20   | 30d  |
| 127.00<br>5.72  | 127.00<br>4.11   | 127.00<br>6.68   | 40d  |
| ————  | ————   | 139.70<br>7.19   | 50d  |
| ————  | ————   | 152.40<br>7.19   | 60d  |

**SUBSTITUTION TABLE FOR IRRIGATION  
COMPONENTS**

| METRIC<br>WATER METERS, TRUCK<br>LOADING STANDPIPES,<br>VALVES, BACKFLOW<br>PREVENTERS, FLOW<br>SENSORS, WYE<br>STRAINERS, FILTER<br>ASSEMBLY UNITS, PIPE<br>SUPPLY LINES, AND PIPE<br>IRRIGATION SUPPLY<br>LINES<br>SHOWN ON THE PLANS<br>DIAMETER NOMINAL (DN)<br>mm | NOMINAL<br>SIZE<br>TO BE SUBSTITUTED<br><br>inch |
|--|--|
| 15   | 1/2  |
| 20   | 3/4  |
| 25   | 1  |
| 32   | 1-1/4  |
| 40   | 1-1/2  |
| 50   | 2  |
| 65   | 2-1/2  |
| 75   | 3  |
| 100  | 4  |
| 150  | 6  |
| 200  | 8  |
| 250  | 10   |
| 300  | 12   |
| 350  | 14   |
| 400  | 16   |

Unless otherwise specified, substitutions of United States Standard Measures standard structural shapes corresponding to the metric designations shown on the plans and in conformance with the requirements in ASTM Designation: A 6/A 6M, Annex 2, will be allowed.

**8-1.02 PREQUALIFIED AND TESTED SIGNING AND DELINEATION MATERIALS**

The Department maintains the following list of Prequalified and Tested Signing and Delineation Materials. The Engineer shall not be precluded from sampling and testing products on the list of Prequalified and Tested Signing and Delineation Materials.

The manufacturer of products on the list of Prequalified and Tested Signing and Delineation Materials shall furnish the Engineer a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each type of traffic product supplied.

For those categories of materials included in 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 in the list of Prequalified and Tested Signing and Delineation Materials, may be used in the work provided they conform to the requirements of the Standard Specifications.

Materials and products may be added to the list of Prequalified and Tested Signing and Delineation Materials if the manufacturer submits a New Product Information Form to the New Product Coordinator at the Transportation Laboratory. Upon a Departmental request for samples, sufficient samples shall be submitted to permit performance of required tests. Approval of materials or products will depend upon compliance with the specifications and tests the Department may elect to perform.

**PAVEMENT MARKERS, PERMANENT TYPE**

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

- A. Apex, Model 921AR (100 mm x 100 mm)
- B. Ray-O-Lite, Model "AA" ARS (100 mm x 100 mm)

- C. Stimsonite, Models 911 (100 mm x 100 mm) and 953 (70 mm x 114 mm)
- D. 3M Series 290 (89 mm x 100 mm)

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

(Used for recessed applications)

- A. Stimsonite, Model 948 (58 mm x 119 mm)
- B. Ray-O-Lite, Model 2002 (58 mm x 117 mm)
- C. Stimsonite, Model 944SB (51 mm x 100 mm)
- D. Ray-O-Lite, Model 2004 ARS (51 mm x 100 mm)\*

\*For use only in 114 mm wide (older) recessed slots

**Non-Reflective For Use With Epoxy Adhesive, 100 mm Round**

- A. Apex Universal (Ceramic)
- B. Highway Ceramics, Inc. (Ceramic)

**Non-Reflective For Use With Bitumen Adhesive, 100 mm Round**

- A. Alpine Products, "D-Dot" and "ANR" (ABS)
- B. Apex Universal (Ceramic)
- C. Apex Universal, Models 929 (ABS) and 929PP (Polypropylene)
- D. Elgin Molded Plastics, "Empco-Lite" Model 900 (ABS)
- E. Highway Ceramics, Inc. (Ceramic)
- F. Hi-Way Safety, Inc., Models P20-2000W and 2001Y (ABS)
- G. Interstate Sales, "Diamond Back" (ABS) and (Polypropylene)
- H. Novabrite Models Adot-w (White) Adot-y (Yellow), (ABS)
- I. Road Creations, Model RCB4NR (Acrylic)
- J. Zumar Industries, "Titan TM40A" (ABS)

**PAVEMENT MARKERS, TEMPORARY TYPE**

**Temporary Markers For Long Term Day/Night Use (6 months or less)**

- A. Apex Universal, Model 924 (100 mm x 100 mm)
- B. Elgin Molded Plastics, "Empco-Lite" Model 901 (100 mm x 100 mm)
- C. Road Creations, Model R41C (100 mm x 100 mm)
- D. Vega Molded Products "Temporary Road Marker" (75 mm x 100 mm)

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

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

- A. Apex Universal, Model 932
- B. Bunzl (formerly Davidson Plastics, Models) T.O.M., T.R.P.M., and "HH" (High Heat)
- C. Hi-Way Safety, Inc., Model 1280/1281

**STRIPING AND PAVEMENT MARKING MATERIAL**

**Permanent Traffic Striping and Pavement Marking Tape**

- A. Advanced Traffic Marking, Series 300 and 400
- B. Brite-Line, Series 1000
- C. Brite-Line, "DeltaLine XRP"
- D. Swarco Industries, "Director 35" (For transverse application only)
- E. Swarco Industries, "Director 60"
- F. 3M, "Stamark" Series 380 and 5730
- G. 3M, "Stamark" Series 420 (For transverse application only)

**Temporary (Removable) Striping and Pavement Marking Tape (6 months or less)**

- A. Advanced Traffic Marking, Series 200
- B. Brite-Line, Series 100
- C. P.B. Laminations, Aztec, Grade 102
- D. Swarco Industries, "Director-2"
- E. Trelleborg Industri, R140 Series
- F. 3M, Series 620 and Series A750

- G. 3M, Series A145, Removable Black Line Mask  
(Black Tape: for use only on Asphalt Concrete Surfaces)
- H. Advanced Traffic Marking Black "Hide-A-Line"  
(Black Tape: for use only on Asphalt Concrete Surfaces)
- I. Brite-Line "BTR" Black Removable Tape  
(Black Tape: for use only on Asphalt Concrete Surfaces)
- J. Trelleborg Industri, RB-140  
(Black Tape: for use only on Asphalt Concrete Surfaces)

**Preformed Thermoplastic (Heated in place)**

- A. Flint Trading, "Premark" and "Premark 20/20 Flex"
- B. Avery Dennison, "Hotape"

**Removable Traffic Paint**

- A. Belpro, Series 250/252 and No. 93 Remover

**Ceramic Surfacing Laminate, 150 mm x 150 mm**

- A. Safeline Industries/Highway Ceramics, Inc.

**CLASS 1 DELINEATORS**

**One Piece Driveable Flexible Type, 1700 mm**

- A. Carsonite, Curve-Flex CFRM-400
- B. Carsonite, Roadmarker CRM-375
- C. Bunzl (Formerly Davidson Plastics), "Flexi-Guide Models 400 and 566"
- D. FlexStake, Model 654 TM
- E. GreenLine Models HWD1-66 and CGD1-66
- F. J. Miller Industries, Model JMI-375 (with soil anchor)

**Special Use Flexible Type, 1700 mm**

- A. Carsonite, "Survivor" (with 450 mm U-Channel base)
- B. FlexStake, Model 604
- C. GreenLine Models HWD and CGD (with 450 mm U-Channel base)
- D. Safe-Hit with 200 mm pavement anchor (SH248-GP1)
- E. Safe-Hit with 380 mm soil anchor (SH248-GP2) and with 450 mm soil anchor (SH248-GP3)

**Surface Mount Flexible Type, 1200 mm**

- A. Bent Manufacturing Company, Masterflex Model MF-180EX-48
- B. Carsonite, "Super Duck II"
- C. FlexStake, Surface Mount, Models 704 and 754 TM

**CHANNELIZERS**

**Surface Mount Type, 900 mm**

- A. Bent Manufacturing Company, Masterflex Models MF-360-36 (Round) and MF-180-36 (Flat)
- B. Carsonite, "Super Duck" (Flat SDF-436, Round SDR-336)
- C. Carsonite, "Super Duck II" Model SDCF203601MB "The Channelizer"
- D. Bunzl (Formerly Davidson Plastics), Flex-Guide Models FG300LD and FG300UR
- E. FlexStake, Surface Mount, Models 703 and 753 TM
- F. GreenLine, Model SMD-36
- G. Hi-Way Safety, Inc. "Channel Guide Channelizer" Model CGC36
- H. The Line Connection, "Dura-Post" Model DP36-3 (Permanent)
- I. The Line Connection, "Dura-Post" Model DP36-3C (Temporary)
- J. Repo, Models 300 and 400
- K. Safe-Hit, Guide Post, Model SH236SMA

**CONICAL DELINEATORS, 1070 mm**

(For 700 mm Traffic Cones, see Standard Specifications)

- A. Bent Manufacturing Company "T-Top"

- B. Plastic Safety Systems "Navigator-42"
- C. Radiator Specialty Company "Enforcer"
- D. Roadmaker Company "Stacker"
- E. Traffix Devices "Grabber"

#### **OBJECT MARKERS**

##### **Type "K", 450 mm**

- A. Carsonite, Model SMD 615
- B. FlexStake, Model 701 KM
- C. Repo, Models 300 and 400
- D. Safe-Hit, Model SH718SMA
- E. The Line Connection, Model DP21-4K

##### **Type "K-4" / "Q" Object Markers, 600 mm**

- A. Bent Manufacturing "Masterflex" Model MF-360-24
- B. Carsonite, Super Duck II
- C. FlexStake, Model 701KM
- D. Repo, Models 300 and 400
- E. Safe-Hit, Models SH8 24SMA\_WA and SH8 24GP3\_WA
- F. The Line Connection, Model DP21-4Q

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

##### **Impactable Type**

- A. ARTUK, "FB"
- B. Bunzl (Formerly Davidson Plastics), Model PCBM-12
- C. Duraflex Corp., "Flexx 2020" and "Electriflexx"
- D. Hi-Way Safety, Inc., Model GMKRM100

##### **Non-Impactable Type**

- A. ARTUK, JD Series
- B. Stimsonite, Model 967 (with 83 mm Acrylic cube corner reflector)
- C. Stimsonite, Model 967LS
- D. Vega Molded Products, Models GBM and JD

#### **THREE BEAM BARRIER MARKERS**

(For use to the left of traffic)

- A. Duraflex Corp., "Railrider"
- B. Bunzl (Formerly Davidson Plastics), "Mini" (75 mm x 254 mm)

#### **CONCRETE BARRIER DELINEATORS, 400 mm**

(For use to the right of traffic. When mounted on top of barrier, place top of reflective element at 1200 mm)

- A. Bunzl (Formerly Davidson Plastics), Model PCBM T-16
- B. Safe-Hit, Model SH216RBM
- C. Sun-Lab Technology, "Safety Guide Light, Model TM," 130 mm x 130 mm x 80 mm

#### **CONCRETE BARRIER-MOUNTED MINI-DRUM (260 mm x 360 mm x 570 mm)**

- A. Stinson Equipment Company "SaddleMarker"

#### **SOUND WALL DELINEATOR**

(Applied vertically. Place top of 75 mm x 300 mm reflective element at 1200 mm above roadway)

- A. Bunzl (Formerly Davidson Plastics), PCBM S-36
- B. Sun-Lab Technology, "Safety Guide Light, Model SM12," 130 mm x 130 mm x 80 mm

#### **GUARD RAILING DELINEATOR**

(Place top of reflective element at 1200 mm above plane of roadway)

### **Wood Post Type, 686 mm**

- A. Carsonite, Model 427
- B. Bunzl (Formerly Davidson Plastics), FG 427 and FG 527
- C. FlexStake, Model 102 GR
- D. GreenLine GRD 27
- E. J.Miller Model JMI-375G
- F. Safe-Hit, Model SH227GRD

### **Steel Post Type**

- A. Carsonite, Model CFGR-327 with CFGRBK300 Mounting Bracket

## **RETROREFLECTIVE SHEETING**

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

- A. 3M, High Intensity
- B. Reflexite, PC-1000 Metalized Polycarbonate
- C. Reflexite, AC-1000 Acrylic
- D. Reflexite, AP-1000 Metalized Polyester
- E. Reflexite, Conformalight, AR-1000 Abrasion Resistant Coating
- F. Avery Dennison T-6500 Series (Formerly Stimsonite, Series 6200) (For rigid substrate devices only)
- G. Nippon Carbide, Flexible Ultralite Grade (ULG) II

### **Traffic Cones, 330 mm Sleeves**

- A. Reflexite SB (Polyester), Vinyl or "TR" (Semi-transparent)

### **Traffic Cones, 100 mm and 150 mm Sleeves**

- A. 3M Series 3840
- B. Reflexite Vinyl, "TR" (Semi-transparent) or "Conformalight"
- C. Nippon Carbide, Flexible Ultralite Grade (ULG) II

### **Barrels and Drums**

- A. Reflexite, "Conformalight", "Super High Intensity" or "High Impact Drum Sheeting"
- B. 3M Series 3810
- C. Nippon Carbide, Flexible Ultralite Grade (ULG) II
- D. Avery Dennison W-6100

### **Barricades: Type I, Engineer Grade**

- A. American Decal, Adcolite
- B. Avery Dennison, T-1500 and T-1600 series
- C. 3M, Engineer Grade, Series 3170

### **Barricades: Type II, Super Engineer Grade**

- A. Avery Dennison, T-2500 Series
- B. Kiwalite Type II
- C. Nikkalite 1800 Series

### **Signs: Type II, Super Engineer Grade**

- A. Avery Dennison, T-2500 Series
- B. Kiwalite, Type II
- C. Nikkalite 1800 Series

### **Signs: Type III, High-Intensity Grade**

- A. 3M Series 3800
- B. Nippon Carbide, Nikkalite Brand Ultralite Grade II

### **Signs: Type IV, High-Intensity Prismatic Grade**

- A. Avery Dennison T-6500 (Formerly Stimsonite Series 6200)

**Signs: Type VII, High-Intensity Prismatic Grade**

- A. 3M Series 3900

**Signs: Type VI, Roll-Up Signs**

- A. Reflexite, Vinyl (Orange)
- B. Reflexite "SuperBright" (Fluorescent orange)
- C. Reflexite "Marathon" (Fluorescent orange)
- D. 3M Series RS34 (Orange) and RS20 (Fluorescent orange)

**SPECIALTY SIGN (All Plastic)**

- A. All Sign Products, STOP Sign, 750 mm

**SIGN SUBSTRATE FOR CONSTRUCTION AREA SIGNS**

**Aluminum**

**Fiberglass Reinforced Plastic (FRP)**

- A. Sequentia, "Polyplate"
- B. Fiber-Brite

**8-1.03 STATE-FURNISHED MATERIALS**

Attention is directed to Section 6-1.02, "State-Furnished Materials," of the Standard Specifications and these special provisions.

The following materials will be furnished to the Contractor:

- A. Sign panels for roadside signs, mounting on the signal mast arms and overhead sign structures.
- B. Hardware for mounting sign panels as follows:
  - 1. Blind rivets for mounting overlapping legend at sign panel joints.
  - 2. Closure inserts.
  - 3. Aluminum bolts and nuts and steel beveled washers for mounting laminated sign panels on overhead sign structures.
  - 4. Aluminum bolts, nuts, and washers for mounting overhead formed panels.
- C. Padlocks for walk gates, and irrigation controller enclosure cabinets.
- D. Marker panels, including reflectors, for Type N, Type P, and Type R object markers.
- E. Model 170, Model 170E and Model 2070 controller assemblies, including controller unit, completely wired controller cabinet, and inductive loop detector sensor units.
- F. Individual or axle type scales for materials hauling equipment on bridges.
- G. Reclaimed water warning signs.

The decorative lighting standards and the 100 W high pressure sodium luminaries will be furnished to the Contractor through the coordination of the Engineer, by the City of Camarillo.

The Contractor shall notify the Engineer no less than 72 hours in advance of when the material is to be picked up, to allow for the Engineer to coordinate with the City of Camarillo, telephone (818) 548-3920. The Engineer will contact the City of Camarillo not less than 48 hours before City-furnished material is to be picked up by the Contractor. A full description of the materials and the time and location of the materials will be picked up shall be provided by the Engineer.

Automatic vehicle classifiers, piezo-electric axle sensor units and epoxy sealant for piezo-electric axle sensor installation will be furnished to the Contractor at the job site.

The Contractor shall notify the Engineer at least 10 working days prior to install the piezo electric axle sensor units.

Completely wired controller cabinets, with auxiliary equipment but without controller unit, will be furnished to the Contractor at:

Department of Transportation  
District Maintenance Yard  
7310 East Bandini Boulevard  
Commerce, CA 90040  
Telephone (213) 620-2319

The Contractor shall notify the Engineer not less than 48 hours before State-furnished material is to be picked up by the Contractor. A full description of the material and the time the material will be picked up shall be provided.

#### **8-1.04 SLAG AGGREGATE**

Aggregate produced from slag resulting from any steel-making process or from air-cooled iron blast furnace slag shall not be used on this project.

#### **8-1.05 ENGINEERING FABRICS**

Engineering fabrics shall conform to the provisions in Section 88, "Engineering Fabrics," of the Standard Specifications and these special provisions.

Filter fabric for this project shall be ultraviolet (UV) ray protected.

### **SECTION 8-2. CONCRETE**

#### **8-2.01 PORTLAND CEMENT CONCRETE**

Portland cement concrete shall conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications and these special provisions.

References to Section 90-2.01, "Portland Cement," of the Standard Specifications shall mean Section 90-2.01, "Cement," of the Standard Specifications.

Mineral admixture shall be combined with cement in conformance with the provisions in Section 90-4.08, "Required Use of Mineral Admixtures," of the Standard Specifications for the concrete materials specified in Section 56-2, "Roadside Signs," of the Standard Specifications.

The requirements of Section 90-4.08, "Required Use of Mineral Admixture," of the Standard Specifications shall not apply to Section 19-3.025C, "Soil Cement Bedding," of the Standard Specifications.

The Department maintains a list of sources of fine and coarse aggregate that have been approved for use with a reduced amount of mineral admixture in the total amount of cementitious material to be used. A source of aggregate will be considered for addition to the approved list if the producer of the aggregate submits to the Transportation Laboratory certified test results from a qualified testing laboratory that verify the aggregate complies with the requirements. Prior to starting the testing, the aggregate test shall be registered with the Department. A registration number can be obtained by calling (916) 227-7228. The registration number shall be used as the identification for the aggregate sample in correspondence with the Department. Upon request, a split of the tested sample shall be provided to the Department. Approval of aggregate will depend upon compliance with the specifications, based on the certified test results submitted, together with any replicate testing the Department may elect to perform. Approval will expire 3 years from the date the most recent registered and evaluated sample was collected from the aggregate source.

Qualified testing laboratories shall conform to the following requirements:

- A. Laboratories performing ASTM Designation: C 1293 shall participate in the Cement and Concrete Reference Laboratory (CCRL) Concrete Proficiency Sample Program and shall have received a score of 3 or better on all tests of the previous 2 sets of concrete samples.
- B. Laboratories performing ASTM Designation: C 1260 shall participate in the Cement and Concrete Reference Laboratory (CCRL) Pozzolan Proficiency Sample Program and shall have received a score of 3 or better on the shrinkage and soundness tests of the previous 2 sets of pozzolan samples.

Aggregates on the list shall conform to one of the following requirements:

- A. When the aggregate is tested in conformance with the requirements in California Test 554 and ASTM Designation: C 1293, the average expansion at one year shall be less than or equal to 0.040 percent; or
- B. When the aggregate is tested in conformance with the requirements in California Test 554 and ASTM Designation: C 1260, the average of the expansion at 16 days shall be less than or equal to 0.15 percent.

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

- A. The minimum amount of cement shall not be less than 75 percent by mass of the specified minimum cementitious material content.

- B. The minimum amount of mineral admixture to be combined with cement shall be determined using one of the following criteria:
1. When the calcium oxide content of a mineral admixture is equal to or less than 2 percent by mass, the amount of mineral admixture shall not be less than 15 percent by mass of the total amount of cementitious material to be used in the mix.
  2. When the calcium oxide content of a mineral admixture is greater than 2 percent by mass, and any of the aggregates used are not listed on the approved list as specified in these special provisions, then the amount of mineral admixture shall not be less than 25 percent by mass of the total amount of cementitious material to be used in the mix.
  3. When the calcium oxide content of a mineral admixture is greater than 2 percent by mass and the fine and coarse aggregates are listed on the approved list as specified in these special provisions, then the amount of mineral admixture shall not be less than 15 percent by mass of the total amount of cementitious material to be used in the mix.
  4. When a mineral admixture that conforms to the provisions for silica fume in Section 90-2.04, "Admixture Materials," of the Standard Specifications is used, the amount of mineral admixture shall not be less than 10 percent by mass of the total amount of cementitious material to be used in the mix.
  5. When a mineral admixture that conforms to the provisions for silica fume in Section 90-2.04, "Admixture Materials," of the Standard Specifications is used and the fine and coarse aggregates are listed on the approved list as specified in these special provisions, then the amount of mineral admixture shall not be less than 7 percent by mass of the total amount of cementitious material to be used in the mix.
- C. The total amount of mineral admixture shall not exceed 35 percent by mass of the total amount of cementitious material to be used in the mix. Where Section 90-1.01, "Description," of the Standard Specifications specifies a maximum cementitious content in kilograms per cubic meter, the total mass of cement and mineral admixture per cubic meter shall not exceed the specified maximum cementitious material content.

Unless otherwise specified, mineral admixture will not be required in portland cement concrete used for precast concrete girders.

The Contractor will be permitted to use Type III portland cement for concrete used in the manufacture of precast concrete members.

## SECTION 8-3. WELDING

### 8-3.01 WELDING

#### GENERAL

Flux core welding electrodes conforming to the requirements of AWS A5.20 E6XT-4 or E7XT-4 shall not be used to perform any type of 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               | 2000             |
| D1.4               | 1992             |
| D1.5               | 1995             |
| D1.5 (metric only) | 1996             |

Requirements of the AWS welding codes shall apply unless specified otherwise in the Standard Specifications, on the plans, or in these special provisions. Wherever the abbreviation AWS is used, it shall be equivalent to the abbreviations ANSI/AWS or ANSI/AASHTO/AWS.

Sections 6.1.2 through 6.1.4.3 of AWS D 1.1, Sections 7.1.1 and 7.1.2 of AWS D 1.4, and Sections 6.1.1.1 through 6.1.3.3 of AWS D 1.5 are replaced with the following:

Quality Control (QC) shall be the responsibility of the Contractor. As a minimum, the Contractor shall perform inspection and testing prior to welding, during welding, and after welding as specified in this section and additionally as necessary to ensure that materials and workmanship conform to the requirements of the contract documents.

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.

Each 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 and Guide for Qualification 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 and Guide for Qualification of Welding Inspectors," or has equivalent qualifications. The QC Inspector shall monitor the Assistant QC Inspector's work, and shall be responsible for signing all reports.

When the term "Inspector" is used without further qualification, it shall refer to the QC Inspector.

Section 6.14.6, "Personnel Qualification," of AWS D 1.1, Section 7.7.6, "Personnel Qualification," of AWS D 1.4, and Section 6.1.3.4, "Personnel Qualification," of AWS D 1.5 are replaced with the following:

Personnel performing nondestructive testing (NDT) shall be qualified 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 requirements of the ASNT Recommended Practice No. SNT-TC-1A. Only individuals who are 1) qualified for NDT Level II, or 2) Level III technicians who have been directly certified by the ASNT and are authorized to perform the work of Level II technicians, shall perform NDT, review the results, and prepare the written reports.

Section 6.5.4, "Scope of Examination," of AWS D 1.1 and Section 7.5.4 of AWS D 1.4 are replaced with the following:

The QC Inspector shall inspect and approve the joint preparation, assembly practice, welding techniques, and 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.

Section 6.5.4 of AWS D 1.5 is replaced with the following:

The QC Inspector shall inspect and approve the joint preparation, assembly practice, welding techniques, and performance of each welder, welding operator, and tack welder to make certain that the applicable requirements of this code and the approved WPS are met. The QC Inspector shall examine the work to make certain that it meets the requirements of Sections 3 and 9.21. The size and contour of welds shall be measured using suitable gages. Visual inspection for cracks in welds and base metal, and for other discontinuities should be aided by strong light magnifiers, or such other devices as may be helpful. Acceptance criteria different from those specified in this code may be used when approved by the Engineer.

Section 6.6.5, "Nonspecified Nondestructive Testing Other Than Visual," of AWS D 1.1, Section 6.6.5 of AWS D 1.4 and Section 6.6.5 of AWS D 1.5 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 welding codes, in the Standard Specifications, or in these special provisions. Additional NDT required by the Engineer, will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. Should any welding deficiencies be discovered by this additional NDT, the cost of the testing will not be paid for as extra work but shall be at the Contractor's expense.

Required repair work to correct welding deficiencies, whether discovered by the required visual inspection or NDT, or by additional NDT directed 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.

A sufficient number of QC Inspectors shall be provided to ensure continuous inspection when any welding is being performed. Continuous inspection, as a minimum, shall include (1) having QC Inspectors continually present when any welding operation is being performed, or (2) having a QC Inspector within such close proximity of all welding operations that inspections by the QC Inspector of each operation, at each welding location, shall not lapse for a period exceeding 30 minutes.

Inspection and approval of the joint preparation, assembly practice, welding techniques, and performance of each welder, welding operator, and tack welder shall be documented by the QC Inspector on a daily basis for each day that welding is performed.

When joint details that are not prequalified by the applicable AWS codes are proposed for use in the work, welders using these details shall perform a qualification test plate using the approved WPS variables and the joint detail to be used in production. The test plate shall be the maximum thickness to be used in production. The test plate shall be mechanically or radiographically tested as directed by the Engineer. Mechanical and radiographic testing and acceptance criteria shall be as specified in the applicable AWS codes.

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. 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 work remains satisfactory.

## **WELDING QUALITY CONTROL**

Welding quality control shall conform to the requirements in the AWS 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," Section 56-1, "Overhead Sign Structures," Section 75-1.035, "Bridge Joint Restrainer Units," or Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications.

In addition, welding quality control shall apply when welding is performed for the following work:

- A. Iron Bridge Railing
- B. Wrought Iron Railing

The welding of fracture critical members (FCMs) shall conform to the provisions specified in the Fracture Control Plan (FCP) and herein.

The Contractor shall designate in writing a welding Quality Control Manager (QCM). The QCM shall be responsible directly to the Contractor for the quality of welding, including materials and workmanship, performed by the Contractor and subcontractors.

The QCM shall be the sole individual responsible to the Contractor for submitting, receiving, and approving all correspondence, required submittals, and reports to and from the Engineer.

The QCM shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project. The QCM may be an employee of the Contractor.

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 welding is performed at a permanent fabrication facility which is certified under the AISC Quality Certification Program, Category Cbr, Major Steel Bridges.
- B. The welding is performed at a permanent fabrication facility which is certified under the AISC Quality Certification Program, Category Sbd, Conventional Steel Building Structures. This condition shall apply only 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.

For welding performed at such certified facilities, the inspection personnel or NDT firms may be employed or compensated by the fabrication facility performing the welding.

Prior to submitting the Welding Quality Control Plan (WQCP) required herein, a pre-welding meeting between the Engineer, Contractor, and any entity performing welding for this project, shall be held to discuss the requirements for the WQCP.

Except for work that is welded in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, prior to performing any welding, 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 WQCP for each item of work for which welding is to be performed.

Prior to furnishing materials welded in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, 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 WQCP for each fabrication facility supplying these materials or proof of previous Engineer approval of a WQCP for such a facility no more than one year prior to the delivery of materials for inspection.

As a minimum, each WQCP shall include the following:

- A. The name of the welding firm and any required NDT firms;
- B. A manual prepared by the NDT firm that shall include equipment, testing procedures, code of safe practices, the Written Practice of the NDT firm, and the names, qualifications, and documentation of certifications for all personnel to be used;
- C. The name of the QCM and the names, qualifications, and documentation of certifications for all QC Inspectors and Assistant QC Inspectors to be used;
- D. An organizational chart showing all QC personnel and their assigned QC responsibilities;
- E. The methods and frequencies for performing all required quality control procedures, including QC inspection forms to be used, as required by the specifications including:
  1. all visual inspections;
  2. all NDT including radiographic geometry, penetrameter and shim selection, film quality, film processing, radiograph identification and marking system, and film interpretation and reports; and
  3. calibration procedures and calibration frequency for all NDT equipment;
- F. A system for the identification and tracking of all welds, NDT, and any required repairs, and a procedure for the reinspection of repaired welds. The system shall have provisions for 1) permanently identifying each weld and the person who performed the weld, 2) placing all identification and tracking information on each radiograph, 3) a method of reporting nonconforming welds to the Engineer, and 4) a method of documentation of repairs and reinspection of nonconforming welds;
- G. Standard procedures for performing noncritical repair welds. Noncritical repair welds are defined as welds to deposit additional weld beads or layers to compensate for insufficient weld size and to fill limited excavations that were performed to remove unacceptable edge or surface discontinuities, rollover or undercut. The depth of these excavations shall not exceed 65 percent of the specified weld size;
- H. The WPS, including documentation of all supporting Procedure Qualification Record (PQR) tests performed, and the name of the testing laboratory who performed the tests, to verify the acceptability of the WPS. The submitted WPS shall be within the allowable period of effectiveness;
- I. Documentation of all certifications for welders for each weld process and position that will be used. Certifications shall list the electrodes used, test position, base metal and thickness, tests performed, and the witnessing authority. All certifications shall be within the allowable period of effectiveness;
- J. One copy each of all AWS welding codes and the FCP which are applicable to the welding to be performed. These codes and the FCP shall become the permanent property of the Department; and
- K. Forms to be used for Certificates of Compliance, daily production logs, and daily reports.

The Engineer shall have 10 working days to review the WQCP submittal after a complete plan has been received. Except for work that is welded in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, no welding shall be performed until the WQCP is approved in writing by the Engineer. No materials welded in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, shall be incorporated into the work until the WQCP is approved in writing 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 WQCP, 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.

An amended WQCP or addendum 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 or procedures, QC, or NDT personnel, or updated systems for tracking and identifying welds. The Engineer shall have 3 working days to complete the review of the amended WQCP or addendum. Work that is affected by any of the proposed revisions shall not be performed until the amended WQCP or addendum has been approved. 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 amended WQCP or addendum, 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.

After final approval of the WQCP, amended WQCP, or addendum, the Contractor shall submit 7 copies to the Engineer of each of these approved documents.

It is expressly understood that the Engineer's approval of the Contractor's WQCP 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 Engineer's approval shall not constitute a waiver of any requirement of the plans and specifications.

nor relieve the Contractor of any obligation thereunder, and defective work, materials, and equipment may be rejected notwithstanding approval of the WQCP.

A daily production log for welding shall be kept by the QCM for each day that welding is performed. The log shall clearly indicate the locations of all welding, except partial penetration longitudinal seam welds performed in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications. 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 7 days following the performance of any welding. For work welded in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, the following items shall be included in a Welding Report that is to be submitted to the Engineer 48 hours prior to the Contractor furnishing a Certificate of Compliance for the material:

- A. Reports of all visual weld inspections and NDT;
- B. Radiographs and radiographic reports, and other required NDT reports;
- C. Documentation that the Contractor has evaluated all radiographs and other nondestructive tests and corrected all rejectable deficiencies, and all repaired welds have been reexamined by the required NDT and found acceptable; and
- D. Daily production log.

Radiographic envelopes shall have clearly written on the outside of the envelope the following information: name of the QCM, name of the nondestructive testing firm, name of the radiographer, date, contract number, complete part description, and all included weld numbers or a report number, as detailed in the WQCP. In addition, all innerleaves shall have clearly written on them the part description and all included weld numbers, as detailed in the WQCP.

Reports regarding NDT, including radiographs, shall be signed by both the NDT technician and the person that performed the review, and then submitted directly to the QCM for review and signature prior to submittal to the Engineer. Corresponding names shall be clearly printed or typewritten next to all signatures.

The Engineer will review the Welding Report to determine if the Contractor is in conformance with the WQCP. Unless otherwise specified, the Engineer shall be allowed 7 working days to review the report and respond in writing after a complete Welding Report has been received. Prior to receiving notification from the Engineer of the Contractor's conformance with the WQCP, the Contractor may encase in concrete or cover welds for which a Welding Report has been submitted. However, should the Contractor elect to encase or cover those welds prior to receiving notification from the Engineer, it is expressly understood that the Contractor shall not be relieved of the responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase or cover welds pending notification by the Engineer, and should the Engineer fail to complete the review and provide notification 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 notification, 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 QC Inspector shall provide reports to the QCM on a daily basis for each day that welding is performed.

Except for noncritical weld repairs, the Engineer shall be notified immediately in writing when welding problems, deficiencies, base metal repairs, or any other type of repairs not submitted in the WQCP are discovered and also of the proposed repair procedures to correct them. The Engineer shall have 5 working days to review these procedures. No remedial work shall begin until the repair procedures are approved in writing 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 proposed repair procedures, 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 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 and the provisions of the Standard Specifications and these special provisions.

## **PAYMENT**

Full compensation for conforming to the requirements of this section 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**

Structure work consists, in general, of widening, replacing and removing the following existing structures, and building retaining walls and a sound wall as shown on the plans:

CAMARILLO OVERHEAD & SEPARATION (WIDEN)  
Bridge No. (52-0016)

CAMARILLO PEDESTRIAN OVERHEAD (REPLACE)  
Bridge No. (52-0448)

ARNEILL ROAD OVERCROSSING (REPLACE)  
Bridge No. (52-0447)

FULTON STREET OVERCROSSING (REMOVE)  
Bridge No. (52-0179)

RETAINING WALL No. 739

RETAINING WALL No. 740

RETAINING WALL No. 743

RETAINING WALL No. 750

SOUND WALL No. 550

The work also consists of installing and modifying lighting equipment as shown on the plans.

Such other items or details not mentioned above that are required by the plans, Standard Specifications dated July 1999, or these special provisions shall be performed or constructed.

**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 1 and 2 Type 2 Construction Project Information signs at the locations designated by the Engineer.

The signs and overlays shall be of a type and material consistent with the estimated time of completion of the project and shall conform to the details shown on the plans.

The sign letters, border and the Department's construction logos shall conform to the colors (non-reflective) and details shown on the plans, and shall be on a white background (non-reflective). The colors blue and orange shall conform to PR Color Number 3 and Number 6, respectively, as specified in the Federal Highway Administration's Color Tolerance Chart.

The sign message to be used for fund types shall consist of the following, in the order shown:

|                                     |
|-------------------------------------|
| FEDERAL HIGHWAY TRUST FUNDS         |
| STATE HIGHWAY FUNDS                 |
| VENTURA COUNTY TRANSPORTATION FUNDS |

The sign message to be used for type of work shall consist of the following:

|                      |
|----------------------|
| HIGHWAY CONSTRUCTION |
|----------------------|

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.

The steel water line shown on the plans at Bent 3 of the Camarillo Overhead and Separation, and at Bent 9 of the Camarillo Pedestrian Overhead shall be removed prior to pile installation at those locations.

Construction of the Camarillo Pedestrian Overhead (Bridge No. 52-0448) shall be completed before work on the left side of Camarillo Overhead and Separation (Bridge No. 52-0016) begins.

Construction activities or operations, in the vicinity of Arneill Road between Ventura Boulevard and Daily Drive, shall not be started until the City of Camarillo Street Festival. The Street Festival is currently scheduled during the month of July, 2002.

Time extension requested by the Contractor will be considered should the Street Festival be held during different month other than July.

Temporary railing (Type K) and temporary crash cushions shall be secured in place prior to commencing work for which the temporary railing and crash cushions are required.

The first order of work shall be to place the order for the traffic signal, electrical and video imaging detection systems equipment. The Contractor shall furnish the Engineer with a statement from the vendor that the order for the traffic signal, electrical and video imaging detection systems equipment have been received and accepted by the vendor.

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

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

Attention is directed to "Concrete Pavement (with doweled transverse weakened plane joints)" of these special provisions regarding the "Prepaving Conference" and "Test Strip" requirements.

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 asphalt concrete, 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 asphalt concrete has been placed. After completion of the asphalt concrete construction 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 tonne for asphalt concrete, and no additional compensation will be allowed therefor.

At the end of each working day if a difference in excess of 0.05-meter exists between the elevation of the existing pavement and the elevation of excavations within 2.4 m of the traveled way, material shall be placed and compacted against the vertical cuts adjacent to the traveled way. During excavation operations, native material may be used for this purpose;

however, once placing of the structural section commences, structural material shall be used. The material shall be placed to the level of the elevation of the top of existing pavement and tapered at a slope of 1:4 (vertical:horizontal) or flatter to the bottom of the excavation. Full compensation for placing the material on a 1:4 slope, regardless of the number of times the material is required, and subsequent removing or reshaping of the material to the lines and grades shown on the plans shall be considered as included in the contract price paid for the materials involved and no additional compensation will be allowed therefor. No payment will be made for material placed in excess of that required for the structural section.

At those locations exposed to public traffic where guard railings or barriers are to be constructed, or removed, 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.

Not less than 30 days after award of the contract, the Contractor shall 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 shall include the names, sizes, and quantities of plants ordered and the anticipated date of delivery.

The Contractor shall place orders for replacement plants with the vendor at the appropriate time so that the roots of the replacement plants are not in a root-bound condition.

Within 30 days after the contract has been approved, the Contractor shall 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 shall include the names and quantity of seed ordered and the anticipated date of delivery.

Attention is directed to "Clearing and Grubbing" and "Earthwork" of these special provisions regarding the clearing and grubbing and earthwork operations to take place within the detention basin and regraded slope.

Attention is directed to "Irrigation Systems Functional Test" of these special provisions, regarding restrictions for planting operations.

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 shall be installed prior to the installation of other pipe supply lines.

Attention is directed to "Existing Highway Irrigation Facilities" of these special provisions regarding the checking of existing irrigation facilities that are to remain in place, prior to the start of any irrigation work.

Clearing, grubbing, and earthwork operations shall not be performed in areas where existing irrigation facilities are to remain in place until existing irrigation facilities have been checked for proper operation in conformance with the provisions in "Existing Highway Irrigation Facilities" of these special provisions.

Attention is directed to Section 20-5.027B, "Wiring Plans and Diagrams," of the Standard Specifications regarding submittal of working drawings.

Attention is directed to "Irrigation Controller Enclosure Cabinet" of these special provisions regarding reinstalling irrigation components in the irrigation controller enclosure cabinet prior to field installation.

When embankment settlement periods are specified, the settlement periods and the deferment of portions of the work shall comply with the provisions in Section 19-6.025, "Settlement Period," of the Standard Specifications and in "Earthwork" of these special provisions.

#### **10-1.02 WATER POLLUTION CONTROL (STORM WATER POLLUTION PREVENTION PLAN)**

Water pollution control work shall conform to the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications and these special provisions.

This project lies within the boundaries of the Los Angeles Regional Water Quality Control Board and shall conform to the requirements of the National Pollutant Discharge Elimination System (NPDES) Permit for General Construction Activities No. CAS000002, Order No, 99-08-DWQ, including State Water Resources Control Board (SWRCB) Resolution No. 2001-046, and the NPDES Permit for the State of California Department of Transportation Properties, Facilities, and Activities, No. CAS000003, Order No, 99-06-DWQ issued by the SWRCB. These permits, hereafter referred to as the "Permits," regulate storm water discharges associated with construction activities.

Water pollution control work shall conform to the requirements in the "Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual" and the "Construction Site Best Management Practices (BMPs) Manual," and addenda thereto issued up to, and including, the date of advertisement of the project, hereafter referred to respectively as the "Preparation Manual" and the "Construction Site BMP Manual" and collectively as the "Manuals." In addition, water pollution control work shall conform to the requirements in the Sampling and Analysis Bulletin. Copies of the Manuals and the Permits may be obtained from the Department of Transportation, Material Operations Branch, Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, California 95815, Telephone: (916) 445-3520. Copies of the Manuals and the Sampling and Analysis Bulletin may also be obtained from the Department's Internet Web Site at: <http://www.dot.ca.gov/hq/construc/stormwater.html>.

The Contractor shall know and fully comply with the applicable provisions of the Manuals, Permits, and Federal, State, and local regulations that govern the Contractor's operations and storm water discharges from both the project site and areas

of disturbance outside the project limits during construction. The Contractor shall maintain copies of the Permits at the project site and shall make the Permits available during construction.

Unless arrangements for disturbance or use of areas outside the project limits are made by the Department and made part of the contract, it is expressly agreed that the Department assumes no responsibility for the Contractor or property owner with respect to any arrangements made between the Contractor and property owner. The Contractor shall implement, inspect and maintain all necessary water pollution control practices to satisfy all applicable Federal, State, and Local laws and regulations that govern water quality for areas used outside of the highway right-of-way or areas arranged for the specific use of the Contractor for this project. Installing, inspecting, and maintaining water pollution control practices on areas outside the highway right-of-way not specifically arranged for and provided for by the Department for the execution of this contract will not be paid for.

The Contractor shall be responsible for the costs and for liabilities imposed by law as a result of the Contractor's failure to comply with the provisions set forth in this section "Water Pollution Control (Storm Water Pollution Prevention Plan)", including but not limited to, compliance with the applicable provisions of the Manuals, Permits and Federal, State and local regulations. Costs and liabilities include, but are not limited to, fines, penalties, and damages whether assessed against the State or the Contractor, including those levied under the Federal Clean Water Act and the State Porter Cologne Water Quality Act.

In addition to the remedies authorized by law, money due the Contractor under the contract, in an amount determined by the Department, may be retained by the State of California until disposition has been made of the costs and liabilities.

When a regulatory agency or other third party identifies a failure to comply with the permit or any other local, State, or federal requirement, the Engineer may retain money due the Contractor, subject to the following:

- A. The Department will give the Contractor 30 days notice of the Department's intention to retain funds from partial payments which may become due to the Contractor prior to acceptance of the contract. Retention of funds from payments made after acceptance of the contract may be made without prior notice to the Contractor.
- B. No retention of additional amounts out of partial payments will be made if the amount to be retained does not exceed the amount being withheld from partial payments pursuant to Section 9-1.06, "Partial Payments," of the Standard Specifications.
- C. If the Department has retained funds and it is subsequently determined that the State is not subject to the costs and liabilities in connection with the matter for which the retention was made, the Department shall be liable for interest on the amount retained for the period of the retention, and the rate of interest payable shall be 6 percent per annum.

Conformance with the provisions of this section "Water Pollution Control (Storm Water Pollution Prevention Plan)" shall not relieve the Contractor from the Contractor's responsibilities, as provided in Section 7, "Legal Relations and Responsibility," 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.

#### **STORM WATER POLLUTION PREVENTION PLAN PREPARATION, APPROVAL AND AMENDMENTS**

As part of the water pollution control work, a Storm Water Pollution Prevention Plan, hereafter referred to as the "SWPPP," is required for this contract. The SWPPP shall conform to the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications, the requirements in the Manuals, the requirements of the Permits, and these special provisions. Upon the Engineer's approval of the SWPPP, the SWPPP shall be considered to fulfill the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications for development and submittal of a Water Pollution Control Program.

No work having potential to cause water pollution, as determined by the Engineer, shall be performed until the SWPPP has been approved by the Engineer.

The Contractor shall designate a Water Pollution Control Manager. The Water Pollution Control Manager shall be responsible for the preparation of the SWPPP and any required modifications or amendments and shall be responsible for the implementation and adequate functioning of the various water pollution control practices employed. The Water Pollution Control Manager shall serve as the primary contact for all issues related to the SWPPP or its implementation. The Contractor shall submit to the Engineer a statement of qualifications, describing the training, previous work history and expertise of the individual selected by the Contractor to serve as Water Pollution Control Manager. The Engineer will reject the Contractor's submission of a Water Pollution Control Manager if the submitted qualifications are deemed to be inadequate.

Within 30 days after the approval of the contract, the Contractor shall submit 3 copies of the draft SWPPP to the Engineer. The Engineer will have 15 days to review the SWPPP. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the SWPPP within 15 days of receipt of the Engineer's comments. The Engineer will have 10 days to review the revisions. Upon the Engineer's approval of the SWPPP, 6 approved copies of the SWPPP, incorporating the required changes, shall be submitted to the Engineer. In order to allow construction activities to proceed,

the Engineer may conditionally approve the SWPPP while minor revisions are being completed. If the Engineer does not review or approve the SWPPP within the time specified, compensation will be made in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The SWPPP shall apply to all areas that are directly related to construction including, but not limited to, staging areas, storage yards, material borrow areas, and access roads within or outside of the highway right-of-way.

The SWPPP shall incorporate water pollution control practices in the following six categories:

- A. Soil stabilization;
- B. Sediment control;
- C. Wind erosion control;
- D. Tracking control;
- E. Non-storm water control; and
- F. Waste management and material pollution control.

The Contractor shall develop a Water Pollution Control Schedule that shall describe the timing of grading or other work activities that could affect water pollution. The Water Pollution Control Schedule shall be updated by the Contractor to reflect any changes in the Contractor's operations that would affect the necessary implementation of water pollution control practices.

The Contractor shall incorporate the "Minimum Requirements" presented in the Preparation Manual into the SWPPP. In addition to the "Minimum Requirements" presented in the Preparation Manual, the Contractor shall complete the BMP Consideration Checklist presented in the Preparation Manual. The Contractor shall identify and incorporate into the SWPPP the water pollution control practices selected by the Contractor or as directed by the Engineer.

The SWPPP shall include, but not be limited to, the items described in the Manuals, Permits, and related information contained in the contract documents. In addition, the SWPPP shall include a copy of the following: LARWQCB, Ventura County Flood Control District Permit.

The Contractor shall prepare an amendment to the SWPPP when there is a change in construction activities or operations which may affect the discharge of pollutants to surface waters, ground waters, municipal storm drain systems, or when the Contractor's activities or operations violate any condition of the Permits, or when directed by the Engineer. Amendments shall show additional water pollution control practices or revised operations, including those areas or operations not shown in the initially approved SWPPP. Amendments to the SWPPP shall be prepared, and submitted for review and approval in the same manner as specified for the SWPPP approval. Subsequent amendments shall be submitted within a time approved by the Engineer, but in no case longer than the time specified for the initial submittal and review of the SWPPP. At a minimum, the SWPPP shall be amended annually and submitted to the Engineer 25 days prior to the defined rainy season.

The Contractor shall keep one copy of the approved SWPPP and approved amendments at the project site. The SWPPP shall be made available upon request of a representative of the Regional Water Quality Control Board, State Water Resources Control Board, United States Environmental Protection Agency or the local storm water management agency. Requests by the public shall be directed to the Engineer.

### **COST BREAK-DOWN**

The Contractor shall submit to the Engineer a cost break-down for the contract lump sum item of water pollution control, together with the SWPPP.

The cost break-down shall be completed and furnished in the format shown in the example of the cost break-down included in this section. Unit descriptions and quantities shall be designated by the Contractor, except for the specified special requirements shown in the example. The units and quantities given in the example, if provided, are special requirements specified for the SWPPP, and shall be included in the cost break-down furnished to the Engineer. The Contractor shall verify the estimated quantities of the special requirements and submit revised quantities in the cost break-down.

The Contractor shall determine the quantities required to complete the work of water pollution control. 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 cost break-down shall not include water pollution control practices which are shown on the plans and for which there is a separate contract item.

The sum of the amounts for the units of work listed in the cost break-down shall be equal to the contract lump sum price paid for water pollution control. Overhead and profit shall be included in each individual unit listed in the cost break-down. The cost break-down shall be submitted and approved within the same times specified for the SWPPP. Partial payment for the item of water pollution control will not be made until the cost break-down is approved, in writing, by the Engineer.

Adjustments in the items of work and quantities listed in the approved cost break-down shall be made when required to address amendments to the SWPPP, except when the adjusted items are paid for as extra work.

No adjustment in compensation will be made in the contract lump sum price paid for water pollution control due to differences between the quantities shown in the approved cost break-down and the quantities required to complete the work as shown on the approved SWPPP. No adjustment in compensation will be made for ordered changes to correct SWPPP work resulting from the Contractor's own operations or from the Contractor's negligence.

The approved cost break-down will be used to determine partial payments during the progress of the work and as the basis for calculating the adjustment in compensation for the item of water pollution control due to increases or decreases of quantities ordered by the Engineer. When an ordered change increases or decreases the quantities of an approved cost break-down item, the adjustment in compensation will be determined in the same manner specified for increases and decreases in the quantity of a contract item of work in conformance with the provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications. If an ordered change requires a new item not on the approved cost break-down, the adjustment in compensation will be determined in the same manner specified for extra work in conformance with Section 4-1.03D, "Extra Work," of the Standard Specifications.

If requested by the Contractor and approved by the Engineer, changes to the water pollution control practices listed in the approved cost break-down, including the addition of new water pollution control practices, will be allowed. The changes shall be included in an approved amendment to the SWPPP. If the changes to the water pollution control practices requested by the Contractor would result in a net cost increase to the lump sum price for water pollution control, an adjustment in compensation will be made without change to the item of water pollution control. The net cost increase to the item of water pollution control resulting from changes requested by the Contractor will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

**WATER POLLUTION CONTROL COST BREAK-DOWN**

**Contract No.** \_\_\_\_\_

| UNIT DESCRIPTION | UNIT | APPROXIMATE QUANTITY | VALUE | AMOUNT |
|------------------|------|----------------------|-------|--------|
|                  |      |                      |       |        |

**TOTAL** \_\_\_\_\_

## **SWPPP IMPLEMENTATION**

Upon approval of the SWPPP, the Contractor shall be responsible throughout the duration of the project for installing, constructing, inspecting, maintaining, removing, and disposing of the water pollution control practices included in the SWPPP and any amendments. Unless otherwise directed by the Engineer, 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. Requirements for installation, construction, inspection, maintenance, removal, and disposal of water pollution control practices are specified in the Manuals and these special provisions.

If the Contractor or the Engineer identifies a deficiency in any aspect of the implementation of the approved SWPPP or amendments, the deficiency shall be corrected immediately. The deficiency may be corrected at a later date and time if requested by the Contractor and approved by the Engineer in writing, but not later than the onset of precipitation. If the Contractor fails to correct the identified deficiency by the date agreed or prior to the onset of precipitation the project shall be in noncompliance. Attention is directed to Section 5-1.01, "Authority of the Engineer," of the Standard Specifications and the payment sections of these special provisions for possible noncompliance penalties.

If the Contractor fails to conform to the provisions of "Water Pollution Control (Storm Water Pollution Prevention Plan)," the Engineer may order the suspension of construction operations which create water pollution.

Implementation of water pollution control practices may vary by season. The Construction Site BMP Manual and these special provisions shall be followed for control practice selection of year round, rainy season and non-rainy season water pollution control practices.

### **Year-Round Implementation Requirements**

The Contractor shall have a year-round program for implementing, inspecting and maintaining water pollution control practices for wind erosion control, tracking control, non-storm water control, and waste management and materials pollution control.

The National Weather Service weather forecast shall be monitored and used by the Contractor on a daily basis. An alternative weather forecast proposed by the Contractor may be used if approved by the Engineer. If precipitation is predicted, the necessary water pollution control practices shall be deployed prior to the onset of the precipitation.

Disturbed soil areas shall be considered active whenever the soil disturbing activities have occurred, continue to occur or will occur during the ensuing 21 days. Non-active areas shall be protected as prescribed in the Construction Site BMP Manual within 14 days of cessation of soil disturbing activities or prior to the onset of precipitation, whichever occurs first.

In order to provide effective erosion control the Contractor may be directed to apply permanent erosion control in small or multiple units as disturbed soil areas are deemed substantially complete by the Engineer. The Contractor's attention is directed to "Erosion Control (Type D)" of these special provisions

### **Rainy Season Requirements**

Soil stabilization and sediment control practices conforming to the requirements in the Special Requirements and applicable Preparation Manual Minimum Requirements, shall be provided throughout the rainy season, defined as between October 1 and May 1.

An implementation schedule of required soil stabilization and sediment control practices for disturbed soil areas shall be completed not later than 20 days prior to the beginning of each rainy season. The implementation schedule shall identify the soil stabilization and sediment control practices to be implemented and the dates on which the implementation will be 25 percent, 50 percent, and 100 percent complete, respectively. Construction activities beginning during the rainy season shall implement applicable soil stabilization and sediment control practices.

Throughout the defined rainy season, the active disturbed soil area of the project site shall be less than 2 hectares. The Engineer may approve, on a case-by-case basis, expansions of the active disturbed soil area limit. Soil stabilization and sediment control materials shall be maintained on site sufficient to protect the unprotected disturbed soil area. A detailed plan for the mobilization of sufficient labor and equipment shall be maintained to deploy the water pollution control practices required to protect the project site prior to the onset of precipitation events.

### **Non-Rainy Season Requirements**

The non-rainy season shall be defined as all days outside the defined rainy season. The Contractor's attention is directed to the Construction Site BMP Manual for soil stabilization and sediment control implementation requirements on disturbed soil areas during the non-rainy season. Disturbed soil areas within the project shall be protected in conformance with the requirements in the Construction Site BMP Manual with an effective combination of soil stabilization and sediment control.

## **MAINTENANCE**

To ensure the proper implementation and functioning of water pollution control practices, the Contractor shall regularly inspect and maintain the construction site for the water pollution control practices identified in the SWPPP. The construction site shall be inspected by the Contractor as follows:

- A. Prior to a forecast storm;
- B. After a precipitation event which causes site runoff;
- C. At 24 hour intervals during extended precipitation events;
- D. Routinely, a minimum of once every 2 weeks outside of the defined rainy season;
- E. Routinely, a minimum of once every week during the defined rainy season.

The Contractor shall use the Storm Water Quality Construction Site Inspection Checklist provided in the preparation manual or an alternative inspection checklist provided by the Engineer. One copy of each site inspection record shall be submitted to the Engineer within 24 hours of completing the inspection.

## **REPORTING REQUIREMENTS**

### **Report of Discharges, Notices or Orders**

If the Contractor identifies any discharge into receiving waters in a manner causing, or potentially causing, a condition of pollution, or if the project receives a written notice or order from any 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 event, notice, or order. The report shall include the following information:

- A. The date, time, location, nature of the operation, and type of discharge, including the cause or nature of the notice or order.
- B. The water pollution control practices deployed before the discharge event, or prior to receiving the notice or order.
- C. The date of deployment and type of water pollution control practices deployed after the discharge event, or after receiving the notice, or order, including additional measures installed or planned to reduce or prevent reoccurrence.
- D. An implementation and maintenance schedule for any affected water pollution control practices.

### **Report of First-Time Non-Storm Water Discharge**

The Contractor shall notify the Engineer at least 3 days in advance of each first-time non-storm water discharge event, excluding exempted discharges. The Contractor shall notify the Engineer of each different operation causing a non-storm water discharge and shall obtain field approval for each first-time non-storm water discharge. Non-storm water discharges shall be monitored at each first-time occurrence and routinely thereafter.

### **Annual Certifications**

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

## **PAYMENT**

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 for doing all the work involved in developing, preparing, obtaining approval of, revising, and amending the SWPPP, including the sampling and analysis plan, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Attention is directed to Section 9-1.06, "Partial Payments," and Section 9-1.07, "Payment After Acceptance," of the Standard Specifications. Payments for prepare storm water pollution prevention plan will be made as follows:

- A. After the SWPPP has been approved by the Engineer, 75 percent of the contract item price for prepare storm water pollution prevention plan will be included in the monthly partial payment estimate; and
- B. After acceptance of the contract in conformance with the provisions in Section 7-1.17, "Acceptance of Contract," of the Standard Specifications, payment for the remaining 25 percent of the contract item price for prepare storm water pollution prevention plan will be made in conformance with the provisions in Section 9-1.07.

The contract lump sum price paid for water pollution control shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing, constructing, removing, and disposing of water pollution control practices, including non-storm water and waste management and materials pollution

water pollution control practices, except those shown on the plans and for which there is a contract item of work, and excluding developing, preparing, obtaining approval of, revising, and amending the SWPPP, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

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.

The cost of maintaining the temporary water pollution control practices shall be divided equally by the State and the Contractor as follows:

**Soil Stabilization**

All temporary water pollution control practices except:

SS-1 Scheduling

SS-2 Preservation of Existing Vegetation

**Sediment Control**

All temporary water pollution control practices.

**Tracking Control**

All temporary water pollution control practices except:

SC-7 Street Sweeping and Vacuuming

**Wind Erosion Control**

All temporary water pollution control practices.

**Non-Storm Water Control**

No sharing of maintenance costs will be allowed.

**Waste Management & Material Control**

No sharing of maintenance costs will be allowed.

The division of cost will be made by determining the cost of maintaining temporary water pollution control practices in conformance with the provisions in Section 9-1.03, "Force Account Payment," of the Standard Specifications and paying to the Contractor one-half of that cost. Clean-up, repair, removal, disposal, improper installation, and replacement of temporary water pollution control practices damaged by the Contractor's negligence shall not be considered as included in the cost for performing maintenance and no additional compensation will be allowed therefor.

The provisions for sharing maintenance costs shall not relieve the Contractor from the responsibility for providing appropriate maintenance on those items where maintenance costs are not shared.

Full compensation for maintenance costs of water pollution control practices not shared, as specified in these special provisions, shall be considered as included in the contract lump sum price paid for water pollution control and no additional compensation will be allowed therefor.

Those water pollution control practices which are shown on the plans and for which there is a contract item of work will be measured and paid for as that contract item of work.

The Engineer will retain an amount equal to 25 percent of the estimated value of the contract work performed during estimate periods in which the Contractor fails to conform to the provisions of this section "Water Pollution Control (Storm Water Pollution Prevention Plan)," as determined by the Engineer.

Retention for failure to conform to the provisions in this section "Water Pollution Control (Storm Water Pollution Prevention Plan)" shall be in addition to the other retention provided for in the contract. The amounts retained for failure of the Contractor to conform to the provisions in this section will be released for payment on the next monthly estimate for partial payment following the date that an approved SWPPP has been implemented and maintained, and water pollution is adequately controlled, as determined by the Engineer.

**10-1.03 TEMPORARY FENCE**

Temporary fence shall be furnished, constructed, maintained, and later removed as shown on the plans, as specified in these special provisions and as directed by the Engineer.

Except as otherwise specified in this section, temporary fence shall conform to the plan details and the specifications for permanent fence of similar character as provided in Section 80, "Fences," of the Standard Specifications.

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

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

Posts shall be either metal or wood at the Contractor's option.

Galvanizing and painting of steel items will not be required.

Treating wood with a wood preservative will not be required.

Concrete footings for metal posts will not be required.

Temporary fence that is damaged during the progress of the work shall be repaired or replaced by the Contractor at the Contractor's expense.

When no longer required for the work, as determined by the Engineer, temporary fence shall be removed. Removed facilities shall become the property of the Contractor and shall be removed from the site of the work, except as otherwise provided in this section.

Removed temporary fence materials that are not damaged may be constructed in the permanent work provided the materials conform to the requirements specified for the permanent work and such materials are new when used for the temporary fence.

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

The various types and kinds of temporary fence will be measured and paid for in the same manner specified for permanent fence of similar character as provided in Section 80, "Fences," of the Standard Specifications.

Full compensation for maintaining, removing, and disposing of temporary fence shall be considered as included in the contract prices paid per meter for the temporary fence and no additional compensation will be allowed therefor.

#### **10-1.04 PRESERVATION OF PROPERTY**

Attention is directed to Section 7-1.11, "Preservation of Property," of the Standard Specifications and these special provisions.

Existing trees, shrubs and other plants, that are not to be removed as shown on the plans or specified in these special provisions, and are injured or damaged by reason of the Contractor's operations, shall be replaced by the Contractor. The minimum size of tree and shrub replacement shall be No. 15 container. Replacement ground cover plants shall be from flats and shall be planted 300 mm on center. Replacement planting shall conform to the requirements in Section 20-4.07, "Replacement," of the Standard Specifications. The Contractor shall water replacement plants in conformance with the provisions in Section 20-4.06, "Watering," of the Standard Specifications.

Damaged or injured plants 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. At the option of the Contractor, removed trees and shrubs may be reduced to chips. The chipped material shall be spread within the highway right of way at locations designated by the Engineer.

Replacement planting of injured or damaged trees, shrubs, and other plants shall be completed prior to the start of the plant establishment period. Replacement planting shall conform to the provisions in Section 20-4.05, "Planting," of the Standard Specifications.

#### **10-1.05 DAMAGE REPAIR**

Attention is directed to Section 7-1.16, "Contractor's Responsibility for the Work and Materials," and Section 7-1.165, "Damage by Storm, Flood, Tsunami or Earthquake," of the Standard Specifications and these special provisions.

When the provisions in Section 7-1.165, "Damage by Storm, Flood, Tsunami or Earthquake," of the Standard Specifications are applicable, the provisions above for payment of costs for repair of damage due to rain, freezing conditions and drought shall not apply.

#### **10-1.06 RELIEF FROM MAINTENANCE AND RESPONSIBILITY**

The Contractor may be relieved of the duty of maintenance and protection for those items not directly connected with plant establishment work, except highway planting and irrigation systems in conformance with the provisions in Section 7-1.15, "Relief From Maintenance and Responsibility," of the Standard Specifications.

#### **10-1.07 COOPERATION**

Attention is directed to Section 7-1.14, "Cooperation," and Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications and these special provisions.

It is anticipated that work by following contractors to relocate utilities in City of Camarillo on Route Ven 101/ Ven 34 from KP 21.6 to KP 23.2 on Ven 101 and KP 21.0 to KP 22.8 on Ven 34 may be in progress adjacent to or within the limits of this project during progress of the work on this contract:

The Contractor for Verizon Telephone Company (Contract No. 0710-7P001 FQ and 0710-7PFR),  
The Contractor for Adelphia Cable TV,  
The Contractor for Southern California Edison Company,  
The Contractor for City of Camarillo Water District, and  
The Contractor for Calleguas Municipal Water District.

It is also anticipated that work by another Contractor (Contract No. C3059-01) to construct railroad platforms in City of Camarillo on Ven 34 from KP 21.5 to KP 22.2 may be in progress adjacent to or within the limits of this project during progress of the work on this contract.

#### **10-1.08 EMISSIONS REDUCTION INCENTIVE PROGRAM**

The Contractor shall participate in a program for the purpose of reducing emissions of nitrogen oxides (NOx) during the construction phase of this contract. Work performed under this program shall conform to these special provisions. Participating in this program shall not relieve the Contractor from the responsibility of conforming to the plans and specifications for this contract.

This program shall apply only to off-road, heavy-duty equipment powered by diesel engines with a rating between 37.3 and 559.3 kilowatts. The Contractor shall receive an incentive payment for achieving a reduction in emissions as specified herein.

The Contractor shall provide for a reduction in NOx emissions to receive an incentive payment, by one of the following methods:

1. More than 20 percent of the off-road, heavy-duty diesel equipment used during construction of the project shall be controlled equipment, based on fuel consumption.
2. NOx emissions produced by off-road, heavy-duty diesel equipment during construction of the project shall be reduced to a NOx emission level less than that of a fleet utilizing 20 percent controlled equipment.

Off-road, heavy-duty diesel equipment is defined as any self-propelled vehicle used for construction purposes, using diesel fuel, having a manufacturer's maximum gross vehicle weight rating of 2 721.5 kg or more, with a power rating between 37.3 and 559.3 kilowatts, and moves only occasionally over highways, or which because of length, height, width, or weight, may not move over the public highways unladen without a permit conforming to the requirements of the California Vehicle Code.

Controlled equipment is defined as equipment powered by a California Air Resources Board certified off-road diesel engine. Certification shall be considered to mean the engine has a label attached in conformance to the requirements of the California Code of Regulations, Title 13.

At least 10 days prior to starting work, the Contractor shall submit a Construction Equipment Emission Plan (CEEP) to the Engineer. The plan will indicate the method used to achieve the emission reduction. If method 2 as specified above, is selected, the Contractor shall describe in the plan how the emissions reduction will be determined. The Engineer will review and approve, or return the plan to the Contractor for additional information within 10 days of receiving the plan. The Contractor shall re-submit the plan within 7 days after receiving the Engineer's request for additional information. With the Engineer's written approval, the Contractor may start work during the re-submittal period. Data sheets shall be maintained and submitted as specified herein if work begins before the CEEP has been approved.

The CEEP shall include data sheets that will be submitted to the Engineer biweekly, signed by an authorized representative of the Contractor. The data sheets shall be maintained on a daily basis and include the following information for all off-road, heavy-duty diesel equipment used:

1. Equipment identifying number conforming to the provisions in Section 5-1.10, "Equipment and Plants," of the Standard Specifications
2. Equipment make and model
3. Engine type and year
4. Engine power rating
5. Engine modifications
6. Hours of operation
7. Fuel usage
8. A signed statement containing the following language:

The undersigned,

\_\_\_\_\_  
Name

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title

hereby certifies that the information provided herein is true and correct.

The Engineer will review the CEEP and make an initial determination whether the Contractor will meet or exceed the 20 percent controlled equipment utilization. If the Engineer's initial determination concludes the Contractor will meet or exceed the 20 percent controlled equipment utilization or equivalent, the Engineer will release 50 percent of the maximum possible incentive calculated for the contract with the first progress payment after approval of the CEEP, conforming to the provisions in Section 9-1.06, "Partial Payments," of the Standard Specifications.

The total amount of payment due the Contractor under this incentive program will be based on the percent of emissions reduction attained, and will be determined as a percentage of the total contract value based on the following equation:

$$X=(A-0.2)B/40$$

where:

- X = incentive payment due the Contractor
- A = percent emission reduction or percent controlled vehicles used, based on time of use and amount of fuel used for off-road, heavy-duty diesel equipment (expressed as a decimal)
- B = total contract value including extra work, not including incentive payment for emissions reduction.

If  $A < 0.20$ , then  $X = 0$ .

The total payment for emission reduction incentive program shall not exceed \$250,000.

At completion of the contract, the information collected in the data sheets submitted by the Contractor will be evaluated and used to make a final determination whether the Contractor has met or exceeded the 20 percent emissions reduction. Based on this evaluation, adjustments to the calculated incentive payment will be made. The final incentive amount, less the initial payment made upon approval of the CEEP, will be paid upon completion of this final determination.

Based on the final determination of percent emission reduction, any excess payment previously made for emission reduction incentive program to the Contractor will be deducted from moneys due or to become due the Contractor.

#### **10-1.09 PROGRESS SCHEDULE (CRITICAL PATH METHOD)**

The Contractor shall submit to the Engineer practicable critical path method (CPM) progress schedules in conformance with these special provisions. Whenever the term "schedule" is used in this section it shall mean CPM progress schedule.

Attention is directed to "Payments" of Section 5 of these special provisions.

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

#### **DEFINITIONS**

The following definitions shall apply to this section:

- A. **ACTIVITY.**—A task, event or other project element on a schedule that contributes to completing the project. Activities have a description, start date, finish date, duration and one or more logic ties.
- B. **BASELINE SCHEDULE.**—The initial schedule representing the Contractor's work plan on the first working day of the project.
- C. **CONTRACT COMPLETION DATE.**—The current extended date for completion of the contract shown on the weekly statement of working days furnished by the Engineer in conformance with the provisions in Section 8-1.06, "Time of Completion," of the Standard Specifications.
- D. **CRITICAL PATH.**—The longest continuous chain of activities for the project that has the least amount of total float of all chains. In general, a delay on the critical path will extend the scheduled completion date.
- E. **CRITICAL PATH METHOD (CPM).**—A network based planning technique using activity durations and the relationships between activities to mathematically calculate a schedule for the entire project.
- F. **DATA DATE.**—The day after the date through which a schedule is current. Everything occurring earlier than the data date is "as-built" and everything on or after the data date is "planned."

- G. **EARLY COMPLETION TIME.**—The difference in time between an early scheduled completion date and the contract completion date.
- H. **FLOAT.**—The difference between the earliest and latest allowable start or finish times for an activity.
- I. **MILESTONE.**—An event activity that has zero duration and is typically used to represent the beginning or end of a certain stage of the project.
- J. **NARRATIVE REPORT.**—A document submitted with each schedule that discusses topics related to project progress and scheduling.
- K. **NEAR CRITICAL PATH.**—A chain of activities with total float exceeding that of the critical path but having no more than 10 working days of total float.
- L. **SCHEDULED COMPLETION DATE.**—The planned project finish date shown on the current accepted schedule.
- M. **STATE OWNED FLOAT ACTIVITY.**—The activity documenting time saved on the critical path by actions of the State. It is the last activity prior to the scheduled completion date.
- N. **TIME IMPACT ANALYSIS.**—A schedule and narrative report developed specifically to demonstrate what effect a proposed change or delay has on the current scheduled completion date.
- O. **TOTAL FLOAT.**—The amount of time that an activity or chain of activities can be delayed before extending the scheduled completion date.
- P. **UPDATE SCHEDULE.**—A current schedule developed from the baseline or subsequent schedule through regular monthly review to incorporate as-built progress and any planned changes.

### **GENERAL REQUIREMENTS**

The Contractor shall submit to the Engineer baseline, monthly update and final update schedules, each consistent in all respects with the time and order of work requirements of the contract. The project work shall be executed in the sequence indicated on the current accepted schedule.

Schedules shall show the order in which the Contractor proposes to carry out the work with logical links between time-scaled work activities, and calculations made using the critical path method to determine the controlling operation or operations. The Contractor is responsible for assuring that all activity sequences are logical and that each schedule shows a coordinated plan for complete performance of the work.

The Contractor shall produce schedules using computer software and shall furnish compatible software for the Engineer's exclusive possession and use. The Contractor shall furnish network diagrams, narrative reports, tabular reports and schedule data as parts of each schedule submittal.

Schedules shall include, but not be limited to, activities that show the following that are applicable to the project:

- A. Project characteristics, salient features, or interfaces, including those with outside entities, that could affect time of completion.
- B. Project start date, scheduled completion date and other milestones.
- C. Work performed by the Contractor, subcontractors and suppliers.
- D. Submittal development, delivery, review and approval, including those from the Contractor, subcontractors and suppliers.
- E. Procurement, delivery, installation and testing of materials, plants and equipment.
- F. Testing and settlement periods.
- G. Utility notification and relocation.
- H. Erection and removal of falsework and shoring.
- I. Major traffic stage switches.
- J. Finishing roadway and final cleanup.
- K. State-owned float as the predecessor activity to the scheduled completion date.
- L. City of Camarillo Street Festival scheduled to be held during the month of July, 2002.

Schedules shall have not less than 50 and not more than 500 activities, unless otherwise authorized by the Engineer. The number of activities shall be sufficient to assure adequate planning of the project, to permit monitoring and evaluation of progress, and to do an analysis of time impacts.

Schedule activities shall include the following:

- A. A clear and legible description.
- B. Start and finish dates.
- C. A duration of not less than one working day, except for event activities, and not more than 20 working days, unless otherwise authorized by the Engineer.
- D. At least one predecessor and one successor activity, except for project start and finish milestones.

- E. Required constraints.
- F. Codes for responsibility, stage, work shifts, location and contract pay item numbers.

The Contractor may show early completion time on any schedule provided that the requirements of the contract are met. Early completion time shall be considered a resource for the exclusive use of the Contractor. The Contractor may increase early completion time by improving production, reallocating resources to be more efficient, performing sequential activities concurrently or by completing activities earlier than planned. The Contractor may also submit for approval a cost reduction incentive proposal in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications that will reduce time of construction.

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

State-owned float shall be considered a resource for the exclusive use of the State. The Engineer may accrue State-owned float by the early completion of review of any type of required submittal when it saves time on the critical path. The Contractor shall prepare a time impact analysis, when requested by the Engineer, to determine the effect of the action in conformance with the provisions in "Time Impact Analysis" specified herein. The Engineer will document State-owned float by directing the Contractor to update the State-owned float activity on the next update schedule. The Contractor shall include a log of the action on the State-owned float activity and include a discussion of the action in the narrative report. The Engineer may use State-owned float to mitigate past, present or future State delays by offsetting potential time extensions for contract change orders.

The Engineer may adjust contract working days for ordered changes that affect the scheduled completion date, in conformance with the provisions in Section 4-1.03, "Changes," of the Standard Specifications. The Contractor shall prepare a time impact analysis to determine the effect of the change in conformance with the provisions in "Time Impact Analysis" specified herein, and shall include the impacts acceptable to the Engineer in the next update schedule. Changes that do not affect the controlling operation on the critical path will not be considered as the basis for a time adjustment. Changes that do affect the controlling operation on the critical path will be considered by the Engineer in decreasing time or granting an extension of time for completion of the contract. Time extensions will only be granted if the total float is absorbed and the scheduled completion date is delayed one or more working days because of the ordered change.

The Engineer's review and acceptance of schedules shall not waive any contract requirements and shall not relieve the Contractor of any obligation thereunder or responsibility for submitting complete and accurate information. Schedules that are rejected shall be corrected by the Contractor and resubmitted to the Engineer within 5 working days of notification by the Engineer, at which time a new review period of one week will begin.

Errors or omissions on schedules shall not relieve the Contractor from finishing all work within the time limit specified for completion of the contract. If, after a schedule has been accepted by the Engineer, either the Contractor or the Engineer discover that any aspect of the schedule has an error or omission, it shall be corrected by the Contractor on the next update schedule.

## **COMPUTER SOFTWARE**

The Contractor shall submit to the Engineer for approval a description of proposed software before delivery. The software shall be the current version of Primavera SureTrak Project Manager for Windows, or equal, and shall be compatible with Windows NT (version 4.0) operating system. If software other than SureTrak is proposed, it shall be capable of generating files that can be imported into SureTrak.

The Contractor shall furnish schedule software and all original software instruction manuals to the Engineer with submittal of the baseline schedule. The furnished schedule software shall become the property of the State and will not be returned to the Contractor. The State will compensate the Contractor in conformance with the provisions in Section 4-1.03, "Extra Work," of the Standard Specifications for replacement of software which is damaged, lost or stolen after delivery to the Engineer.

The Contractor shall instruct the Engineer in the use of the software and provide software support until the contract is accepted. Within 20 working days of contract approval, the Contractor shall provide a commercial 8-hour training session for 2 Department employees in the use of the software at a location acceptable to the Engineer. It is recommended that the Contractor also send at least 2 employees to the same training session to facilitate development of similar knowledge and skills in the use of the software. If software other than SureTrak is furnished, then the training session shall be a total of 16-hours for each Department employee.

## **NETWORK DIAGRAMS, REPORTS AND DATA**

The Contractor shall include the following for each schedule submittal:

- A. Two sets of originally plotted, time-scaled network diagrams.

- B. Two copies of a narrative report.
- C. Two copies of each of 3 sorts of the CPM software-generated tabular reports.
- D. One 1.44-megabyte 90 mm (3.5 inch) floppy diskette containing the schedule data.

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

- A. Show a continuous flow of information from left to right.
- B. Be based on early start and early finish dates of activities.
- C. Clearly show the primary paths of criticality using graphical presentation.
- D. Be prepared on E-size sheets, 860 mm x 1120 mm (34 inch x 44 inch).
- E. Include a title block and a timeline on each page.

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

- A. Contractor's transmittal letter.
- B. Work completed during the period.
- C. Identification of unusual conditions or restrictions regarding labor, equipment or material; including multiple shifts, 6-day work weeks, specified overtime or work at times other than regular days or hours.
- D. Description of the current critical path.
- E. Changes to the critical path and scheduled completion date since the last schedule submittal.
- F. Description of problem areas.
- G. Current and anticipated delays:
  - 1. Cause of delay.
  - 2. Impact of delay on other activities, milestones and completion dates.
  - 3. Corrective action and schedule adjustments to correct the delay.
- H. Pending items and status thereof:
  - 1. Permits
  - 2. Change orders
  - 3. Time adjustments
  - 4. Non-compliance notices
- I. Reasons for an early or late scheduled completion date in comparison to the contract completion date.

Tabular reports shall be software-generated and provide information for each activity included in the project schedule. Three different reports shall be sorted by (1) activity number, (2) early start and (3) total float. Tabular reports shall be 215 mm x 280 mm (8 1/2 inch x 11 inch) in size and shall include, as a minimum, the following applicable information:

- A. Data date
- B. Activity number and description
- C. Predecessor and successor activity numbers and descriptions
- D. Activity codes
- E. Scheduled, or actual and remaining durations (work days) for each activity
- F. Earliest start (calendar) date
- G. Earliest finish (calendar) date
- H. Actual start (calendar) date
- I. Actual finish (calendar) date
- J. Latest start (calendar) date
- K. Latest finish (calendar) date
- L. Free float (work days)
- M. Total float (work days)
- N. Percentage of activity complete and remaining duration for incomplete activities.
- O. Lags
- P. Required constraints

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

## **PRE-CONSTRUCTION SCHEDULING CONFERENCE**

The Contractor shall schedule and the Engineer will conduct a pre-construction scheduling conference with the Contractor's project manager and construction scheduler within 10 working days of the approval of the contract. At this meeting the Engineer will review the requirements of this section of the special provisions with the Contractor.

The Contractor shall submit a general time-scaled logic diagram displaying the major activities and sequence of planned operations and shall be prepared to discuss the proposed work plan and schedule methodology that comply with the requirements of these special provisions. If the Contractor proposes deviations to the construction staging of the project, then the general time-scaled logic diagram shall also display the deviations and resulting time impacts. The Contractor shall be prepared to discuss the proposal.

At this meeting, the Contractor shall additionally submit the alphanumeric coding structure and the activity identification system for labeling the work activities. To easily identify relationships, each activity description shall indicate its associated scope or location of work by including such terms as quantity of material, type of work, bridge number, station to station location, side of highway (such as left, right, northbound, southbound), lane number, shoulder, ramp name, ramp line descriptor or mainline.

The Engineer will review the logic diagram, coding structure, and activity identification system, and provide any required baseline schedule changes to the Contractor for implementation.

## **BASELINE SCHEDULE**

Beginning the week following the pre-construction scheduling conference, the Contractor shall meet with the Engineer weekly until the baseline schedule is accepted by the Engineer to discuss schedule development and resolve schedule issues.

The Contractor shall submit to the Engineer a baseline schedule within 20 working days of approval of the contract. The Contractor shall allow 3 weeks for the Engineer's review after the baseline schedule and all support data are submitted. In addition, the baseline schedule submittal will not be considered complete until the computer software is delivered and installed for use in review of the schedule.

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

The baseline schedule shall not extend beyond the number of working days specified in these special provisions. The baseline schedule shall have a data date of the first working day of the contract and not include any completed work to date. The baseline schedule shall not attribute negative float or negative lag to any activity.

If the Contractor submits an early completion baseline schedule that shows contract completion in less than 85 percent of the working days specified in these special provisions, the baseline schedule shall be supplemented with resource allocations for every task activity and include time-scaled resource histograms. The resource allocations shall be shown to a level of detail that facilitates report generation based on labor crafts and equipment classes for the Contractor and subcontractors. The Contractor shall use average composite crews to display the labor loading of on-site construction activities. The Contractor shall optimize and level labor to reflect a reasonable plan for accomplishing the work of the contract and to assure that resources are not duplicated in concurrent activities. The time-scaled resource histograms shall show labor crafts and equipment classes to be utilized on the contract. The Engineer may review the baseline schedule activity resource allocations using Means Productivity Standards or equivalent to determine if the schedule is practicable.

## **UPDATE SCHEDULE**

The Contractor shall submit an update schedule and meet with the Engineer to review contract progress, on or before the first day of each month, beginning one month after the baseline schedule is accepted. The Contractor shall allow 2 weeks for the Engineer's review after the update schedule and all support data are submitted, except that the review period shall not start until the previous month's required schedule is accepted. Update schedules that are not accepted or rejected within the review period will be considered accepted by the Engineer.

The update schedule shall have a data date of the twenty-first day of the month or other date established by the Engineer. The update schedule shall show the status of work actually completed to date and the work yet to be performed as planned. Actual activity start dates, percent complete and finish dates shall be shown as applicable. Durations for work that has been completed shall be shown on the update schedule as the work actually occurred, including Engineer submittal review and Contractor resubmittal times.

The Contractor may include modifications such as adding or deleting activities or changing activity constraints, durations or logic that do not (1) alter the critical path(s) or near critical path(s) or (2) extend the scheduled completion date compared to that shown on the current accepted schedule. The Contractor shall state in writing the reasons for any changes to planned work. If any proposed changes in planned work will result in (1) or (2) above, then the Contractor shall submit a time impact analysis as described herein.

## **TIME IMPACT ANALYSIS**

The Contractor shall submit a written time impact analysis (TIA) to the Engineer with each request for adjustment of contract time, or when the Contractor or Engineer consider that an approved or anticipated change may impact the critical path or contract progress.

The TIA shall illustrate the impacts of each change or delay on the current scheduled completion date or internal milestone, as appropriate. The analysis shall use the accepted schedule that has a data date closest to and prior to the event. If the Engineer determines that the accepted schedule used does not appropriately represent the conditions prior to the event, the accepted schedule shall be updated to the day before the event being analyzed. The TIA shall include an impact schedule developed from incorporating the event into the accepted schedule by adding or deleting activities, or by changing durations or logic of existing activities. If the impact schedule shows that incorporating the event modifies the critical path and scheduled completion date of the accepted schedule, the difference between scheduled completion dates of the two schedules shall be equal to the adjustment of contract time. The Engineer may construct and utilize an appropriate project schedule or other recognized method to determine adjustments in contract time until the Contractor provides the TIA.

The Contractor shall submit a TIA in duplicate within 15 working days of receiving a written request for a TIA from the Engineer. The Contractor shall allow the Engineer 2 weeks after receipt to approve or reject the submitted TIA. All approved TIA schedule changes shall be shown on the next update schedule.

If a TIA submitted by the Contractor is rejected by the Engineer, the Contractor shall meet with the Engineer to discuss and resolve issues related to the TIA. If agreement is not reached, the Contractor will be allowed 15 days from the meeting with the Engineer to give notice in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications. The Contractor shall only show actual as-built work, not unapproved changes related to the TIA, in subsequent update schedules. If agreement is reached at a later date, approved TIA schedule changes shall be shown on the next update schedule. The Engineer will withhold remaining payment on the schedule contract item if a TIA is requested by the Engineer and not submitted by the Contractor within 15 working days. The schedule item payment will resume on the next estimate after the requested TIA is submitted. No other contract payment will be retained regarding TIA submittals.

## **FINAL UPDATE SCHEDULE**

The Contractor shall submit a final update, as-built schedule with actual start and finish dates for the activities, within 30 days after completion of contract work. The Contractor shall provide a written certificate with this submittal signed by the Contractor's project manager and an officer of the company stating, "To my knowledge and belief, the enclosed final update schedule reflects the actual start and finish dates of the actual activities for the project contained herein." An officer of the company may delegate in writing the authority to sign the certificate to a responsible manager.

## **RETENTION**

The Department will retain an amount equal to 25 percent of the estimated value of the work performed during each estimate period in which the Contractor fails to submit an acceptable schedule conforming to the requirements of these special provisions as determined by the Engineer. Schedule retentions will be released for payment on the next monthly estimate for partial payment following the date that acceptable schedules are submitted to the Engineer or as otherwise specified herein. Upon completion of all contract work and submittal of the final update schedule and certification, any remaining retained funds associated with this section, "Progress Schedule (Critical Path Method)", will be released for payment. Retentions held in conformance with this section shall be in addition to other retentions provided for in the contract. No interest will be due the Contractor on retention amounts.

## **PAYMENT**

Progress schedule (critical path method) will be paid for at a lump sum price. The contract lump sum price paid for progress schedule (critical path method) shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, including computer software, and for doing all the work involved in preparing, furnishing, and updating schedules, and instructing and assisting the Engineer in the use of computer software, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Payments for the progress schedule (critical path method) contract item will be made progressively as follows:

- A. A total of 25 percent of the item amount or a total of 25 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon achieving all of the following:
  1. Completion of 5 percent of all contract item work.
  2. Acceptance of all schedules and TIAs required to the time when 5 percent of all contract item work is complete.

3. Delivery of schedule software to the Engineer.
  4. Completion of required schedule software training.
- B. A total of 50 percent of the item amount or a total of 50 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon completion of 25 percent of all contract item work and acceptance of all schedules and TIAs required to the time when 25 percent of all contract item work is complete.
  - C. A total of 75 percent of the item amount or a total of 75 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon completion of 50 percent of all contract item work and acceptance of all schedules and TIAs required to the time when 50 percent of all contract item work is complete.
  - D. A total of 100 percent of the item amount or a total of 100 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon completion of all contract item work, acceptance of all schedules and TIAs required to the time when all contract item work is complete, and submittal of the certified final update schedule.

If the Contractor fails to complete any of the work or provide any of the schedules required by this section, the Engineer shall make an adjustment in compensation in conformance with the provisions in Section 4-1.03C, "Changes in Character of Work," of the Standard Specifications for the work not performed. Adjustments in compensation for schedules will not be made for any increased or decreased work ordered by the Engineer in furnishing schedules.

#### **10-1.10 OVERHEAD**

Overhead shall conform to these special provisions. The Contractor will be compensated for time-related overhead in conformance with these special provisions.

Attention is directed to "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 any other charges incurred only once during the contract.

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 any of the work of the contract. Such time-related costs include, but are not limited to, the salaries and benefits 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. The rate of home office overhead 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 to be paid will be measured by the working day, as specified in the Engineer's Estimate as WDAY. The estimated amount will be based on the number of working days, excluding any days for plant establishment, as specified in "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions. 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 quantity of time-related overhead eligible for payment will be based on the total number of working days as specified in "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions, rather than the Contractor's early completion progress schedule. The quantity of time-related overhead, as measured above, will be adjusted only as a result of suspensions and adjustments of time which revise the current contract completion date and which are also any of the following:

- 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; or

2. Suspensions ordered due to the failure on the part of the Contractor to carry out orders given, or to perform any provision of the contract; or
  3. Any other suspensions mutually agreed upon between the Engineer and the Contractor.
- B. Extensions of 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; or
- C. Reductions in contract time set forth in approved contract change orders, in conformance with the provisions in Section 4-1.03, "Changes," of the Standard Specifications.

In the event a cost reduction proposal is submitted by the Contractor, and is subsequently approved by the Engineer, which provides for a reduction in contract time, the contract amount of time-related overhead associated with the reduction in contract time shall be considered as a net savings in the total cost of time-related overhead. The Contractor will be paid 50 percent of the estimated net savings of the time-related overhead, in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications.

If the quantity of time-related overhead, measured as specified in this special provision, exceeds 149 percent of the number of working days specified in the Engineer's Estimate, the Contractor shall, within 60 days of the Engineer's written request, submit to the Engineer an audit examination and report performed by an independent Certified Public Accountant of the Contractor's actual overhead costs. The independent Certified Public Accountant's audit examination shall be performed in conformance with the requirements of the American Institute of Certified Public Accountants Attestation Standards. The audit examination and report shall depict the Contractor's project and company-wide financial records and shall specify the actual overall average daily rates for both field and home office overhead for the entire duration of the project, and whether the costs have been properly allocated. The rates of field and home office overhead shall exclude all unallowable costs as determined in the Federal Acquisition Regulations, 48 CFR, Chapter 1, Part 31. The audit examination shall determine if the rates of field and home office overhead:

- A. are allowable in conformance with the requirements of the Federal Acquisition Regulations, 48 CFR, Chapter 1, Part 31;
- B. are adequately supported by reliable documentation; and
- C. related solely to the project under examination.

Upon 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 elects, or if requested in writing by the Contractor, contract item payments for time-related overhead, in excess of 149 percent of the number of working days designated in the Engineer's Estimate, will be adjusted to reflect the actual rate.

The cost of performing an 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 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 contract price paid per working day for time-related overhead shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in time-related overhead, complete in place, including all field and home office overhead costs incurred by the Contractor and by any joint venture partner, subcontractor, supplier or other party associated with the Contractor, and the Contractor's share of costs of audits 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," 4-1.03C, "Changes in Character of the Work," of the Standard Specifications shall not apply to time-related overhead.

Full compensation for additional overhead costs involved in the performance of extra work at force account shall be considered as included in the markups specified in "Force Account Payment," of these special provisions.

Full compensation for additional overhead cost involved in performing additional contract item work that is not a controlling operation and for all overhead, other than the time-related overhead measured and paid for as specified in this section "Overhead", shall be considered as included in the various items of work involved, and no additional compensation will be allowed therefor.

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. The amount earned per working day for time-related overhead shall be either the contract item price, or 20 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, whichever is the lesser.

After all work has been completed, except plant establishment work, as provided in Section 20-4.08, "Plant Establishment Work," of the Standard Specifications, the amount, if any, of the total contract item price for time-related overhead not yet paid will be included for payment in the first estimate made after completion of all roadway construction work, in conformance with the provisions in Section 9-1.06, "Partial Payments," of the Standard Specifications.

**10-1.11 OBSTRUCTIONS**

Attention is directed to Section 8-1.10, "Utility and Non-Highway Facilities," and Section 15, "Existing Highway Facilities," and Section 51-1.19, "Utility Facilities," of the Standard Specifications and these special provisions.

Attention is directed to the existence of certain underground facilities that may require special precautions be taken by the Contractor to protect the health, safety and welfare of workers and of the public. Facilities requiring special precautions include, but are not limited to: conductors of petroleum products, oxygen, chlorine, and toxic or flammable gases; natural gas in pipelines greater than 150 mm in diameter or pipelines operating at pressures greater than 415 kPa (gage); underground electric supply system conductors or cables, with potential to ground of more than 300 V, either directly buried or in a duct or conduit which do not have concentric grounded or other effectively grounded metal shields or sheaths.

If these facilities are not located on the plans in both alignment and elevation, no work shall be performed in the vicinity of the facilities, except as provided herein for conduit to be placed under pavement, until the owner, or the owner's representative, has located the facility by potholing, probing or other means that will locate and identify the method in conformance with the provisions in "Conduit" of these special provisions. If, in the opinion of the Engineer, the Contractor's operations are delayed or interfered with by reason of the utility facilities not being located by the owner or the owner's representative, the State will compensate the Contractor for the delays to the extent provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications, and not otherwise, except as provided in Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications.

All excavation required to install electrical conduits and pull boxes within 1.22-m in the areas with high risks utilities shall be performed by hand excavation without the use of power equipment except that power equipment may be used to cut and remove asphalt or portland cement pavement.

The Contractor shall notify the Engineer and the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to performing any excavation or other work close to any underground pipeline, conduit, duct, wire or other structure. Regional notification centers include, but are not limited to, the following:

| Notification Center                                 | Telephone Number |
|---|------------------|
| Underground Service Alert-Northern California (USA) | 1-800-642-2444   |
|   | 1-800-227-2600   |
| Underground Service Alert-Southern California (USA) | 1-800-422-4133   |
|   | 1-800-227-2600   |

The following utility agencies shall be contacted prior to doing work at the location indicated in this section of these special provisions:

| Utility Agency    | Telephone Number |
|-------------------|------------------|
| So. Cal Edison    | 805-654-7315     |
| Calleguas MWD     | 805-579-7118     |
| Verizon           | 805-388-2210     |
| Verizon Americast | 805-384-5723     |
| Adelphia Cable    | 805-375-5213     |
| City of Camarilo  | 805-388-5345     |
| So. Cal Gas       | 805-681-8029     |

Final installation of the following utilities will require coordination with the Contractor's operations. The Contractor shall make necessary arrangements with the utility company, through the Engineer, and shall submit a schedule of work, verified by a representative of the utility company to the Engineer.

| Utility Company   | Location at Arneill O.C.                   | Minimum Working Days |
|-------------------|--|----------------------|
| City of Camerilo  | 305 mm water line 7.5 m West of centerline | 14                   |
| So. Cal Edison    | 2-126 mm ducts 9.95 m East of centerline   | 14                   |
| Adelphia Cable    | 2-102 mm 10,11 m West of centerline        | 14                   |
| Verizon Americast | 2-102 mm 10.11 m West of centerline        | 14                   |
| Verizon           | 6-102 mm 10.11 m west of centerline        | 14                   |

The removal or installation of the following utilities will require coordination with the Contractor's operation as shown on the plans:

Calleguas Municipal Water District to install 975 mm water line along Daily Drive.

So. Cal. Edison to install 4 new overhead poles along realigned Daily Drive and to remove 6 existing overhead poles upon completion of the final grading.

#### 10-1.12 DUST CONTROL

Dust control shall conform to the provisions in Section 10, "Dust Control," of the Standard Specifications and these special provisions.

Attention is directed to "Water Conservation" of these special provisions regarding the use of a dust palliative to control dust.

#### 10-1.13 MOBILIZATION

Mobilization shall conform to the provisions in Section 11, "Mobilization," of the Standard Specifications.

#### 10-1.14 CONSTRUCTION AREA TRAFFIC CONTROL DEVICES

Flagging, signs, and all other traffic control devices furnished, installed, maintained, and removed when no longer required shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Category 1 traffic control devices are defined as those devices that are small and lightweight (less than 45 kg), and have been in common use for many years. The devices shall be known to be crashworthy by crash testing, crash testing of similar devices, or years of demonstrable safe performance. Category 1 traffic control devices include traffic cones, plastic drums, portable delineators, and channelizers.

If requested by the Engineer, the Contractor shall provide written self-certification for crashworthiness of Category 1 traffic control devices. Self-certification shall be provided by the manufacturer or Contractor and shall include the following: date, Federal Aid number (if applicable), expenditure authorization, district, county, route and kilometer post of project limits; company name of certifying vendor, street address, city, state and zip code; printed name, signature and title of certifying person; and an indication of which Category 1 traffic control devices will be used on the project. The Contractor may obtain a standard form for self-certification from the Engineer.

Category 2 traffic control devices are defined as those items that are small and lightweight (less than 45 kg), that are not expected to produce significant vehicular velocity change, but may otherwise be potentially hazardous. Category 2 traffic control devices include: barricades and portable sign supports.

Category 2 devices purchased on or after October 1, 2000 shall be on the Federal Highway Administration (FHWA) Acceptable Crashworthy Category 2 Hardware for Work Zones list. This list is maintained by FHWA and can be located at the following internet address: <http://safety.fhwa.dot.gov/fourthlevel/hardware/listing.cfm?code=workzone>. The Department maintains a secondary list at the following internet address: <http://www.dot.ca.gov/hq/traffops/signtech/signdel/pdf/files.htm>.

Category 2 devices that have not received FHWA acceptance, and were purchased before October 1, 2000, may continue to be used until they complete their useful service life or until January 1, 2003, whichever comes first. Category 2 devices in use that have received FHWA acceptance shall be labeled with the FHWA acceptance letter number and the name of the manufacturer by the start of the project. The label shall be readable. After January 1, 2003, all Category 2 devices without a label shall not be used on the project.

If requested by the Engineer, the Contractor shall provide a written list of Category 2 devices to be used on the project at least 5 days prior to beginning any work using the devices. For each type of device, the list shall indicate the FHWA acceptance letter number and the name of the manufacturer.

Full compensation for providing self-certification for crashworthiness of Category 1 traffic control devices and for providing a list of Category 2 devices used on the project and labeling Category 2 devices as specified shall be considered as included in the prices paid for the various contract items of work requiring the use of the Category 1 or Category 2 traffic control devices and no additional compensation will be allowed therefor.

**10-1.15 CONSTRUCTION AREA SIGNS**

Construction area signs shall be furnished, installed, maintained, and removed when no longer required in conformance with the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. Type II retroreflective sheeting shall not be used on 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 notify the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to commencing excavation for construction area sign posts. The regional notification centers include, but are not limited to, the following:

| Notification Center                                 | Telephone Number |
|---|------------------|
| Underground Service Alert-Northern California (USA) | 1-800-642-2444   |
|   | 1-800-227-2600   |
| Underground Service Alert-Southern California (USA) | 1-800-422-4133   |
|   | 1-800-227-2600   |

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.

Sign substrates for stationary mounted construction area signs may be fabricated from fiberglass reinforced plastic as specified under "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

The Contractor may be required to cover certain signs during the progress of the work. Signs that are no longer required or that convey inaccurate information to the public shall be immediately covered or removed, or the information shall be corrected. Covers for construction area signs shall be of sufficient size and density to completely block out the complete face of the signs. The retroreflective face of the covered signs shall not be visible either during the day or at night. Covers shall be fastened securely so that the signs remain covered during inclement weather. Covers shall be replaced when they no longer cover the signs properly.

Full compensation for placing, fastening, maintaining, replacing and removing sign covers shall be considered as included in the contract lump sum price paid for construction area signs and no separate payment will be made therefor.

**10-1.16 MAINTAINING TRAFFIC**

Attention is directed to Sections 7-1.08, "Public Convenience," 7-1.09, "Public Safety," and 12, "Construction Area Traffic Control Devices," of the Standard Specifications and to the provisions in "Public Safety", "Portable Changeable Message Sign", and "Structural Approach Slabs (Type R)" of these special provisions and these special provisions. Nothing in these special provisions shall be construed as relieving the Contractor from the responsibilities specified in Section 7-1.09.

Lane closures shall conform to the provisions in section "Traffic Control System for Lane Closure" of these special provisions.

In addition to the provisions set forth in "Public Safety" of these special provisions, whenever work to be performed on the freeway traveled way (except grinding operations; saw-cutting concrete slabs with a truck mounted attenuator (TMA) as a shadow vehicle and the work of installing, maintaining and removing traffic control devices) is within 1.8 m of the adjacent traffic lane, the adjacent traffic lane shall be closed.

At locations where falsework pavement lighting or pedestrian openings through falsework are designated, falsework lighting shall be installed in conformance with the provisions in Section 86-6.11, "Falsework Lighting," of the Standard Specifications.

Openings shall be provided through bridge falsework for the use of public traffic at each location where falsework is constructed over the streets or routes listed in the following table. The type, minimum width, height, and number of openings at each location, and the location and maximum spacing of falsework lighting, if required for each opening, shall conform to the requirements in the table. The width of vehicular openings shall be the clear width between temporary railings or other protective work. The spacing shown for falsework pavement lighting is the maximum distance center to center in meters between fixtures.

Camarillo Overhead & Separation  
(Bridge No. 52-0016)  
Route 34

|                             | Number      | Width   | Height |
|-----------------------------|-------------|---------|--------|
| Vehicle Openings            | 1 (NB)      | 5.41    | 4.6    |
|                             | 1 (SB)      | 6.10    | 4.6    |
| Pedestrian Openings         | 1 (NB)      | 1.52    | 2.44   |
|                             |             |         |        |
|                             | Location    | Spacing |        |
| Falsework Pavement Lighting | R (NB & SB) | 7       |        |

(Width and Height in meters)  
(R = Right side of traffic. L = Left side of traffic)  
(C = Centered overhead)

Camarillo Overhead & Separation  
(Bridge No. 52-0016)  
Dawson Road

|                             | Number      | Width                       | Height |
|-----------------------------|-------------|-----------------------------|--------|
| Vehicle Openings            | 1           | 9.6                         | 4.6    |
| Pedestrian Openings         | 1 (Rt Side) | 1.52                        | 2.44   |
|                             |             |                             |        |
|                             | Location    | Spacing                     |        |
| Falsework Pavement Lighting | R & L       | 9<br>staggered 1/2<br>space |        |

(Width and Height in meters)  
(R = Right side of traffic. L = Left side of traffic)  
(C = Centered overhead)

Arneill Road Overcrossing  
(Bridge No. 52-0447)

|                             | Number   | Width   | Height |
|-----------------------------|----------|---------|--------|
| Vehicle Openings            | 1 (NB)   | 14.7    | 4.6    |
|                             | 1 (SB)   | 14.7    | 4.6    |
|                             |          |         |        |
|                             | Location | Spacing |        |
| Falsework Pavement Lighting | R & L    | 9       |        |

(Width and Height in meters)  
(R = Right side of traffic. L = Left side of traffic)  
(C = Centered overhead)

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

Personal vehicles of the Contractor's employees shall not be parked within the freeway right of way.

The Contractor shall notify local authorities of the Contractor's intent to begin work at least 5 days before work is begun. The Contractor shall cooperate with local authorities relative to handling traffic through the area and shall make arrangements relative to keeping the working area clear of parked vehicles.

Whenever vehicles or equipment are parked on the freeway shoulder within 1.8 m of a traffic lane, the shoulder area shall be closed as shown on the plans.

Except as otherwise provided in these special provisions or as shown on the Stage Construction Plans, freeway lanes and ramps shall be closed only during the hours shown on Charts 1 through 2, and 5 through 9 included in this section "Maintaining Traffic." Except work required under Sections 7-1.08 and 7-1.09, work that interferes with public traffic shall be performed only during the hours shown for lane closures.

Except as otherwise provided in these special provisions, at his option, the Contractor may work during the hours designated as "No freeway lane closure permitted; no work permitted ..." shown on Charts 1 and 2, provided temporary traffic screens are installed on top of temporary railings (Type K), as shown on the plans. Temporary traffic screen panels shall be new or used CDX Grade, or better, plywood or weather resistant strandboard mounted and anchored on temporary railing (Type K). Wale boards shall be new or used Douglas fir, rough sawn, Construction Grade, or better. Pipe screen supports shall be new or used galvanized steel pipe Schedule 40. Nuts, bolts, and washers shall be cadmium plated. Screws shall be black or cadmium plated flat head, cross slotted screws with full thread length.

When removing and replacing approach slabs, the Contractor shall schedule his operations in conformance with the hours and requirements shown on Table A and B in place of Charts 1 and 2. The Contractor shall place a Special "WET CONCRETE" sign in front of newly poured concrete during the entire cure period. When a designated legal holiday falls between and including Thursday and the following Tuesday, no work will be permitted during the intervening weekend for approach slab replacement.

Except as otherwise provided in these special provisions, Route 101 freeway may be closed to public traffic in one direction at a time for the purpose of falsework erection, falsework removal and bridge demolition in conformance with the hours and requirements as shown on Charts 3 and 4.

When performing freeway restriping, the Contractor shall close freeway lanes as shown on the plan (Flip-Flop Operation).

Except as otherwise shown on the Stage Construction Plans, ramps shall be closed only during the hours as shown on Charts 5 through 9.

No two consecutive on-ramps or consecutive off-ramps in the same direction of travel shall be closed at the same time unless otherwise permitted by the Engineer. If two or more consecutive on-ramps are permitted to be closed, the Contractor, at his expense, shall furnish and install special signs for entrance ramp closures (sign SP-4) as directed by the Engineer. When an off-ramp is closed, the Contractor shall furnish and erect, as directed by the Engineer, a special sign for exit ramp closures (sign SP-3 or SP-5) as shown on the plans.

Special advance notice publicity signs (sign SP-1), as shown on the plans shall be posted as directed by the Engineer, a minimum of 7 days prior to the actual ramp closure. When work is not actively in progress, the SP-1 sign shall be removed or covered. When a ramp is closed, public traffic shall be detoured as directed by the Engineer.

Full compensation for furnishing, erecting, maintaining, and removing special portable freeway detour signs (sign SP-2), special signs for exit ramp closures (SP-3 or SP-5), special advance notice publicity signs (SP-1), and special "WET CONCRETE" (2100 MM X 900 MM, series "D" letter and black on orange) signs as shown on the plans or in these special provisions shall be considered as included in the contract lump sum price paid for traffic control system and no additional payment will be made therefor.

All aforementioned special signs shall become the property of the Contractor at the conclusion of this project and shall be removed from the worksite.

Lewis Road (Route 34) and Dawson Drive shall be closed only during the hours shown on Table C included in this section "Maintaining Traffic." Except work required under Sections 7-1.08 and 7-1.09, work that interferes with public traffic shall be performed only during the hours shown for lane closures.

Except as otherwise provided in these special provisions or as shown on stage construction plans, a minimum of one paved traffic lane, not less than 3.3 m wide on Lewis Road (Route 34) and local streets, shall be opened for use by public traffic in each direction of travel. No work that interfere with traffic shall be performed on Saturday, Sunday, designated legal holidays or after 3:00 p.m. on Friday and the day preceding designated legal holiday.

Lewis Road and Dawson Drive in the same direction of travel shall not be closed at the same time unless otherwise permitted by the Engineer.

Furnishing, erecting, maintaining, and removing special portable detour signs to accommodate closure and detour requirement for Lewis Road (Route 34) and Dawson Drive will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

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.

Minor deviations from the requirements of this section concerning hours of work which do not significantly change the cost of the work may be permitted upon the written request of the Contractor, if in the opinion of the Engineer, public traffic will be better served and the work expedited. These deviations shall not be adopted by the Contractor until the Engineer has approved the deviations in writing. All other modifications will be made by contract change order.

Pedestrian access facilities shall be provided for passenger loading access east of Bent 6 at Camarillo Overhead and Separation, and through other construction areas within the right of way as shown on the plans and as specified herein. Pedestrian walkways shall be surfaced with asphalt concrete, portland cement concrete or timber. The surface shall be skid resistant and free of irregularities. Hand railings shall be provided on each side of pedestrian walkways as necessary to protect pedestrian traffic from hazards due to construction operations or adjacent vehicular traffic. Protective overhead covering shall be provided as necessary to insure protection from falling objects and drip from overhead structures.

In addition to the required openings through falsework, pedestrian facilities shall be provided during pile driving, footing, wall, and other bridge construction operations. At least one walkway shall be available at all times. If the Contractor's operations require the closure of one walkway, then another walkway shall be provided nearby, off the traveled roadway.

Railings shall be constructed of wood, S4S, and shall be painted white. Railings and walkways shall be maintained in good condition. Walkways shall be kept clear of obstructions.

Full compensation for providing pedestrian facilities 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.

Precast concrete members shall not be cast, assembled or stored within the right of way of Route 101 or within the median or within 6 m of the edge of pavement of Route 101. During work on the members, no workers, equipment or materials shall occupy any area within 1.2 m of the edge of the existing pavement except as permitted during lane closures.

Erection and removal of falsework over Route 101 on Arneill Road Overcrossing, and on Route 34 and Dawson Street at Camarillo Overhead and Separation, at locations where falsework openings are required, shall be undertaken one location at a time. During falsework erection and removal, public traffic in the lanes over which falsework is being erected or removed shall be routed around the work area by means of a local detour conforming to these special provisions. Erection shall include all adjustments or removal of falsework components prior to concrete placement that contribute to the horizontal stability of the falsework system. Removal shall include lowering falsework, blowing sand from sand jacks, turning screws on screw jacks, and removing wedges.

Regardless of the construction procedure, methods and equipment selected, the Contractor shall have necessary materials and equipment on the site to erect or remove the falsework in any one span or over any one opening prior to detouring or stopping public traffic, and shall erect or remove the falsework in an expeditious manner in order that inconvenience to public traffic will be at a minimum.

| <b>Chart No. 1</b>  |   |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |
|---|---|---|---|---|---|---|---|---|---|---|----|------|----|---|---|---|---|---|---|---|---|---|----|----|
| <b>Lane Requirements and Hours of Work</b>  |   |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |
| Location: Northbound Route 101 from Calleguas Creek to Carmen Dr. off-ramp  |   |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |
| FROM HOUR TO HOUR   | a.m.  |   |   |   |   |   |   |   |   |   |    | p.m. |    |   |   |   |   |   |   |   |   |   |    |    |
|   | 12  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11   | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Mondays through Thursdays   | 1   | 1 | 1 | 1 | 1 | 1 | 2 |   |   |   |    |      |    |   |   | X | X | X |   | 2 | 2 | 2 | 1  | 1  |
| Fridays   | 1   | 1 | 1 | 1 | 1 | 1 | 2 |   |   |   |    |      |    |   |   | X | X | X |   |   | 2 | 2 | 2  | 2  |
| Saturdays   | 1   | 1 | 1 | 1 | 1 | 1 | 2 | 2 |   |   |    |      |    |   |   |   |   |   |   | 2 | 2 | 2 | 2  | 1  |
| Sundays   | 1   | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 |   |    |      |    |   |   |   |   |   |   | 2 | 2 | 2 | 2  | 1  |
| Working day before designated legal holiday   | 1   | 1 | 1 | 1 | 1 | 1 | 2 |   |   |   |    |      | X  | X | X | X | X | X | X | X | X | X | X  | X  |
| Designated legal holidays   | X   | X | X | X | X | X | X | X | X | X | X  | X    | X  | X | X | X | X | X | X | X | X | X | X  | X  |
| <b>Legend:</b>  |   |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |
| 1   | Provide at least one through freeway lane open in direction of travel                         |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |
| 2   | Provide at least two through freeway lanes open in direction of travel                        |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |
|   | No lane closure permitted; work permitted anywhere that does not require freeway lane closure |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |
| X   | No lane closure permitted; no work permitted on north roadway                                 |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |
| <b>REMARKS: Number of Through Traffic Lanes - 3*</b>  |   |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |
| * - The traffic lane which is outside of the through traffic lanes and is delineated with a double line of pavement markers as shown on "Pavement Markers and Traffic Lines Detail 37 series," may be closed at same time as the adjacent ramp is allowed to be closed as shown on Chart 8, except as otherwise provided in this section. |   |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |

**Chart No. 2  
Lane Requirements and Hours of Work**

Location: Southbound Route 101 from Carmen Dr. to Calleguas Creek

| FROM HOUR TO HOUR                           | a.m. |   |   |   |   |   |   |   |   |   |    |    | p.m. |   |   |   |   |   |   |   |   |   |    |    |    |
|---|------|---|---|---|---|---|---|---|---|---|----|----|------|---|---|---|---|---|---|---|---|---|----|----|----|
|   | 12   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Mondays through Thursdays                   | 1    | 1 | 1 | 1 | 1 | 2 |   | X |   |   |    |    |      |   |   |   |   | X |   | 2 | 2 | 2 | 1  | 1  |    |
| Fridays                                     | 1    | 1 | 1 | 1 | 1 | 2 |   | X |   |   |    |    |      |   |   |   |   | X |   |   | 2 | 2 | 2  | 1  |    |
| Saturdays                                   | 1    | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 |    |    |      |   |   |   | X | X |   | 2 | 2 | 2 | 2  | 1  |    |
| Sundays                                     | 1    | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2  |    |      |   |   |   | X | X | X | X |   | 2 | 2  | 1  | 1  |
| Working day before designated legal holiday | 1    | 1 | 1 | 1 | 1 | 2 |   | X | X | X | X  | X  | X    | X | X | X | X | X | X | X | X | X | X  | X  |    |
| Designated legal holidays                   | X    | X | X | X | X | X | X | X | X | X | X  | X  | X    | X | X | X | X | X | X | X | X | X | X  | X  |    |

**Legend:**

|   |   |
|---|---|
| 1 | Provide at least one through freeway lane open in direction of travel                         |
| 2 | Provide at least two through freeway lanes open in direction of travel                        |
|   | No lane closure permitted; work permitted anywhere that does not require freeway lane closure |
| X | No lane closure permitted; no work permitted on south roadway                                 |

REMARKS: Number of Through Traffic Lanes - 3\*

\* - The traffic lane which is outside of the through traffic lanes and is delineated with a double line of pavement markers as shown on "Pavement Markers and Traffic Lines Detail 37 series," may be closed at same time as the adjacent ramp is allowed to be closed as shown on Charts 6 and 9, except as otherwise provided in this section.

| Chart No. 3   |  |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
|---|--|---|---|---|---|---|---|---|---|---|----|------|----|---|---|---|---|---|---|---|---|---|--|----|----|
| Complete Freeway Closure Requirements and Hours of Work   |  |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
| Location: Northbound Route 101 from Lewis Rd. (Rte. 34) to Carmen Dr.   |  |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
| FROM HOUR TO HOUR   | a.m.                                   |   |   |   |   |   |   |   |   |   |    | p.m. |    |   |   |   |   |   |   |   |   |   |  |    |    |
|   | 12                                     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11   | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |  | 10 | 11 |
| Mondays through Thursdays   | C                                      | C | C | C | C |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    | C  |
| Fridays   | C                                      | C | C | C | C |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
| Saturdays   | C                                      | C | C | C | C | C |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
| Sundays   | C                                      | C | C | C | C | C | C |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    | C  |
| Working day before designated legal holiday   | C                                      | C | C | C | C | C |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
| Designated legal holidays   |  |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
| Legend:   |  |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
| C   | Freeway may be closed completely       |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
|   | No complete freeway closure is allowed |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
| REMARKS: Detour traffic to exit at Lewis Rd. (Rte. 34) off-ramp; east on Daily Dr. to Lewis Rd. (Rte 34); south to Ventura Blvd.; west to Carmen Dr.; north to the on-ramp to northbound Route 101. Place a portable changeable message sign on the right shoulder of northbound Route 101 at Pleasant Valley Rd. on-ramp with the message: "FREEWAY / CLOSED / AHEAD - LEWIS RD / TO / CARMN DR".<br>A minimum of 15 special freeway detour signs (Sign SP-2) shall be posted along the detour route.<br>Close the Flynn Rd. northbound on-ramp. |  |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |

| Chart No. 4   |  |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
|---|--|---|---|---|---|---|---|---|---|---|----|------|----|---|---|---|---|---|---|---|---|---|--|----|----|
| Complete Freeway Closure Requirements and Hours of Work   |  |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
| Location: Southbound Route 101 from Carmen Dr. to Fulton Street OC  |  |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
| FROM HOUR TO HOUR   | a.m.                                   |   |   |   |   |   |   |   |   |   |    | p.m. |    |   |   |   |   |   |   |   |   |   |  |    |    |
|   | 12                                     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11   | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |  | 10 | 11 |
| Mondays through Thursdays   | C                                      | C | C | C | C |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    | C  |
| Fridays   | C                                      | C | C | C | C |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    | C  |
| Saturdays   | C                                      | C | C | C | C | C |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
| Sundays   | C                                      | C | C | C | C | C | C | C |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    | C  |
| Working day before designated legal holiday   | C                                      | C | C | C | C |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
| Designated legal holidays   |  |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
| Legend:   |  |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
| C   | Freeway may be closed completely       |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
|   | No complete freeway closure is allowed |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |
| REMARKS: Detour traffic to exit at Carmen Dr. off-ramp; east on Ventura Blvd. to Fulton St.; north to the on-ramp to southbound Route 101. Place a portable changeable message sign on the right shoulder of southbound Route 101 at Las Posas Rd. on-ramp with the message: "FREEWAY / CLOSED / AHEAD - CARMN DR / TO / LEWIS RD".<br>A minimum of 15 special freeway detour signs (Sign SP-2) shall be posted along the detour route.<br>Close the Carmen Dr. southbound on-ramp. |  |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |  |    |    |

| <b>Chart No. 5</b>                                    |      |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |    |
|---|------|---|---|---|---|---|---|---|---|---|----|------|----|---|---|---|---|---|---|---|---|---|----|----|----|
| <b>Ramp Lane Requirements and Hours of Work</b>       |      |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |    |
| Location: Northbound Route 101 on-ramp from Flynn Rd. |      |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |    |
| FROM HOUR TO HOUR                                     | a.m. |   |   |   |   |   |   |   |   |   |    | p.m. |    |   |   |   |   |   |   |   |   |   |    |    |    |
|   | 12   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11   | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Mondays through Thursdays                             | 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  |
| Saturdays   | 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  |
| Working day before designated legal holiday           | C    | C | C | C | C | C |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |    |
| Designated legal holidays                             |      |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |    |

Legend:

|   |   |
|---|---|
| C | Ramp may be closed  |
|   | Work permitted anywhere that does not require ramp lane closure |

| <b>Chart No. 6</b>                                    |      |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |    |
|---|------|---|---|---|---|---|---|---|---|---|----|------|----|---|---|---|---|---|---|---|---|---|----|----|----|
| <b>Ramp Lane Requirements and Hours of Work</b>       |      |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |    |
| Location: Southbound Route 101 off-ramp to Dawson Dr. |      |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |    |
| FROM HOUR TO HOUR                                     | a.m. |   |   |   |   |   |   |   |   |   |    | p.m. |    |   |   |   |   |   |   |   |   |   |    |    |    |
|   | 12   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11   | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Mondays through Thursdays                             | 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  |
| Saturdays   | 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  |
| Working day before designated legal holiday           | C    | C | C | C | C | C |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |    |
| Designated legal holidays                             |      |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |    |

Legend:

|   |   |
|---|---|
| C | Ramp may be closed  |
|   | Work permitted anywhere that does not require ramp lane closure |

| <b>Chart No. 7</b>   |   |   |   |   |   |   |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    |    |   |
|--|---|---|---|---|---|---|---|---|---|---|----|----|------|---|---|---|---|---|---|---|---|---|----|----|----|---|
| <b>Ramp Lane Requirements and Hours of Work</b>  |   |   |   |   |   |   |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    |    |   |
| Location: Southbound Route 101 on-ramp from Dawson Dr.   |   |   |   |   |   |   |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    |    |   |
| FROM HOUR TO HOUR  | a.m.  |   |   |   |   |   |   |   |   |   |    |    | p.m. |   |   |   |   |   |   |   |   |   |    |    |    |   |
|  | 12  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |   |
| Mondays through Thursdays  | C   | C | C | C | C | C |   |   |   |   |    | C  | C    | C | C | C | C |   |   |   |   | C | C  | C  | C  | C |
| Fridays  | C   | C | C | C | C | C |   |   |   |   |    | C  | C    | C | C | C | C |   |   |   |   | C | C  | C  | C  | C |
| Saturdays  | C   | C | C | C | C | C | C | C | C | C | C  | C  | C    | C | C | C | C | C | C | C | C | C | C  | C  | 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  | C |
| Working day before designated legal holiday  | C   | C | C | C | C | C |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    |    |   |
| Designated legal holidays  |   |   |   |   |   |   |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    |    |   |
| Legend:  |   |   |   |   |   |   |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    |    |   |
| C  | Ramp may be closed  |   |   |   |   |   |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    |    |   |
|  | Work permitted anywhere that does not require ramp lane closure |   |   |   |   |   |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    |    |   |
| REMARKS: The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress. |   |   |   |   |   |   |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    |    |   |

| <b>Chart No. 8</b>   |   |   |   |   |   |   |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    |    |   |   |   |
|--|---|---|---|---|---|---|---|---|---|---|----|----|------|---|---|---|---|---|---|---|---|---|----|----|----|---|---|---|
| <b>Ramp Lane Requirements and Hours of Work</b>                |   |   |   |   |   |   |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    |    |   |   |   |
| Location: Northbound Route 101 off-ramp to Lewis Rd. (Rte. 34) |   |   |   |   |   |   |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    |    |   |   |   |
| FROM HOUR TO HOUR  | a.m.  |   |   |   |   |   |   |   |   |   |    |    | p.m. |   |   |   |   |   |   |   |   |   |    |    |    |   |   |   |
|  | 12  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |   |   |   |
| Mondays through Thursdays                                      | C   | C | C | C | C | C |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    | C  | C  | C | C | C |
| Fridays  | C   | C | C | C | C | C |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    | C  | C | C | C |
| Saturdays  | 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 |
| Working day before designated legal holiday                    | C   | C | C | C | C | C |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    |    |   |   |   |
| Designated legal holidays                                      |   |   |   |   |   |   |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    |    |   |   |   |
| Legend:  |   |   |   |   |   |   |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    |    |   |   |   |
| C  | Ramp may be closed  |   |   |   |   |   |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    |    |   |   |   |
|  | Work permitted anywhere that does not require ramp lane closure |   |   |   |   |   |   |   |   |   |    |    |      |   |   |   |   |   |   |   |   |   |    |    |    |   |   |   |

| Chart No. 9<br>Ramp Lane Requirements and Hours of Work |      |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |    |   |   |   |   |
|---|------|---|---|---|---|---|---|---|---|---|----|------|----|---|---|---|---|---|---|---|---|---|----|----|----|---|---|---|---|
| Location: Southbound Route 101 on-ramp from Fulton St.  |      |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |    |   |   |   |   |
| FROM HOUR TO HOUR                                       | a.m. |   |   |   |   |   |   |   |   |   |    | p.m. |    |   |   |   |   |   |   |   |   |   |    |    |    |   |   |   |   |
|   | 12   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11   | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |   |   |   |   |
| Mondays through Thursdays                               | C    | C | C | C | C | C |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    | C  | C  | C | C |   |   |
| Fridays   | C    | C | C | C | C | C |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |    | C | C | C |   |
| Saturdays   | 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 |
| Working day before designated legal holiday             | C    | C | C | C | C | C |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |    |   |   |   |   |
| Designated legal holidays                               |      |   |   |   |   |   |   |   |   |   |    |      |    |   |   |   |   |   |   |   |   |   |    |    |    |   |   |   |   |

Legend:

|   |   |
|---|---|
| C | Ramp may be closed  |
|   | Work permitted anywhere that does not require ramp lane closure |

TABLE A

PERMISSIBLE HOURS OF LANE CLOSURES FOR  
APPROACH SLAB REPLACEMENT

| LOCATION: Northbound Route 101 at Camarillo Overhead and Separation |   |  |
|---|---|--|
| Lane No. Being Replaced   | Lane No. Closed   | Remove, Replace, and Cure Slabs  |
|   |   | Closure Hours  |
| #1  | #1 & 2  | 12:01 a.m. Saturday to 9:00 a.m. Saturday<br>12:01 a.m. Sunday to 9:00 a.m. Sunday |
| #2  | #1, 2 & 3   | 12:01 a.m. Sunday to 9:00 a.m. Sunday  |
| #3  | #2, 3 & 4   | 12:01 a.m. Saturday to 9:00 a.m. Saturday<br>12:01 a.m. Sunday to 9:00 a.m. Sunday |
| Lane No. Being Replaced   | Other Closure Requirements  |  |
| #1  | Open lane #2 by 6:00 a.m. on Saturdays and 7:00 a.m. on Sundays.<br>Place a portable changeable message sign as shown on the plan.                            |  |
| #2  | Open lane #3 by 7:00 a.m.<br>Close Flynn Road on-ramp<br>Place a portable changeable message sign as shown on the plan.                                       |  |
| #3  | Open lane #2 by 6:00 a.m. on Saturdays and 7:00 a.m. on Sundays<br>Close Flynn Road on-ramp<br>Place a portable changeable message sign as shown on the plan. |  |

TABLE B

PERMISSIBLE HOURS OF LANE CLOSURES FOR  
APPROACH SLAB REPLACEMENT

| LOCATION: Southbound Route 101 at Camarillo Overhead and Separation |   |  |
|---|---|--|
| Lane No.<br>Being<br>Replaced                                       | Lane No.<br>Closed  | Remove, Replace, and Cure Slabs  |
|   |   | Closure Hours  |
| #1  | #1 & 2  | 11:00 p.m. Friday to 10:00 a.m. Saturday<br>11:00 p.m. Saturday to 11:00 a.m. Sunday |
| #2  | #1, 2 & 3   | 11:00 p.m. Saturday to 8:00 a.m. Sunday  |
| #3  | #2, 3 & 4   | 11:00 p.m. Friday to 10:00 a.m. Saturday<br>11:00 p.m. Saturday to 11:00 a.m. Sunday |
| Lane No.<br>Being<br>Replaced                                       | Other Closure Requirements  |  |
| #1  | Open lane #2 by 6:00 a.m. on Saturdays and 8:00 a.m. on Sundays.<br>Place a portable changeable message sign as shown on the plan.  |  |
| #2  | Use right shoulder as a traffic lane as shown on Standard Plan T-10A.<br>Open lane #3 by 8:00 a.m.<br>Close Fulton Street on-ramp<br>Place a portable changeable message sign as shown on the plan. |  |
| #3  | Open lane #2 by 6:00 a.m. on Saturdays and 8:00 a.m. on Sundays.<br>Close ramps as necessary<br>Place a portable changeable message sign as shown on the plan.                                      |  |

Table C  
Permissible Hours of Closures and Detour Routes for  
Lewis Road and Dawson Drive

|                       | Permissible Hours of Closure | Detour Routes and Closure Requirements   |
|-----------------------|------------------------------|--|
| Lewis Road (Route 34) | 7:00 p.m - 7:00 a.m.         | Detour for closure at Route 101:<br><br>Detour N/B Route 34 traffic to Ventura Boulevard, right on Arneill Road or Carmen Drive, right on Daily Drive<br><br>Detour S/B Route 34 traffic to Daily Drive, left on Arneill Road or Carmen Drive, left on Ventura Boulevard   |
| Dawson Drive          | 7:00 p.m - 7:00 a.m.         | Detour for closure at Route 101:<br><br>Place "Dawson Drive Closed" sign at Flynn Road/Mission Oaks Boulevard. Detour traffic from Flynn Road N/B offramp and W/B Mission Oaks Boulevard to Flynn Road, left on Adolfo Road<br><br>Place "Mission Oaks Boulevard Closed" sign at Route 34/Dawson Place. Detour N/B Route 34 traffic past Route 101, right on Adolfo Road, right on Flynn Road. |
| Arneill Road          | 7:00 p.m - 7:00 a.m.         | Detour traffic to Fulton. Fulton Street detour at the intersections of Ventura Blvd. and Daily Dr. to be controlled by temporary all-way stop signs or as directed by the engineer   |

**10-1.17 CLOSURE REQUIREMENTS AND CONDITIONS**

The term closure, as used herein, is defined as the closure of a traffic lane or lanes, including ramp or connector lanes, within a single traffic control system.

**CLOSURE SCHEDULE**

By noon Monday, the Contractor shall submit a written schedule of planned closures for the following week period, defined as Friday noon through the following Friday noon.

The Closure Schedule shall show the locations and times when the proposed closures are to be in effect. The Contractor shall use the Closure Schedule request forms furnished by the Engineer. Closure Schedules submitted to the Engineer with incomplete, unintelligible or inaccurate information will be returned for correction and resubmittal. The Contractor will be notified of disapproved closures or closures that require coordination with other parties as a condition of approval.

Amendments to the Closure Schedule, including adding additional closures, shall be submitted to the Engineer, in writing, at least 3 working days in advance of a planned closure. Approval of amendments to the Closure Schedule will be at the discretion of the Engineer.

The Contractor shall confirm, in writing, all scheduled closures by no later than 8:00 a.m. 3 working days prior to the date on which the closure is to be made. Approval or denial of scheduled closures will be made no later than 4:00 p.m. 2 working days prior to the date on which the closure is to be made. Closures not confirmed or approved will not be allowed.

Confirmed closures that are cancelled due to unsuitable weather may be rescheduled at the discretion of the Engineer for the following working day.

**CONTINGENCY PLAN**

The Contractor shall prepare a contingency plan for reopening closures to public traffic. The Contractor shall submit the contingency plan for a given operation to the Engineer within one working day of the Engineer's request.

## **LATE REOPENING OF CLOSURES**

If a closure is not reopened to public traffic by the specified time, work shall be suspended in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications. The Contractor shall not make any further closures until the Engineer has accepted a work plan, submitted by the Contractor, that will insure that future closures will be reopened to public traffic at the specified time. The Engineer will have 2 working days to accept or reject the Contractor's proposed work plan. The Contractor will not be entitled to any compensation for the suspension of work resulting from the late reopening of closures.

For each 10-minute interval, or fraction thereof past the time specified to reopen the closure, the Department will deduct \$ 2500.00 per interval from moneys due or that may become due the Contractor under the contract.

## **COMPENSATION**

The Contractor shall notify the Engineer of any delay in the Contractor's operations due to the following conditions, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of those conditions, and the Contractor's loss due to that delay could not have been avoided by rescheduling the affected closure or by judicious handling of forces, equipment and plant, the delay will be considered a right of way delay within the meaning of Section 8-1.09, "Right of Way Delays," and compensation for the delay will be determined in conformance with the provisions in Section 8-1.09:

- A. The Contractor's proposed Closure Schedule is denied and his planned closures are within the time frame allowed for closures in "Maintaining Traffic" of these special provisions, except that the Contractor will not be entitled to any compensation for amendments to the Closure Schedule that are not approved.
- B. The Contractor is denied a confirmed closure.

Should the Engineer direct the Contractor to remove a closure prior to the time designated in the approved Closure Schedule, any delay to the Contractor's schedule due to removal of the closure will be considered a right of way delay within the meaning of Section 8-1.09, "Right of Way Delays," and compensation for the delay will be determined in conformance with the provisions in Section 8-1.09.

## **10-1.18 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.

When performing traffic control where the median shoulder is less than 3 meters, the Contractor shall conform to the requirements under the moving type lane closure for truck mounted attenuator (TMA).

During traffic stripe operations and pavement marker placement operations using bituminous adhesive, traffic shall be controlled, at the option of the Contractor, with either stationary or moving lane closures. During other operations, traffic shall be controlled with stationary lane closures. Attention is directed to the provisions in Section 84-1.04, "Protection From Damage," and Section 85-1.06, "Placement," of the Standard Specifications.

If components in the traffic control system are displaced or cease to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair the components to the original condition or replace the components and shall restore the components to the original location.

## **STATIONARY LANE CLOSURE**

When lane and ramp closures are made for work periods only, at the end of each work period, components of the traffic control system, except portable delineators placed along open trenches or excavation adjacent to the traveled way, shall be removed from the traveled way and shoulder. If the Contractor so elects, the components may be stored at selected central locations, designated by the Engineer within the limits of the highway right of way.

Each vehicle used to place, maintain and remove components of a traffic control system on multilane highways shall be equipped with a Type II flashing arrow sign which shall be in operation when the vehicle is being used for placing, maintaining or removing the components. Vehicles equipped with Type II flashing arrow sign not involved in placing, maintaining or removing the components when operated within a stationary type lane closure shall only display the caution display mode. The sign shall be controllable by the operator of the vehicle while the vehicle is in motion. The flashing

arrow sign shown on the plans shall not be used on the vehicles which are doing the placing, maintaining and removing of components of a traffic control system and shall be in place before a lane closure requiring the sign's use is completed.

The traffic cones shown to be placed transversely across closed traffic lanes and shoulders on the plans entitled "Traffic Control System for Lane Closures on Freeways and Expressways" and "Traffic Control System for Lane and Complete Closures on Freeways and Expressways" shall not be placed.

### **MOVING LANE CLOSURE**

Flashing arrow signs used in moving lane closures shall be truck-mounted. Changeable message signs used in moving lane closure operations shall conform to the provisions in Section 12-3.12, "Portable Changeable Message Signs," of the Standard Specifications, except the signs shall be truck-mounted and the full operation height of the bottom of the sign may be less than 2.1 m above the ground, but should be as high as practicable.

Truck-mounted attenuators (TMA) for use in moving lane closures shall be any of the following approved models, or equal:

- A. Hexfoam TMA Series 3000, Alpha 1000 TMA Series 1000 and Alpha 2001 TMA Series 2001, manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601-2076, Telephone (312) 467-6750.
  - 1. Distributor (Northern): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, Telephone 1-800-884-8274, FAX (916) 387-9734.
  - 2. Distributor (Southern): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805, Telephone 1-800-222-8274.
- B. Cal T-001 Model 2 or Model 3, manufacturer and distributor: Hexcel Corporation, 11711 Dublin Boulevard, P.O. Box 2312, Dublin, CA 94568, Telephone (510) 828-4200.
- C. Renco Rengard Model Nos. CAM 8-815 and RAM 8-815, manufacturer and distributor: Renco Inc., 1582 Pflugerville Loop Road, P.O. Box 730, Pflugerville, TX 78660-0730, Telephone 1-800-654-8182.

Each TMA shall be individually identified with the manufacturer's name, address, TMA model number, and a specific serial number. The names and numbers shall each be a minimum 13 mm high and located on the left (street) side at the lower front corner. The TMA shall have a message next to the name and model number in 13 mm high letters which states, "The bottom of this TMA shall be \_\_\_\_\_ mm  $\pm$  \_\_\_\_\_ mm above the ground at all points for proper impact performance." Any TMA which is damaged or appears to be in poor condition shall not be used unless recertified by the manufacturer. The Engineer shall be the sole judge as to whether used TMAs supplied under this contract need recertification. Each unit shall be certified by the manufacturer to meet the requirements for TMA in conformance with the standards established by the Transportation Laboratory.

Approvals for new TMA designs proposed as equal to the above approved models shall be in conformance with the procedures (including crash testing) established by the Transportation Laboratory. For information regarding submittal of new designs for evaluation contact: Transportation Laboratory, 5900 Folsom Boulevard, Sacramento, California 95819.

New TMAs proposed as equal to approved TMAs or approved TMAs determined by the Engineer to need recertification shall not be used until approved or recertified by the Transportation Laboratory.

### **PAYMENT**

The contract lump sum price paid for traffic control system shall include full compensation for furnishing all labor, materials (including signs), tools, equipment, and incidentals, and for doing all the work involved in placing, removing, storing, maintaining, moving to new locations, replacing and disposing of the components of the traffic control system shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The adjustment provisions in Section 4-1.03, "Changes," of the Standard Specifications shall not apply to the item of traffic control system. Adjustments in compensation for traffic control system will be made only for increased or decreased traffic control system required by changes ordered by the Engineer and will be made on the basis of the cost of the increased or decreased traffic control necessary. The adjustment will be made on a force account basis as provided in Section 9-1.03, "Force Account Payment," of the Standard Specifications for increased work and estimated on the same basis in the case of decreased work.

Traffic control system required by work which is classed as extra work, as provided in Section 4-1.03D of the Standard Specifications, will be paid for as a part of the extra work.

### **10-1.19 TEMPORARY PAVEMENT DELINEATION**

Temporary pavement delineation shall be furnished, placed, maintained, and removed in conformance with the provisions in Section 12-3.01, "General," of the Standard Specifications and these special provisions. Nothing in these

special provisions shall be construed as reducing the minimum standards specified in the Manual of Traffic Controls published by the Department or as relieving the Contractor from the responsibilities specified in Section 7-1.09, "Public Safety," of the Standard Specifications.

### **GENERAL**

Whenever the work causes obliteration of pavement delineation, temporary or permanent pavement delineation shall be in place prior to opening the traveled way to public traffic. Laneline or centerline pavement delineation shall be provided at all times for traveled ways open to public traffic. On multilane roadways (freeways and expressways) edgeline delineation shall be provided at all times for traveled ways open to public traffic.

The Contractor shall perform the work necessary to establish the alignment of temporary pavement delineation, including required lines or marks. Surfaces to receive temporary pavement delineation shall be dry and free of dirt and loose material. Temporary pavement delineation shall not be applied over existing pavement delineation or other temporary pavement delineation. Temporary pavement delineation shall be maintained until superseded or replaced with a new pattern of temporary pavement delineation or permanent pavement delineation.

Temporary pavement markers, including underlying adhesive, and removable traffic tape which are applied to the final layer of surfacing or existing pavement to remain in place or which 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**

Whenever 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 7.3 m. 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 (6 months 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 (6 months 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 7.3 m and shall be used for a maximum of 14 days on lanes opened to public traffic. Prior to the end of the 14 days the permanent pavement delineation shall be placed. If the permanent pavement delineation is not placed within the 14 days, 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.

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.

### **TEMPORARY EDGELINE DELINEATION**

On multilane roadways (freeways and expressways), whenever 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:

- A. Temporary pavement delineation for right edgelines shall, at the option of the Contractor, consist of either a solid 100-mm wide traffic stripe of the same color as the stripe the temporary edgeline delineation replaces, or traffic cones, portable delineators or channelizers placed at longitudinal intervals not to exceed 30 m.
- B. Temporary pavement delineation for left edgelines shall, at the option of the Contractor, consist of either solid 100-mm wide traffic stripe of the same color as the stripe the temporary edgeline delineation replaces, traffic cones, portable delineators or channelizers placed at longitudinal intervals not to exceed 30 m or temporary pavement markers placed at longitudinal intervals of not more than 1.8 m. Temporary pavement markers used for temporary left edgeline delineation shall be one of the types of temporary pavement markers listed for short term day/night use

(14 days or less) or long term day/night use (6 months or less) in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Traffic stripe (100-mm wide) placed as temporary edgeline delineation which will require removal shall conform to the provisions of "Temporary Traffic Stripe (Tape)" of these special provisions. Where removal of the 100-mm 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 quantity of temporary traffic stripe (tape) or temporary traffic stripe (paint) used for this temporary edgeline delineation will not be included in the quantities of tape or paint to be paid for.

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 (900 mm) 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.

The quantity of channelizers used as temporary edgeline delineation will not be included in the quantity of channelizers to be paid for. Full compensation for furnishing, placing, maintaining and removing temporary edgeline delineation for those areas where temporary edgeline delineation is 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.

#### **TEMPORARY TRAFFIC STRIPE (PAINT)**

Temporary traffic stripe consisting of painted traffic stripe shall be applied and maintained at the locations shown on the plans. The painted temporary traffic stripe shall be complete in place at the location shown prior to opening the traveled way to public traffic. Removal of painted temporary traffic stripe will not be required.

Temporary painted traffic stripe shall conform to the provisions in "Paint Traffic Stripes and Pavement Markings" of these special provisions, 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.

At the Contractor's option, temporary removable striping tape listed in "Prequalified and Tested Signing and Delineation Materials" of these special provisions may be used instead of painted temporary traffic stripes. When traffic stripe tape is used in place of painted temporary traffic stripes, the tape will be measured and paid for by the meter as temporary traffic stripe (paint).

When painted traffic stripe is specified for temporary left edgeline delineation, temporary pavement markers placed at longitudinal intervals of not more than 1.8 m may be used in place of the temporary painted traffic stripe. Temporary pavement markers shall be one of the types of temporary pavement markers listed for long term day/night use (6 months or less) in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. When temporary reflective pavement markers are used in place of temporary painted traffic stripe, payment for those temporary pavement markers will be made on the basis of the theoretical quantity of temporary traffic stripe (paint) required for the left edgeline the temporary pavement markers replace.

#### **MEASUREMENT AND PAYMENT**

Temporary traffic stripe (paint) will be measured and paid for in the same manner specified for paint traffic stripe (1-coat) in Section 84-3.06, "Measurement," and Section 84-3.07, "Payment," of the Standard Specifications.

#### **10-1.20 BARRICADE**

Barricades shall be furnished, placed and maintained at the locations shown on the plans, specified in the Standard Specifications or in these special provisions or where designated by the Engineer. Barricades shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to "Prequalified and Tested Signing and Delineation Materials" of these special provisions regarding retroreflective sheeting for barricades.

Construction area sign and marker panels conforming to the provisions in Section 12-3.06, "Construction Area Signs," of the Standard Specifications shall be installed on barricades in a manner determined by the Engineer at the locations shown on the plans.

Sign panels for construction area signs and marker panels installed on barricades shall conform to the provisions in Section 12-3.06A, "Stationary Mounted Signs," of the Standard Specifications.

Full compensation for furnishing, installing, maintaining, and removing construction area signs and marker panels on barricades shall be considered as included in the contract unit price paid for the type of barricade involved and no separate payment will be made therefor.

Barricades shown on the plans as part of a traffic control system will be paid for as provided in "Traffic Control System for Lane Closure" of these special provisions and will not be included in the count for payment of barricades.

#### **10-1.21 PORTABLE CHANGEABLE MESSAGE SIGN**

Portable changeable message signs shall be furnished, placed, operated, and maintained at those locations provided for in these special provisions or where designated by the Engineer in conformance with the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to Charts 3, 4, Tables A and B in "Maintaining Traffic" of these special provisions regarding the use and locations of the portable changeable message signs.

Portable Changeable Message Signs shall have either timer control or remote control.

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 the portable changeable message signs as specified in these special provisions shall be considered as included in the contract lump sum price paid for traffic control system and no additional payment will be made therefor.

#### **10-1.22 TEMPORARY (STAGE) SIGNAL AND LIGHTING SYSTEM**

The temporary (stage) signal and lighting (TSL) system shall consist of installing and maintaining temporary (stage) traffic signal and lighting for traffic control in conformance with the details shown on the plan entitled "Temporary (Stage) Traffic Signal and Lighting System," the provisions in "Maintaining Traffic" of these special provisions, the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications, and these special provisions.

The provisions in this section shall not relieve the Contractor from the responsibility to provide the additional devices or take the measures as may be necessary to conform to the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications.

Temporary (stage) signal and lighting system shall be installed as shown on the plans and directed by the Engineer.

The following materials and equipment for the temporary (stage) signal and lighting system will be furnished to the Contractor:

- A. Lamps for vehicle traffic signal units.

Other materials and equipment for a temporary (stage) signal and lighting system including, but not limited to, signal heads, mast arms, luminaries, conductors, and hardware shall be furnished by the Contractor.

Materials and equipment to be used in the temporary (stage) signal and lighting system shall be either new or used suitable for the intended use.

Each signal face shall be oriented to be clearly visible to traffic approaching from the direction which the signal is intended to control.

#### **OPERATION**

Temporary (stage) signal and lighting system shall operate at nominal 120 V. Lighting shall operate at 120 V or 240 V.

Unless otherwise directed by the Engineer, the system shall be operated on a continuous 24-hour basis.

Timing of a temporary (stage) signal system will be performed by State forces.

#### **MAINTAINING TEMPORARY (STAGE) SIGNAL SYSTEM**

Maintaining a temporary (stage) signal and lighting system, except the controller assembly, shall be the sole responsibility of the Contractor.

If components in the temporary (stage) signal and lighting system are damaged, 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. Components shall include signs and signal equipment.

In the event the temporary (stage) signal and lighting system is out of operation, for any reason, the Contractor shall provide flaggers, at the Contractor's expense, to maintain traffic control until the traffic signals are returned to service.

#### **CONDUIT**

Attention is directed to "Conduit" of these special provisions.

## **CONDUCTORS AND WIRING**

Attention is directed to "Conductor And Wiring" of these special provisions.

Where conductors are to be placed across paved areas, the conductors shall be placed in conduit or in slots cut in the pavement as specified for inductive loop detectors in Section 86-5.01A(5), "Installation Details," of the Standard Specifications, including placing sealant over the conductors, or the conductors shall be suspended at least 7.6 m above the roadway.

## **BONDING AND GROUNDING**

Signal heads, standards with metal bases and the controller cabinet shall be mechanically and electrically secure to form a continuous system effectively grounded by the grounding conductor.

## **SERVICE**

Electric service for the TSLs shall be a metered 120/240 V, single-phase service in the existing Type III service equipment enclosure.

State forces will maintain all controller assemblies.

## **DETECTORS**

Attention is directed to "Detectors" and "Video Imaging Detection System" of these special provisions.

## **SALVAGING TEMPORARY (STAGE) SIGNAL AND LIGHTING SYSTEM**

Upon completion of the work requiring traffic signals, as determined by the Engineer, State-furnished components of the temporary (stage) signal and lighting system and the video image detection system equipment shall be salvaged and delivered to the Department of Transportation, Camarillo Maintenance Yard, 4821 Adhor Lane, telephone (805) 388-1426, Camarillo, California 93012.

Other materials and equipment shall become the property of the Contractor and shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Materials Outside the Highway Right of Way," of the Standard Specifications. Pole holes shall be backfilled.

Conductors placed in slots across paved areas as specified herein, when no longer required, shall be abandoned in place when determined by the Engineer.

## **10-1.23 MODIFY(STAGE) LIGHTING AND SIGN ILLUMINATION SYSTEM**

The modify (stage) lighting and sign illumination (MLSI) system shall consist of installing and maintaining modify (stage) lighting and sign illumination in conformance with the details shown on the plan entitled "Modify (Stage) Lighting and Sign Illumination System," the provisions in "Maintaining Traffic" of these special provisions, the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications, and these special provisions.

The provisions in this section shall not relieve the Contractor from the responsibility to provide the additional devices or take the measures as may be necessary to conform to the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications.

MLSI system shall be installed as shown on the plans and directed by the Engineer.

Other materials and equipment for a modify (stage) lighting and sign illumination system including, but not limited to, lighting standards, sign lighting fixtures, luminaries, conductors, and hardware shall be furnished by the Contractor.

Materials and equipment to be used in the modify (stage) lighting and sign illumination system shall be either new or used suitable for the intended use.

## **OPERATION**

Modify (stage) lighting and sign illumination system shall operate at 120/240 V.

## **MAINTAINING MODIFY (STAGE) LIGHTING AND SIGN ILLUMINATION SYSTEM**

Maintaining a modify (stage) lighting and sign illumination system shall be the sole responsibility of the Contractor.

If components in the modify (stage) lighting and sign illumination system are damaged, 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.

## **CONDUIT**

Attention is directed to "Conduit" of these special provisions.

## **CONDUCTORS AND WIRING**

Attention is directed to "Conductor And Wiring" of these special provisions.

## **BONDING AND GROUNDING**

The MLSI system shall be mechanically and electrically secure to form a continuous system effectively grounded by the grounding conductor.

## **SERVICE**

Attention is directed to "Service" of these special provisions.

## **SALVAGING (STAGE) LIGHTING AND SIGN ILLUMINATION SYSTEM**

Upon completion of the work requiring lighting and sign illumination, as determined by the Engineer, State-furnished components of the modify (stage) lighting and sign illumination system shall be salvaged and delivered to the Department of Transportation, District Maintenance Yard, 4821 Adhor Lane, Camarillo, California 93012.

Other materials and equipment shall become the property of the Contractor and shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Materials Outside the Highway Right of Way," of the Standard Specifications.

### **10-1.24 TEMPORARY RAILING (TYPE K)**

Temporary railing (Type K) shall be placed as shown on the plans, as specified in the Standard Specifications or these special provisions or where ordered by the Engineer and shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Reflectors on temporary railing (Type K) shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Temporary railing (Type K), conforming to the details shown on Standard Plan T3 may be used. Temporary railing (Type K) fabricated prior to January 1, 1993, and conforming to 1988 Standard Plan B11-30 may be used, provided the fabrication date is printed on the required Certificate of Compliance and vertical holes are not drilled in the top of the temporary railing to secure temporary traffic screen to the temporary railing.

Attention is directed to "Public Safety" and "Order of Work" of these special provisions.

Temporary railing (Type K) placed in conformance with the provisions in "Public Safety" of these special provisions will be neither measured nor paid for.

### **10-1.25 CHANNELIZER (SURFACE MOUNTED)**

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.

### **10-1.26 TEMPORARY CRASH CUSHION MODULE**

This work shall consist of furnishing, installing, and maintaining sand filled temporary crash cushion modules in groupings or arrays at each location shown on the plans, as specified in these special provisions or where designated by the Engineer. The grouping or array of sand filled modules shall form a complete sand filled temporary crash cushion in conformance with the details shown on the plans and these special provisions.

Attention is directed to "Public Safety", "Order of Work", and "Temporary Railing" of these special provisions.

Whenever the work or the Contractor's operations establishes a fixed obstacle, the exposed fixed obstacle shall be protected with a sand filled temporary crash cushion. The sand filled temporary crash cushion shall be in place prior to opening the lanes adjacent to the fixed obstacle to public traffic.

Sand filled temporary crash cushions shall be maintained in place at each location, including times when work is not actively in progress. Sand filled temporary crash cushions may be removed during a work period for access to the work provided that the exposed fixed obstacle is 4.6 m or more from a lane carrying public traffic and the temporary crash cushion is reset to protect the obstacle prior to the end of the work period in which the fixed obstacle was exposed. When no longer required, as determined by the Engineer, sand filled temporary crash cushions shall be removed from the site of the work.

At the Contractor's option, the modules for use in sand filled temporary crash cushions shall be either Energite III Inertial Modules, Fitch Inertial Modules or Traffix Sand Barrels manufactured after March 31, 1997, or equal:

- A. Energite III and Fitch Inertial Modules, manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601-2076. Telephone 1-312-467-6750, FAX 1-800-770-6755
  - 1. Distributor (North): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828. Telephone 1-800-884-8274, FAX 1-916-387-9734
  - 2. Distributor (South): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805. Telephone 1-800-222-8274, FAX 1-714-937-1070
  
- B. Traffix Sand Barrels, manufactured by Traffix Devices, Inc., 220 Calle Pintoresco, San Clemente, CA 92672. Telephone 1-949 361-5663, FAX 1-949 361-9205
  - 1. Distributor (North): United Rentals, Inc., 1533 Berger Drive, San Jose, CA 95112. Telephone 1-408 287-4303, FAX 1-408 287-1929
  - 2. Distributor (South): Statewide Safety & Sign, Inc., P.O. Box 1440, Pismo Beach, CA 93448. Telephone 1-800-559-7080, FAX 1-805 929-5786

Modules contained in each temporary crash cushion shall be of the same type at each location. The color of the modules shall be the standard yellow color, as furnished by the vendor, with black lids. The modules shall exhibit good workmanship free from structural flaws and objectionable surface defects. The modules need not be new. Good used undamaged modules conforming to color and quality of the types specified herein may be utilized. If used Fitch modules requiring a seal are furnished, the top edge of the seal shall be securely fastened to the wall of the module by a continuous strip of heavy duty tape.

Modules shall be filled with sand in conformance with the manufacturer's directions, and to the sand capacity in kilograms for each module shown on the plans. Sand for filling the modules shall be clean washed concrete sand of commercial quality. At the time of placing in the modules, the sand shall contain not more than 7 percent water as determined by California Test 226.

Modules damaged due to the Contractor's operations shall be repaired immediately by the Contractor at the Contractor's expense. Modules damaged beyond repair, as determined by the Engineer, due to the Contractor's operations shall be removed and replaced by the Contractor at the Contractor's expense.

Temporary crash cushion modules shall be placed on movable pallets or frames conforming to the dimensions shown on the plans. The pallets or frames shall provide a full bearing base beneath the modules. The modules and supporting pallets or frames shall not be moved by sliding or skidding along the pavement or bridge deck.

A Type R or P marker panel shall be attached to the front of the crash cushion as shown on the plans, when the closest point of the crash cushion array is within 3.6 m of the traveled way. The marker panel, when required, shall be firmly fastened to the crash cushion with commercial quality hardware or by other methods determined by the Engineer.

At the completion of the project, temporary crash cushion modules, sand filling, pallets or frames, and marker panels shall become the property of the Contractor and shall be removed from the site of the work. Temporary crash cushion modules shall not be installed in the permanent work.

Temporary crash cushion modules 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 the provisions in "Public Safety" of these special provisions 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.

### **10-1.27 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.

Plans of the existing bridges may be requested by fax from the Office of Structure Maintenance and Investigations, 1801 30th Street, Sacramento, CA, Fax (916) 227-8357, and are available at the Office of Structure Maintenance and Investigations, Los Angeles, CA, Telephone (213) 897-6156.

Plans of the existing bridges available to the Contractor are reproductions of the original contract plans with significant changes noted and working drawings and do not necessarily show normal construction tolerances and variances. Where dimensions of new construction required by this contract are dependent on the dimensions of the existing bridges, the Contractor shall verify the controlling field dimensions and shall be responsible for adjusting dimensions of the work to fit existing conditions.

#### **ABANDON CULVERT**

Existing culverts, where shown on the plans to be abandoned, shall be abandoned in place or, at the option of the Contractor, the culverts shall be removed and disposed of. Resulting openings into existing structures that are to remain in place shall be plugged with commercial quality concrete containing not less than 300 kg of cement per cubic meter.

Abandoning culverts in place shall conform to the following:

- A. Culverts that intersect the side slopes shall be removed to a depth of not less than one meter measured normal to the plane of the finished side slope, before being abandoned.
- B. Culverts 300 mm in diameter and larger, shall, at the Contractor's option, be backfilled with either sand, controlled low strength material or slurry cement backfill conforming to the provisions in Section 19-3.062, "Slurry Cement Backfill," of the Standard Specifications by any method acceptable to the Engineer that completely fills the pipe. Sand backfill material shall be clean, free draining, and free from roots and other deleterious substances.
- C. The ends of culverts shall be securely closed by a 150 mm thick tight fitting plug or wall of commercial quality concrete.

Culverts shall not be abandoned until their use is no longer required. The Contractor shall notify the Engineer in advance of any intended culvert or pipeline abandonment.

If the Contractor elects to remove and dispose of a culvert which is specified to be abandoned, as provided herein, backfill specified for the pipe will be measured and paid for in the same manner as if the culvert has been abandoned in place.

Backfill will be measured by the cubic meter determined from the dimensions of the culverts to be abandoned.

The contract price paid per cubic meter for sand backfill shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in backfilling culverts with sand, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Controlled low strength material and slurry cement backfill, if used at the Contractor's option, will be measured and paid for by the cubic meter as sand backfill.

Full compensation for concrete plugs, pipe removal, structure excavation, and backfill shall be considered as included in the contract price paid per meter for abandon culvert 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 meter for remove metal beam guard railing and no separate payment will be made therefor.

Full compensation for removing cable anchor assemblies, terminal anchor assemblies or steel foundation tubes shall be considered as included in the contract price paid per meter for remove metal beam guard railing and no separate payment will be made therefor.

#### **REMOVE 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.

A sign structure shall not be removed until replacement temporary signs, where shown on the plans to be installed, are in place.

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 1 m 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 PAVEMENT MARKER**

Existing pavement markers, including underlying adhesive, when no longer required for traffic lane delineation as determined by the Engineer, shall be removed and disposed of.

### **REMOVE WALL**

Existing retaining wall and soundwall, including footings, where shown on the plans to be removed, shall be removed and disposed of.

Full compensation for backfilling and compacting holes resulting from the removal of wall footings shall be considered as included in the contract price paid per meter for remove wall and no additional compensation will be allowed therefor.

### **REMOVE-CHAIN LINK FENCE**

Existing chain link fence, including post footings, where shown on the plans, shall be removed and disposed of.

Post footings which do not conflict with the installation of new chain link fence may remain in place.

On structures, the posts shall be removed and the pipe post sleeves or other type post anchorages shall be cut off flush with the bridge deck. Sleeves shall be cleaned and filled with grout consisting of one part portland cement to 6 parts sand.

Full compensation for backfilling and compacting post hole and for cutting off pipe post sleeves or other type post anchorages on structures shall be considered as included in the contract price paid per meter for remove chain link fence and no additional compensation will be allowed therefor.

### **REMOVE TRAFFIC STRIPE AND PAVEMENT MARKING**

Traffic stripe and pavement marking shall be removed at the locations shown on the plans and as directed by the Engineer.

The provisions of this section shall be made as a part of every subcontract executed pursuant to this contract.

Attention is directed to "Water Pollution Control" of these special provisions.

The Contractor shall take samples of yellow thermoplastic traffic stripes, yellow thermoplastic pavement markings and yellow painted traffic stripes shown on the plans to be removed and as directed by the Engineer, and obtain analysis for lead and chromium before beginning removing yellow thermoplastic traffic stripes, yellow thermoplastic pavement markings and yellow painted traffic stripes work. Samples shall be analyzed for lead and chromium by a laboratory certified by the California Department of Health Services using EPA Method 6010. Analytical results shall be made available to the Engineer within 48 hours. Laboratory results shall be sent by facsimile or hand delivered to the Engineer as soon as they are available. A summary report of sampling protocols, chain of custody, analysis, and laboratory data sheets shall be supplied to the Engineer within in 3 days of completion of sampling.

Waste from removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking contains lead chromate in average concentrations greater than or equal to 350 mg/kg and less than 1000 mg/kg Total Lead. Residue produced when yellow thermoplastic and yellow paint are removed may contain heavy metals in concentrations that exceed thresholds established by the California Health and Safety Code and may produce toxic fumes when heated.

Waste from removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking contains lead chromate in average concentrations greater than or equal to 5 mg/L Soluble Lead or 1000 mg/kg Total Lead. Residue produced from when yellow thermoplastic and yellow paint are removed may contain heavy metals in concentrations that exceed thresholds established by the California Health and Safety Code and may produce toxic fumes when heated.

The removed yellow thermoplastic and yellow paint shall be disposed of at a Class 1 disposal facility or a Class 2 disposal facility permitted by the Regional Water Quality Control Board in conformance with the requirements of the disposal facility operator within 90 days after accumulating 100 kg of residue and dust. The Contractor shall make necessary arrangements with the operator of the disposal facility to test the yellow thermoplastic and yellow paint residue as required by the facility and these special provisions. Testing shall include, at a minimum, (1) Total Lead and Chromium by EPA Method 7000 series and (2) Soluble Lead and Chromium by California Waste Extraction Test. From the first 3360 L of waste or portion thereof, if less than 3360 L of waste are produced, a minimum of four randomly selected samples shall be taken and analyzed. From each additional 840 L of waste or portion thereof, if less than 840 L are produced, a minimum of one additional random sample shall be taken and analyzed. 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 3 days prior to the start of removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking. The analytical laboratory shall be certified by the Department of Health Services Environmental Laboratory Accreditation Program. 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.

The Contractor shall prepare a project specific Lead Compliance Plan to prevent or minimize worker exposure to lead while handling removed yellow thermoplastic and yellow paint residue. Attention is directed to Title 8, California Code of Regulations, Section 1532.1, "Lead," for specific Cal-OSHA requirements when working with lead.

The Lead Compliance Plan shall contain the elements listed in Title 8, California Code of Regulations, Section 1532.1(e)(2)(B). Before submission to the Engineer, the Lead Compliance Plan shall be approved by an Industrial Hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene. The Plan shall be submitted to the Engineer at least 7 days prior to beginning removal of yellow thermoplastic and yellow paint.

Prior to removing yellow thermoplastic and yellow painted traffic stripe and pavement marking, 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 4.

Where grinding or other methods approved by the Engineer are used to remove yellow thermoplastic and yellow painted traffic stripe and pavement marking, the removed residue, including dust, shall be contained and collected immediately. Sweeping equipment shall not be used. 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 thermoplastic and yellow painted traffic stripe and pavement marking 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 and pavement marking 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 enclosure at a location within the project limits until disposal, as approved by the Engineer.

If the yellow thermoplastic and yellow painted traffic stripe and pavement marking residue is transported to a Class 1 disposal facility, a manifest shall be used, and the transporter shall be registered with the California Department of Toxic Substance Control. The Engineer will obtain the United States Environmental Protection Agency Identification Number and sign all manifests as the generator within 2 working days of receiving sample test results and approving the test methods.

The Contractor shall assume that the yellow paint removed is not regulated under the Federal Resource Conservation and Recovery Act (RCRA). Additional disposal costs for removal residue regulated under RCRA, as determined by test results required by the disposal facility, will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

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 "Material Containing Aerially Deposited Lead" of these special provisions regarding payment for the Lead Compliance Plan.

The contract lump sum price paid for test yellow traffic stripes and yellow pavement markings shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in testing yellow thermoplastic traffic stripes, yellow thermoplastic pavement markings and yellow painted traffic stripes, including removal of test portions of yellow thermoplastic traffic stripes, yellow thermoplastic pavement markings and yellow painted traffic stripes, and for sampling and furnishing the final report, 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 a written work plan for the removal, storage, and disposal of yellow thermoplastic traffic stripes, yellow thermoplastic pavement markings and yellow painted traffic stripes shall be considered as included in the contract lump sum price paid for test yellow traffic stripes and yellow pavement markings and no separate payment will be made therefor.

Except as otherwise provided, the contract price paid per meter for remove thermoplastic traffic stripe, remove yellow thermoplastic traffic stripe, remove painted traffic stripes and remove yellow painted traffic stripe or per square meter for remove thermoplastic pavement marking and remove yellow thermoplastic pavement marking shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the removal, storage and disposal of thermoplastic and painted traffic stripes and pavement markings, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### **REMOVE DRAINAGE FACILITY**

Existing box culverts, inlets, headwalls and endwalls, pipes, trapezoidal channel, ditches and flared end section where any portion of these structures is within one meter of the grading plane in excavation areas, or within 0.3-m of original ground in embankment areas, or where shown on the plans to be removed, shall be completely removed and disposed of.

Upon removal of Drainage System 8A, the Contractor shall provide temporary drainage discharge system capable of conveying 51 cfs to the existing downstream trapezoidal channel. Temporary drainage discharge system shall be maintained until Drainage System 8 is fully operational.

Full compensation for providing and maintaining the temporary drainage discharge system shall be considered as included in the contract price paid per meter for install 900 mm RCP for drainage system 8 and no separate payment will be made therefor.

Backfill shall conform to these provisions in Section 19-3.06 "Structure Backfill" of the Standard Specifications.

Full compensation for backfilling the void left by the drainage facilities removal shall be considered as included in the contract price paid for various items of remove drainage facility and no additional compensation will be allowed therefor.

### **REMOVE ROADSIDE SIGN (WOOD POST)**

Existing roadside signs (wood post), at those locations shown on the plans to be removed, shall be removed and disposed of.

Sign panels, where shown on the plans to be reused, shall be reused in the new work. Sign panels to be reused that are damaged by the Contractor shall be replaced at the Contractor's expense.

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.

Foundations of existing metal post roadside signs to be removed shall be removed and disposed of.

Full compensation for removing and disposing of foundations for metal post roadside signs to be removed shall be considered as included in the contract unit price paid for remove roadside sign (wood post) and no separate payment will be made therefor.

### **REMOVE CURB**

Curb, where shown on the plans to be removed, shall be removed.

Removing curb will be measured by the meter, measured along the curb before removal operations.

Concrete removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

### **REMOVE CONCRETE**

Concrete, where shown on the plans to be removed, shall be removed.

The pay quantities of concrete to be removed will be measured by the cubic meter, measured before and during removal operations.

Concrete removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

### **REMOVE CONCRETE BARRIER**

Concrete barrier (type K), where shown on the plans to be removed, shall be removed only when existing concrete barrier are no longer required for the safety of public traffic, unless otherwise directed by the Engineer. Any portion of existing concrete barrier (type K) are to remain in place shall not be damaged.

Removing concrete barrier will be measured by the meter, measured along the barrier before removal operations.

Removed concrete and reinforcement material shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

### **ADJUST INLET AND MANHOLE TO GRADE**

Existing pipe inlets, concrete drainage inlets and manholes shall be adjusted to grade as shown on the plans.

Portland cement concrete shall be minor concrete or may be produced from commercial quality concrete containing not less than 350 kilograms of cement per cubic meter.

Adjustment of inlets and manholes shall be performed prior to paving and shall be limited to the area to be paved or surfaced during the working day in which the adjustment is performed. The top of the inlet and manholes grate or cover shall be protected from the asphalt concrete during paving operations by means of heavy plywood covers, steel plate covers or by other methods approved by the Engineer. Excess paving material shall be removed prior to rolling.

Where inlets and manholes 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.

### **OBLITERATE SURFACING**

Existing surfacing, when no longer required for the passage of public traffic, shall be obliterated at the locations shown on the plans.

Surfacing shall not be obliterated by the earth cover method.

Obliteration shall consist of rooting, plowing, pulverizing or scarifying the existing surfacing in conformance with the provisions in Section 15-2.02A, "Obliterating Roads and Detours," of the Standard Specifications.

### **REMOVE BASE AND SURFACING**

Existing base and bituminous surfacing shown on the plans to be removed, shall be removed to a depth of at least 150 mm below the grade of the existing surfacing. Resulting holes and depressions shall be backfilled with earthy material selected from excavation to the lines and grade established by the Engineer.

The material removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 15-2.03, "Disposal," of the Standard Specifications.

Removing base and surfacing will be measured by the cubic meter in the same manner specified for roadway excavation in conformance with the provisions in Section 19, "Earthwork," of the Standard Specifications and will be paid for at the contract price per cubic meter for remove base and surfacing.

### **COLD PLANE ASPHALT CONCRETE PAVEMENT**

Existing asphalt concrete pavement shall be cold planed at the locations and to the dimensions shown on the plans.

Planing asphalt concrete pavement shall be performed by the cold planing method. Planing of the asphalt concrete pavement shall not be done by the heater planing method.

Cold planing machines shall be equipped with a cutter head not less than 750 mm in width and shall be operated so that no fumes or smoke will be produced. The cold planing machine shall plane the pavement without requiring the use of a heating device to soften the pavement during or prior to the planing operation.

The depth, width, and shape of the cut shall be as shown on the typical cross sections or as designated by the Engineer. The final cut shall result in a uniform surface conforming to the typical cross sections. The outside lines of the planed area shall be neat and uniform. Planing asphalt concrete pavement operations shall be performed without damage to the surfacing to remain in place.

Planed widths of pavement shall be continuous except for intersections at cross streets where the planing shall be carried around the corners and through the conform lines. Following planing operations, a drop-off of more than 45 mm will not be allowed between adjacent lanes open to public traffic.

Where transverse joints are planed in the pavement at conform lines no drop-off shall remain between the existing pavement and the planed area when the pavement is opened to public traffic. If asphalt concrete has not been placed to the level of existing pavement before the pavement is to be opened to public traffic a temporary asphalt concrete taper shall be constructed. Asphalt concrete for temporary tapers shall be placed to the level of the existing pavement and tapered on a slope of 1:30 (Vertical: Horizontal) or flatter to the level of the planed area.

Asphalt concrete for temporary tapers shall be commercial quality and may be spread and compacted by any method that will produce a smooth riding surface. Temporary asphalt concrete tapers shall be completely removed, including the removal of loose material from the underlying surface, before placing the permanent surfacing. The removed material shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The material planed from the roadway surface, including material deposited in existing gutters or on the adjacent traveled way, shall be removed and disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications. Removal operations of cold planed material shall be concurrent with planing operations and follow within 15 m of the planer, unless otherwise directed by the Engineer.

Cold plane asphalt concrete pavement will be measured by the square meter. The quantity to be paid for will be the actual area of surface cold planed irrespective of the number of passes required to obtain the depth shown on the plans.

The contract price paid per square meter for cold plane asphalt concrete pavement shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in cold planing asphalt concrete surfacing and disposing of planed material, including furnishing the asphalt concrete for and constructing, maintaining, removing, and disposing of temporary asphalt concrete tapers, as specified in the Standard Specifications and these special provisions and as directed by the Engineer.

## **CAP INLET**

Existing pipe inlets and concrete drainage inlets, where shown on the plans to be capped, shall be capped and the bottoms of the inlets shall be rounded with portland cement concrete as shown on the plans.

Portland cement concrete shall be minor concrete or may be produced from commercial quality aggregates and cement containing not less than 350 kg of cement per cubic meter.

Inlets shall be removed to a depth of at least 0.3-m below the grading plane.

Concrete removal shall be performed without damage to portions of the inlet that are to remain in place. Damage to existing concrete, which is to remain in place, shall be repaired by the Contractor to a condition equal to that existing prior to the beginning of removal operations. The repair of existing concrete damaged by the Contractor's operations shall be at the Contractor's expense.

Existing reinforcement that is to be incorporated in the new work shall be protected from damage and shall be thoroughly cleaned of adhering material before being embedded in the new concrete.

The quantity of capping inlets will be determined as units from actual count.

The contract unit price paid for cap inlet shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in capping inlets, including removing portions of inlets, rounding bottoms of inlets, bar reinforcing steel, and structure excavation and structure backfill, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

## **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.

Existing below ground irrigation facilities will be marked by the Engineer. Marked Irrigation facilities damaged by the Contractor's operations shall be repaired or replaced at the Contractor's expense. The replacement and repair of damaged unmarked below ground irrigation facilities will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

Water shall be maintained in conformance with the provisions in Section 20-5.025, "Maintain Existing Water Supply," of the Standard Specifications.

## **BRIDGE REMOVAL**

Removing portions of bridges shall conform to the provisions in Section 15-4, "Bridge Removal," of the Standard Specifications and these special provisions.

Bridge removal, Location A shall consist of removing the existing Camarillo Pedestrian Overhead (Bridge No. 52-0426). Bridge removal, Location B shall consist of removing the existing Arneill Road Overcrossing (Bridge No. 52-0180). Bridge removal, Location C shall consist of removing the existing Fulton Street Overcrossing (Bridge No. 52-0179).

Bridge removal (portion) shall consist of removing portions of existing structure approach, abutment, retaining wall, curtain wall, pedestal, wingwall and concrete barrier on Camarillo Overhead and Separation (Bridge No. 52-0016).

All 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 outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The Contractor shall submit a complete bridge removal plan to the Engineer detailing procedures and sequence for removing portions of bridge, including all features necessary to remove the bridges in a safe and controlled manner.

The bridge removal plan shall be furnished for Bridge No. 52-0426, Bridge No. 52-0180 and Bridge No. 52-0179, and shall include the following:

- A. The bridge removal sequence for the entire structure, including staging of bridge removal;
- B. Equipment locations on the structure during removal operations;
- C. Temporary support shoring or temporary bracing;
- D. Locations where work is to be performed over traffic or railroad property; and
- E. Details and locations of protective covers or other measures to assure that people, property, and improvements will not be endangered.

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 following additional requirements apply to the removal of portions of bridges that are over or adjacent to roadways that may be closed to public traffic for only brief periods of time:

- A. The closure of roadways to public traffic shall conform to the provisions in "Maintaining Traffic" of these special provisions.
- B. Prior to closing a roadway to traffic to accommodate bridge removal operations, the Contractor shall have all necessary workers, materials, and equipment at the site as needed to proceed with the removal work in an expeditious manner. While the roadway is closed to public traffic, work shall be pursued promptly and without interruption until the roadway is reopened to public traffic.
- C. All removal operations shall be performed during periods of time that the roadway is closed to public traffic except as specified herein for preliminary work.
- D. Preliminary work shall be limited to operations that will not reduce the structural strength or stability of the bridge, or any element thereof, to a level that in the judgment of the Engineer would constitute a hazard to the public. Such preliminary work shall also be limited to operations that cannot cause debris or any other material to fall onto the roadway. Protective covers may be used to perform preliminary work such as chipping or cutting the superstructure into segments, provided the covers are of sufficient strength to support all loads and are sufficiently tight to prevent dust and fine material from sifting down onto the traveled way. Protective covers shall extend at least 1.2 m beyond the limit of the work underway. Bottom slabs of box girders may be considered to be protective covers for preliminary work performed on the top slab inside the limits of the exterior girders.
- E. Temporary support shoring, temporary bracing, and protective covers shall not encroach closer than 2.4 m horizontally from the edge or 4.6 m vertically above any traffic lane or shoulder that is open to public traffic.
- F. During periods when the roadway is closed to public traffic, debris from bridge removal operations may be allowed to fall directly onto the lower roadway provided adequate protection is furnished for all highway facilities. The minimum protection for paved areas shall be a 0.6-m thick earthen pad or a 25-mm thick steel plate placed over the area where debris can fall. Prior to reopening the roadway to public traffic, all debris, protective pads, and devices shall be removed and the roadway swept clean with wet power sweepers or equivalent methods.
- G. The removal operations shall be conducted in such a manner that the portion of the structure not yet removed remains in a stable condition at all times. For girder bridges, each girder shall be completely removed within a span before the removal of the adjacent girder is begun. For slab type bridges, removal operations within a span shall be performed along a front that roughly parallels the primary reinforcing steel.

The following additional requirements apply to the removal of portions of bridges whenever the removal work is to be performed over public traffic or railroad property:

- A. A protective cover supported by falsework or members of the existing structure shall be constructed before beginning bridge removal work.
- B. The construction and removal of the protective cover, and the installation and removal of temporary railings shall conform to the provisions in "Maintaining Traffic," and "Temporary Railings" of these special provisions.
- C. The protective cover shall prevent any materials, equipment, or debris from falling onto public traffic or railroad property. The protective cover shall have a minimum strength equivalent to that provided by good, sound Douglas fir planking having a nominal thickness of 50 mm. Additional layers of material shall be furnished as necessary to prevent fine materials or debris from sifting down upon the traveled way and shoulders.
- D. The protective cover shall extend at least 3 m beyond the outside face of the bridge railing.
- E. During the removal of bridge segments, and when portions of the bridge, such as deck slabs or box girder slabs, comply with the requirements for the protective cover, a separate protective cover need not be constructed.
- F. Before removal, the protective cover shall be cleaned of all debris and fine material.
- G. The protective cover shall provide the openings specified under "Maintaining Traffic" of these special provisions, except that when no openings are specified for bridge removal, a vertical opening of 4.6 m and a horizontal opening of 9.8 m shall be provided for the passage of public traffic.
- H. The protective cover shall be in conformance with the guidelines of the railroad company involved and shall provide the minimum clearances required under "Relations with Railroad Company" of these special provisions for the passage of railroad traffic.

The Contractor shall submit working drawings, with design calculations, to the Engineer for the proposed bridge removal plan. The bridge removal plan shall be prepared 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.

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 and design calculations and times for review for any 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.

The time to be provided for the Engineer's review of the working drawings for removing specific structures, or portions thereof, shall be as follows:

| Structure or Portion of Structure | Review Time - Weeks |
|-----------------------------------|---------------------|
| Camarillo Pedestrian Overhead     | 9                   |
| Camarillo Overhead and Separation | 9                   |

For bridge removal over railroads, approval by the Engineer of the bridge removal plans will be contingent upon the drawings being satisfactory to the railroad company involved.

At a bridge site where a bridge removal plan is required, 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, 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 shall consist of cleaning the portland cement concrete bridge deck surface on Camarillo Overhead and Separation as shown on the plans and as specified in these special provisions.

Asphaltic or petroleum products, contrast treatment, except for slurry or chip seal contrast treatment, and concrete curing seals shall be cleaned from the deck surface by abrasive blasting. The deck shall be dry when blast cleaning is performed.

If the surface becomes contaminated at any time prior to placing the penetrating sealer, the surface shall be cleaned by abrasive blasting.

Where abrasive blasting is being performed within 3 m 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.

Nothing in these special provisions shall relieve the Contractor from his responsibilities as provided in Section 7-1.09, "Public Safety," of the Standard Specifications.

Traffic stripes and pavement markings shall be protected during the process of cleaning the deck or replaced at the Contractor's expense.

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.

Removal of slurry or chip seal contrast treatment will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

All removed materials 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.

Cleaning bridge deck surface will be measured by the square meter of surface that is cleaned, based on field measurement of the completed work.

The contract price paid per square meter for clean bridge deck shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in cleaning the bridge deck, except for removal of 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.

**REMOVE CRASH CUSHION (SAND FILLED)**

Crash cushions (sand filled), designated on the plans to be removed, shall be removed and disposed of.

Crash cushion must be removed by module, regardless of the number of modules grouped at each location. Crash cushion removal operation can only be performed when construction work requiring crash cushion module be removed in that day.

Remove crash cushion shall be measured by the unit and consist of removing a grouping of modules. Removed 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. Removed crash cushion modules shall not be installed in the permanent work.

The contract unit price paid for remove crash cushion (sand filled) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in removing and disposal of pallets,

frames, anchors, and epoxy motor base, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions.

#### **10-1.28 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.

Existing vegetation outside the areas to be cleared and grubbed shall be protected from injury or damage resulting from the Contractor's operations.

Activities controlled by the Contractor, except cleanup or other required work, shall be confined within the graded areas of the roadway.

Nothing herein shall be construed as relieving the Contractor of the Contractor's responsibility for final cleanup of the highway as provided in Section 4-1.02, "Final Cleaning Up," of the Standard Specifications.

#### **10-1.29 ARCHAEOLOGICAL MONITOR**

Archaeological monitor shall consist of observing and evaluating the project area as specified in these special provisions and as directed by the Engineer.

In the event that buried cultural materials are unearthed during the course of construction, work in the immediately vicinity must cease until a qualified Archaeological Specialist hired by the Contractor can assess its significance and evaluate the nature. Contractor's Archaeological Specialist shall meet with Caltrans Archaeologist prior to the said evaluation.

If human remains are unearthed during construction, no further disturbance shall occur until the County Coroner has made the necessary findings as to the origin and disposition. In such instance, Engineer shall be immediately notified.

In the event that potentially significant historic or Archaeological findings are encountered and, if in the opinion of the Engineer, the Contractor's operation are delayed or interfered with by reason of the discovery, the State will compensate the Contractor for the delays to the extent provided in Section 8.-1.09, "Right of Way Delays," of the Standard Specifications.

Archaeological monitor, including furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in archaeological monitor as specified in these special provisions will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

#### **10-1.30 DUST PALLIATIVE**

Furnishing and applying dust palliative shall conform to the provisions in Section 18, "Dust Palliative," of the Standard Specifications.

Full compensation for furnishing and applying dust palliative shall be considered as included in the price paid for various contract items requiring earthwork and no separate payment will be made therefor.

#### **10-1.31 EARTHWORK**

Earthwork shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

All finished grades, detention basin, and any other areas of disturbance shall be left in a rough grade a minimum depth of 0.20 m. The rough grade shall then be track walked or scarified parallel to the toe of slope. The use of cutting edges, such as motorgrader blades, shall not be used for the final cutting of the slopes.

Sand backfill and ditch excavation shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications.

Attention is directed to "Material Containing Aerially Deposited Lead" of these special provisions.

When a layer of specified material is not to be placed on the basement material, the finished grading plane shall not vary more than 30 mm above or below the grade established by the Engineer. The requirements for obtaining a relative compaction of 95 percent, as provided in the first 2 paragraphs in Section 19-5.03, "Relative Compaction (95 Percent)," of the Standard Specifications, shall not apply when a layer of specified material is not to be placed on the basement material.

The grading plane of embankments beneath structure approach slabs and beneath the thickened portion of sleeper slabs shall not project above the grade established by the Engineer.

Surplus excavated material not designated or determined to contain aerially deposited lead shall become the property of the Contractor and shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

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 50 mm before removing the surfacing. Full compensation for cutting the existing surfacing shall be considered as included in the contract price paid per cubic meter for roadway excavation and no additional compensation will be allowed therefor.

The portion of imported borrow placed within 1.5 m of the finished grade shall have a Resistance (R-Value) of not less than 15.

The "0.2-m" dimensions in the fifth paragraph of Section 19-3.08, "Payment," of the Standard Specifications are increased to "0.3-m" on this project.

Settlement periods are required for the bridge approach embankments at the Camarillo Overhead and Separation (Bridge No. 52-0016).

The duration of the required settlement period at each location will be determined by the Engineer and will not exceed 30 days.

If the Contractor elects to use the "Weep Hole and Geocomposite Drain" alternative where permitted on the plans, the geocomposite drain shall conform to the details shown on the plans and the following:

- A. Attention is directed to "Engineering Fabrics" under "Materials" of these special provisions.
- B. Geocomposite drain shall consist of a manufactured core not less than 6.35 mm thick nor more than 50 mm thick with one or both sides covered with a layer of filter fabric that will provide a drainage void. The drain shall produce a flow rate, through the drainage void, of at least 25 liters per minute per meter of width at a hydraulic gradient of 1.0 and a minimum externally applied pressure of 168 kPa.
- C. A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished for the geocomposite drain certifying that the drain produces the required flow rate and complies with these special provisions. The Certificate of Compliance shall be accompanied by a flow capability graph for the geocomposite drain showing flow rates for externally applied pressures and hydraulic gradients. The flow capability graph shall be stamped with the verification of an independent testing laboratory.
- D. Filter fabric for the geocomposite drain shall conform to the provisions for fabric for underdrains in Section 88, "Engineering Fabrics," of the Standard Specifications.
- E. The manufactured core shall be either a preformed grid of embossed plastic, a mat of random shapes of plastic fibers, a drainage net consisting of a uniform pattern of polymeric strands forming 2 sets of continuous flow channels, or a system of plastic pillars and interconnections forming a semirigid mat.
- F. The core material and filter fabric shall be capable of maintaining the drainage void for the entire height of geocomposite drain. Filter fabric shall be integrally bonded to the side of the core material with the drainage void. Core material manufactured from impermeable plastic sheeting having nonconnecting corrugations shall be placed with the corrugations approximately perpendicular to the drainage collection system.
- G. The geocomposite drain shall be installed with the drainage void and the filter fabric facing the embankment. The fabric facing the embankment side shall overlap a minimum of 75 mm at all joints and wrap around the exterior edges a minimum of 75 mm beyond the exterior edge. If additional fabric is needed to provide overlap at joints and wrap-around at edges, the added fabric shall overlap the fabric on the geocomposite drain at least 150 mm and be attached thereto.
- H. Should the fabric on the geocomposite drain be torn or punctured, the damaged section shall be replaced completely or repaired by placing a piece of fabric that is large enough to cover the damaged area and provide a minimum 150-mm overlap.
- I. Plastic pipe shall conform to the provisions for edge drain pipe and edge drain outlets in Section 68-3, "Edge Drains," of the Standard Specifications.
- J. Treated permeable base to be placed around the slotted plastic pipe at the bottom of the geocomposite drain shall be cement treated permeable base conforming to the provisions for cement treated permeable base in Section 29, "Treated Permeable Bases," of the Standard Specifications and these special provisions.
- K. The treated permeable base shall be enclosed with a high density polyethylene sheet or PVC geomembrane, not less than 250  $\mu\text{m}$  thick, which is bonded with a suitable adhesive to the concrete and geocomposite drain. Surfaces to receive the polyethylene sheet shall be cleaned before applying the adhesive. The treated permeable base shall be compacted with a vibrating shoe type compactor.

If structure excavation or structure backfill involved in bridges is not otherwise designated by type, and payment for the structure excavation or structure backfill has not otherwise been provided for in the Standard Specifications or these special provisions, the structure excavation or structure backfill will be paid for at the contract price per cubic meter for structure excavation (bridge) or structure backfill (bridge).

During clearing, grading, earth moving or excavation operations, regular watering, or other dust prevention measures using the following procedures shall control fugitive dust emissions:

- A. All active portions of the construction site shall be watered to prevent dust. Watering, with complete coverage, shall occur at least twice daily, in the late morning and after work is done for the day.
- B. All onsite roads shall be watered periodically or chemically stabilized and onsite vehicle speed shall be limited to 15 mph.

- C. All clearing, grading, earth moving, or excavation activities shall cease during period of high wind (i.e. greater than 20 mph averaged over 1 hour).
- D. All material transported offsite shall be either watered or securely covered to prevent excess amounts of dust.
- E. The area disturbed by demolition, clearing, grading, earth moving, or excavation operations shall be minimized at all times.
- F. Any portions of the construction site to remain inactive longer than 3 months shall be seeded and watered until grass cover is grown

**10-1.32 HIGH-MODULUS GEOGRID**

High-modulus geogrid shall be placed where shown on the plans and at locations designated by the Engineer in accordance with these special provisions.

Geogrid shall be a single-layer biaxial grid manufactured from polypropylene material, be resistant to ultraviolet degradation, and conform to the following physical and mechanical property requirements in the weakest principal direction:

| Property & Test Method                            | Value (English)        | Value (Metric)       |
|---|------------------------|----------------------|
| Aperture size range                               | 1.0-2.0 in.            | 25-50 mm             |
| Mass per unit area, minimum (ASTM D-5261)         | 8.8 oz/yd <sup>2</sup> | 300 g/m <sup>2</sup> |
| Tensile Strength and Modulus (ASTM D-4595):       | 600 lb./ft             | 8.7 kN/m             |
| Wide Width Tensile strength at 5%, minimum, OR    | 1,100 lb./ft           | 16.0 kN/m            |
| Wide Width Ultimate tensile strength, minimum, OR | 15,000 lb./ft          | 219 kN/m             |
| Tensile Modulus @ 2%, minimum                     |                        |                      |
| Flexural rigidity, minimum (ASTM D-1388)          | 220 lb.-mil            | 250,000 mg-cm        |

Prior to installation, geogrid shall be protected from ultraviolet radiation and from abrasion due to shipping and handling. Defective or damaged geogrids shall not be used.

A Certificate of Compliance conforming to the provisions in Section 6-1.07 "Certificate of Compliance" of the Standard Specifications shall accompany Geogrid.

The surface to receive the geogrid shall be brought to the required lines and dimensions as shown on the plan or as directed by the Engineer. The surface shall be smooth and shaped to eliminate clods, rocks, roots, or other deleterious items which may cause damage to the geogrid.

Geogrid shall be rolled out along the alignment on prepared surface in the direction of advancing construction on all the locations and to the limits shown on plan or as ordered by the Engineer. The deployed geogrid shall be pulled taut to form a tight wrinkle-free mat and shall be secured, as necessary and directed by the Engineer, to prevent displacement or movement. If pins or clips are to be used to fasten the geogrid, the Contractor shall demonstrate that these will not cause damage to any fabric to be placed directly above the geogrid.

The adjacent borders of parallel strips or roll ends of the geogrid shall be overlapped a minimum of 600 mm. The overlap shall be in the direction that the fill material will be spread. Placement of geogrid around corners shall be performed by cutting of geogrid product and diagonal overlapping such that the minimum of 600 mm overlap is always insured at all locations.

Should the geogrid be damaged during placement, the damaged section shall be repaired by placing a new piece of geogrid over the damaged area. Said piece of geogrid shall be large enough to cover the damaged area and provide a minimum 1 meter overlap on all edges.

The amount of geogrid (or fabric) placed shall be limited to that which can be covered with aggregate base material within 72 hours.

No vehicles or equipment shall be driven directly on the laid geogrid or fabric. Also, during spreading and compaction of the aggregate material, a sufficient thickness of the material shall always be maintained between the geogrid or fabric and the equipment to prevent damage to the geogrid or the fabric. Placing, spreading, and compaction operations over the geogrid or the fabric shall be conducted in such a manner that minimizes wrinkles development and damage or displacement of the geogrid or the fabric. Care shall be taken to ensure that the geogrid and fabric sections do not separate at overlaps during placement of the aggregate material.

Displaced geogrid shall be fixed and repaired at the Contractor's expense and so shall any damage of the geogrid resulting from the Contractor's vehicles, equipment, or operations.

As ordered by the Engineer, geogrid shall be sampled during placement for subsequent testing to verify conformance with the physical and mechanical requirements of this special provision.

The quantity of high-modulus geogrid to be paid for will be measured by the square meter of the surface area upon which the geogrid has been placed and accepted by the Engineer. No compensation shall be paid for additional geogrid used for overlap or cut off or wasted.

The contract price paid per square meter for high-modulus geogrid shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing the high-modulus geogrid complete in place, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

**10-1.33 SUBGRADE ENHANCEMENT FABRIC**

Subgrade enhancement fabric (SEF) shall be placed directly on cleared surface of the lightweight fill, longitudinally along the alignment to the limits shown on the plans or as designated by the Engineer.

Subgrade enhancement fabric shall be manufactured from one or more of the following polymers: polyester, nylon, or polypropylene.

Subgrade enhancement fabric shall be woven and shall conform to the following requirements:

| Geotextile Property & Standard Test  | Value |
|--|-------|
| Grab Tensile Strength, minimum, kN<br>(ASTM D-4632)                        | 1.40  |
| Puncture Resistance, minimum, kN<br>(ASTM D-4833)                          | 0.50  |
| Burst Resistance, minimum, MPa<br>(ASTM D-3786)                            | 3.50  |
| Tear (impact) Resistance, minimum, kN,<br>(ASTM D-4533)                    | 0.50  |
| Ultraviolet Stability, minimum, %,<br>ASTM D-4355 (after 500 hrs exposure) | 50    |

All property values shall be based on minimum average roll value (MARV) in the weaker principal direction.

Subgrade enhancement fabric shall be furnished in an appropriate protective cover capable of-protecting it from water, ultraviolet radiation due to sunshine, and abrasion due to shipping and handling, and shall remain in said cover until installation.

Subgrade enhancement fabric shall be accompanied by a Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificate of Compliance," of the Standard Specifications.

The surface to receive the fabric, immediately prior to placing, shall conform to the elevation tolerance and cross slopes as specified in the plans.

Subgrade enhancement fabric shall be handled and placed in accordance with the manufacturer's recommendations and shall be positioned longitudinally along the alignment and pulled taut to form a tight, wrinkle-free mat on the prepared surface.

Adjacent borders of adjacent-rolls of the fabric shall be overlapped a minimum of 450 mm in the direction as ordered by the Engineer. All roll ends shall be overlapped a minimum of 600 mm in the direction of the spreading of the aggregate subbase material.

On curves, the fabric may be folded or cut to conform to the curves. If cut, a minimum overlap of 450 mm shall be provided for adjacent fabric sides. The fold or overlap shall be held in place by staples, pins, or piles of fill of the materials to be placed on the fabric, or as directed by the Engineer.

Equipment or vehicles shall not be operated or driven directly on the subgrade enhancement fabric.

The amount of subgrade enhancement fabric placed shall be limited to that which can be covered with aggregate subbase material within 72 hours.

Stockpiling of materials directly on the subgrade enhancement fabric is not allowed. Once a sufficient working platform has been constructed to allow compaction, as determined by the Engineer, all remaining materials shall be placed and compacted in accordance with special provisions and the Standard Specifications. Until a sufficient working platform has been constructed, compaction shall be achieved by using either smooth wheel (without vibratory action) or rubber tired rollers. Sheepsfoot or other types of equipment employing a foot shall not be used. Excessive turning of vehicles shall not be allowed on the aggregate subbase material over the fabric.

Subgrade enhancement fabric damaged during placement shall be repaired as directed by the Engineer at the Contractor's expense. Fabric damaged beyond repair, as determined by the Engineer, shall be replaced. Repairing damaged fabric shall consist of placing new fabric over the damaged area. The fabric overlap from the edge of the damaged area shall be a minimum of 600 mm.

Subgrade enhancement fabric will be measured by the square meter. The quantity to be paid for will be the actual area covered, not including additional fabric required for overlaps.

The contract price paid per square meter for subgrade enhancement fabric shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and placing subgrade

enhancement fabric, complete in place, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

#### **10-1.34 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 aluminum and aluminum-coated culverts nor for culverts having a diameter or span greater than 6.1 m.

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 300 mm. This minimum may be reduced to 150 mm when the height of cover is less than or equal to 6.1 m or the pipe diameter or span is less than 1050 mm.

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 25 mm 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 345 kPa and 690 kPa for pipe culverts having a height of cover of 6.1 m or less and a minimum 28-day compressive strength of 690 kPa for pipe culverts having a height of cover greater than 6.1 m. Compressive strength shall be determined in conformance with the requirements in ASTM Designation: D 4832.
- B. When controlled low strength material is used as structure backfill for pipe culverts, the sections of pipe culvert in contact with the controlled low strength material shall conform to the requirements of Chapter 850 of the Highway Design Manual using the minimum resistivity, pH, chloride content, and sulfate content of the hardened controlled low strength material. Minimum resistivity and pH shall be determined in conformance with the requirements of California Test 643. The chloride content shall be determined in conformance with the requirements of California Test 422 and the sulfate content shall be determined in conformance with the requirements of California Test 417.
- C. 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.
- D. 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 mass 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 76 mm 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.

#### **10-1.35 MATERIAL CONTAINING AERIALY DEPOSITED LEAD**

Earthwork involving materials containing aerially deposited lead shall conform to the provisions in "Earthwork" and this section "Material Containing Aerially Deposited Lead" of these special provisions.

Attention is directed to "Aerially Deposited Lead" of these special provisions.

Type Y material contains aerially deposited lead in average concentrations greater than or equal to 5.0 mg/L Soluble Lead and between 0 - 350 mg/kg (inclusive) Total Lead, as tested using the California Waste Extraction Test. Type Y material exists at the edges of existing pavement, from Station 215+63 to Station 222+18, and from surface m to 0.15 m below existing grade, or as shown on the plans. These materials shall be placed as shown on the plans, unless otherwise directed by the Engineer, and covered with a minimum 0.3-m layer of non-hazardous soil or pavement. These materials are hazardous waste regulated by the State of California that may be reused as permitted under the Variance of the Department of Toxic Substances Control. Temporary surplus material may be generated on this project due to the requirements of stage construction. Temporary surplus material shall not be transported outside the project limits. In order to conform to the requirements of these provisions, it may be necessary to stockpile materials for subsequent stages or construct some embankments out of stage or handle temporary surplus material more than once.

Type Z-1 material contains aerially deposited lead in average concentrations less than 5.0 mg/L Soluble Lead and between 350 - 1000 mg/kg Total Lead, as tested using the California Waste Extraction Test. at the edges of existing pavement below existing grade, or as shown on the plans. These materials are non-hazardous waste, but shall be transported to and disposed of at a Class 1 Disposal Site or at a Class II Disposal Site that has permits to accept such waste from the Regional Waste Quality Control Board and Integrated Waste Management Board.

### **LEAD COMPLIANCE PLAN**

The Contractor shall prepare a project specific Lead Compliance Plan to prevent or minimize worker exposure to lead while handling material containing aerially deposited lead. Attention is directed to Title 8, California Code of Regulations, Section 1532.1, "Lead," for specific Cal-OSHA requirements when working with lead.

The Lead Compliance Plan shall contain the elements listed in Title 8, California Code of Regulations, Section 1532.1(e)(2)(B). Before submission to the Engineer, the Lead Compliance Plan shall be approved by an Industrial Hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene. The Plan shall be submitted to the Engineer for review and acceptance at least 15 days prior to beginning work in areas containing aerially deposited lead.

The Contractor shall not work in areas containing aerially deposited lead within the project limits, unless authorized in writing by the Engineer, until the Engineer has accepted the Lead Compliance Plan.

Prior to performing work in areas containing aerially deposited lead, personnel who have no prior training or are not current in their training status, including State personnel, shall complete a safety training program provided by the Contractor. The safety training program shall meet the requirements of Title 8, California Code of Regulations, Section 1532.1, "Lead."

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 5.

The Engineer will notify the Contractor of acceptance or rejection of any submitted or revised Lead Compliance Plan not more than 10 days after submittal of the plan.

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.

### **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 15 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 15 days of receipt of the Engineer's comments. The Engineer will have 15 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 aerially deposited lead. 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. Dust control measures
- E. Air monitoring
  - 1. Location and type of equipment
  - 2. Sampling frequency
  - 3. Analytical laboratory
- F. Transportation equipment and routes
- G. Method for preventing spills and tracking material onto public roads
- H. Truck waiting and staging areas
- I. Site for disposal of hazardous waste
- J. Spill Contingency Plan for material containing aerially deposited lead

### **DUST CONTROL**

Excavation, transportation, placement, and handling of materials containing aerially deposited lead 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 aerially deposited lead.

Stockpiles of material containing aerially deposited lead shall not be placed where affected by surface run-on or run-off. Stockpiles shall be covered with plastic sheeting 0.33 mm minimum thickness or 0.3 m of non-hazardous 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 aerially deposited lead 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 150 m<sup>3</sup> 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 aerially deposited lead 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 aerially deposited lead excavated outside the pay limits of excavation will be at the Contractor's expense.

### **MEASUREMENT AND PAYMENT**

Quantities of roadway excavation (aerially deposited lead) and structure excavation (aerially deposited lead), of the types shown in the Engineer's Estimate, will be measured and paid for in the same manner specified for roadway excavation and structure excavation, respectively, in Section 19, "Earthwork," of the Standard Specifications.

Full compensation for preparing an approved Excavation and Transportation Plan, transporting material containing aerially deposited lead reused in the work from location to location, and transporting and disposing of material containing aerially deposited lead shall be considered as included in the contract prices paid per cubic meter for the items of roadway

excavation (aerially deposited lead) and structure excavation (aerially deposited lead) involved, and no additional compensation will be allowed therefor.

No payment for stockpiling of material containing aerially deposited lead will be made, unless the stockpiling is ordered by the Engineer.

**10-1.36 EROSION CONTROL (TYPE D)**

Erosion control (Type D) shall conform to the provisions in Section 20-3, "Erosion Control," of the Standard Specifications and these special provisions and shall consist of applying erosion control materials to embankment and excavation slopes and other areas disturbed by construction activities.

If the slope on which the erosion control is to be placed is finished during the rainy season as specified in "Water Pollution Control" of these special provisions, the erosion control shall be applied immediately to the slope.

Prior to installing erosion control materials, soil surface preparation shall conform to the provisions in Section 19-2.05, "Slopes," of the Standard Specifications, except that rills and gullies exceeding 50 mm in depth or width shall be leveled. Vegetative growth, temporary erosion control materials, and other debris shall be removed from areas to receive erosion control.

**MATERIALS**

Materials shall conform to the provisions in Section 20-2, "Materials," of the Standard Specifications and these special provisions.

**Seed**

Seed shall conform to the provisions in Section 20-2.10, "Seed," of the Standard Specifications. Individual seed species shall be measured and mixed in the presence of the Engineer.

Seed shall be delivered to the project site in unopened separate containers with the seed tag attached. Containers without a seed tag attached will not be accepted.

A sample of approximately 30 g of seed will be taken from each seed container by the Engineer.

**Legume Seed**

Legume seed shall be pellet-inoculated or industrial-inoculated and shall conform to the following:

- A. Inoculated seed shall be inoculated in conformance with the provisions in Section 20-2.10, "Seed," of the Standard Specifications.
- B. Inoculated seed shall have a calcium carbonate coating.
- C. Industrial-inoculated seed shall be inoculated with Rhizobia and coated using an industrial process by a manufacturer whose principal business is seed coating and seed inoculation.
- D. Industrial-inoculated seed shall be sown within 180 calendar days after inoculation.
- E. Legume seed shall consist of the following:

**LEGUME SEED**

| Botanical Name<br>(Common Name)          | Percent Germination<br>(Minimum) | Kilograms Pure Live Seed Per Hectare<br>(Slope Measurement) |
|--|----------------------------------|---|
| Lupinus Bicolor<br>(Pigmy leaved Lupine) | 40                               | 1.0   |

### Non-Legume Seed

Non-legume seed shall consist of the following:

| NON-LEGUME SEED                                |                                  |   |
|--|----------------------------------|---|
| Botanical Name<br>(Common Name)                | Percent Germination<br>(Minimum) | Kilograms Pure Live Seed Per Hectare<br>(Slope Measurement) |
| Agrostis Pallens                               | 35                               | 1.0   |
| Aristida Purpurea<br>(Purple Three-Awn)        | 35                               | .30   |
| Elymus Elymoides<br>(Bottlebrush Squirreltail) | 40                               | 2.0   |
| Eschscholzia Californica<br>(California Poppy) | 30                               | 1.0   |
| Festuca Ovina<br>(Sheep Fescue)                | 40                               | 4.5   |
| Melica Californica<br>(California Melic)       | 40                               | 2.0   |
| Nassella Cernua<br>(Nodding Stipa)             | 30                               | 1.0   |
| Nassella Pulchra<br>(Purple Needlegrass)       | 40                               | 1.0   |
| Poa Secunda Secunda<br>(Pine Bluegrass)        | 25                               | 2.0   |
| Vulpia Microstachys<br>(Small Fescue)          | 40                               | 4.0   |

### Straw

Straw shall conform to the provisions in Section 20-2.06, "Straw," of the Standard Specifications and these special provisions.

Straw shall be derived from rice.

### Compost

Compost shall be derived from green material consisting of chipped, shredded or ground vegetation or clean processed recycled wood products or a Class A, exceptional quality biosolids composts, as required by the United States Environmental Protection Agency (EPA), 40 CFR, Part 503c regulations or a combination of green material and biosolids compost. The compost shall be processed or completed to reduce weed seeds, pathogens and deleterious material, and shall not contain paint, petroleum products, herbicides, fungicides or other chemical residues that would be harmful to plant or animal life. Other deleterious material, plastic, glass, metal or rocks shall not exceed 0.1 percent by weight or volume. A minimum internal temperature of 57°C shall be maintained for at least 15 continuous days during the composting process. The compost shall be thoroughly turned a minimum of 5 times during the composting process and shall go through a minimum 90-day curing period after the 15-day thermophilic compost process has been completed. Compost shall be screened through a maximum 9.5-mm screen. The moisture content of the compost shall not exceed 35 percent. Compost products with a higher moisture content may be used provided the weight of the compost is increased to equal the compost with a moisture content of 35 percent. Moist samples of compost on an as received basis shall be dried in an oven at a temperature between 105°C and 115°C until a constant dry weight of the sample is achieved. The percentage of moisture will be determined by dividing the dry weight of the sample by the moist weight of the sample and then multiplying by 100. Compost will be tested for maturity and stability with a Solvita test kit. The compost shall measure a minimum of 6 on the maturity and stability scale.

### Stabilizing Emulsion

Stabilizing emulsion shall conform to the provisions in Section 20-2.11, "Stabilizing Emulsion," of the Standard Specifications and these special provisions.

Stabilizing emulsion shall be in a dry powder form, may be reemulsifiable, and shall be a processed organic adhesive used as a soil tackifier.

## APPLICATION

Erosion control materials shall be applied in separate applications in the following sequence:

- A. The following mixture in the proportions indicated shall be applied with hydro-seeding equipment within 60 minutes after the seed has been added to the mixture:

| Material        | Kilograms Per Hectare<br>(Slope Measurement) |
|-----------------|--|
| Legume Seed     | 1.0  |
| Non-Legume Seed | 18.8   |
| Fiber           | 340  |
| Compost         | 2040   |

- B. Straw shall be applied at the rate of 3.5 tonnes per hectare based on slope measurements. Incorporation of straw will not be required. Straw shall be distributed evenly without clumping or piling.
- C. The following mixture in the proportions indicated shall be applied with hydro-seeding equipment:

| Material             | Kilograms Per Hectare<br>(Slope Measurement) |
|----------------------|--|
| Fiber                | 510  |
| Compost              | 1360   |
| Stabilizing Emulsion | 170  |

The ratio of total water to total stabilizing emulsion in the mixture shall be as recommended by the manufacturer.

Once straw work is started in an area, stabilizing emulsion applications shall be completed in that area on the same working day.

The proportions of erosion control materials may be changed by the Engineer to meet field conditions.

## MEASUREMENT AND PAYMENT

Compost (erosion control) will be measured by the kilogram or tonne, whichever unit is designated in the Engineer's Estimate. The weight will be as determined by the Engineer from marked mass and sack count or from scale weighings.

The contract price paid per kilogram or tonne for compost (erosion control) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying compost for erosion control, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### 10-1.37 IRRIGATION CROSSOVERS

Irrigation crossovers shall conform to the provisions in Section 20-5, "Irrigation Systems," of the Standard Specifications and these special provisions.

Conduits shall be placed in open trenches in conformance with the provisions in Section 20-5.03B, "Conduit for Irrigation Crossovers," of the Standard Specifications.

Conduits shall be alternate conduits and, at the option of the Contractor, shall be one of the following:

- A. Coated corrugated steel pipe,
- B. Corrugated aluminum pipe,
- C. Acrylonitrile-butadiene-styrene (ABS) composite pipe,
- D. Corrugated high density polyethylene (CHDPE) pipe conforming to the requirements in ASTM Designation: F 405 or F 667, or AASHTO Designation: M 252 or M 294 and shall be Type S. Couplings and fittings for CHDPE pipe shall be as recommended by the pipe manufacturer.

Water line crossovers shall conform to the provisions in Section 20-5.03C, "Water Line Crossovers," of the Standard Specifications.

Sprinkler control crossovers shall conform to the provisions in Section 20-5.027D, "Sprinkler Control Crossovers," of the Standard Specifications.

Installation of pull boxes shall conform to the provisions in Section 20-5.027I, "Conductors, Electrical Conduit and Pull Boxes," of the Standard Specifications. When no conductors are installed in electrical conduits, pull boxes for irrigation crossovers shall be installed on a foundation of compacted soil.

**10-1.38 AGGREGATE SUBBASE**

Aggregate subbase shall be Class 4 and shall conform to the provisions in Section 25, "Aggregate Subbases," of the Standard Specifications and these special provisions.

The restriction that the amount of reclaimed material included in Class 4 aggregate subbase not exceed 50 percent of the total volume of the aggregate used shall not apply. Aggregate for Class 4 aggregate subbase may include reclaimed glass. Aggregate subbase incorporating reclaimed glass shall not be placed at locations where surfacing will not be placed over the aggregate subbase.

The percentage composition by mass of Class 4 aggregate subbase shall conform to the following grading requirements:

Grading Requirements (Percentage Passing)

| Sieve Sizes | Operating Range | Contract Compliance |
|-------------|-----------------|---------------------|
| 75          | 100             | 100                 |
| 63          | 87-100          | 90-100              |
| 4.75-mm     | 30-100          | 35-100              |
| 75-µm       | 0-23            | 0-20                |

Class 4 aggregate subbase shall also conform to the following quality requirements:

Quality Requirements

| Test                 | Operating Range | Contract Compliance |
|----------------------|-----------------|---------------------|
| Sand Equivalent      | 21 Min.         | 18 Min.             |
| Resistance (R-value) | ----            | 50 Min.             |

The provisions of the last 4 paragraphs in Section 25-1.02A, "Class 1, Class 2, and Class 3 Aggregate Subbases," of the Standard Specifications shall apply to Class 4 aggregate subbase.

At the option of the Contractor, Class 2 aggregate subbase conforming to the grading and quality requirements in Section 25-1.02A, may be used in place of Class 4 aggregate subbase. The restriction that the amount of reclaimed material included in Class 2 aggregate subbase not exceed 50 percent of the total volume of the aggregate used shall not apply. Aggregate for Class 2 aggregate subbase may include reclaimed glass. Aggregate subbase incorporating reclaimed glass shall not be placed at locations where surfacing will not be placed over the aggregate subbase. Once a class of aggregate subbase is selected, the class shall not be changed without written approval of the Engineer.

Regardless of the class of aggregate subbase supplied under the provisions of this section, payment for all aggregate subbase will be made as Class 4 aggregate subbase.

**10-1.39 AGGREGATE BASE**

Aggregate bases shall be Class 2 and Class 3 and shall conform to the provisions in Section 26, "Aggregate Bases," of the Standard Specifications and these special provisions.

The restriction that the amount of reclaimed material included in Class 2 and Class 3 aggregate base not exceed 50 percent of the total volume of the aggregate used shall not apply. Aggregate for Class 2 and Class 3 aggregate base may include reclaimed glass. Aggregate base incorporating reclaimed glass shall not be placed at locations where surfacing will not be placed over the aggregate base.

At the option of the Contractor, the aggregate for Class 3 aggregate base shall conform to either the 37.5-mm maximum or the 19-mm maximum grading.

Aggregate for Class 3 aggregate base shall be clean and free from organic matter and other deleterious substances and shall conform to the following grading and quality requirements:

Grading Requirements (Percentage Passing )

| Sieve Sizes | 37.5-mm Maximum |                     | 19-mm Maximum   |                     |
|-------------|-----------------|---------------------|-----------------|---------------------|
|             | Operating Range | Contract Compliance | Operating Range | Contract Compliance |
| 50-mm       | 100             | 100                 | -----           | -----               |
| 37.5-mm     | 90 - 100        | 87 - 100            | -----           | -----               |
| 25-mm       | -----           | -----               | 100             | 100                 |
| 19-mm       | 50 - 90         | 45 - 95             | 90 - 100        | 87 - 100            |
| 4.75-mm     | 25 - 60         | 20 - 65             | 40 - 70         | 35 - 75             |
| 600-µm      | 10 - 35         | 6 - 39              | 12 - 40         | 7 - 45              |
| 75-µm       | 3 - 15          | 0 - 19              | 3 - 15          | 0 - 19              |

Quality Requirements

| Tests                | Operating Range | Contract Compliance |
|----------------------|-----------------|---------------------|
| Sand Equivalent      | 21 Min.         | 18 Min.             |
| Resistance (R-value) | -----           | 50 Min.             |

The provisions of the third paragraph in Section 26-1.02A, "Class 2 Aggregate Base," of the Standard Specifications shall apply to Class 3 aggregate base.

The requirements of the last 4 paragraphs in Section 26-1.02A of the Standard Specifications shall apply to Class 3 aggregate base.

**10-1.40 LEAN CONCRETE BASE**

Lean concrete base shall conform to the provisions in Section 28, "Lean Concrete Base," of the Standard Specifications.

**10-1.41 ASPHALT CONCRETE**

Asphalt concrete shall be Type B and shall conform to the provisions in Section 11-1, "Quality Control / Quality Assurance," of these special provisions and these special provisions.

The aggregate for Type B asphalt concrete shall be lime treated in conformance with "Lime Treated Aggregates" of these special provisions.

The Contractor may obtain a copy of the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete" at [www.dot.ca.gov/hq/construc/qcqa.html](http://www.dot.ca.gov/hq/construc/qcqa.html).

The aggregate for Type B asphalt concrete shall conform to the 19 mm maximum grading specified in Section 39-2.02, "Aggregate," in Section 11-1, "Quality Control / Quality Assurance," of these special provisions.

Asphalt concrete surfacing shall be placed on existing surfacing, including curve widening, chain control lanes, turnouts, left turn pockets, and public and private road connections shown on the plans, unless otherwise directed by the Engineer.

**10-1.42 LIME TREATED AGGREGATES**

This work shall consist of furnishing and treating aggregates with lime in conformance with these special provisions.

Prior to being incorporated into Type B asphalt concrete, aggregate shall be treated with a slurry of lime and water in conformance with these special provisions.

**MATERIALS**

Lime shall conform to the provisions in Section 24-1.02, "Materials," of the Standard Specifications and shall be a high-calcium hydrated lime. Water for mixing with aggregate and lime shall be free from oil and other impurities and shall contain not more than 650 parts per million of chlorides as Cl, and not more than 1300 parts per million of sulfates as SO<sub>4</sub>.

Lime shall be added to the aggregate as slurry. The slurry of dry lime and water shall be prepared at a ratio of one part lime to 3 parts water.

Aggregate for Type B asphalt concrete shall conform to the aggregate quality requirements specified in Section 11, "Asphalt Concrete," and these special provisions prior to the aggregate being treated with lime.

Combined aggregate gradation for Type B asphalt concrete will be determined after the aggregate has been treated with lime. Sampling of the combined aggregates shall be in conformance with the sampling requirements of the proportioning process being used for asphalt concrete production in conformance with the provisions in Section 11, "Asphalt Concrete," and these special provisions.

The lime ratio for the combined aggregates shall be not less than 1.2 percent and not more than 1.5 percent. The lime ratio is the kilograms of dry hydrated lime per 100 kg of dry aggregate expressed as a percent of the dry aggregate. The exact proportion shall be determined by the Contractor and approved by the Engineer. The lime ratio of the combined aggregate

shall not deviate from the approved lime ratio for combined aggregate by more than 0.2-percent when the individual sizes of aggregate are combined in the proportions designated in the approved asphalt concrete mix design. The water content of the slurry or the untreated aggregate shall have no bearing on the lime ratio.

Aggregate sizes shall be lime treated and cured separately. Lime shall be added to the separate sizes of aggregate in the following proportions:

|        | Aggregate Sizes           | Lime Ratio |
|--------|---------------------------|------------|
| Coarse | Retained on 4.75-mm sieve | 0.5 to 1.0 |
| Fine   | Passing the 4.75-mm sieve | 1.5 to 2.0 |

The exact proportions of lime and fine or coarse aggregates for Type B asphalt concrete shall be determined by the Contractor and reviewed by the Engineer as part of the proposed mix design submitted in conformance with the provisions in Section 11, "Asphalt Concrete," and these special provisions.

The lime ratio for individual aggregate sizes shall not vary by more than 0.2-percent above or below the agreed lime ratio.

At the time of mixing the slurry with the aggregate, the moisture content of the aggregate shall be of sufficient quantity that complete coating of the aggregate with slurry is assured. Aggregate shall have been dried or drained such that no visible separation of water from the aggregate will take place.

Lime treated aggregate shall be free of lime balls and clods.

Once aggregate has been treated with lime, the aggregate shall not be treated with lime again.

### PROPORTIONING

Weighing and measuring devices used for the proportioning of ingredients, except continuous weigh belts, shall have been Type-approved by the Division of Measurement Standards, Department of Food and Agriculture, State of California. Weighing and measuring devices used in the proportioning of slurry shall be tested in conformance with California Test 109 and these special provisions.

Scales used to calibrate proportioning devices used in the production of lime slurry or lime treated aggregates shall conform to the provisions in Section 9-1.01, "Measurement of Quantities" of the Standard Specifications and shall be error tested in conformance with California Test 109 within 24 hours of calibrating the proportioning devices.

Slurry of dry lime and water shall be proportioned by mass or by volume as specified in these Special Provisions. The proportioning of lime and water shall be of either a continuous or a batch type operation.

#### Proportioning for Lime Slurry by Continuous Mixing

When a continuous proportioning operation for the production of slurry is used the proportioning device shall determine the exact ratio of water to lime at all production rates. Rate-of-flow indicators and totalizers for like materials shall be accurate within 0.5-percent when compared directly. The following methods shall be used:

- A. Dry lime shall be weighed using a belt scale. Belt scale accuracy shall be such that, when operating between 30 percent and 100 percent of production capacity, the average difference between the indicated mass of material delivered and the actual mass delivered will not exceed 0.5-percent of the actual mass for 3 individual runs. For any of the 3 individual runs, the indicated mass of material delivered shall not vary from the actual mass delivered by more than one percent of the actual mass. Test run duration shall be for at least 0.5-tonne of dry lime. Tests shall be run using hydrated lime and shall be weighed on a platform scale located at the slurry proportioning plant. The platform scale shall have a maximum capacity not exceeding 2.5 tonnes with a maximum graduation size of 0.5-kg.
- B. Water to be used in the slurry shall be measured with a meter. Meter accuracy shall be such that, when operating between 50 percent and 100 percent of production capacity, the difference between the indicated mass of water delivered and the actual mass delivered shall not exceed one percent of the actual mass for 3 individual runs. Tests shall be weighed on a platform scale located at the slurry proportioning plant. The platform scale shall have a maximum capacity not exceeding 2.5 tonnes with a maximum graduation size of 0.5-kg. Test run duration shall be for at least 1150 L.
- C. Meters and scales used for the continuous proportioning of dry lime and water shall be equipped with rate-of-flow indicators to show the rates of delivery of dry lime and water and resettable totalizers so that the total amounts of dry lime and water introduced into slurry storage tank can be determined. Individual feeds for water and dry lime shall be equipped with no-flow devices which shall stop slurry production when either of the individual ingredients is not being delivered to the slurry storage tank.

### **Proportioning for Lime Slurry by Batch Mixing**

When a batch type proportioning operation for the production of slurry is used the following methods shall be used:

- A. Dry lime shall be proportioned by mass. The weighing of the dry lime shall be performed at the slurry production site. The scale shall be appropriate for the amount of lime draft used. When the proportioning operation uses a dry lime draft of less than 10 tonnes, an automatic batch controller shall be utilized. Automatic batch controllers used for Type B asphalt concrete shall conform to the provisions in Section 11, "Asphalt Concrete," of these special provisions.
- B. Water to be used in the slurry shall be measured with a meter. Meter accuracy shall be such that, when operating between 50 percent and 100 percent of production capacity, the difference between the indicated mass of water delivered and the actual mass delivered shall not exceed one percent of the actual mass for 3 individual runs. Tests shall be weighed on a platform scale located at the slurry proportioning plant. The platform scale shall have a maximum capacity not exceeding 2.5 tonnes with a maximum graduation size of 0.5-kg. Test run duration shall be for at least 1150 L.
- C. The water meter shall be equipped with a resettable totalizer. When an automatic controller is used to batch the dry lime it shall also control the proportioning of the water. When an automatic controller is used to proportion the water the indicated draft of the water shall be within one percent of its total draft mass.

### **Proportioning for Lime Treated Aggregate Production**

Slurry and aggregate proportioning shall be of the continuous type.

Slurry shall be introduced into the mixer through a meter conforming to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications. The meter shall be the mass flow of Coriolis effect type. The system shall be capable of varying the rate of delivery of slurry proportionate with the delivery of aggregate.

The slurry meter shall function with such accuracy that, when operated at rates commensurate with aggregate delivery, the average difference between the indicated mass of material delivered and the actual mass delivered shall not exceed 0.5-percent of the actual mass for 3 runs of at least 3.75 tonnes. For any of 3 individual runs of at least 3.75 tonnes, the indicated mass of material delivered shall not vary from the actual mass delivered by more than one percent of the actual mass. Tests shall be weighed on a platform scale located at the slurry proportioning plant. The platform scale shall have a maximum capacity not exceeding 2.5 tonnes with a maximum graduation size of 0.5-kg. Test run duration shall be for at least 1150 L.

The aggregate shall be weighed using a belt scale. The belt scale shall be of such accuracy that, when the plant is operating between 30 percent and 100 percent of belt capacity, the average difference between the indicated mass of material delivered and the actual mass delivered shall not exceed one percent of the actual mass for 3 individual 3-minute runs. For any of the 3 individual 3-minute runs, the indicated mass of material delivered shall not vary from the actual mass delivered by more than 2 percent of the actual mass.

The actual mass of material delivered for aggregate weigh belt calibrations shall be determined by a vehicle scale conforming to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications. The vehicle scale shall be located at the plant site and shall be error checked within 24 hours of checking the plant's proportioning devices. The meters and belt scales used for proportioning aggregates and slurry shall be equipped to facilitate accuracy checks. These accuracy checks shall be performed before production begins and at other times determined by the Engineer.

The belt scale for the aggregate and the slurry meter shall be interlocked so that the rates of feed of the aggregates and slurry are adjusted automatically at all production rates and production rate changes to maintain the agreed lime ratio. The plant shall not be operated unless this automatic system is operating and in good working condition.

The slurry meter and the aggregate feeder shall be equipped with devices by which the rate of feed can be determined while the plant is in full operation. Meters and belt scales used for proportioning aggregates and slurry shall be equipped with rate-of-flow indicators to show the rates of delivery of slurry and aggregate, and resettable totalizers so that the total amounts of slurry and aggregate introduced into the mixer can be determined. Rate-of-flow indicators and totalizers for like materials shall be accurate to within 0.5-percent when compared directly. The slurry totalizer shall not register when the slurry metering system is not delivering material to the mixer.

A monitoring device shall be located either in the stream of aggregate feed or where the device will monitor movement of the belt by detecting revolutions of the tail pulley on the belt feeder. The device for monitoring no flow or belt movement, as the case may be, shall stop the slurry and aggregate proportioning automatically and immediately when there is no flow.

### **MIXING AND STORAGE**

The lime slurry shall be stored in a central mixing tank provided with an agitator that both mixes and keeps the lime in suspension until applied to the aggregate. Agitation shall be continuous while the slurry is in storage and the storage time shall not exceed 24 hours. Agitation shall be such that a build-up of consolidated lime on the bottom or sides of the storage tank is prevented. The storage tank for slurry shall be equipped with a float-type device for automatic and immediate cut-off of the proportioning of slurry and aggregate when the level of slurry is lowered sufficiently to expose the pump suction line.

The rate of feed to the continuous mixer used for production of the lime treated aggregate shall not exceed the rate of feed that will permit complete mixing of all the material. Dead areas in the mixer, in which the 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 equipped with paddles of a type and arrangement that provides sufficient mixing action and movement to the mixture. The mixer shall produce a homogeneous mixture of thoroughly and uniformly coated aggregates at discharge from the mixer.

After the slurry has been added to the aggregate, the lime treated aggregate shall be placed in stockpiles and cured for not less than 24 hours but not more than 24 days before being incorporated into the asphalt concrete. Lime treated aggregate stored in excess of 24 days shall not be used in the work.

### **PRODUCTION DATA COLLECTION**

The device that controls the proportioning of slurry to aggregate shall produce a log of production data. The log of production data shall consist of a series of sets of data captured at 10-minute intervals throughout the period of daily production. Each set of production data shall be a register of production activity at that time and not a summation of the data over the preceding 10 minutes. The amount of material represented by each set of data shall be that amount produced for the period of time from 5 minutes before and 5 minutes after the capture time. Collected data shall be held in storage by the plant control device for the duration of the contract. The daily log shall be submitted to the Engineer, in electronic and printed media, at the end of each production shift, or as requested by the Engineer, and shall include the following:

- A. Date of production.
- B. Time of day the data is captured.
- C. Aggregate size being treated.
- D. Rate of flow of the wet aggregate, collected directly from the aggregate weigh belt.
- E. Moisture content of the aggregate about to be treated, expressed as a percent of the dry aggregate.
- F. Rate of flow of the dry aggregate calculated from the wet aggregate flow rate.
- G. Rate of flow of the lime slurry measured by the slurry meter.
- H. Rate of flow of dry lime, calculated from the slurry meter output.
- I. Agreed lime ratio for the individual aggregate size being treated.
- J. Actual lime ratio calculated from the aggregate weigh belt and the slurry meter output, expressed as a percent of the dry aggregate.
- K. Calculated difference between the agreed lime ratio and the actual lime ratio.
- L. Portions of dry lime and water as proportioned at the time of the slurry production.

Electronic media containing recorded production data shall be presented in a tab delimited format on a 90-mm diskette with a capacity of at least 1.44 megabytes. Each set of continuous production data shall be LFCR (line feed carriage return, one line, separate record) 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.

### **CONTRACTOR QUALITY CONTROL**

The Contractor shall control the lime treatment operation. Should it become evident that the Contractor does not have control of the process, lime treatment of aggregates for the contract shall cease until such time as the problem is identified and corrected. Evidence that the Contractor is not controlling the production shall include, but not be limited to, the following:

- A. Data has not been submitted to the Engineer.
- B. Collected data has not been complete, timely, or in the correct format.
- C. The Contractor has not taken corrective actions when necessary.
- D. Corrective actions taken have not been successful or timely.
- E. Plant production has not been stopped when proportioning tolerances have been exceeded.
- F. Any of the devices used for the production of lime treated aggregates has failed to function during production.

The Contractor shall determine the moisture content of the aggregate at least once during each 2 hours of production and shall adjust the slurry to aggregate proportioning accordingly. Aggregate moisture content determinations shall be representative of the amount of moisture in the aggregate being treated. Moisture content shall be calculated in conformance with California Test 226 or 370 and as a percent of the dry mass of the aggregate. The Engineer will use the same California Test for the verification of moisture content.

The following actions shall be taken by the Contractor:

- A. When 3 consecutive sets of recorded production data indicates deviation greater than 0.2-percent above or below the agreed lime ratio, production of lime treated aggregates shall cease.
- B. When a set of recorded production data indicates a deviation of greater than 0.4-percent above or below the agreed lime ratio, production of lime treated aggregates shall cease and the material represented by that set of data shall not be used for the manufacture of asphalt concrete.
- C. When 20 percent or more of the total daily production indicates deviation of greater than 0.2-percent above or below the agreed lime ratio, production shall cease and the total day's production shall not be used for the manufacture of asphalt concrete.

When production is stopped for failure to conform to these special provisions, the Contractor shall implement corrective measures, shall notify the Engineer before proceeding, and shall conduct a successful 15-minute test run prior to resuming production.

#### **PAYMENT**

Full compensation for lime treated aggregates for use in the manufacture of Type B asphalt concrete, shall be considered as included in the contract price paid per tonne for asphalt concrete (Type B) and no separate payment will be made therefor.

### **10-1.43 CONCRETE PAVEMENT (WITH DOWELED TRANSVERSE WEAKENED PLANE JOINTS)**

#### **GENERAL**

Portland cement concrete pavement shall conform to the provisions in Section 40, "Portland Cement Concrete Pavement," of the Standard Specifications and these special provisions.

#### **PREPAVING CONFERENCE**

Supervisory personnel of the Contractor and any subcontractor 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 all phases of the paving work.

The Contractor shall provide the facility for the prepping conference. Attendance at the prepping conference is mandatory for the Contractor's project superintendent, paving construction foreman, paving subcontractors, concrete plant operations personnel (including plant supervisors, manager, and operator) and paving operators. All conference attendees will 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.

The above-mentioned personnel along with the Engineer's representatives shall attend a 4-hour training class on portland cement concrete and paving techniques as part of the prepping conference. This training class time will be in addition to the regular conference time. The class shall be scheduled no more than 2 weeks prior to the placement of portland cement concrete pavement. The class shall be held during normal working hours. Selection of the instructor of the class shall be as agreed to by the Engineer and the Contractor.

#### **TEST STRIP**

At the beginning of paving operations, the Contractor shall construct an initial test strip of concrete pavement at least 200 meters, but not more than 300 meters, in length at the specified paving width. If the test strip conforms to specifications, it will become part of the project's paving surface and will be measured and paid for as concrete pavement and seal pavement joint. The Engineer will determine the specified paving width. The Contractor shall use the same equipment for the remainder of the paving operations. The Contractor shall not perform further paving until the test strip is evaluated in conformance with the provisions in Section 40-1.10, "Final Finishing," of the Standard Specifications regarding surface straight edge and profile requirements; for dowel and tie bar alignment verification; concrete quality; and pavement thickness. An additional test strip will be required when:

1. The Contractor proposes using different paving equipment including the batch plant, paver, dowel inserter, tie bar inserter, tining, or curing equipment, or
2. Any 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 and profile requirements without the use of grinding or other corrective method, or
3. The dowel tolerances are not met, or
4. The pavement thickness deficiency is greater than 15 mm, or
5. A change in concrete mix design has occurred.

The Contractor shall perform coring of the test strips, as directed by the Engineer, as part of the dowel or tie bar placement tolerance verification. A minimum of six dowel bars shall 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 Alignment Assurance Testing" of these special provisions.

Regardless of the placement method [load transfer assemblies (dowel baskets) or mechanical inserters] chosen by the Contractor, after the initial test strip is placed, operations shall be suspended until the Engineer has sufficient time to inspect dowel positioning to insure that proper alignment of dowels is being achieved. Dowel alignment tolerance allowance shall be in conformance to the requirements of these special provisions.

If mechanical inserters are to be 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 insertion point.

Prior to 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 dowels being placed. This procedure shall take into account inadvertent covering of paint markings after applying curing compound, misalignment by transferring marking spots, and inadequate staking of joints.

The Contractor shall change methods or equipment and construct additional test strips until a test strip conforms to the provisions in Section 40-1.10, "Final Finishing," of the Standard Specifications, and dowel bar alignment verification, without grinding or other corrective work. Each additional test strip shall be limited to 200 meters in length.

If test strip fails to conform to the specifications, before grinding, test strip shall be removed at the Contractor's expense. Additional test strips shall be constructed until the Contractor can demonstrate that test strip will conform to the requirements of these specifications.

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 and the mixer has not been altered or moved. The personnel shall be individuals listed in the prepaving conference used on the preceding Department project.

Materials resulting from the construction of all 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**

### **Tie Bars**

Tie bars shall be deformed reinforcing steel bars conforming to the requirements of ASTM Designation: A 615/A 615M, Grade 300 or 420, and shall be epoxy-coated in conformance with the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement," of the Standard Specifications, except that references made to ASTM Designation D 3963 shall be deemed to mean ASTM Designation A 934 or A 775. Epoxy-coated tie bars shall not be bent after installation.

### **Epoxy**

If used, epoxy resin to bond tie bars to existing concrete shall conform to the provisions in Section 95-2.03, "Epoxy Resin Adhesive for Bonding New Concrete to Old Concrete," of the Standard Specifications.

### **Dowels**

Dowels shall be smooth, round, epoxy-coated steel conforming to the requirements of ASTM Designation: A 615/A 615M, Grade 300 or 420, the details shown on the plans and the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement," of the Standard Specifications, except that references made to ASTM Designation D 3963/D 3963M shall be deemed to mean ASTM Designation A 934/A 934M.

Dowels shall be plain, smooth, round bars. Dowels shall be free from burrs or other deformations detrimental to free movement of the bars in the concrete.

### **Bond Breaker**

Dowels 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 dowels 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: C309, 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 two separate applications. Each application of curing compound shall be applied at the approximate rate of one liter per 3.7 m<sup>2</sup>.

### **Load Transfer Assemblies (Dowel Basket)**

Load transfer assemblies shall be manufactured with a minimum welded wire gage number of 3/0 (9.2 mm). Assemblies shall be either a U- or a A-frame. J-frame shapes shall not be used. Assemblies shall be fabricated in conformance with the requirements of ASTM Designation: A 82. Welding of assemblies shall conform to the requirements of AWS D1.1. A broken weld will be a cause for rejection of the assembly. Assemblies shall be epoxy coated in conformance with the requirements of ASTM Designation: A 884/A 884M.

Wire for staking pins shall conform to the requirements of ASTM Designation: A 82. Staking pins shall not be less than 7 mm wire diameter.

Concrete fasteners shall be driven fasteners (concrete nails) used specifically for fastening to hardened concrete conforming to the requirements of ASTM Designation: F1667. Shank diameter shall be a minimum of 4 mm with a minimum shank length of 64 mm. Clips shall be commercial quality manufactured for use with dowel assemblies.

Surface of staking pins, concrete fasteners and clips shall be either zinc electroplated or galvanized with a minimum coating thickness of 0.005 mm.

### **Preformed Compression Joint Sealant**

Preformed compression seals shall conform to the requirements of ASTM Designation: D 2628. All preformed compression seals shall have 5 or 6 cells. Lubricant adhesive used with preformed compression seals shall conform to the requirements of ASTM Designation D 2835. Compression seals along with lubricant adhesive shall be installed in conformance with the manufacturer's recommendations. The manufacturer's recommendations shall be submitted to the Engineer at the prepping conference.

Each lot of compression seal and lubricant adhesive shall be accompanied by a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications, and shall be accompanied with storage instructions and precautionary instructions for use. The Contractor shall also submit the manufacturer's data sheet with installation instructions and recommended model or type of preformed compression seal for the joint size and depth as shown on the plans. The manufacturer's selected compression seal shall show evidence that the seal is being compressed at level between 20 and 50 percent at all times for the joint width and depth shown on the plans.

### **Joint Filler Material**

Joint filler material shall be preformed expansion joint filler for concrete (bituminous type), conforming to the requirements of ASTM Designation: D 994.

### **SUBMITTALS**

Samples of the following materials used in the work shall be submitted for the Engineer's approval, 10 days prior to installation or placement of the materials:

- Dowel Bars
- Bond Breaker
- Tie Bars
- Epoxy
- Load Transfer Assemblies
- Staking Pins
- Concrete Nails and clips
- Joint Sealant
- Backer Rods
- Joint Filler Material

### **INSTALLING TIE BARS**

Tie bars shall be installed at longitudinal contact joints and longitudinal weakened plane joints as shown on the plans. In no case, shall any consecutive width of new portland cement concrete pavement tied together with tie bars exceed 15 meters. In no case shall tie bars be used at a joint where portland cement concrete and asphalt concrete pavements abut.

Tie bars shall be installed at longitudinal joints by one of the 3 following methods:

1. Drilling and bonding tie bars with epoxy shall conform to the details shown on the plans. The epoxy shall be a two-component, epoxy-resin, conforming to the requirements of ASTM Designation: C881, Type V. Grade 3 (Non-Sagging), and Class B. Epoxy shall be accompanied by a certificate of compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. A copy of the

manufacturer's recommended installation procedure shall be provided to the Engineer at least 7 days prior to the start of work or at the prepaving conference, whichever occurs first. The drilled holes shall be cleaned in conformance with the epoxy manufacturer's instructions and shall be dry at the time of placing the epoxy and tie bars. Immediately after inserting the tie bars into the epoxy, the tie bars shall be supported as necessary to prevent movement during the curing and shall remain undisturbed until the epoxy has cured a minimum time as specified by the manufacturer. Tie bars that are improperly bonded, as determined by the Engineer, will be rejected. If rejected, adjacent new holes shall be drilled, as directed by the Engineer, and new tie bars shall be placed and securely bonded to the concrete. All work necessary to correct improperly bonded tie bars shall be performed at the Contractor's expense.

2. By inserting the 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 to such an extent that there is no evidence on the surface of the completed pavement that there has been any insertion performed. Any loose tie bars shall be replaced by drilling and grouting into place with epoxy as described in method 1 above at the Contractor's expense.
3. By 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. The Certificate of Compliance shall be provided to the Engineer at the prepaving conference. Installation of threaded dowel splice couplers shall conform to the requirements of the manufacturer's recommendations.

### **DOWEL PLACEMENT**

Dowels at transverse weakened plane joints and at transverse contact joints shall be placed as shown on the plans. Prior to placement of the dowels, the Contractor shall submit to the Engineer in writing, a daily procedure to identify the transverse weakened plane joint location relative to the middle of the dowel bars. This procedure shall be verified by either coring, or any other method that is approved by the Engineer. Sawcuts for transverse weakened plane joints that are not directly over the center of the dowel bar (tolerance  $\pm 25$  mm) will be rejected and shall be corrected in conformance with "Core Drilling for Dowel Placement Alignment Assurance Testing" of these special provisions.

Dowels shall be placed by using load transfer assemblies (dowel baskets) or by mechanical insertion. Dowels shall be oriented parallel to the pavement lane centerline and surface of the pavement at mid slab depth. Dowel alignment shall be  $\pm 6$  mm per 300 mm of dowel length in both horizontal and vertical planes.

When dowels are placed by mechanical insertion, the concrete over the tie bars shall be reworked and refinished to such an extent that there is no evidence on the surface of the completed pavement that there has been any insertion performed.

When load transfer assemblies (dowel baskets) are used, they shall be securely anchored firmly to the base to hold all the dowel bars at the specified depth and alignment during concrete placement without displacement. For granular or non-stabilized bases, a minimum of 8 alternating, equally spaced, steel staking pins with a welded hook shall be used to anchor each 3.6 m assembly (4 per lower runner wire). Staking pins shall penetrate at least 300 mm into the granular base. For stabilized base such as cement treated base or lean concrete base, a minimum of 8 alternating, equally spaced, concrete fasteners with clips shall be used to anchor each 3.6 m assembly (4 per lower runner wire). At least 10 staking pins or concrete fasteners shall be used for assembly sections greater than 3.6 m and less than or equal to 4.9 m. Temporary spacer wires connecting load transfer assemblies shall be cut or removed after the assemblies are anchored into position prior to concrete placement. Paving shall be suspended when approved assemblies are not in place at least 60 m 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.

If load transfer assemblies are to be used, the Contractor shall submit working drawings in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The Contractor shall submit the working drawings 14 days prior to installation or at the prepaving conference.

Approval of the initial placement of load transfer assemblies shall not constitute acceptance of the final position of the dowel bars.

### **CORE DRILLING FOR DOWEL PLACEMENT ALIGNMENT ASSURANCE TESTING**

Coring, to confirm dowel placement, shall be provided by the Contractor throughout the project and, as directed by the Engineer. Immediately after coring, the concrete cores shall be identified by the Contractor with a location description and submitted to the Engineer for inspection. The holes shall be cored by methods that will not shatter or damage the concrete adjacent to the holes.

After removal of cores, core hole voids in concrete pavement shall be cleaned and filled with hydraulic cement grout conforming to ASTM Designation: C1107. At the Contractor's option, the grout shall be extended with clean pea gravel by an amount not exceeding that printed on the grout's packaging.

After placement of hydraulic cement grout, the material while still plastic shall be trowelled smooth to match the pavement surface. The backfill material shall not evidence any depressions or surplus material above the level surface of the pavement.

Water for core drilling operations shall be from a local domestic water supply. Water used for coring shall not contain more than 1000 parts per million of chlorides as Cl, nor more than 1300 parts per million of sulfates as SO<sub>4</sub>, nor shall it contain any 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.

The Engineer will randomly check dowel positioning by coring or other methods. Each day's paving will be checked by the Engineer within 2 calendar days by performing one test for every 1670 square meters of doweled pavement or fraction thereof. One test shall consist of drilling 2 cores, one on each end of a dowel bar to expose both ends and allow measurement for proper alignment. If the dowel bars are located incorrectly or air voids exist surrounding the dowel bars, additional cores will be required to determine the severity. The Engineer will select the location for performing the test.

Dowel alignment shall conform to the specified tolerances. If at any time dowels are found to be installed improperly, the paving operations will be suspended and operations shall not begin until the Contractor has demonstrated to the Engineer that the problem which causes the improper dowel positioning has been corrected.

Joints containing dowels that do not conform to specifications will be rejected. The Contractor shall replace rejected joints by saw cutting on each side of the joint a minimum of 0.9-m, lifting out concrete to be removed, installing dowels, placing concrete, and installing new joints. New dowel holes shall be drilled by the use of an automatic dowel-drilling rig for the dowels to be installed at the contact joint. Dowels shall be placed at the locations as shown on the plans for 2 new contact joints. No additional payment will be made for replacement of slabs and joints required due to joints (dowel placement) not conforming to the specified tolerances.

#### **PREFORMED COMPRESSION JOINT SEAL INSTALLATION**

The compression seal alternative joint 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 any joint after the compression seal has been placed, the joint materials shall be completely removed and disposed of, and replaced at the Contractor's expense. Compression seal shall be recessed below the final finished surface as shown on the plans.

At the Contractor's option, transverse weakened plane joints shall be either Type DSC or Type SSC as shown on the plans. Longitudinal weakened plane joints shall be Type SSC only as shown on the plans.

Seven days after the concrete pavement placement and not more than 4 hours before placing preformed compression joint seals, the joint walls shall be cleaned by the dry sand blast method and other means as necessary to completely remove from the joint all objectionable material such as soil, asphalt, curing compound, paint and rust. After cleaning the joint, all traces of sand, dust and loose material shall be removed from and near the joint for a distance along the pavement surfaces of at least 50 mm on each side of the joint by the use of a vacuum device. Surface moisture shall be removed at the joints by means of compressed air or moderate hot compressed air or other means approved by the Engineer. Drying procedures that leave a residue or film on the joint wall shall not be used. Sandblasting equipment shall have a maximum nozzle diameter size of  $6 \pm 1$  mm and a minimum pressure of 0.62-MPa.

#### **CONSTRUCTING TRANSVERSE CONTACT JOINTS**

A transverse (contact) construction joint shall be constructed 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 any excess concrete shall be at the Contractor's expense. Any excess material shall become the property of the Contractor and shall be properly disposed of.

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**

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 during placement of concrete.

Sealant for longitudinal isolation joint shall be Compression Sealant and placed in accordance with the requirements for compression joint sealant installation as specified above.

## MEASUREMENT AND PAYMENT

Full compensation for sealing longitudinal and transverse weakened plane joints and longitudinal isolation joints in Portland cement concrete pavement including sawing, cleaning and preparing the joints in the concrete pavement, repairing and patching spalled or raveled sawed joints, and replacing or repairing rejected joints, shall be considered as included in the contract price paid per cubic meter for concrete pavement (ramp termini) and no separate payment will be made therefor.

Full compensation for furnishing and placing epoxy-coated tie bars and lubricated epoxy-coated dowels with epoxy-coated dowel assemblies with fasteners or staking pins in portland cement concrete pavement shall be considered as included in the contract price paid per cubic meter for concrete pavement and no separate payment will be made therefor.

Full compensation for drilling holes and bonding tie bars with epoxy resin shall be considered as included in the contract price paid per cubic meter for concrete pavement and no additional compensation will be allowed therefor.

Full compensation for constructing test strips and coring the test strip shall be considered as included in the contract price paid per cubic meter for concrete pavement and no additional compensation will be allowed therefor.

Full compensation for providing the prepaving conference facility and the required Contractor personnel at the conference, and for doing all the work involved in arranging for the prepaving conference (except for the costs involved in providing an instructor for the training class) shall be considered as included in the contract price paid per cubic meter for concrete pavement and no additional compensation will be allowed therefor.

The costs involved in providing an instructor at the 4-hour training class as part of the prepaving conference will be paid for as extra work in conformance with the provisions in Section 4-1.03D, "Extra Work," of the Standard Specifications except that if payment is made by force account as provided in Section 9-1.03, "Force Account Payment," of the Standard Specifications, no markups will be added to the costs involved.

Full compensation for core drilling and backfilling with hydraulic cement grout shall be included in the contract price per cubic meter for concrete pavement and no additional compensation will be allowed therefor.

If the cores show that the dowels are within alignment tolerances and the Engineer orders more dowel coring than the one test for every 1670 square meter of doweled pavement, 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.

If the cores show the dowels are out of alignment and the Engineer orders more dowel coring, the additional drilling for the cores shall be included in the contract price per cubic meter for concrete pavement and no additional compensation will be allowed therefor.

### 10-1.44 EXIT RAMP TERMINI

Portland cement concrete pavement at exit ramp termini shall be constructed as shown on the plans and as provided in Section 40, "Portland Cement Concrete Pavement," of the Standard Specifications.

### 10-1.45 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.

Foundation recommendations are included in the "Information Handout" available to the Contractor as provided for in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

Attention is directed to "Welding" of these special provisions.

Difficult pile installation is anticipated due to the presence of dense gravel, dense sand, dense gravelly sand layers, and caving soils.

#### Drilling

Drilling to obtain the specified penetration in conformance with the provisions in Section 49-1.05, "Driving Equipment," of the Standard Specifications shall only be used for driven type piles on Camarillo Overhead/Separation to 3 m above specified tip elevation. Drilled holes shall be limited to 350 mm diameter for Class 900 and 300 mm diameter for Class 625 alternative W piles. Materials resulting from drilling holes shall be disposed of in conformance with the provisions in Section 19-2.06, "Surplus Material," of the Standard Specifications.

#### Predrilled Holes

Piles shall be driven in oversized drilled holes in conformance with the provisions in Section 49-1.06, "Predrilled Holes," of the Standard Specifications at the locations and to the corresponding bottom of hole elevations listed in the following table:

| Bridge Name or Number            | Abutment Number | Bent Number | Elevation of Bottom of Hole |
|----------------------------------|-----------------|-------------|-----------------------------|
| Camarillo<br>Overhead/Separation | 1 R             |             | 48                          |
| Camarillo<br>Overhead/Separation | 1 L             |             | 49                          |
| Camarillo<br>Overhead/Separation | 11 R            |             | 44                          |
| Camarillo<br>Overhead/Separation | 11 L            |             | 49                          |

### **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 600 mm in diameter or larger may be constructed by excavation and depositing concrete under slurry.

Ground water is expected during installation of cast-in-drilled-hole piles at Bent 2 on Arneill Road Overcrossing.

#### **Materials**

Concrete deposited under slurry shall have a nominal penetration equal to or greater than 90 mm. Concrete shall be proportioned to prevent excessive bleed water and segregation.

Concrete deposited under slurry shall contain not less than 400 kg of cementitious material per cubic meter.

The combined aggregate grading used in concrete for cast-in-drilled-hole concrete piling shall be either the 25-mm maximum grading, the 12.5-mm maximum grading, or the 9.5-mm maximum grading and shall conform to the requirements in Section 90-3 "Aggregate Gradings," 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 midheight and near the bottom of the hole. Slurry shall be recirculated when tests show that the samples taken from midheight and near the bottom of the hole do not have consistent specified properties.

Slurry shall also be sampled and tested prior to final cleaning of the bottom of the hole and again just prior to placing concrete. Samples shall be taken from midheight 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 midheight 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 (kg/m <sup>3</sup> )<br>- before placement in the drilled hole<br>- during drilling<br>- prior to final cleaning<br>- immediately prior to placing concrete  | 1030* to 1110*<br><br>1030* to 1200* | Mud Weight (Density)<br>API 13B-1<br>Section 1   |
| Viscosity (seconds/liter)<br>bentonite<br>attapulgate  | 29 to 53<br><br>29 to 42             | 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>- prior to final cleaning<br>- immediately prior to 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 32 kg/m <sup>3</sup> .<br>Slurry temperature shall be at least 4 degrees Celsius 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>Suite 216<br>735 Broad Street<br>Chattanooga, TN 37402<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            |

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 Office of Structure Design, P.O. Box 942874, Sacramento, CA 94274-0001.

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 prior to 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 prior to 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 with steel reinforcement in place and just prior to 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 (kg/m <sup>3</sup> )<br>- during drilling<br><br>- prior to final cleaning<br>- just prior to placing concrete   | less than or equal to 1075*<br><br>less than or equal to 1025* | Mud Weight (Density)<br>API 13B-1<br>Section 1   |
| Viscosity (seconds/liter)<br>- during drilling<br><br>-prior to final cleaning<br>- just prior to placing concrete   | 53 to 127<br><br>less than or equal to 74                      | 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>- prior to final cleaning<br>- just prior to placing concrete  | less than or equal to 0.5                                      | Sand<br>API 13B-1<br>Section 5                   |
| <p>*When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 32 kg/m<sup>3</sup>.<br/>Slurry temperature shall be at least 4 degrees Celsius when tested.</p> |  |  |

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 (kg/m <sup>3</sup> )<br>- prior to final cleaning<br>- just prior to placing concrete  | less than or equal to 1025*              | Mud Weight (Density)<br>API 13B-1<br>Section 1   |
| Viscosity (seconds/liter)<br>- during drilling<br>- prior to final cleaning<br>- just prior to placing concrete  | 34 to 64<br><br>less than or equal to 64 | 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>- prior to final cleaning<br>-just prior to 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 32 kg/m <sup>3</sup> .<br>Slurry temperature shall be at least 4 degrees Celsius 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 (kg/m <sup>3</sup> )<br>- prior to final cleaning<br>- just prior to placing concrete  | less than or equal to 1025*          | Mud Weight (Density)<br>API 13B-1<br>Section 1   |
| Viscosity (seconds/liter)<br>- during drilling<br>- prior to final cleaning<br>- just prior to placing concrete  | 35 to 78<br>less than or equal to 60 | 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>- prior to final cleaning<br>-just prior to 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 32 kg/m <sup>3</sup> .<br>Slurry temperature shall be at least 4 degrees Celsius 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<br>(kg/m <sup>3</sup> )<br><br>- prior to final<br>cleaning<br>- just prior to<br>placing concrete                               | 1017 *                       | Mud Weight<br>(Density)<br>API 13B-1<br>Section 1 |
| Sand Content<br>(percent)<br><br>- prior to final<br>cleaning<br>-just prior to placing<br>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 32 kg/m <sup>3</sup> . |                              |   |

## 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 description, 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 and inspection pipes, if required.
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. 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.
2. 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.
3. Suppliers test reports on the physical and chemical properties of the slurry and any proposed slurry chemical additives including Material Safety Data Sheet.
4. Slurry testing equipment and procedures.
5. Removal and disposal of excavation, slurry, and contaminated concrete, including methods and rates of removal.
6. Slurry agitating, recirculating, and cleaning methods and equipment.

In addition to compressive strength requirements, the consistency of the concrete to be deposited under slurry shall be verified before use by producing a batch to be tested. 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 testing in conformance with California Test 533. Depositing of test batch concrete under slurry will not be required. 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 both the specified nominal penetration and a penetration of at least 50 mm after twice that time has elapsed. 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 both the specified nominal penetration and a penetration of at least 50 mm 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. 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.

Concrete deposited under slurry shall not be vibrated until all temporary casing is removed and concrete contaminated with soil, slurry, or other materials is removed. Concrete deposited under slurry shall be vibrated in the upper 2 m of the pile.

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. 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 250 mm 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 250-mm tube.

Spillage of concrete into the slurry during concrete placing operations shall not be allowed. Delivery tubes shall be capped with a water tight 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 to prevent reentry of the slurry into the tube. Until at least 3 m of concrete has been placed, the tip of the delivery tube shall be within 150 mm of the bottom of the drilled hole, and then the embedment of the tip shall be maintained at least 3 m 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 3 m 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 300 mm 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 215 mm x 280 mm 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 1.5 m 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 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 1.5 m 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.

Where cast-in-drilled-hole concrete piling is constructed in slag aggregate embankments, the diameter of the piling shall be increased to provide at least 76 mm of concrete cover over the reinforcing steel. Increases in the diameter of piling solely for the purpose of providing additional concrete cover over the reinforcing steel will not be considered as qualifying for revisions in the specified tip elevation.

Any pile which has been increased in diameter as provided above will be paid for at the contract price per meter for the size of cast-in-drilled-hole concrete piling shown on the plans at that location.

### **Acceptance Testing and Mitigation**

Vertical inspection pipes for acceptance testing shall be provided in all cast-in-drilled-hole concrete piles that are 600 mm in diameter or larger, except when the holes are dry or when the holes are dewatered without the use of temporary casing to control the groundwater.

Inspection pipes shall be Schedule 40 polyvinyl chloride pipe with a nominal inside diameter of 50 mm. Each inspection pipe shall be capped top and bottom and shall have watertight couplers to provide a clean, dry and unobstructed 50-mm diameter clear opening from 1.0 m above the pile cutoff down to the bottom of the reinforcing cage.

If the Contractor drills the hole below the specified tip elevation, the reinforcement and the inspection pipes shall be extended to 75 mm clear of the bottom of the drilled hole.

Inspection pipes shall be placed around the pile, inside the outermost spiral or hoop reinforcement, and 75 mm clear of the vertical reinforcement, at a uniform spacing not exceeding 840 mm 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 26 mm in diameter, inspection pipes may be placed 50 mm 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 48.3-mm diameter rigid cylinder 610 mm long through the complete length of pipe. If the 48.3-mm diameter rigid cylinder fails to pass any of the inspection pipes, the Contractor shall attempt to pass a 32.0-mm diameter rigid cylinder 1.375 m long through the complete length of those pipes in the presence of the Engineer. If an inspection pipe fails to pass the 32.0-mm 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 32.0-mm diameter cylinder with a 50.8-mm 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, no more than 150 mm inside the reinforcement, and 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 8.0 m 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 3 weeks for the Engineer to conduct these tests and make determination of acceptance if the 48.3-mm diameter cylinder passed all inspection pipes, and 4 weeks if only the 32.0-mm 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 Contractors 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, \$400 per cubic meter for the portion of the pile affected by the anomalies. The volume, in cubic meters, 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 meters, as determined by the Engineer, multiplied by the distance, in meters, 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 \$400. 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-Kilometer Post, 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 3 weeks 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-Kilometer Post, 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.

**STEEL PIPE PILING**

**General**

Steel pipe piling shall consist of unfilled steel pipe piling. Steel pipe piling shall conform to the provisions in Section 49-5, "Steel Piles," of the Standard Specifications and these special provisions.

Wherever reference is made to the following American Petroleum Institute (API) specifications in the Standard Specifications, on the project plans, or in these special provisions, the year of adoption for these specifications shall be as follows:

| API Codes | Year of Adoption |
|-----------|------------------|
| API 2B    | 1990             |
| API 5L    | 1995             |

All requirements of the codes listed above shall apply unless specified otherwise in the Standard Specifications, on the plans or in these special provisions.

Only steel pipe pile seam welds may be made by the electric resistance welding method. Such welds shall be welded in conformance with the requirements in API 5L and any amendments to API 5L in the Standard Specifications or these special provisions.

Seams in steel pipe piles made by submerged arc welding may be welded in conformance with the requirements in API 5L and any amendments to API 5L in the Standard Specifications or these special provisions.

Handling devices may be attached to steel pipe piling. Welds attaching these devices shall be aligned parallel to the axis of the pile and shall conform to the requirements for field welding specified herein. Permanent bolted connections shall be corrosion resistant. Prior to making attachments, the Contractor shall submit a plan to the Engineer that includes the locations, handling and fitting device details, and connection details. Attachments shall not be made to the steel pipe piling until the plan is approved in writing by the Engineer. The Engineer shall have 7 days to review the plan. Should the Engineer fail to complete the review within 7 days, 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 plan, 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.

Each length of steel pipe piling shall be marked in conformance with the requirements in ASTM Designation: A 252.

For steel pipe piling, including bar reinforcement in the piling, the Engineer shall be allowed 48 hours to review the "Welding Report," specified in "Welding Quality Control" of these special provisions, 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. Should the Engineer fail to complete the review and provide notification 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 notification, 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.

At the Contractor's option, a steel pipe pile may be re-tapped to prevent pile set-up; however, the field welded splice shall remain at least one meter above the work platform until that splice is approved in writing by the Engineer.

**Manufactured Steel Pipe**

Manufactured steel pipe is defined as pipe produced at a permanent facility where an automatic welding process, electric resistance welder, or seamless pipe operation is used in conformance with ASTM Designations: A 252, A 53, A 135, A 139, API 5L, or AWWA C200; where this steel pipe can be produced in lengths at least 9 m long without a circumferential splice; and where this manufacturing can be done on a daily basis. Manufactured steel pipe is not a specifically engineered product. (i.e. Manufactured steel pipe is an off-the-shelf item.)

Manufactured steel pipe used for steel pipe piling shall conform to the following requirements:

- A. The outside circumference of the steel pipe piling end shall not vary by more than 10 mm from that corresponding to the diameter shown on the plans.
- B. The maximum allowable misalignment for adjacent steel pipe pile edges to be welded shall be 0.1875 times the wall thickness, but not more than 1.6 mm.
- C. Steel pipe pile straightness shall conform to the requirements in API 5L, Section 7.6, "Straightness."

- D. Welds made at a permanent manufacturing facility shall be made by either an automatic welding process or an electric resistance welding process.

### **Fabricated Steel Pipe**

Fabricated steel pipe is defined as pipe produced at a permanent facility where a variety of steel fabrication including roll forming and welding steel plate into pipe is performed, where this pipe is at least 19 mm in wall thickness, where this pipe is produced in conformance with API 2B, and where this fabrication can be done on a daily basis. Fabricated steel pipe is a specifically engineered product. (i.e. Fabricated steel pipe is engineered for a specific project.)

Fabricated steel pipe used for steel pipe piling shall conform to API 2B and the following requirements:

- A. An API site license and API monogram are not required.
- B. Weld filler metal shall conform to the requirements of AWS D1.5 for the welding of ASTM Designation: A 709, Grade 50 steel, except that the qualification, pretest, and verification test requirements need not be conducted if certified test reports are provided for the consumables to be used.

### **Field Welding**

Field welding of steel piling is defined as welding performed after the certificate of compliance has been furnished by the manufacturer or fabricator and shall conform to the following requirements:

- A. Match marking of pipe ends at the manufacturing or fabrication facility is recommended for piling to ensure weld joint fit-up. Prior to positioning any 2 sections of steel pipe to be spliced by field welding, including those that have been match marked at the manufacturing or fabrication facility, the Contractor shall equalize the offsets of the pipe ends to be joined and match mark the pipe ends.
- B. Welds made in the flat position or vertical position (where the longitudinal pipe axis is horizontal) shall be single-vee groove welds. Welds made in the horizontal position (where the longitudinal pipe axis is vertical) shall be single-bevel groove welds. Joint fit-ups shall conform to the requirements for tubular sections in AWS D1.1 and these special provisions.
- C. The minimum thickness of the backing ring shall be 6 mm, and the ring shall be continuous. Splices in the backing ring shall be made by complete penetration welds. These welds shall be completed and inspected prior to final insertion into a pipe end. Attachment of backing rings to pipe ends shall be done using the minimum size and spacing of tack welds that will securely hold the backing ring in place. Tack welding shall be done in the root area of the weld splice. Cracked tack welds shall be removed and replaced prior to subsequent weld passes. The gap between the backing ring and the steel pipe piling wall shall be no greater than 2 mm. One localized portion of the splice, that is equal to or less than a length that is 20 percent of the outside circumference of the pipe, as determined by the Engineer, may be offset by a gap equal to or less than 6 mm provided that this localized portion is first seal welded using shielded metal arc E7016 or E7018 electrodes. The Contractor shall mark this localized portion so that it can be referenced during any required nondestructive testing (NDT). Backing rings shall have a minimum width of 1 1/2 times the thickness of the pile to be welded so that they will not interfere with the interpretation of the NDT.
- D. For steel pipe with an outside diameter greater than 1.1 m, and with a wall thickness greater than 25.4 mm, the root opening tolerances may be increased to a maximum of 5 mm over the specified tolerances.
- E. Weld filler metal shall conform to the requirements shown in AWS D1.5 for the welding of ASTM Designation: A 709, Grade 50 steel, except that the qualification, pretest, and verification test requirements need not be conducted if certified test reports are provided for the consumables to be used.
- F. For field welding, including attaching backing rings and making repairs, the preheat and interpass temperature shall be in conformance with AWS D1.1, Section 3.5, "Minimum Preheat and Interpass Temperature Requirements," and with Table 3.2, Category C; and the minimum preheat and interpass temperature shall be 66°C, regardless of the pipe pile wall thickness or steel grade. In the event welding is disrupted, preheating to 66°C must occur before welding is resumed.
- G. Welds shall not be water quenched. Welds shall be allowed to cool unassisted.

Radiographic, magnetic particle, or ultrasonic testing shall be used to assure soundness of backing rings in conformance with the requirements in AWS D1.1, Section 6.

### **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.

Payment for cast-in-place concrete piling shall conform to the provisions in Section 49-6.02, "Payment," of the Standard Specifications except that, when the diameter of cast-in-place concrete piling is shown on the plans as 600 mm or larger, reinforcement in the piling will be paid for by the kilogram as bar reinforcing steel (bridge).

Full compensation for any changes in the cost of constructing cast-in-drilled-hole concrete piling with increased diameters as provided in these special provisions, including the increased quantity of portland cement concrete and any changes in the drilling cost, shall be considered as included in the contract price paid per meter for the size of cast-in-drilled-hole concrete piling shown on the plans, and no separate payment will be made therefor.

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 re-drilling through concrete, shall be considered as included in the contract prices paid per meter 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.

Full compensation for conforming to the provisions in "Steel Pipe Piling" of these special provisions 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.

#### **10-1.46 PRESTRESSING CONCRETE**

Prestressing concrete shall conform to the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications.

The details shown on the plans for cast-in-place prestressed box girder bridges are based on a bonded full length draped tendon prestressing system. For these bridges the Contractor may, in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications, propose an alternative prestressing system utilizing bonded partial length tendons provided the proposed system and associated details meet the following requirements:

- A. The proposed system and details shall provide moment and shear resistances at least equal to those used for the design of the structure shown on the plans.
- B. The concrete strength shall not be less than that shown on the plans.
- C. Not less than 35 percent of the total prestressing force at any section shall be provided by full length draped tendons.
- D. Anchorage blocks for partial length tendons shall be located so that the blocks will not interfere with the placement of the utility facilities shown on the plans or of any future utilities to be placed through openings shown on the plans.
- E. Temporary prestressing tendons, if used, shall be detensioned, and the temporary ducts shall be filled with grout before completion of the work. Temporary tendons shall be either removed or fully encased in grout before completion of the work.
- F. All details of the proposed system, including supporting checked calculations, shall be included in the drawings submitted in conformance with the provisions in Section 50-1.02, "Drawings," of the Standard Specifications.

Moments and shears for loads used in the design shown on the plans will be made available to the Contractor upon written request to the Engineer.

#### **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.

Drainage box culverts, headwalls, wingwalls, type "B" drain, and concrete "V" ditches shall be considered as concrete structures as specified in the Standard Specifications.

Full compensation for connecting box culverts, headwalls, wingwalls, type "B" drain, and concrete "V" ditches or new facilities shall be considered as included in the contract price paid per cubic meter for minor concrete (minor structure) and no separate payment will be made therefor.

Concrete rings and reducers for manholes shall be included in the contract price paid per cubic meter for minor concrete (minor structure) and no separate payment will be made therefor.

#### **GENERAL**

Entry columns on the Arneill Road Overcrossing shall be constructed of minor concrete and shall conform to the provisions in Section 51-1.02, "Minor Structures," of the Standard Specifications, and these special provisions.

Entry columns shall be integrally colored in conformance with the requirements in ASTM Designation: C 979. The entry column cap shall match Federal Standard 595B, No. 33617, and the entry column base shall match Federal Standard 595B, No. 37886.

Shotcrete shall not be used as an alternative construction method for reinforced concrete members unless otherwise specified.

Neoprene strip shall be furnished and installed at abutment backwall joint protection on Camarillo Overhead and Separation, and Arneill Road Overcrossing in conformance with the details shown on the plans, the provisions in the Standard Specifications, and these special provisions.

Furnishing and installing neoprene strip shall conform to the requirements for strip waterstops as provided in Section 51-1.145, "Strip Waterstops," of the Standard Specifications, except that the protective board will not be required.

Materials for access opening covers in soffits of new cast-in-place concrete box girder bridges shall conform to the provisions for materials in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

Plastic pipe located at vertical drains used behind retaining walls shall be polyvinyl chloride (PVC) plastic pipe, Schedule 80, conforming to the provisions for pipe for edge drains and edge drain outlets in Section 68-3.02, "Materials," of the Standard Specifications. The vertical drain pipe shall be rigidly supported in place during backfilling operations.

## **FALSEWORK**

Falsework shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Attention is directed to "Railroad Relations and Insurance" of these special provisions for additional requirements for falsework over railroads.

In addition to the provisions in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications, the time to be provided for the Engineer's review of the working drawings for specific structures, or portions thereof, shall be as follows:

| Structure or Portion of Structure | Total Review Time - Weeks |
|-----------------------------------|---------------------------|
| Camarillo Overhead and Separation | 9                         |
| Camarillo Pedestrian Overhead     | 9                         |

## **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 175 N/mm for each 3 mm 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 be in writing, 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.

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 three 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 three 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.

### **COST REDUCTION INCENTIVE PROPOSALS FOR CAST-IN-PLACE PRESTRESSED BOX GIRDER BRIDGES**

Except as provided herein, cast-in-place prestressed box girder bridges shall be constructed in conformance with the details shown on the plans and the provisions in Section 50, "Prestressing Concrete," and Section 51, "Concrete Structures," of the Standard Specifications.

If the Contractor submits cost reduction incentive proposals for cast-in-place prestressed box girder bridges, the proposals shall be in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications and these special provisions.

The Engineer may reject any proposal which, in the Engineer's judgment, may not produce a structure which is at least equivalent to the planned structure.

At the time the cost reduction incentive proposal (CRIP) is submitted to the Engineer, the Contractor shall also submit 4 sets of the proposed revisions to the contract plans, design calculations, and calculations from an independent checker for all changes involved in the proposal, including revisions in camber, predicted deck profile at each construction stage, and falsework requirements to the Office of Structure Design, Documents Unit, P.O. Box 942874, Sacramento, CA 94274-0001 (1801 30th Street, Sacramento, CA 95816), telephone (916) 227-8230. When notified in writing by the Engineer, the Contractor shall submit 12 sets of the CRIP plan revisions and calculations to the Office of Structure Design for final approval and use during construction. The calculations shall verify that all requirements are satisfied. The CRIP plans and calculations shall be signed by an engineer who is registered as a Civil Engineer in the State of California.

The CRIP plans shall be either 279 mm x 432 mm, or 559 mm x 864 mm in size. Each CRIP plan sheet and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Kilometer Post. Each CRIP plan sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

Within 3 weeks after final approval of the CRIP plan sheets, one set of the corrected good quality prints on 75-g/m<sup>2</sup> (minimum) bond paper, 559 mm x 864 mm in size, of all CRIP plan sheets prepared by the Contractor for each CRIP shall be furnished to the Office of Structure Design, Documents Unit.

Each CRIP shall be submitted prior to completion of 25 percent of the contract working days and sufficiently in advance of the start of the work that is proposed to be revised by the CRIP to allow time for review by the Engineer and correction by the Contractor of the CRIP plans and calculations without delaying the work. The Contractor shall allow a minimum of 10 weeks for the review of a CRIP. In the event that several CRIPs are submitted simultaneously, or an additional CRIP is submitted for review before the review of a previously submitted CRIP has been completed, the Contractor shall designate the sequence in which the CRIPs are to be reviewed. In this event, the time to be provided for the review of any proposal in the sequence shall be not less than the review time specified herein for that proposal, plus 2 weeks for each CRIP of higher priority which is still under review.

Should the review not be complete by the date specified in the Contractor's CRIP, or such other date as the Engineer and Contractor may subsequently have agreed to in writing and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in review of CRIP plans and calculations, an extension of time commensurate with the delay in completion of the work thus caused will be granted as provided in Section 8-1.07, "Liquidated Damages," of the Standard Specifications except that the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications shall not apply.

Permits and approvals required of the State have been obtained for the structures shown on the plans. Proposals which result in a deviation in configuration may require new permits or approvals. The Contractor shall be responsible for obtaining the new permits and approvals before the Engineer will reach a decision on the proposal. Delays in obtaining permits and approvals will not be reason for granting an extension of contract time.

All proposed modifications shall be designed in conformance with the bridge design specifications and procedures currently employed by the Department. The proposal shall include all related, dependent or incidental changes to the structure and other work affected by the proposal. The proposal will be considered only when all aspects of the design changes are included for the entire structure. Changes, such as but not limited to, additional reinforcement and changes in location of reinforcement, necessary to implement the CRIP after approval by the Engineer, shall be made at the Contractor's expense.

Modifications may be proposed in (1) the thickness of girder stems and deck slabs, (2) the number of girders, (3) the deck overhang dimensions as specified herein, (4) the amount and location of reinforcing steel, (5) the amount and location of prestressing force in the superstructure, and (6) the number of hinges, except that the number of hinges shall not be increased. The strength of the concrete used may be increased but the strength employed for design or analysis shall not exceed 42 MPa.

Modifications proposed to the minimum amount of prestressing force which must be provided by full length draped tendons are subject to the provisions in "Prestressing Concrete" of these special provisions.

No modifications will be permitted in (1) the foundation type, (2) the span lengths or (3) the exterior dimensions of columns or bridge superstructure, except that the overhang dimension from face of exterior girder to the outside edge of roadway deck may be uniformly increased or decreased by 25 percent on each side of the box girder section. Fixed connections at the tops and bottoms of columns shown on the plans shall not be eliminated.

The Contractor shall be responsible for determining construction camber and obtaining the final profile grade as shown on the plans.

The Contractor shall reimburse the State for the actual cost of investigating CRIPs for cast-in-place prestressed box girder bridges submitted by the Contractor. The Department will deduct this cost from any moneys due, or that may become due the Contractor under the contract, regardless of whether or not the proposal is approved or rejected.

### **DECK CLOSURE POURS**

Where a deck closure pour is shown on the plans, reinforcement protruding into the closure space and forms for the closure pour shall conform to the following:

- A. During the time of placement of concrete in the deck, other than for the closure pour itself, reinforcing steel which protrudes into the closure space shall be completely free from any connection to the reinforcing steel, concrete, or other attachments of the adjacent structure, including forms. The reinforcing steel shall remain free of any connection for a period of not less than 24 hours following completion of the pour.
- B. Forms for the closure pour shall be supported from the superstructure on both sides of the closure space.

### **SLIDING BEARINGS**

Sliding bearings consisting of elastomeric bearing pads lubricated with grease and covered with sheet metal shall conform to the following requirements:

- A. Grease shall conform to the requirements of Military Specification: MIL-S-8660. A uniform film of grease shall be applied to the upper surface of the pads prior to placing the sheet metal.
- B. Sheet metal shall be commercial quality galvanized sheet steel. The sheet metal shall be smooth and free of kinks, bends, or burrs.
- C. Construction methods and procedures shall prevent grout or concrete seepage into the sliding bearing assembly.

### **ELASTOMERIC BEARING PADS**

Elastomeric bearing pads shall conform to the provisions in Section 51-1.12H, "Elastomeric Bearing Pads," of the Standard Specifications.

### **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, prior to prestressing, and prior to the release of falsework. In any 50-m<sup>2</sup> portion of deck within the limits of the new concrete deck, should the intensity of cracking be such that there are more than 5 m of cracks whose width at any location exceeds 0.5-mm, 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 1.5 m beyond the furthest single continuous crack outside the 50-m<sup>2</sup> portion, measured from where that crack exceeds 0.5-mm in width, as determined by the Engineer.

Deck crack treatment shall consist of test sealing, and furnishing and applying methacrylate resin in conformance with the requirements of these special provisions. If grinding operation is required, deck treatment shall take place after grinding.

Prior to the start of deck treatment work, the Contractor shall submit for approval by the Engineer, a program for public safety associated with the use of methacrylate resin. The program shall identify materials, equipment, and methods to be used. The Contractor shall not perform deck treatment work, other than that specifically authorized in writing by the Engineer, until the program has been approved.

If the measures being taken by the Contractor are inadequate to provide for public safety associated with use of methacrylate resin, the Engineer will direct the Contractor to revise the operations and the public safety program. Directions for revisions will be in writing and will specify the items in which the Contractor's program is inadequate. No further deck treatment shall be performed until public safety measures are adequate, and a revised program for public safety has been approved.

The Engineer will notify the Contractor of the approval or rejection of any submitted or revised program for public safety associated with the use of methacrylate resin within 10 working days of receipt of the final submitted program.

The State will not be liable to the Contractor for failure to approve all or any portion of an originally submitted or revised program for public safety associated with the use of methacrylate resin, nor for any delays to the work due to the Contractor's failure to submit an acceptable program for public safety associated with the use of methacrylate resin. If the Engineer does not review or approve the program submitted by the Contractor 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 program for public safety, 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 Contractor shall furnish an airborne emissions monitoring plan prepared by a certified industrial hygienist. Emissions will be monitored at a minimum of 4 points including the point of mixing, the point of application, and the point of nearest public contact, as determined by the Engineer. At the completion of work, a report by the certified industrial hygienist with results of the airborne emissions monitoring plan shall be furnished to the Engineer.

**Materials**

The material used for treating the deck shall be a low odor, high molecular weight methacrylate resin. Prior to 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   | TEST METHOD         | REQUIREMENT |
|--|---------------------|-------------|
| Viscosity<br>mPa·s, maximum,<br>(Brookfield RVT<br>with UL adaptor, 50<br>RPM at 25°C)     | ASTM D 2196         | 0.025       |
| Specific Gravity<br>minimum, at 25°C   | ASTM D 1475         | 0.90        |
| Flash Point<br>°C, minimum   | ASTM D 3278         | 82          |
| Vapor Pressure<br>mm Hg, maximum,<br>at 25°C   | ASTM D 323          | 1.0         |
| Tack-free time<br>minutes, maximum<br>at 25°C  | California Test 551 | 400         |
| PCC Saturated<br>Surface-Dry Bond<br>Strength<br>MPa, minimum at<br>24 hours and<br>21±1°C | California Test 551 | 3.5         |
| * Test shall be performed prior to adding initiator.                                       |                     |             |

A Material Safety Data Sheet shall be furnished prior to use for each shipment of high molecular weight methacrylate resin.

The promoter and initiator, if supplied separately from the resin, shall not be mixed directly with each other. Containers of promoters and initiators shall not be stored together in a manner that will allow leakage or spillage from one to contact the containers or material of the other.

**Testing**

The Contractor shall allow 14 days for sampling and testing by the Engineer of the high molecular weight methacrylate resin prior to proposed use.

The Contractor shall treat a test area within the project limits of approximately 50 m<sup>2</sup> at a location approved by the Engineer. Conditions during the test treatment shall be similar to those expected on the deck. Equipment used in the test shall be similar to those used for the deck treating operations. If the test area is on the traveled way, traffic shall not be allowed on the treated test area until (1) the treated surface is tack free (non-oily), (2) the sand cover adheres sufficiently to

resist brushing by hand, and (3) the coefficient of friction of the deck is at least 0.35 when tested in conformance with the requirements in California Test 342.

Should the above requirements for traffic use not be met, the Contractor shall suspend treating of bridge decks until another test area is treated and complies with the requirements.

### **Construction**

Prior to 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 prior to placing the penetrating sealer, the deck surface shall be cleaned by abrasive blasting.

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.

Where abrasive blasting is being performed within 3 m 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.

The relative humidity shall be less than 90 percent at time of treatment.

A compatible promoter/initiator system shall be capable of providing a resin gel time of not less than 40 minutes nor more than 1.5 hours at the temperature of application. Gel time shall be adjusted to compensate for the changes in temperature throughout treatment application.

The quantity of resin mixed with promoter and initiator shall be limited to 20 L at a time for manual application.

Machine application of the resin shall be performed by using a two-part resin system using 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. Hand held spray apparatus shall not be used.

The Contractor shall allow methacrylate resin to be applied only to the specified area. Barrier rails, 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 prepared area shall be dry and the surface temperature shall be less than or equal to 38°C when the resin is applied. The rate of application of promoted/initiated resin shall be approximately 2.5 square meters per liter,  $\pm 0.1$  square meter per liter.

The deck surfaces to be treated shall be flooded with resin, allowing penetration into the concrete and filling of all cracks. The treatment 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.

After the resin has been applied, at least 20 minutes shall elapse before applying sand. The sand shall be commercial quality dry blast sand. Ninety-five percent of the sand shall pass the 2.36-mm sieve, and 95 percent shall be retained on the 850- $\mu\text{m}$  sieve. The sand shall be applied at a rate of one kilogram per square meter,  $\pm 0.1$  kilogram per square meter.

Excess sand shall be removed from the deck surface by vacuuming or sweeping prior to opening to traffic.

Traffic shall not be allowed on the treated area until (1) the treated surface is tack free (non-oily), (2) the sand cover adheres sufficiently to resist brushing by hand, and (3) the coefficient of friction of the deck is at least 0.35 when tested in conformance with the requirements in California Test 342.

### **PRECAST PRESTRESSED CONCRETE BRIDGE MEMBERS**

The anticipated deflection and method of accommodation of deflection of precast prestressed concrete girders, prior to the time the deck concrete is placed, shall be shown on the working drawings in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The deflection shall include the following:

- A. Anticipated upward deflection caused by the prestressing forces.
- B. Downward deflection caused by the dead load of the girder.
- C. Deflection caused by the creep and shrinkage of the concrete for the time interval between the stressing of the girders and the planned placement of the deck.

Such deflection shall be substantiated by calculations that consider the ages of the girder concrete at the time of stressing and the Contractor's planned placement of the deck. All deflection calculations shall be based on the concrete producer's estimate of the modulus of elasticity at the applicable concrete age.

Adjustments to accommodate girder deflections, which occur prior to the time the deck concrete is placed, may include revisions in bearing seat elevations, but any such adjustments shall be limited by the following conditions:

- A. The minimum permanent vertical clearance under the structure as shown on the plans shall not be reduced.
- B. The profile grade and cross slope of the deck shall not be changed.
- C. A minimum of 25 mm of deck slab concrete between the top of the precast girders and the deck slab reinforcement shall be maintained.

Girders with unanticipated girder deflection and which cannot comply with conditions A, B, and C will be rejected in conformance with the provisions in Section 6-1.04, "Defective Materials," of the Standard Specifications.

Adjustments to accommodate girder deflections will not be considered a change in dimensions. Full compensation for increases in the cost of construction, including increases in the quantity of deck or bearing seat concrete, resulting from adjustments to accommodate girder deflections shall be considered as included in the contract price paid for the various items of work involved and no additional compensation will be allowed therefor.

Temporary lateral bracing shall be provided for girders located over the railroad property at the Camarillo Overhead and Separation bridge. The bracing shall be installed at each end of each girder, except notched ends, prior to the release of the erection equipment from the girder and shall remain in place until 2 days after the concrete diaphragms have been placed. The bracing shall be adequate to prevent overturning of the girders prior to completion of the work and as a minimum shall be capable of resisting a lateral force of 720 Pa of girder side area applied laterally in either direction to the top of the girder. Girder erection shall not be started until the temporary lateral bracing proposed for use by the Contractor has been approved by the Engineer.

## **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 and these special provisions.

The contract unit price paid for minor concrete (entry column) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing the entry columns complete in place, including furnishing and placing bar reinforcing steel and integral color, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The concrete sign pedestal on Camarillo Overhead and Separation will be measured and paid for as structural concrete, bridge.

Full compensation for furnishing and installing access opening grates in soffits of new cast-in-place box girder bridges shall be considered as included in the contract price paid per cubic meter for structural concrete, bridge and no separate payment will be made therefor.

Full compensation for furnishing and installing plastic pipe located at vertical drains used behind retaining walls, including excavation and backfill involved in placing the plastic pipe, shall be considered as included in the contract price paid per cubic meter for the various items of concrete work involved and no separate payment will be made therefor.

Full compensation for deck crack treatment, including a program for public safety and airborne monitoring, shall be considered as included in the contract price paid per cubic meter for structural concrete, bridge and no additional compensation will be allowed therefor.

### **10-1.48 STRUCTURE APPROACH SLABS (Type N) and (Type EQ)**

This work shall consist of constructing reinforced concrete approach slabs, structure approach drainage system, and treated permeable base at structure approaches in conformance with the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

#### **GENERAL**

Attention is directed to "Engineering Fabrics" of these special provisions.

#### **STRUCTURE APPROACH DRAINAGE SYSTEM**

##### **Geocomposite Drain**

Geocomposite drain shall consist of a manufactured core not less than 6.35 mm thick nor more than 50 mm thick with one or both sides covered with a layer of filter fabric that will provide a drainage void. The drain shall produce a flow rate, through the drainage void, of at least 25 liters per minute per meter of width at a hydraulic gradient of 1.0 and a minimum externally applied pressure of 168 kPa. A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished for the geocomposite drain certifying that the drain produces the required flow rate and complies with these special provisions. The Certificate of Compliance shall be

accompanied by a flow capability graph for the geocomposite drain showing flow rates and the externally applied pressures and hydraulic gradients. The flow capability graph shall be stamped with the verification of an independent testing laboratory.

Filter fabric for the geocomposite drain shall conform to the provisions for fabric for underdrains in Section 88, "Engineering Fabrics," of the Standard Specifications.

The manufactured core shall be either a preformed grid of embossed plastic, a mat of random shapes of plastic fibers, a drainage net consisting of a uniform pattern of polymeric strands forming 2 sets of continuous flow channels, or a system of plastic pillars and interconnections forming a semirigid mat.

The core material and filter fabric shall be capable of maintaining the drainage void for the entire height of geocomposite drain. Filter fabric shall be integrally bonded to the side of the core material with the drainage void. Core material manufactured from impermeable plastic sheeting having nonconnecting corrugations shall be placed with the corrugations approximately perpendicular to the drainage collection system.

The geocomposite drain shall be installed with the drainage void and the filter fabric facing the embankment. The fabric facing the embankment side shall overlap a minimum of 75 mm at all joints and wrap around the exterior edges a minimum of 75 mm beyond the exterior edge. If additional fabric is needed to provide overlap at joints and wrap-around at edges, the added fabric shall overlap the fabric on the geocomposite drain at least 150 mm and be attached thereto.

Should the fabric on the geocomposite drain be torn or punctured, the damaged section shall be replaced completely or repaired by placing a piece of fabric that is large enough to cover the damaged area and provide a 150-mm overlap.

### **Plastic Pipe**

Plastic pipe shall conform to the provisions for pipe for edge drains and edge drain outlets in Section 68-3, "Edge Drains," of the Standard Specifications.

### **Drainage Pads**

Concrete for use in drainage pads shall be minor concrete, except the concrete shall contain not less than 300 kg of cement per cubic meter.

### **Treated Permeable Base At Bottom Of Geocomposite Drains**

Treated permeable base to be placed around the slotted plastic pipe at the bottom of geocomposite drains shall conform to the provisions in "Treated Permeable Base Under Approach Slabs." If asphalt treated permeable base is used, it shall be placed at a temperature of not less than 82°C nor more than 110°C.

The filter fabric to be placed over the treated permeable base at the bottom of geocomposite drains shall conform to the provisions for filter fabric for edge drains in Section 88, "Engineering Fabrics," of the Standard Specifications.

## **ENGINEERING FABRICS**

Filter fabric to be placed between the structure approach embankment material and the treated permeable base shall conform to the provisions for filter fabric for edge drains in Section 88, "Engineering Fabrics," of the Standard Specifications and these special provisions.

The subgrade to receive the filter fabric, immediately prior to placing, shall conform to the compaction and elevation tolerance specified for the material involved.

Filter fabric shall be aligned, handled, and placed in a wrinkle-free manner in conformance with the manufacturer's recommendations.

Adjacent borders of the filter fabric shall be overlapped from 300 to 450 mm or stitched. The preceding roll shall overlap the following roll in the direction the material is being spread or shall be stitched. When the fabric is joined by stitching, it shall be stitched with yarn of a contrasting color. The size and composition of the yarn shall be as recommended by the fabric manufacturer. The number of stitches per 25 mm of seam shall be 5 to 7.

Equipment or vehicles shall not be operated or driven directly on the filter fabric.

Woven tape fabric shall be treated to provide a minimum of 70 percent breaking strength retention after 500 hours exposure when tested in conformance with the requirements in ASTM Designation: D 4355. The Contractor shall notify the Engineer, in writing, of the source of woven tape fabric at least 45 days prior to use.

### **TREATED PERMEABLE BASE UNDER APPROACH SLAB**

Treated permeable base under structure approach slabs shall consist of constructing either an asphalt treated permeable base or a cement treated permeable base in accordance with Section 29, "Treated Permeable Bases," of the Standard Specifications and these special provisions.

The type of treatment, asphalt or cement, to be used shall be at the option of the Contractor.

The Contractor shall notify the Engineer in writing, not less than 30 days prior to the start of placing the treated permeable base, which type of treated permeable base will be furnished. Once the Contractor has notified the Engineer of the selection, the type to be furnished shall not be changed without a prior written request to do so and approval thereof in writing by the Engineer.

Asphalt treated permeable base shall be placed at a temperature of not less than 93°C nor more than 121°C. Material stored in excess of 2 hours shall not be used in the work.

Asphalt treated permeable base material may be spread in one layer. The base material shall be compacted with a vibrating shoe type compactor or rolled with a roller weighing at least 1.3 tonnes but no more than 4.5 tonnes. Rolling shall begin as soon as the mixture has cooled sufficiently to support the weight of the rolling equipment without undue displacement.

Cement treated permeable base material may be spread in one layer. The base material shall be compacted with either a vibrating shoe type compactor or with a steel-drum roller weighing at least 1.3 tonnes but no more than 4.5 tonnes. Compaction shall follow within one-half hour after the spreading operation and shall consist of 2 complete coverages of the treated material.

**APPROACH SLABS**

Concrete for use in approach slabs shall contain not less than 400 kg of cementitious material per cubic meter.

The steel angle at the concrete barrier joint shall conform to the provision in Section 75-1.03, "Miscellaneous Metal," of the Standard Specifications.

Structure approach slabs shall be constructed using concrete with a non-chloride Type C chemical admixture conforming to these special provisions

Portland cement for use in concrete using a non-chloride Type C chemical admixture shall be Type II Modified, Type II Prestress, or Type III. Type II Modified and Type III cement shall conform to the provisions in Section 90-2.01, "Cement," of the Standard Specifications. Type II Prestress cement shall conform to the requirements of Type II Modified cement, except the mortar containing the portland cement to be used and Ottawa sand, when tested in conformance with California Test 527, shall not contract in air more than 0.053-percent.

The non-chloride Type C chemical admixture, approved by the Engineer, shall conform to the requirements in ASTM Designation: C 494 and Section 90-4, "Admixtures," of the Standard Specifications.

The concrete with non-chloride Type C chemical admixture shall be prequalified prior to placement in conformance with the provisions for prequalification of concrete specified by compressive strength in Section 90-9.01, "General," of the Standard Specifications and the following:

- A. Immediately after fabrication of the 5 test cylinders, the cylinders shall be stored in a temperature medium of 21 ± 1.5°C until the cylinders are tested.
- B. The 6-hour average strength of the 5 test cylinders shall not be less than 5.85 MPa. No more than 2 test cylinders shall have a strength of less than 5.5 MPa.

Building paper shall be commercial quality No. 30 asphalt felt.

Polyvinyl chloride (PVC) conduit used to encase the abutment tie rod shall be of commercial quality.

The top surface of approach slabs shall be finished in conformance with the provisions in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications. Edges of slabs shall be edger finished.

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.

Structure approach slabs constructed using concrete with a non-chloride Type C chemical admixture shall be cured for not less than 6 hours prior to opening to public traffic. The curing period shall be considered to begin at the start of discharge of the last truck load of concrete to be used in the slab.

If the ambient temperature is below 18°C during the curing period for approach slabs using concrete with a non-chloride Type C chemical admixture, an insulating layer or blanket shall be used to cover the surface. The insulating layer or blanket shall have an R-value rating given in the table below. At the Contractor's option, a heating tent may be used in lieu of or in combination with the insulating layer or blanket.

| Temperature range during curing period | R-value, minimum |
|--|------------------|
| 13°C to 18°C                           | 1                |
| 7°C to 13°C                            | 2                |
| 4°C to 7°C                             | 3                |

## **JOINTS**

Hardboard and expanded polystyrene shall conform to the provisions in Section 51-1.12D, "Sheet Packing, Preformed Pads and Board Fillers," of the Standard Specifications.

Type AL joint seals shall conform to the provisions in Section 51-1.12F, "Sealed Joints" of the Standard Specifications. The sealant may be mixed by hand-held power-driven agitators and placed by hand methods.

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 prior to 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 N) and structural concrete, approach slab (Type EQ) 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 the structure approach drainage system including geocomposite drain, plastic pipe, drainage pads, treated permeable base, filter fabric, miscellaneous metal, pourable seals shall be considered as included in the contract price paid per cubic meter for structural concrete, approach slab of the type shown in the Engineer's Estimate, and no additional compensation will be allowed therefor.

### **10-1.49 STRUCTURE APPROACH SLABS (TYPE R)**

Structure approach slabs (Type R) shall consist of removing portions of existing structures, existing pavement and base including reinforced concrete approach slabs, asphalt concrete surfacing, portland cement concrete pavement, 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 Contractor shall establish a grade line for new approach slabs which shall provide a smooth profile grade. The profile grade will be subject to the approval of the Engineer.

The Contractor shall schedule his operations so that the pavement and base materials removed during a work period shall be replaced, in that same work period, with approach slab concrete that shall be cured for at least 4 hours prior to the time the lane is to be opened to public traffic as designated in "Maintaining Traffic" of these special provisions. In the event the existing pavement and base materials are removed and the Contractor is unable to construct, finish, and cure the new approach slab by the time the lane is to be opened to public traffic, the excavation shall be filled with a temporary roadway structural section as specified in this section, "Structure Approach Slabs (Type R)."

## **TEMPORARY ROADWAY STRUCTURAL SECTION**

A standby quantity of asphalt concrete and aggregate base, equal to the quantity of pavement removed during the work shift, shall be provided at the project site for construction of a temporary roadway structural section where existing approaches to structures are being replaced. The temporary structural section shall be maintained and later removed as a first order of work when the Contractor is able to construct and cure the approach slab within the prescribed time limit. The temporary structural section shall consist of 90-mm thick layer of asphalt concrete over aggregate base.

The aggregate base for the temporary structural section shall conform to the requirements specified under "Aggregate Base (Approach Slab)" of these special provisions.

The asphalt concrete for the temporary structural section shall be produced from commercial quality aggregates and asphalt binder. The grading of the aggregate shall conform to the 19-mm maximum medium grading in Section 39-2.02, "Aggregate," of the Standard Specifications and the asphalt binder shall conform to the requirements of liquid asphalt SC-800 in Section 93, "Liquid Asphalts," of the Standard Specifications. The amount of asphalt binder to be mixed with the aggregate shall be approximately 0.3-percent less than the optimum bitumen content as determined by California Test 367.

Aggregate base and asphalt concrete for the temporary structural section shall be spread and compacted by methods that will produce a well-compacted, uniform base, free from pockets of coarse or fine material and a surfacing of uniform smoothness, texture, and density. The aggregate base and the asphalt concrete may each be spread and compacted in one layer. The finished surface of the asphalt concrete shall not vary more than 15 mm from the lower edge of a 3.6-m straightedge placed parallel with the centerline and shall match the elevation of the existing concrete pavement and structure along the joints between the existing pavement and structure and the temporary surfacing.

The material from the removed temporary structural section shall be disposed of in conformance with Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications except that removed aggregate base may be stockpiled at the project site and reused for construction of another temporary structural section. When no longer required, standby material or stockpiled material for construction of temporary structural sections shall be removed and disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

### **REMOVING PORTIONS OF EXISTING STRUCTURES**

Attention is directed to "Existing Highway Facilities" of these special provisions.

### **REMOVING EXISTING PAVEMENT AND BASE MATERIALS**

The outline of portland cement concrete to be removed shall be sawed full depth with a power-driven concrete saw.

The outlines of excavations in asphalt concrete shall be cut on a neat line to a minimum depth of 75 mm with a power-driven concrete saw or wheel-type rock cutting excavator before any asphalt concrete material is removed. These excavations shall be permanently or temporarily backfilled to conform to the grade of the adjacent pavement prior to opening the lane to public traffic. Surplus excavated material may be used as temporary backfill material.

Regardless of the type of equipment used to remove concrete within the sawed outline, the surface of the concrete to be removed shall not be impacted within 0.5-m of the pavement to remain in place. Removing existing pavement and base materials shall be performed without damage to the adjacent structure or pavement that is to remain in place. Damage to the structure or to the pavement that is to remain in place shall be repaired in conformance with the provisions in Section 7-1.11, "Preservation of Property," of the Standard Specifications.

Materials removed shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The base material remaining in-place, after removing the existing pavement and base materials to the required depth, shall be graded uniformly, watered, and compacted. The finished surface of the base material at any point shall not extend above the grade approved by the Engineer.

Areas of the base material that are low as a result of over excavation shall be filled, at the Contractor's expense, with structure approach slab concrete at the time and in the same operation that the new concrete is placed.

### **AGGREGATE BASE (APPROACH SLAB)**

The aggregate base (approach slab) for filling voids below the reinforced structure approach slab concrete shall be produced from commercial quality aggregates consisting of broken stone, crushed gravel or natural rough-surfaced gravel, and sand, or any combination thereof. The grading of the aggregate base shall conform to the 19-mm maximum grading specified in Section 26-1.02A, "Class 2 Aggregate Base," of the Standard Specifications.

Aggregate base (approach slab) for filling voids below the reinforced structure approach slab concrete shall be spread and compacted by methods that will produce a well-compacted, uniform base, free from pockets of coarse or fine material. The aggregate base shall be watered and compacted to the grade approved by the Engineer. Where the required thickness of aggregate base is 200 mm or less, the base may be spread and compacted in one layer. Where the required thickness of aggregate base is more than 200 mm, the base shall be spread and compacted in 2 or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed 200 mm. The finished surface of the base material at any point shall not extend above the grade approved by the Engineer. Areas of the base material that are lower than the grade approved by the Engineer, shall be filled with structure approach slab concrete at the time and in the same operation that the new concrete is placed.

### **STRUCTURE APPROACH SLAB**

Reinforced concrete approach slabs shall conform to the provisions for approach slabs in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Concrete for use in approach slabs shall contain not less than 400 kg of cement per cubic meter.

The steel angles at the concrete barrier joint shall conform to the provision in Section 75-1.03, "Miscellaneous Metal," of the Standard Specifications.

Approach slab concrete that requires a minimum curing period of 4 hours shall be constructed using a non-chloride Type C chemical admixture. Mineral admixture will not be required in this concrete.

Portland cement for use in concrete using a non-chloride Type C chemical admixture shall be Type II Modified, Type II Prestress, or Type III. Type II Modified and Type III cement shall conform to the provisions in Section 90-2.01, "Cement," of the Standard Specifications. Type II Prestress cement shall conform to the requirements of Type II Modified cement, except the mortar containing the portland cement to be used and Ottawa sand, when tested in conformance with California Test 527, shall not contract in air more than 0.053-percent.

The non-chloride Type C chemical admixture shall be approved by the Engineer and shall conform to the requirements in ASTM Designation: C 494 and Section 90-4, "Admixtures," of the Standard Specifications.

The concrete with non-chloride Type C chemical admixture shall be prequalified prior to placement in conformance with the provisions for prequalification of concrete specified by compressive strength in Section 90-9.01, "General," of the Standard Specifications and the following:

- A. Immediately after fabrication of the 5 test cylinders, the cylinders shall be stored in a temperature medium of  $21 \pm 1.5^{\circ}\text{C}$  until the cylinders are tested.
- B. The 4-hour average strength of the 5 test cylinders shall not be less than 5.85 MPa. No more than 2 test cylinders shall have a strength of less than 5.5 MPa.

Bar reinforcement in drilled holes shall be bonded in conformance with the provisions for drilling and bonding dowels in Section 83-2.02D(1), "General," of the Standard Specifications.

If reinforcement is encountered during drilling before the specified depth is attained, the Engineer shall be notified. Unless the Engineer approves coring through the reinforcement, the hole will be rejected and a new hole, in which reinforcement is not encountered, shall be drilled adjacent to the rejected hole to the depth shown on the plans.

The top surface of approach slabs shall be finished in conformance with the provisions in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications. The finished top surface shall not vary more than 6 mm from the lower edge of a 3.6-m straightedge placed parallel with the centerline. Edges of slabs shall be edger finished.

The surface of the approach slab will not be profiled and the Profile Index requirements shall not apply.

Approach slabs shall be cured with pigmented curing compound (1) in conformance with the provisions for curing structures in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications. The minimum curing period as specified herein shall be considered to begin at the start of discharge of the last truck load of concrete to be used in the slab. Fogging of the surface with water after the curing compound has been applied will not be required. Should the film of curing compound be damaged from any cause before the approach slab is opened to public traffic, the damaged portion shall be repaired immediately with additional compound, at the Contractor's expense. Damage to the curing compound after the approach slab is opened to public traffic shall not be repaired.

If the ambient temperature is below  $18^{\circ}\text{C}$  during the curing period, an insulating layer or blanket shall cover the surface. The insulation layer or blanket shall have an R-value rating given in the table below. At the Contractor's option, a heating tent may be used in lieu of or in combination with the insulating layer or blanket:

| Temperature range during curing period       | R-value, minimum |
|--|------------------|
| $13^{\circ}\text{C}$ to $18^{\circ}\text{C}$ | 1                |
| $7^{\circ}\text{C}$ to $13^{\circ}\text{C}$  | 2                |
| $4^{\circ}\text{C}$ to $7^{\circ}\text{C}$   | 3                |

Tests to determine the coefficient of friction of the final textured surface will be made only if the Engineer determines by visual inspection that the final texturing may not have produced a surface having the specified coefficient of friction. Tests to determine the coefficient of friction will be made after the approach slab is opened to public traffic, but not later than 5 days after concrete placement. The coefficient of friction will be measured by California Test 342. Portions of completed concrete surfaces that are found to have a coefficient of friction less than 0.35 shall be ground or grooved parallel to the center line in conformance with the provisions for bridge decks in Section 42, "Groove and Grind Pavement," of the Standard Specifications.

## JOINTS

Hardboard and expanded polystyrene shall conform to the provisions in Section 51-1.12D, "Sheet Packing, Preformed Pads and Board Fillers," of the Standard Specifications.

Type AL joint seals shall conform to the provisions in Section 51-1.12F, "Sealed Joints," of the Standard Specifications. The sealant may be mixed by hand-held power-driven agitators and placed by hand methods.

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 prior to 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.

Contract No. <Dist>-<Contract\_No>

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 meter for structural concrete, approach slab (Type R) and no separate payment will be made therefor.

The quantity of aggregate base (approach slab) to be paid for shall include the actual volume of aggregate base (approach slab) used to fill voids below the reinforced structure approach slab concrete, except for the volume of areas low as a result of over excavation. The volume to be paid for will be calculated on the basis of the constructed length, width, and thickness of the filled voids. Structure approach slab concrete used to fill voids lower than the approved grade of the base, except for the areas low as a result of over excavation by the Contractor, will be measured and paid for by the cubic meter as aggregate base (approach slab).

The contract price paid per cubic meter for aggregate base (approach slab) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing aggregate base (approach slab), complete in place, including excavation and removing and disposing of base and subsealing materials, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for furnishing, stockpiling, and disposing of standby material for construction of temporary structural sections; and for constructing, maintaining, removing, and disposing of temporary structural sections shall be considered as included in the contract price paid per cubic meter for structural concrete, approach slab (Type R) and no separate payment will be made therefor.

Full compensation for drilling and bonding of bar reinforcement shall be considered as included in the contract price paid per cubic meter for structural concrete, approach slab (Type R) and no separate payment will be made therefor.

## **10-1.50 SOUND WALL**

### **DESCRIPTION**

This work shall consist of constructing sound walls of masonry block. Sound walls shall be supported on retaining walls, footings, piles and pile caps as shown on the plans.

### **SOUND WALL (MASONRY BLOCK)**

Sound wall (masonry block), consisting of a reinforced hollow unit masonry block stem, shall be constructed in conformance with the provisions in Sections 19, "Earthwork," 52, "Reinforcement," and 90, "Portland Cement Concrete," of the Standard Specifications and these special provisions.

Sound wall masonry unit stems shall be constructed with joints of portland cement mortar. Wall stems shall be constructed with hand laid block. Wall stems shall not be constructed with preassembled panels.

Concrete for sound wall pile caps shall be minor concrete.

Concrete masonry units shall be hollow, load bearing, conforming to the requirements in ASTM Designation: C 90, medium weight classification, Type II. Standard or open end units may be used. Open end units, if used, shall not reduce the spacing of the bar reinforcement as shown on the plans.

The masonry units shall be nominal size and texture and of uniform color. The color shall be tan, selected from the manufacturer's standards.

When high strength concrete masonry units with  $f'_m=17.2$  MPa are shown on the plans, the high strength masonry units shall have a minimum compressive strength of 26 MPa based on net area. Each high strength concrete masonry unit shall be identified with a groove embedded in an interior corner. The groove shall extend from a mortar surface for a length of about 50 mm and shall have a depth of about 5 mm.

Expansion joint filler shall conform to the requirements in ASTM Designation: D 1751 or ASTM Designation: D 2000 2AA-805.

Portland cement mortar shall be colored to match the units. Coloring shall be chemically inert, fade resistant mineral oxide or synthetic type.

Portland cement for wall stems shall conform to the provisions in Section 90-2.01, "Portland Cement," of the Standard Specifications.

Hydrated lime shall conform to the requirements in ASTM Designation: C 207, Type S.

Mortar sand shall be commercial quality.

Mortar for laying masonry units shall consist, by volume, of one part portland cement, 0 to 0.5 part hydrated lime, and 2.25 to 3 parts mortar sand. Sufficient water shall be added to make a workable mortar. Each batch of mortar shall be accurately measured and thoroughly mixed. Mortar shall be freshly mixed as required. Mortar shall not be retempered more than one hour after mixing.

Prepackaged mortar materials and mortar containing admixtures may be used when approved in writing by the Engineer, provided the mortar shall not contain more than 0.05 percent soluble chlorides when tested in conformance with California Test 422 nor more than 0.25 percent soluble sulfates, as  $SO_4$ , when tested in conformance with California Test 417.

Prior to laying masonry units using prepackaged mortar materials or mortar containing admixtures, the Contractor shall submit to the Engineer the proposed sources of the materials together with test data from an independent testing laboratory

for mortar tested in conformance with California Test 551. The test data shall be from specimens having a moist cure, except, the sample shall not be immersed in lime water. The average 28-day compressive strength of the mortar shall be not less than 17.2 MPa.

Aggregate for grout used to fill masonry units shall consist of fine aggregate and coarse aggregate conforming to the provisions in Section 90-2.02, "Aggregates," of the Standard Specifications. At least 20 percent of the aggregate shall be coarse aggregate. The Contractor shall determine the grading except that 100 percent of the combined grading shall pass the 12.5-mm sieve.

At the option of the Contractor, grout for filling masonry units may be proportioned either by volume or mass. Grout shall contain only enough water to cause the grout to flow and fill the voids without segregation. The maximum amount of free water shall not exceed 0.7 times the weight of the cement for regular strength masonry. The maximum amount of free water shall not exceed 0.6 times the mass of the cement for high strength masonry.

Grout proportioned by volume for regular strength masonry shall consist of at least one part portland cement and 4.5 parts aggregate. Grout proportioned by volume for high strength masonry shall consist of at least one part portland cement and 3.5 parts aggregate. Aggregate volumes shall be based on a loose, air-dry condition.

Grout proportioned by mass for regular strength masonry shall contain not less than 325 kg of portland cement per cubic meter. Grout proportioned by mass for high strength masonry shall contain not less than 400 kg of portland cement per cubic meter.

Reinforced concrete masonry unit wall stems shall be constructed with portland cement mortar joints in conformance with the following:

- A. Concrete masonry unit construction shall be true and plumb in the lateral direction and shall conform to the grade shown on the plans in the longitudinal direction. Bond beam units or recesses for horizontal reinforcement shall be provided.
- B. Mortar joints shall be approximately 13 mm wide. Walls and cross webs forming cells to be filled with grout shall be full bedded in mortar to prevent leakage of grout. All head and bed joints shall be solidly filled with mortar for a distance in from the face of the wall or unit not less than the thickness of the longitudinal face shells. Head joints shall be shoved tight.
- C. Mortared joints around cells to be filled shall be placed so as to preserve the unobstructed vertical continuity of the grout filling. Any overhanging mortar or other obstruction or debris shall be removed from the inside of such cells.
- D. Reinforcement shall be securely held in position at top and bottom with either wire ties or spacing devices and at intervals not exceeding 192 bar diameters prior to placing any grout. Wire shall be 16-gage (1.57 mm) or heavier. Wooden, aluminum, or plastic spacing devices shall not be used.
- E. Splices in vertical reinforcement shall be made only at the locations shown on the plans.
- F. Only those cells containing reinforcement shall be filled solidly with grout. All grout in the cells shall be consolidated at the time of placement by vibrating, and reconsolidated after excess moisture has been absorbed, but before plasticity is lost. Grout shall not be sliced with a trowel.
- G. Walls shall be constructed in 1.2-m maximum height lifts. Grouting of each lift shall be completed before beginning masonry unit construction for the next lift. The top course of each lift shall consist of a bond beam.
- H. A construction joint shall be constructed at the top of the top course to permit placement of the mortar cap. The mix design for the mortar cap shall be as approved by the Engineer.
- I. Construction joints shall be made when the placing of grout, in grout filled cells, is stopped for more than one hour. The construction joint shall be approximately 12 mm below the top of the last course filled with grout.
- J. Bond beams shall be continuous. The top of unfilled cells under horizontal bond beams shall be covered with metal or plastic lath.
- K. When fresh masonry joins masonry that is partially or totally set, the contact surface shall be cleaned, roughened, and lightly wetted.
- L. Surfaces of concrete on which the masonry walls are to be constructed shall be roughened and cleaned, exposing the aggregate, and shall be flushed with water and allowed to dry to a surface dry condition immediately prior to laying the masonry units.
- M. Where cutting of masonry units is necessary, all cuts shall be made with a masonry saw to neat and true lines. Masonry units with cracking or chipping of the finished exposed surfaces will not be acceptable.
- N. Masonry shall be protected in the same manner specified for concrete structures in Section 90-8, "Protecting Concrete," of the Standard Specifications and these special provisions.
- O. During erection, all cells shall be kept dry in inclement weather by covering partially completed walls. The covering shall be waterproof fabric, plastic or paper sheeting, or other approved material. Wooden boards and planks shall not be used as covering materials. The covering shall extend down each side of masonry walls approximately 0.6-m.
- P. Splashes, stains or spots on the exposed faces of the wall shall be removed.

## **ACCESS GATES**

Access gates shall conform to the details shown on the plans and these special provisions.

Timber members shall be tongue and groove Douglas fir sub-flooring free of knotholes. The location of knots of adjoining boards shall be staggered. The construction of the gate shall be with the tongue placed in the up position. The tongue of the top board and the groove of the bottom board shall be removed.

Timber members, steel frames, channels, anchorage devices, mounting hardware, gate rollers, corrugated steel pipe, nylon washers, and neoprene tubing shall be of commercial quality.

The 25-mm round ladder rungs with non-skid surface shall consist of No. 25 deformed, diamond pattern, bar reinforcing steel of commercial quality.

Gate rollers shall be rigid casters with self-lubricating bearings and hard rubber wheels.

All metal parts and hardware shall be hot-dip galvanized.

Timber surfaces of the access gates shall be primed and then stained with 2 coats of stain to match the adjacent sound wall. Primer and stain shall be of the top grade primer and stain from an established manufacturer. An established manufacturer is one who has manufactured industrial paints and stains to meet custom specifications for at least 10 years.

Where the back side of the masonry wall is to be split faced, or rough surface blocks, the bond beam above the gate opening upon which the upper gate guide is to be mounted shall have smooth sided blocks.

Material from excavation may be used for backfill outside of the pipe landings. Aggregate filling inside the pipe landings shall be a coarse concrete aggregate of commercial quality. Compacting of the aggregate will not be required.

## **MEASUREMENT AND PAYMENT**

Sound wall (masonry block) and sound wall (retaining wall) (masonry block) will be measured by the square meter of wall projected on a vertical plane between the elevation lines shown on the plans or for walls supported on retaining wall from the top of the retaining wall to the upper elevation line and length of wall (including access gates).

The contract prices paid per square meter for sound wall (masonry block) and sound wall (retaining wall) (masonry block) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the sound wall, complete in place, including all supports (except retaining walls and retaining wall supports), anchorages, access gates, excavation, backfill, and reinforcement, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer. Retaining walls, and retaining wall supports supporting sound walls (retaining wall) will be measured and paid for as separate items of work.

### **10-1.51 DRILL AND BOND DOWELS**

Drilling and bonding dowels shall conform to the details shown on the plans, the provisions in Section 83-2.02D(1), "General," of the Standard Specifications, and these special provisions.

Dowels shall conform to the provisions for bar reinforcement in "Reinforcement" of 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 a new hole, in which reinforcement is not encountered, shall be drilled adjacent to the rejected hole to the depth shown on the plans.

Unless otherwise provided, dowels to be bonded into drilled holes will be paid for as bar reinforcing steel (bridge).

Unless otherwise provided, drilling and bonding dowels will be measured and paid for by the meter determined by the number and the required depth of holes as shown on the plans or as ordered by the Engineer.

The contract price paid per meter for drill and bond dowel shall include full compensation for furnishing all labor, materials (except reinforcing steel dowels), tools, equipment, and incidentals, and for doing all the work involved in drilling the holes, including coring through reinforcement when approved by the Engineer, and bonding the dowels, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### **10-1.52 CORE CONCRETE**

Coring concrete shall consist of coring holes through reinforced concrete bridge members as shown on the plans and in conformance with these special provisions.

The holes shall be cored by methods that will not shatter or damage the concrete adjacent to the holes.

Water for core drilling operations shall be from the local domestic water supply or shall not contain more than 1000 parts per million of chlorides as Cl, nor more than 1300 parts per million of sulfates as SO<sub>4</sub>, nor shall the water contain any impurities in a sufficient amount that would 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.

Coring concrete will be measured by the meter as core concrete of the sizes listed in the Engineer's Estimate. The cored concrete will be measured along the centerline of the hole without deduction for expansion joints.

The contract price paid per meter for core concrete of the sizes 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 coring the holes, including control of water from core drilling and repairing any damaged reinforcement, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

#### **10-1.53 SEALING JOINTS**

Joints in concrete bridge decks and joints between concrete structures and concrete approach slabs shall be sealed in conformance with the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

Where polyurethane seals are shown on the plans, a silicone sealant conforming to the provisions in Section 51-1.12F, "Sealed Joints," of the Standard Specifications may be used.

When ordered by the Engineer, a joint seal larger than called for by the Movement Rating shown on the plans shall be furnished and installed. Payment to the Contractor for furnishing the larger seal and for saw cutting the increment of additional depth of groove required will be determined as provided in Section 4-1.03, "Changes," of the Standard Specifications.

#### **10-1.54 ARCHITECTURAL SURFACE (TEXTURED CONCRETE)**

Architectural texture for concrete surfaces shall conform to the details shown on the plans and the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Formed relief texture is required at concrete surfaces shown on the plans.

The architectural texture at Camarillo Pedestrian Overhead shall simulate a formed relief constructed to the dimensions and shapes shown on the plans. Corners at the intersection of plane surfaces shall be sharp and crisp without easing or rounding. A Class 1 surface finish shall be applied to the architectural texture.

#### **TEST PANEL**

A test panel at least 1.25 m x 1.25 m in size shall be successfully completed at a location approved by the Engineer before beginning work on architectural textures. The test panel shall be constructed and finished with the materials, tools, equipment and methods to be used in constructing the architectural texture. If ordered by the Engineer, additional test panels shall be constructed and finished until the specified finish, texture and color are obtained, as determined by the Engineer.

The test panel approved by the Engineer shall be used as the standard of comparison in determining acceptability of architectural texture for concrete surfaces.

#### **FORM LINERS**

Form liners shall be used for textured concrete surfaces and shall be installed in conformance with the manufacturer's recommendations, unless other methods of forming textured concrete surfaces are approved by the Engineer. Form liners shall be manufactured from an elastomeric material or a semi-elastomeric polyurethane material by a manufacturer of commercially available concrete form liners. No substitution of other types of formliner material will be allowed. Form liners shall leave crisp, sharp definition of the architectural surface. Recurring textural configurations exhibited by repeating, recognizable shadow patterns shall be prevented by proper casting of form liner patterns. Textured concrete surfaces with such recurring textural configurations shall be reworked to remove such patterns as approved by the Engineer or the concrete shall be replaced.

Form liners shall have the following properties:

| Description                   | ASTM Designation: | Range      |
|-------------------------------|-------------------|------------|
| Elastomeric material          |                   |            |
| Shore A hardness              | D 2240            | 20 to 65   |
| Tensile strength (MPa)        | D 412             | 0.9 to 6.2 |
| Semi-elastomeric polyurethane |                   |            |
| Shore D hardness              | D 2240            | 55 to 65   |
| Tensile strength (MPa)        | D 2370            | 18 minimum |

Cuts and tears in form liners shall be sealed and repaired in conformance with the manufacturer's recommendations. Form liners that are delaminated from the form shall not be used. Form liners with deformations to the manufactured surface caused by improper storage practices or any other reason shall not be used.

Form liners shall extend the full length of texturing with transverse joints at 2.5 m minimum spacing. Small pieces of form liners shall not be used. Grooves shall be aligned straight and true. Grooves shall match at joints between form liners. Joints in the direction of grooves in grooved patterns shall be located only in the depressed portion of the textured concrete. Adjoining liners shall be butted together without distortion, open cracks or offsets at the joints. Joints between liners shall be cleaned before each use to remove any mortar in the joint.

Adhesives shall be compatible with the form liner material and with concrete. Adhesives shall be approved by the liner manufacturer. Adhesives shall not cause swelling of the liner material.

### RELEASING FORM LINERS

Products and application procedures for form release agents shall be approved by the form liner manufacturer. Release agents shall not cause swelling of the liner material or delamination from the forms. Release agents shall not stain the concrete or react with the liner material. For reliefs simulating fractured concrete or wood grain surfaces the application method shall include the scrubbing method using a natural bristle scrub brush in the direction of grooves or grain. The release agent shall coat the liner with a thin film. Following application of form release agent, the liner surfaces shall be cleaned of excess amounts of agent using compressed air. Buildup of form release agent caused by the reuse of a liner shall be removed at least every 5 uses.

Form liners shall release without leaving particles or pieces of liner material on the concrete and without pulling or breaking concrete from the textured surface. The concrete surfaces exposed by removing forms shall be protected from damage.

### CURING

Concrete surfaces with architectural texture shall be cured only by the forms-in-place or water methods. Seals and curing compounds shall not be used.

### MEASUREMENT AND PAYMENT

Architectural texture will be measured and paid for by the square meter.

The contract price paid per square meter for architectural texture of the types listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in architectural texture, complete in place, including test panels, 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 bar reinforcing steel for the concrete sign pedestal on Camarillo Overhead and Separation will be measured and paid for as bar reinforcing steel (bridge).

### **10-1.56 TREAT BRIDGE DECKS**

Treating bridge decks shall consist of test sealing and furnishing and applying a penetrating sealer in conformance with details shown on the plans and the requirements of these special provisions.

The following bridge shall be treated:

Camarillo Overhead and Separation (Bridge No. 52-0016)

Prior to treating bridge decks, the deck surface shall be cleaned as specified in "Clean Bridge Deck" of these special provisions.

Before starting deck treatment work on the project, the Contractor shall submit, for approval by the Engineer, a program for public safety associated with use of methacrylate resin during the construction of the project. Such program shall identify materials, equipment and methods to be used. The Contractor shall not perform any deck treatment work on the project, other than that specifically authorized in writing by the Engineer, until such program has been approved.

If the measures being taken by the Contractor are inadequate to provide for public safety associated with use of methacrylate resin, the Engineer will direct the Contractor to revise his operations and his public safety program. Such directions will be in writing and will specify the items of work for which the Contractor's program for public safety associated with use of methacrylate resin are inadequate. No further work shall be performed on said items until the public safety measures are adequate and, if required, a revised program for public safety associated with use of methacrylate resin has been approved.

The Engineer will notify the Contractor of the approval or rejection of any submitted or revised program for public safety associated with use of methacrylate resin in not more than 10 working days.

The State will not be liable to the Contractor for failure to approve all or any portion of an originally submitted or revised program for public safety associated with use of methacrylate resin, nor for any delays to the work due to the Contractor's failure to submit an acceptable program for public safety associated with use of methacrylate resin.

A certified industrial hygienist will furnish an airborne emissions monitoring plan. The emissions will be monitored at a minimum of 4 points including the point of mixing, application, and the point of nearest public contact, as determined by the Engineer. At the completion of work, a report by the certified industrial hygienist with results of the airborne emissions monitoring plan shall be furnished to the Engineer. The airborne emissions monitoring work, including planning, monitoring and reporting, done by the certified industrial hygienist will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

A Material Safety Data Sheet shall be furnished prior to use for each shipment of high molecular weight methacrylate resin.

The Contractor shall allow 14 days for sampling and testing of the high molecular weight methacrylate resin prior to proposed use.

The entire deck surface shall be cleaned by manual or power sweeping, and all loose material shall be blown from visible cracks using high pressure air.

The material used for treating the concrete shall be a low odor, high molecular weight methacrylate resin. Prior to 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 conforming to the following:

| High Molecular Weight Methacrylate (HMWM) Resin      |   |                     |
|--|---|---------------------|
| PROPERTY   | REQUIREMENT   | TEST METHOD         |
| * Viscosity  | 0.025 Pa·s, maximum, (Brookfield RVT with UL adaptor, 50 RPM at 25°C) | ASTM D 2196         |
| * Specific Gravity                                   | 0.90, minimum, at 25°C  | ASTM D 1475         |
| * Flash Point  | 82°C, minimum   | ASTM D 3278         |
| * Vapor Pressure                                     | 1.0 mm Hg, maximum, at 25°C   | ASTM D 323          |
| Tack-free time                                       | 400 minutes, maximum at 25°C  | California Test 551 |
| PCC Saturated Surface-Dry Bond Strength              | 3.5 MPa, minimum at 24 hours and 21±1°C                               | California Test 551 |
| * Test shall be performed prior to adding initiator. |   |                     |

A compatible promoter/initiator system shall be capable of providing a resin gel time of not less than 40 minutes nor more than 1.5 hours at the temperature of application. Gel time shall be adjusted to compensate for the changes in temperature throughout treatment application.

The relative humidity shall be less than 90 percent at time of treatment.

Traffic shall not be permitted on the treated bridge deck until: (1) the treated surface is tack free (non oily), and (2) the sand cover adheres sufficiently to resist brushing by hand.

The Contractor shall seal a test area of approximately 50 square meters at a location approved by the Engineer. Conditions during the test sealing and equipment used in the test shall be similar to those expected and to be used for the deck sealing operations. Prior to treating the bridge decks within the traveled way, the test seal shall comply with the above 2 requirements for traffic use of the treated decks, and the coefficient of friction of the deck shall be at least 0.35 when tested in conformance with the requirements in California Test 342.

Should the above 2 requirements for traffic use not be met, the Contractor shall suspend treating of bridge decks until another test area is sealed and passes the requirements for the first test area.

The promoter and initiator, if supplied separately from the resin, shall not be mixed directly with each other. Containers of promoters and initiators shall not be stored together in a manner that will allow leakage or spillage from one to contact the containers or material of the other.

The quantity of resin mixed with promoter and initiator shall be limited to 20 L at a time for manual application.

Machine application of the resin may be performed by using a two-part resin system utilizing a promoted resin for one part and an initiated resin for the other part. This two-part resin system may be combined at equal volumes to spray bars through separate positive displacement pumps. Combining of the 2 components may be by either static in-line mixers or by external intersecting spray fans. The pump pressure at the spray bar 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. Hand held spray apparatus will not be allowed.

Joints, drainage facilities and pavement markers shall be adequately protected to prevent contamination by the treatment material. Contaminated items shall be repaired at the Contractor's expense. Traffic stripes and pavement markings shall be cleaned to remove resin during the process of deck treatment or replaced at the Contractor's expense.

The prepared area shall be dry and the surface temperature shall not exceed 38°C when the resin is applied. The rate of application of promoted/initiated resin shall be approximately 2.5 square meter per liter; the exact rate shall be determined by the Engineer.

The deck surfaces to be treated shall be flooded with resin, allowing penetration into the concrete and filling of all cracks. The treatment 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.

After the resin has been applied, at least 20 minutes shall elapse before applying sand. The sand shall be commercial quality dry blast sand. Ninety-five percent of the sand shall pass the 2.36-mm sieve, and 95 percent shall be retained on the 850-µm sieve. The sand shall be applied at a rate of approximately one kilogram per square meter.

Excess sand shall be removed from the deck surface by vacuuming or sweeping prior to opening to traffic.

Treating bridge deck surfaces will be measured by the square meter based on plan dimensions and will be paid for as treat bridge deck. Furnishing the high molecular weight methacrylate resin will be measured by the liter of mixed material actually placed and will be paid for as furnish bridge deck treatment material. No payment will be made for material wasted or not used in the work.

The contract price paid per square meter for treat bridge deck shall include full compensation for furnishing all labor, materials, (including sand, but excluding treatment material), tools, equipment and incidentals, and for doing all the work involved in test sealing, applying treatment material and removing excess sand, 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 liter for furnish bridge deck treatment material (low odor) 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.

Full compensation for compliance with the requirements for the program for public safety associated with use of methacrylate resin, but excluding the airborne emissions monitoring work done by the certified industrial hygienist, shall be considered as included in the contract prices paid for the items of work involving treating bridge decks and no additional compensation will be allowed therefor.

### **10-1.57 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 and these special provisions.

Attention is directed to "Welding Quality Control" of these special provisions.

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, 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 and in the special provisions.

Working drawings shall be 559 mm x 864 mm or 279 mm x 432 mm in size and each drawing and calculation sheet shall include the State assigned designations for the contract number, sign structure type and reference as shown on the contract plans, District-County-Route-Kilometer Post, and contract number.

The Engineer shall have 20 working 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.

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.

Surfaces of base plates which are to come in contact with concrete, grout, or washers and leveling nuts shall be flat to within 3 mm tolerance in 305 mm, and to within 5 mm tolerance overall. Faying surfaces of plates in high-strength bolted connections including flange surfaces of field splices, chord joints, and frame junctures, and contact surfaces of plates used for breakaway slip base assemblies shall be flat to within 2 mm tolerance in 305 mm, and within 3 mm tolerance overall.

Thermally cut holes made in tubular members of sign supports, other than holes in base and flange plates, shall initially be made a minimum of 2 mm undersized, and then be mechanically enlarged by reaming or grinding to the final required size and shape. All edges shall have a surface roughness of not greater than 6.35  $\mu\text{m}$ . Round holes may be drilled to the exact final diameter. No holes shall be made in members unless the holes are shown on the plans or are approved in writing by the Engineer.

Steel members used for overhead sign structures shall receive nondestructive testing (NDT) in conformance with AWS D1.1 and the following:

A.

| Weld Location   | Weld Type                         | Minimum Required NDT |
|---|-----------------------------------|----------------------|
| Welds for butt joint welds in tubular sections, nontubular sections, and posts  | CJP groove weld with backing ring | 100% UT or RT        |
| Longitudinal seam welds*  | PJP groove weld                   | 25% MT               |
|   | CJP groove weld                   | 100% UT or RT        |
| Welds for base plate, flange plate, or end cap to post or mast arm  | CJP groove weld                   | 25% UT or RT         |
|   | Fillet weld                       | 25% MT               |
| * Longitudinal seam welds shall have 60% minimum penetration, except that within 150 mm of any circumferential weld, longitudinal seam welds shall be CJP groove welds. |                                   |                      |

- B. A written procedure approved by the Engineer shall be used when performing UT on material less than 8 mm thick. Contoured shoes shall be used when performing UT on round tubular sections under 1270 mm in diameter.
- C. When less than 100 percent of a weld is specified for NDT, and if defects are found during this inspection, additional NDT shall be performed. This additional NDT shall be performed on 25 percent of the total weld for all similar welds, as determined by the Engineer, produced for sign structures in the project. If any portion of the additional weld inspected is found defective, 100 percent of all similar welds produced for sign structures in the project, as determined by the Engineer, shall be tested.

### HIGH-STRENGTH BOLTED CONNECTIONS

The following substitutions of high-strength steel fasteners shall be made:

| METRIC SIZE SHOWN ON THE PLANS  | SIZE TO BE SUBSTITUTED                                    |
|---|---|
| ASTM Designation: A 325M<br>(Nominal bolt diameter (mm or mm x thread pitch)) | ASTM Designation: A 325<br>(Nominal bolt diameter (inch)) |
| 13 or 12.70, M12, M12 x 1.75  | 1/2   |
| 16 or 15.88, M16, M16 x 2   | 5/8   |
| 19 or 19.05, M20, M20 x 2.5   | 3/4   |
| 22 or 22.22, M22, M22 x 2.5   | 7/8   |
| 24, 25, or 25.40, M24, M24 x 3  | 1   |
| 29 or 28.58, M27, M24 x 3   | 1 1/8   |
| 32 or 31.75, M30, M30 x 3.5   | 1 1/4   |
| 38 or 38.10, M36, M36 x 4   | 1 1/2   |

### Materials

High-strength fastener assemblies and other bolts attached to structural steel with nuts and washers shall be zinc-coated. When direct tension indicators are used in these assemblies, the direct tension indicator and all components of the fastener assembly shall be zinc-coated by the mechanical deposition process.

### 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.

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: F436.
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 (inches)   | Snug Tension (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 (a,b)   |                          |
|---|--------------------------|
| 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 (c)   | 1 1/3                    |
| <p>(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.</p> <p>(b) Applicable only to connections in which all material within grip of the bolt is steel.</p> <p>(c) When bolt length exceeds 12 diameters, the required rotation shall be determined by actual tests in a suitable tension device simulating the actual conditions.</p> |                          |

- 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 (in ft-lbs), where  $T = [(the\ measured\ tension\ in\ pounds) \times (the\ bolt\ diameter\ in\ inches) / 48\ in/ft]$ .

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                    |

- 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.
- Loosen and remove the nut and examine the threads on both the nut and bolt.

C. Long Bolt Acceptance Criteria:

- 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: F436.
4. Steel plate or girder with a hole to install bolt. The hole size shall be 1.6 mm 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 305 mm 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 (inches)   | Torque (ft-lbs) |
| 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.

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 jobsite, 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: F959, except that bolts shall be initially tensioned to a value 5 percent greater than the minimum required bolt tension.

Full compensation for furnishing anchor bolt templates and for testing of welds shall be considered as included in the contract price paid per kilogram for furnish sign structure and no additional compensation will be allowed therefor.

#### **10-1.58 ROADSIDE SIGNS**

Roadside signs shall be 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.

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 with creosote, creosote coal tar solution, creosote petroleum solution (50-50), pentachlorophenol in hydrocarbon solvent, copper naphthenate, ammoniacal copper arsenate, or ammoniacal copper zinc arsenate. In addition to the preservatives listed above, Southern yellow pine may also be pressure treated with chromated copper arsenate. When other than one of the creosote processes is used, blocks shall have a minimum retention of  $6.4 \text{ kg/m}^3$ , and need not be incised.

Roadside sign (metal post) – one post and roadside sign (metal post) – two post will be measured and paid for in the same manner as specified for roadside sign – one post and roadside sign – two post.

Perforated square tubing for metal post and post anchor assembly shall be roll formed from 10-gage (3.43)(0.135)ENGLISH and 12-gage (2.69)(0.105)ENGLISH U.S.S. gage cold rolled steel, galvanized material ASTM Designation: A-446 Grade A.

All metal components of the perforated square tubing and post anchor assembly shall be hot dip galvanized after fabrication conforming to ASTM specification A-525, Designation: G-90.

The contract unit price paid for roadside sign (metal post) – one post and for roadside sign (metal post) – two post shall include full compensation for furnishing all labor, materials (including blind rivets), tools, equipment, and incidentals and for doing all work involved in installing anchor post (metal post), complete in place, including installing anchor post assemblies, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

Install roadside sign (retaining wall mounted) will be measured and paid for as roadside sign (metal post) – one post.

Type N, and Type L 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.

### **10-1.59 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.

Existing sign panels, as shown on the plans, shall be removed and disposed of as provided in Section 15, "Existing Highway Facilities," of the Standard Specifications.

Installing sign panels on existing frames will be measured by the square meter and the quantity to be paid for will be the total area, in square meters, of sign panels installed in place.

The contract price paid per square meter for install sign panel on existing frame shall include full compensation for furnishing all labor, materials (except State-furnished sign panels and mounting bolts), tools, equipment, and incidentals, and for doing all the work involved in installing sign panels on existing frames, complete in place (including removing and disposing of existing sign panels), as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### **10-1.60 CLEAN AND PAINT IRON BRIDGE RAILING AND WROUGHT IRON RAILING**

Exposed new metal surfaces of iron bridge railing and wrought iron railing 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 inside of tube steel need not be cleaned and painted.

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 "SSPC: The Society for Protective Coatings" specifications or qualification procedures which are applicable to the painting or paint removal to be performed. These documents shall become the permanent property of the Department.
- C. Proposed methods and equipment to be used for any paint application.
- D. Proof of each of any required certifications, SSPC-QP 1, SSPC-QP 2, SSPC-QP 3.
  1. In lieu of certification in conformance with the requirements in SSPC-QP 1 for this project, the Contractor may submit written documentation showing conformance with the requirements in Section 3, "General Qualification Requirements," of SSPC-QP 1.
  2. In lieu of certification in conformance with the requirements in SSPC-QP 2 for this project, the Contractor may submit written documentation showing conformance with the requirements in Sections 4.2 through 4.6 of SSPC-QP 2.

The Engineer shall have 2 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 reviewed 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.

### **CLEANING**

Exposed new metal surfaces shall be dry blast cleaned in conformance with the requirements in Surface Preparation Specification No. 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 not less than 40  $\mu\text{m}$  nor more than 86  $\mu\text{m}$  as measured in conformance with the requirements in ASTM Designation: D 4417.

Mineral and slag abrasives used for blast cleaning steel shall conform to the requirements in Abrasive Specification No. 1, "Mineral and Slag Abrasives," of the "SSPC: The Society for Protective Coatings" and shall not contain hazardous material. Mineral and slag abrasives shall comply with the requirements for Class A, Grade 2 to 3 as defined therein.

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 steel.

## **PAINTING**

Blast cleaned surfaces shall receive a single undercoat and, a minimum of 2 finish coats of an exterior grade latex paint supplied by the manufacturer of the inorganic zinc coating.

The single undercoat shall consist of a waterborne inorganic zinc coating conforming to the requirements in AASHTO Designation M 300, Type II, except that: 1) the first 3 sentences of Section 4.7, "Primer Field Performance Requirements," and the entire Section 4.7.1 shall not apply, and 2) zinc dust shall be Type II in conformance with the requirements in ASTM Designation: D 520. The inorganic zinc coating shall be listed on 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 the provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

Inorganic zinc coating shall not be applied when the atmospheric or surface temperature is less than 7°C nor more than 29°C, nor when the relative humidity exceeds 85 percent.

The single undercoat of inorganic zinc coating shall be applied to the required dry film thickness in 2 or more applications within 4 hours after blast cleaning.

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 100 µm nor more than 200 µm, except that the total dry film thickness on each faying (contact) surface of high strength bolted connections shall be between 25 µm 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 he has 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.

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 prior to 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 inorganic zinc coating shall be tested for adhesion and cure. The locations of the tests will be determined by the Engineer. The sequence of the rinsing and testing operations shall be determined by the Contractor. The testing for adhesion and cure will be performed no sooner than 72 hours after application of the single undercoat of inorganic zinc coating. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to determine the location of the tests and to test the inorganic zinc coating cure. The inorganic zinc coating shall pass the following tests:

### **Adhesion**

- The inorganic zinc coating shall have a minimum adhesion to steel of 4 MPa when measured at no more than 6 locations per span on each girder using a self-aligning adhesion tester in conformance with the requirements in ASTM Designation: D 4541. The Contractor, at the Contractor's expense, shall: (1) verify compliance with the adhesion requirements, (2) furnish test results to the Engineer, and (3) repair the coating after testing.

### **Cure**

- The inorganic zinc coating, when properly cured, 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.
- The surface pH of the inorganic zinc primer shall be checked in conformance with ASTM Designation: D4262 by wetting the surface with deionized water and applying pH paper with a capability of measuring in increments of 0.5 pH units. Application of finish coats will not be permitted until the surface pH is less than 8.

Except as approved by the Engineer, a minimum curing time of 72 hours shall be allowed between application of inorganic zinc coating and water rinsing.

Exposed area of inorganic zinc coating shall be water rinsed. Areas of the coating that are removed by the 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.

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 and shall conform to the following:

A.

| Property                                     | Value              | ASTM Designation    |
|--|--------------------|---------------------|
| Pigment content, percent                     | 24 max.            | D 3723              |
| Nonvolatile content, mass percent            | 49 min.            | D 2369              |
| Viscosity, KU                                | 75 min. to 90 max. | D 562               |
| Fineness of dispersion, Hegman               | 6 min.             | D 1210              |
| Drying time at 25°C, 50% RH, 100-µm wet film |                    | D 1640              |
| Set to touch, minutes                        | 30 max.            |                     |
| Dry through, hours                           | 1 max.             |                     |
| Adhesion                                     | 4A                 | D 3359, Procedure A |

B. No visible color change in the finish coats shall occur when tested in conformance with the requirements in ASTM Designation: G 53 using FS 40 UV-B bulbs for a minimum of 38 cycles. The cycle shall be 4 hours of ultraviolet (UV) exposure at 60° C and 4 hours of condensate exposure at 40° C.

C. 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: D1640. The first finish coat color for the Iron Bridge Railing shall match Federal Standard 595B No. 10070. The total dry film thickness of both applications of the first finish coat shall be not less than 50 µm.

The first finish coat color for the Wrought Iron Railing shall match Federal Standard 595B, No. 14062.

Except as approved by the Engineer, a minimum drying time of 12 hours shall be allowed between finish coats.

The second finish coat color for the Iron Bridge Railing shall match Federal Standard 595B, No. 10070. The total dry film thickness of the applications of the second finish coat shall be not less than 50 µm.

The second finish coat color for the Wrought Iron Railing shall match Federal Standard 595B, No. 14062. The total dry film thickness of the applications of the second finish coat shall be not less than 50 µm.

The 2 finish coats shall be applied in 3 or more applications to a total dry film thickness of not less than 100 µm nor more than 200 µm.

The total dry film thickness of all applications of inorganic zinc coating and finish coat paint shall be not less than 200 µm nor more than 350 µm.

#### 10-1.61 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.

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 1.2 m 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.

When reinforced concrete pipe is installed in conformance with the details shown on Revised Standard Plan A62DA, the fifth paragraph of Section 19-3.04, "Water Control and Foundation Treatment," of the Standard Specifications shall not apply.

When solid rock or other unyielding material is encountered at the planned elevation of the bottom of the bedding, the material below the bottom of the bedding shall be removed to a depth of 1/50 of the height of the embankment over the top of the culvert, but not less than 150 mm nor more than 300 mm. The resulting trench below the bottom of the bedding shall be backfilled with structure backfill material in conformance with the provisions in Section 19-3.06, "Structure Backfill," of the Standard Specifications.

Concrete plugs shall be constructed at the ends of unconnected reinforced concrete pipe where shown on the plans and consist of a tight fitting wall of minor concrete no less than 150 millimeters thick. Minor concrete shall conform to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications.

Full compensation for concrete plugs shall be considered as included in the contract price paid per meter for the various types of reinforced concrete pipe and no additional compensation will be allowed therefor.

The Contractor shall coordinate with the Engineer to ensure that construction of the lateral connection to the existing Ventura County Flood Control District's reinforced concrete channel be performed in the presence of the District representative.

The Outer Bedding shown on Revised Standard Plan A62DA shall not be compacted prior to placement of the pipe.

**10-1.62 CORRUGATED METAL PIPE**

Corrugated steel pipes 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.

**10-1.63 EDGE DRAIN**

Edge drains shall conform to the provisions in Section 68-3, "Edge Drains," of the Standard Specifications.

**10-1.64 OVERSIDE DRAIN**

Corrugated steel pipes downdrains shall conform to the provisions in Section 69, "Overside Drains," of the Standard Specifications.

**10-1.65 MISCELLANEOUS FACILITIES**

Concrete flared end sections, precast concrete pipe manholes, and corrugated steel pipe riser shall conform to the provisions in Section 70, "Miscellaneous Facilities," of the Standard Specifications.

**10-1.66 GRATED LINE DRAIN**

This work shall consist of furnishing and installing precast grated line drain, with necessary fittings, coupling systems, frames, grates and associated items as shown on the plans and in conformance with these special provisions.

The interior surface of the grated line drain, below the level of the frame and grate and associated connections, shall be smooth. Grated line drain channel sections shall be manufactured of monolithic polymer concrete with no side extensions.

Monolithic polymer concrete shall be made from a composition of aggregate and polyester resin or vinylester resin and shall have the following properties when tested as follows:

| PROPERTY                                      | ASTM TEST METHOD | VALUE     |
|---|------------------|-----------|
| Tensile Strength, MPa                         | C 307            | 10 min.   |
| Compressive Strength, MPa                     | C 579            | 80 min.   |
| Bending Strength, MPa                         | C 580            | 20 min.   |
| Moisture Absorption, %                        | C 140            | 0.5 max.  |
| Chemical Resistance                           | C 267            | Pass      |
| Freeze/Thaw, number of cycles w/o weight loss | C 666            | 1600 min. |

The manufacturer of the grated line drain 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.

Grated line drain frames and grates shall be manufactured of ductile iron conforming to the provisions in Section 75-1.02, "Miscellaneous Iron and Steel," of the Standard Specifications. The frames and grates need not be galvanized or coated with asphalt paint. Bolts, nuts, frame anchors, and other connecting hardware shall conform to the provisions in Section 75-1.02, "Miscellaneous Iron and Steel," of the Standard Specifications.

Frames and grates, when installed in conformance with the manufacturer's recommendations and these special provisions, shall withstand load testing conforming to the requirements in Federal Specification RR-F-621E for "Frames, Covers, Gratings, Steps, Manhole Sump and Catch Basin." Grates shall fit into the frames without rocking.

Frames shall be secured to the surrounding concrete backfill with steel anchoring rods as shown on the plans. Other methods may be used to secure the frame to the concrete backfill or grated line drain wall provided that a minimum pullout resistance of 10 kN per meter of length of grated line drain frame is maintained.

Grates and frames shall be one piece or the grates shall be removable. Removable grates shall be held in place by locking devices that are tamper resistant. Removable grates shall provide a minimum repetitive pullout resistance of 5 kN per meter of length after completion of 1000 hours of salt spray testing in conformance with the requirements in ASTM Designation: B 117. When a combination of one piece frame and grate and removable grates are used, the locations of the removable grates shall be shown on the plans.

Except for grates installed within designated pedestrian paths of travel, grates shall accept inflow of runoff through openings. The openings shall consist of a minimum of 60 percent of the total top surface area of the grate, with individual openings or slots having a dimension not greater than 50 mm measured in the direction of the grated line drain flow line. Grates installed within designated pedestrian paths of travel shall be certified as conforming to the requirements of the "Americans with Disabilities Act."

Grated line drains shall be installed in trenches excavated to the lines and grades established by the Engineer. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the grated line drain.

Grated line drains shall be installed and jointed in conformance with the manufacturer's recommendations.

Grated line drains shall be installed to the lines and grades with sections closely jointed and secured to ensure that no separation of the line drains occurs during backfilling.

The frame or grate of the grated line drain shall not extend above the level of the surrounding concrete backfill.

Grated line drains shall be connected to new or existing drainage facilities as shown on the plans.

Excavation and backfill shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications.

Backfill for the grated line drains shall be either minor concrete or Class 3 concrete conforming to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications, except that minor concrete shall contain not less than 300 kg of cement per cubic meter.

Concrete backfill shall be placed in the trench as shown on the plans. Concrete backfill shall be placed against undisturbed material at the sides and bottom of the trench and in a manner that will prevent floating or shifting of the grated line drain and voids in, or segregation of, the concrete. Foreign material which falls into the trench, prior to or during placement of the concrete, shall be immediately removed. Where necessary, earth plugs shall be constructed and compacted at the ends of the planned concrete backfill to contain the concrete within the trench.

Concrete backfill shall be finished flush with the adjacent surfacing.

The surface of the concrete shall be textured with a broom or burlap drag to produce a durable skid-resistant surface.

The length the grated line drain to be paid for will be the length measured by the meter along the pavement surface as designated by the Engineer. No payment will be made for grated line drain placed in excess of the designated length.

The contract price paid per meter for grated line drain shall include full compensation for furnishing all labor, materials (including frames and grates), tools, equipment, and incidentals, and for doing all the work involved in installing grated line drains, complete in place, including excavation and backfill, connecting grated line drains to new or existing facilities, concrete collars, reinforcement, and other connecting devices, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

#### **10-1.67 WELDED STEEL PIPE CASING (BRIDGE)**

Welded steel pipe casings through bridges and under approach slabs shall be of the size shown and shall conform to the provisions in Section 70, "Miscellaneous Facilities," of the Standard Specifications and these special provisions.

Unless otherwise shown on the project plans, casings shall be installed at each abutment, and casings shall be extended to the greater of: (1) 1.5 m beyond the approach slab, (2) 1.5 m beyond the end of the adjacent wingwall or (3) 6 m beyond the abutment.

#### **WORKING DRAWINGS**

Working drawings for temporary support of casing pipe at the abutments shall be submitted for approval in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings" of the Standard Specifications.

#### **MATERIALS**

##### **Casing pipe**

Casing pipe shall be welded steel pipe conforming to the provisions in Section 70-1.02B, "Welded Steel Pipe," of the Standard Specifications, except that the pipe shall be treated in accordance with the following requirements, prior to shipping. Exterior surfaces of welded steel pipe shall be cleaned and coated in conformance with the requirements in ANSI/AWWA C213 or at the option of the Contractor, cleaned, primed, and coated in accordance with specifications of ANSI/AWWA C214.

### **Pipe wrapping tape**

Wrapping tapes for pipe in contact with the ground shall be a pressure sensitive polyvinyl chloride or polyethylene tape having thickness of 1.27 mm, minimum.

### **CONSTRUCTION**

If a blockout is provided in the bridge abutment wall for casing pipe, the space between the casing pipe and bridge abutment wall shall be filled with portland cement mortar conforming to the provisions in Section 51-1.135, "Mortar," of the Standard Specifications.

Openings for utilities through bridge superstructure concrete shall either be formed or shall consist of pipe sleeves.

### **Wrapping and coating pipe**

Damaged coating on steel pipe casing in contact with earth shall be wrapped as follows:

- A. Pipe to be wrapped shall be thoroughly cleaned and primed as recommended by the tape manufacturer.
- B. Tapes shall be tightly applied with 1/2 uniform lap, free from wrinkles and voids to provide not less than 2.5 mm thickness.
- C. Field joints and fittings for wrapped pipe shall be covered by double wrapping 1.27 mm thick tape. Wrapping at joints shall extend a minimum of 150 mm over adjacent pipe coverings. Width of tape for wrapping fittings shall not exceed 50 mm. Adequate tension shall be applied so tape will conform closely to contours of joint.

Where a welded steel pipe casing passes through the abutment wall, the welded steel pipe casing shall be additionally wrapped with 2 layers of No. 15 asphalt-felt building paper, securely taped or wired in place.

### **MEASUREMENT AND PAYMENT**

Measurement and payment for welded steel pipe casing for each size listed in the Engineers Estimate shall conform to the provisions in Sections 70-1.04, "Measurement," and 70-1.05, "Payment," of the Standard Specifications.

Full compensation for furnishing and installing steel cover plates, mortar and building paper, other fittings, and casing, shall be considered as included in the contract prices paid per meter for the sizes of welded steel pipe casing involved and no additional compensation will be allowed therefor.

### **10-1.68 ROCK SLOPE PROTECTION**

Rock slope protection shall be placed or constructed in conformance with the provisions in Section 72, "Slope Protection," of the Standard Specifications.

### **10-1.69 SLOPE PAVING**

Slopes under the ends of bridges, where shown on the plans, shall be paved in conformance with the provisions in Section 72-6, "Slope Paving," of the Standard Specifications and these special provisions.

The slope paving shall be colored in conformance with the provisions in Section 72-6.03, "Materials," of the Standard Specifications.

The color of the slope paving shall conform to Color No. 22563 of Federal Standard No. 595B.

### **10-1.70 MISCELLANEOUS CONCRETE CONSTRUCTION**

Curb ramp, curbs and gutters, sidewalks and driveways, gutter depressions and gutter flare for pipe downdrain shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications and these special provisions.

Curb ramp detectable warning surface shall conform to the details shown on the plans and shall not be constructed or installed on curb ramps with a slope that exceeds 6.67 percent unless otherwise shown on the design plans. The finished surfaces of the detectable warning surface shall be free from blemishes.

Curb ramp detectable warning surface shall consist of raised truncated domes constructed or installed on curb ramps. Detectable warning surface, at the option of the Contractor, shall be either cast-in-place or stamped into the surface of the curb ramp, or shall be a prefabricated surface installed on the curb ramp. The color of the detectable warning surface shall be yellow conforming to Federal Standard No. 595B, Color No. 33538. Detectable warning surface, either cast-in-place or stamped into the surface of the curb ramp, shall be painted yellow in conformance with the provisions in Section 59-6, "Painting Concrete," of the Standard Specifications.

Prior to constructing curb ramps with a cast-in-place or stamped detectable warning surface, a test panel shall be constructed on the project site and shall be of a size not less than 600 mm by 600 mm. The test panel shall be constructed, finished and cured with the same materials, tools, equipment, and methods to be used in constructing the proposed permanent

work. Additional test panels shall be constructed as necessary until a panel is produced which demonstrates, to the satisfaction of the Engineer, the ability of the selected procedure to produce a detectable warning surface that meets all of the specified requirements.

Full compensation for constructing or installing a curb ramp detectable warning surface shall be considered as included in the contract price paid per cubic meter for minor concrete (curb and gutter) and no separate payment will be made therefor.

#### **10-1.71 MISCELLANEOUS IRON AND STEEL**

Miscellaneous iron and steel shall conform to the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications.

#### **10-1.72 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.

Self-tapping screws used for sleeve connections shall be hex-head stainless steel, installed in holes drilled to fit the self-tapping screws, conforming to the requirements of ASTM Designation: A 276, Type 304.

At the Contractor's option, fiberglass pipes and fittings with the same diameter and minimum bend radius as those shown on the plans, may be substituted for welded steel pipe in deck drain systems.

Fiberglass pipe and fittings shall conform to the requirements in ASTM Designation: D 2996, and shall have a minimum short-term rupture strength of 207 MPa. The adhesive type recommended by the manufacturer shall be used for joining pipe and fittings. Fiberglass pipe not enclosed in a box girder cell or encased in concrete shall be manufactured from ultraviolet-resistant resin pigmented with concrete-gray color, or be coated with a concrete-gray resin-rich exterior coating. Paint shall not be used. Fiberglass pipe treated with ultraviolet protection shall withstand a minimum of 2500 hours of accelerated weathering when tested in conformance with the requirements in ASTM Designation: G 154. Lamps shall be UV-B (313 nm wavelength). The resting cycle shall be 4 hours of ultraviolet (UV) exposure at 60°C, and then 4 hour of condensate exposure at 50°C. After testing, the surface of the pipe shall exhibit no fiber exposure, crazing, or checking, and only a slight chalking or color change.

Support spacing for fiberglass pipe shall be the same as shown on the plans for welded steel pipe. Pipe supports shall have a width of not less than 38 mm.

A Certificate of Compliance for fiberglass pipe and fittings 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 of Compliance shall include all laboratory test results conforming to the provisions specified herein.

For drainage piping NPS 8 or smaller, which is: (1) enclosed in a box girder cell and exposed for a length not greater than 6 m within the cell, or (2) encased in concrete, the Contractor shall have the option of substituting polyvinyl chloride (PVC) plastic pipe and fittings, with the same diameter and minimum bend radius as shown on the plans, for welded steel pipe.

The PVC plastic pipe and fittings shall be Schedule 40 conforming to the requirements of ASTM Designations: D 1785. The maximum support spacing for PVC plastic pipe shall be 2 m.

Couplings used to connect PVC plastic pipe or fiberglass pipe to steel shall be threaded or flanged. The sleeve connections shown on the plans shall not be used for either PVC plastic pipe or fiberglass pipe.

If PVC plastic pipe or fiberglass pipe is substituted for welded steel pipe, the quantity of drainage piping will be computed on the basis of the dimensions and details shown on the plans, and no change in the quantities to be paid for will be made because of the use of PVC plastic pipe or fiberglass pipe.

#### **10-1.73 MISCELLANEOUS METAL (RESTRAINER-CABLE TYPE)**

Miscellaneous metal (restrainer-cable type) shall conform to the provisions for bridge joint restrainer units in Section 75-1.035, "Bridge Joint Restrainer Units," of the Standard Specifications and these special provisions.

New concrete adjacent to restrainers shall be placed prior to installing restrainers.

Miscellaneous metal (restrainer-cable type) will be measured and paid for by the kilogram in the same manner specified for miscellaneous metal (restrainer) in Sections 75-1.06, "Measurement," and 75-1.07, "Payment," of the Standard Specifications.

#### **10-1.74 CHAIN LINK FENCE**

Chain link fence shall be Type CL-1.8 and shall conform to the provisions in Section 80, "Fences," of the Standard Specifications.

### **10-1.75 VINYL COATED CHAIN LINK FENCE**

Vinyl coated chain link fence shall be Type CL-3.1 and shall conform to the provisions in Section 80, "Fences," of the Standard Specifications and these special provisions.

Chain link fabric shall be 9-gage Type IV polyvinyl chloride (PVC) coated conforming to the requirements in Federal Specification RR-F-19.

Posts, rails, braces, truss rods, post tops, tension bars, wires, ties and fittings shall be hot-dipped galvanized and polyvinyl chloride (PVC) coated.

The color of the vinyl coating shall be green. The vinyl coating of any fence shall all be of the same color.

### **10-1.76 CHAIN LINK GATE**

Chain link gates shall be Type CL-1.8 conforming to the provisions in Section 80, "Fences," of the Standard Specifications and these special provisions.

Full compensation for making the openings in existing fences (including disposing removed fences fabric), for temporary closing of the openings (including furnishing additional fence fabric if necessary), and for new posts, footings, hardware, braces, and truss rods shall be considered as included in the contract unit price paid for 1.5-m chain link gate (Type CL-1.8) and no additional compensation will be allowed therefor.

### **10-1.77 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.

### **10-1.78 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 and blocks shall be wood.

Delete the ninth and eleventh paragraphs in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications.

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

Wood posts and blocks 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 with creosote, creosote coal tar solution, creosote petroleum solution (50-50), pentachlorophenol in hydrocarbon solvent, copper naphthenate, ammoniacal copper arsenate, or ammoniacal copper zinc arsenate. In addition to the preservatives listed above, Southern yellow pine may also be pressure treated with chromated copper arsenate. When other than one of the creosote processes is used, blocks shall have a minimum retention of 6.4 Kg/m<sup>3</sup>, and need not be incised.

### **TERMINAL SYSTEM (TYPE SRT)**

Terminal system (Type SRT) shall be furnished and installed as shown on the plans and in conformance with these special provisions.

Terminal system (Type SRT) shall be a SRT-350 Slotted Rail Terminal (8 post system) as manufactured by Trinity Industries, Inc., and shall include all the items detailed for terminal system (Type SRT) shown on the plans.

The 5 mm x 44 mm x 75 mm plate washer shown on the elevation view and in Section D-D at Wood Post No. 1 shall be omitted.

Arrangements have been made to insure that any successful bidder can obtain the SRT-350 Slotted Rail Terminal (8 post system) from the manufacturer, Trinity Industries, Inc., P.O. Box 99, 950 West 400S, Centerville, UT 84014, Telephone 1-800-772-7976. The price quoted by the manufacturer for the SRT-350 Slotted Rail Terminal (8 post system), FOB Centerville, Utah is \$845, not including sales tax.

The above price will be firm for orders placed on or before July 31, 2002, provided delivery is accepted within 90 days after the order is placed.

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 terminal systems (Type SRT) 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.

The terminal system (Type SRT) 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 100 mm thick and each layer shall be moistened and thoroughly compacted. Wood terminal posts shall be inserted into the steel foundation tubes by hand. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 65°C or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

Surplus excavated material remaining after the terminal system (Type SRT) has been constructed shall be disposed of in a uniform manner along the adjacent roadway where designated by the Engineer.

### **TERMINAL SYSTEM (TYPE CAT)**

Terminal system (Type CAT) and terminal system (Type CAT) backup shall be furnished and installed as shown on the plans and in conformance with these special provisions.

Terminal system (Type CAT) shall be a CAT-350 Crash Cushion Attenuating Terminal as manufactured by Trinity Industries, Inc., and shall include items detailed for terminal system (Type CAT) shown on the plans.

Terminal system (Type CAT) backup shall consist of items detailed for terminal system (Type CAT) backup shown on the plans, and shall conform to the provisions in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications.

Excluding the terminal system (Type CAT) backup, arrangements have been made to insure that any successful bidder can obtain the CAT-350 Crash Cushion Attenuating Terminal from the manufacturer, Trinity Industries, Inc., P.O. Box 99, 950 West 400S, Centerville, UT 84014, Telephone 1-800-772-7976. The price quoted by the manufacturer for the CAT-350 Crash Cushion Attenuating Terminal, FOB Centerville, Utah is \$2,850 not including sales tax.

The above price will be firm for orders placed on or before July 31, 2002, provided delivery is accepted within 90 days after the order is placed.

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 system (Type CAT) conforms with the contract plans and specifications, conforms to the prequalified design and material requirements, and was manufactured in conformance with the approved quality control program.

The terminal system (Type CAT) 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 100 mm thick and each layer shall be moistened and thoroughly compacted. Wood posts shall be inserted into the steel foundation tubes by hand. Before the wood posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 65°C or less. The edges of the wood posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

Surplus excavated material remaining after the terminal system (Type CAT) and backup have been constructed shall be disposed of in a uniform manner along the adjacent roadway where designated by the Engineer.

### **10-1.79 CHAIN LINK RAILING**

Chain link railing shall conform to the provisions in Section 83-1, "Railings," of the Standard Specifications.

### **10-1.80 METAL BRIDGE RAILING**

Tubular handrailing shall conform to the provisions in Section 83-1, "Railings," of the Standard Specifications.

### **10-1.81 IRON BRIDGE RAILING**

Iron bridge railing shall conform to the provisions in Section 83-1, "Railings," of the Standard Specifications, and these special provisions.

Attention is directed to "Welding Quality Control" of these special provisions.

Iron railing surfaces shall be cleaned and painted in conformance with the provisions in "Clean and Paint Iron Bridge Railing and Wrought Iron Railing" of these special provisions.

Chain link fabric attached to the iron bridge railing, as shown on the plans, shall conform to the provisions for vinyl coated chain link fabric in Section 83-1.02I, "Chain Link Railing" of the Standard Specifications, and shall be black in color.

Full compensation for vinyl coated chain link fabric attached to iron railing as shown on the plans, and for painting iron railing, shall be considered as included in the contract price paid per meter for iron railing and no separate payment will be made therefor.

#### **10-1.82 WROUGHT IRON RAILING**

Wrought iron railing shall conform to the details shown on the plans, provisions in Section 83-1, "Railings," of the Standard Specifications, and these special provisions.

Attention is directed to "Welding Quality Control" of these special provisions.

Wrought iron railing surfaces shall be cleaned and painted in conformance with the provisions in "Clean and Paint Iron Bridge Railing and Wrought Iron Railing" of these special provisions.

#### **10-1.83 CABLE RAILING**

Cable railing shall conform to the provisions in Section 83-1, "Railings," of the Standard Specifications.

#### **10-1.84 CONCRETE BARRIER**

Concrete barriers shall conform to the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

Type 26A Modified concrete barriers will be measured and paid for as concrete barrier (Type 26 Modified). Light pedestals and intermediate posts will be measured and paid for as the type of concrete barrier attached thereto.

#### **10-1.85 THERMOPLASTIC TRAFFIC STRIPE AND PAVEMENT MARKING**

Thermoplastic traffic stripes (traffic lines) and pavement markings shall be applied in conformance with the provisions in Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

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 material for traffic stripes shall be applied at a minimum thickness of 2.0 mm.

At the option of the Contractor, permanent traffic striping and pavement marking 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 and pavement markings 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 and pavement markings, the tape will be measured and paid for by the meter as thermoplastic traffic stripe and by the square meter as thermoplastic pavement marking.

#### **10-1.86 PAINT TRAFFIC STRIPE AND PAVEMENT MARKING**

Painted traffic stripes (traffic lines) and pavement markings shall be applied in conformance with the provisions in Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

At the option of the Contractor, permanent traffic striping and pavement marking tape conforming to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions may be placed instead of the painted traffic stripes and pavement markings specified herein. Permanent tape, if used, shall be installed in conformance with the manufacturer's specifications. If permanent tape is placed instead of painted traffic stripes and pavement markings, the tape will be measured and paid for by the meter as paint traffic stripe and by the square meter as paint pavement marking of the number of coats designated in the Engineer's Estimate.

#### **10-1.87 PAINT STALL LINE AND PAVEMENT MARKING**

Painted stall lines and pavement markings at parking lot locations shall be applied in conformance with the details shown on the plans or designated by the Engineer, and as specified in Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

At the option of the Contractor, permanent traffic striping and pavement marking tape conforming to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions may be placed instead of the painted stall lines and pavement markings specified herein. Permanent tape, if used, shall be installed in conformance with the manufacturer's specifications. If permanent tape is placed instead of painted stall lines and pavement markings, the tape will be measured and paid for by the meter as paint stall lines and paint pavement marking of the number of coats designated in the Engineer's Estimate.

Paint for painted stall lines and pavement markings shall be applied in 2 coats.

Painted stall lines and pavement markings will be measured by the meter. Double or triple stall lines will be measured as 2 or 3 traffic stripes, respectively, and 150-mm wide and 200-mm wide stall lines will be measured as 1.5 or 2 stall lines, respectively. Each square meter of pavement marking will be measured as 10 meters of stall line.

The contract price paid per meter for painted stall lines and pavement markings shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in painted stall lines and pavement markings at parking lot locations, including establishing alignment for stall lines and layout work, complete in place, as shown on the plans, as specified in the Standard Specification and these special provisions, and as directed by the Engineer.

#### **10-1.88 PAINT MEDIAN CURB**

Paint median curbs shall consist of painting raised concrete median island noses as shown on the plans, and shall conform to the provisions in Sections 84-1, "General," and 84-3, "Painted Traffic Strips and Pavement Markings," of the Standard Specifications and these special provisions.

Paint for paint median curb shall be applied in 2 coats.

Full compensation for paint median curb shall be considered as included in the various contract items of work involved, and no additional compensation will be allowed therefor.

#### **10-1.89 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.

Retroreflective pavement markers shall comply with the specific intensity provisions for reflectance after abrading the lens surface in conformance with the "Steel Wool Abrasion Procedure" specified for pavement markers placed in pavement recesses in Section 85-1.05, "Retroreflective Pavement Markers," of the Standard Specifications.

### **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.

Full compensation for watering plants outside normal working hours shall be considered as included in the contract lump sum prices paid for highway planting and plant establishment work and no additional compensation will be allowed therefor.

#### **PROGRESS INSPECTIONS**

Progress inspections will be performed by the Engineer for completed highway planting and 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.
- C. Irrigation functional tests.
- D. Before planting begins and after completion of the work specified for planting in Section 20-4.03, "Preparing Planting Areas," of the Standard Specifications.

- E. Before plant establishment work begins and after completion of the work specified for planting in Section 20-4.05, "Planting," of the Standard Specifications.
- F. At intervals of one month during the plant establishment period.

### **COST BREAK-DOWN**

The Contractor shall furnish the Engineer a cost break-down for the contract lump sum items of highway planting and irrigation system. Cost break-down tables shall be submitted to the Engineer for approval within 15 working days after the contract has been approved. Cost break-down tables shall be approved, in writing, by the Engineer before any partial payment will be made for the applicable items of highway planting and irrigation system involved.

Attention is directed to "Overhead" of these special provisions regarding compensation for time-related overhead

Cost break-downs shall be completed and furnished in the format shown in the samples of the cost break-downs 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 unit descriptions shown in the samples. The line items and quantities given in the samples are to show the manner of preparing the cost break-downs 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-downs submitted to the Engineer for approval. The Contractor shall be responsible for the accuracy of the quantities and values used in the cost break-downs submitted for approval.

The sum of the amounts for the line items of work listed in each cost break-down table for highway planting and for irrigation system work shall be equal to the contract lump sum price bid for Highway Planting and Irrigation System, respectively. Profit, except for time-related overhead, shall be included in each individual line item of work listed in a cost break-down table.

No adjustment in compensation will be made in the contract lump sum prices paid for highway planting and irrigation system due to differences between the quantities shown in the cost break-downs 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 tables 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 items of highway planting and irrigation system due to changes in line items of work ordered by the Engineer. When the total of ordered changes to line items of work increases or decreases the lump sum price bid for either Highway Planting or Irrigation System by more than 25 percent, the adjustment in compensation for the applicable lump sum item 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.

## HIGHWAY PLANTING COST BREAK-DOWN

Contract No. 07-104954

| UNIT DESCRIPTION                     | UNIT | APPROXIMATE QUANTITY | VALUE | AMOUNT |
|--------------------------------------|------|----------------------|-------|--------|
| ROADSIDE CLEARING                    | LS   | LUMP SUM             |       |        |
| MULCH (100 MM THICK)                 | M3   | 337                  |       |        |
| COMMERCIAL FERTILIZER (SLOW RELEASE) | KG   | 1488                 |       |        |
| PLANT (GROUP A)                      | EA   | 983                  |       |        |
| PLANT (GROUP B)                      | EA   | 161                  |       |        |
| PLANT (GROUP F)                      | EA   | 18240                |       |        |
| PLANT (GROUP H)                      | EA   | 93550                |       |        |
| PLANT (GROUP K)                      | EA   | 2                    |       |        |
| PLANT (GROUP U)                      | EA   | 137                  |       |        |
| PREPARE HOLE (SOIL AMENDMENT)        | EA   | 1283                 |       |        |

**TOTAL** \_\_\_\_\_

**IRRIGATION SYSTEM COST BREAK-DOWN**

**Contract No. 07-104954**

| UNIT DESCRIPTION                                      | UNIT | APPROXIMATE QUANTITY | VALUE | AMOUNT |
|---|------|----------------------|-------|--------|
| OPEN TRENCHES IN EXISTING SURFACING                   | M    | 60                   |       |        |
| CHECK, TEST AND REMOVE EXISTING IRRIGATION FACILITIES | LS   | LUMP SUM             |       |        |
| CONTROL AND NEUTRAL CONDUCTORS                        | LS   | LUMP SUM             |       |        |
| 20 MM CONTROL VALVE (MANUAL)                          | EA   | 2                    |       |        |
| 25 MM ELECTRIC REMOTE CONTROL VALVE                   | EA   | 28                   |       |        |
| 40 MM ELECTRIC REMOTE CONTROL VALVE                   | EA   | 49                   |       |        |
| 50 MM ELECTRIC REMOTE CONTROL VALVE                   | EA   | 6                    |       |        |
| 8 STATION IRRIGATION CONTROLLER (WALL MOUNTED)        | EA   | 1                    |       |        |
| 12 STATION IRRIGATION CONTROLLER (WALL MOUNTED)       | EA   | 2                    |       |        |
| 16 STATION IRRIGATION CONTROLLER (WALL MOUNTED)       | EA   | 3                    |       |        |
| 24 STATION IRRIGATION CONTROLLER (WALL MOUNTED)       | EA   | 1                    |       |        |
| 20 MM PLASTIC PIPE (PR 200)                           | M    | 4595                 |       |        |
| 25 MM PLASTIC PIPE (PR 200)                           | M    | 4072                 |       |        |
| 32 MM PLASTIC PIPE (PR 200)                           | M    | 771                  |       |        |
| 40 MM PLASTIC PIPE (PR 200)                           | M    | 676                  |       |        |
| 40 MM PLASTIC PIPE (PR 315)(SUPPLY LINE)              | M    | 400                  |       |        |
| 50 MM PLASTIC PIPE (PR 315)(SUPPLY LINE)              | M    | 1317                 |       |        |
| 65 MM PLASTIC PIPE (PR 315)(SUPPLY LINE)              | M    | 198                  |       |        |
| 50 MM PLASTIC PIPE (PR 315)(MAIN LINE)                | M    | 156                  |       |        |
| 75 MM PLASTIC PIPE (PR 315)(MAIN LINE)                | M    | 1111                 |       |        |
| SPRINKLER (TYPE A-1)                                  | EA   | 342                  |       |        |
| SPRINKLER (TYPE A-3)                                  | EA   | 31                   |       |        |
| SPRINKLER (TYPE B-2)                                  | EA   | 182                  |       |        |
| SPRINKLER (TYPE B-6)                                  | EA   | 14                   |       |        |
| SPRINKLER (TYPE C-3)                                  | EA   | 1014                 |       |        |

**IRRIGATION SYSTEM COST BREAK-DOWN (Cont'd)**

**Contract No. 07-104954**

| UNIT DESCRIPTION                 | UNIT | APPROXIMATE QUANTITY | VALUE | AMOUNT |
|----------------------------------|------|----------------------|-------|--------|
| 50 MM GATE VALVE                 | EA   | 1                    |       |        |
| 75 MM GATE VALVE                 | EA   | 3                    |       |        |
| 40 MM FILTER ASSEMBLY UNIT       | EA   | 10                   |       |        |
| 25 MM BALL VALVE                 | EA   | 4                    |       |        |
| 40 MM BALL VALVE                 | EA   | 11                   |       |        |
| 40 MM BACKFLOW PREVENTER         | EA   | 1                    |       |        |
| 50 MM BACKFLOW PREVENTER         | EA   | 1                    |       |        |
| 65 MM BACKFLOW PREVENTER         | EA   | 5                    |       |        |
| 25 MM FLUSH VALVE (GARDEN VALVE) | EA   | 1                    |       |        |

**TOTAL** \_\_\_\_\_

### **10-2.02 EXISTING HIGHWAY PLANTING**

In addition to the provisions in Section 20 of the Standard Specifications, work performed in connection with existing highway planting shall be in conformance with the provisions in Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

Replacement planting shall conform to the requirements specified under "Preservation of Property" of these special provisions.

#### **MAINTAIN EXISTING PLANTS**

Existing plants shall be maintained as directed by the Engineer. Maintaining existing plants will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

### **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 Section 15, "Existing Highway Facilities," of the Standard Specifications and 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.

#### **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 of the Standard Specifications.

When existing irrigation facilities are checked, existing backflow preventers to remain shall be tested for proper operation in conformance with the provisions in Section 20-5.03J, "Check and Test Backflow Preventers," 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.

Repairs to the existing irrigation facilities ordered by the Engineer after checking and testing the facilities, and further repairs required thereafter as ordered by the Engineer, except as otherwise provided under "Existing Highway Irrigation Facilities" of these special provisions, will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

#### **REMOVE EXISTING IRRIGATION FACILITIES**

Existing irrigation facilities to be removed, shall be removed. Facilities that are more than 150 mm 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.

Facilities to be 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.

### **10-2.04 HIGHWAY PLANTING**

The work performed in connection with highway planting shall conform to the provisions in Section 20-4, "Highway Planting," of the Standard Specifications and these special provisions.

#### **HIGHWAY PLANTING MATERIALS**

##### **Mulch (Green Material)**

Mulch shall be woody material. Woody materials shall consist of chipped, shredded or ground green materials such as shrubs, tree trimmings or clean processed wood products.

Deleterious materials such as rocks, glass, plastics, metals, clods, weeds, weed seeds, coarse objects, sticks larger than the specified particle size, salts, paint, petroleum products, pesticides or other chemical residues that would be harmful to

plant or animal life shall not exceed 0.1-percent of the mulch volume. Chipping shall include shredding, grinding or other methods used to reduce mulch materials to the specified size.

Green materials shall be processed and have reached an internal temperature of 56°C for a minimum of 15 consecutive days. During the processing period, the green material shall have been turned a minimum of 5 times.

Green material shall have a particle size conforming to the provisions for shredded bark in Section 20-2.08, "Mulch," of the Standard Specifications.

**Commercial Fertilizer (Slow Release)**

Commercial fertilizer (slow release) shall be a pelleted or granular form, shall be slow or controlled release with a nutrient release over an 8- to 12-month period, and shall fall within the following guaranteed chemical analysis range:

| Ingredient           | Percentage |
|----------------------|------------|
| Nitrogen             | 16-21      |
| Phosphoric Acid      | 6-8        |
| Water Soluble Potash | 4-10       |

**ROADSIDE CLEARING**

Prior to preparing planting areas, applying mulch, or commencing irrigation trenching operations for new planting areas, trash and debris shall be removed from the entire highway right of way within the project limits, excluding paved areas.

In addition to removing trash and debris, the project area shall be cleared as specified herein:

- A. Weeds shall be killed and removed within the entire highway right of way, within the project limits.

After the initial roadside clearing is complete, additional roadside clearing work shall be performed as necessary to maintain the areas, as specified above, in a neat appearance until the start of the plant establishment period. This work shall include the following:

- A. Trash and debris shall be removed.
- B. Rodents shall be controlled.
- C. Weed growth shall be killed before the weeds reach the seed stage of growth or exceed 150 mm in length.
- D. Weeds in plant basins, including basin walls, shall be removed by hand pulling, after the plants have been planted.

**Weed Control**

Weed control shall also conform to the following:

- A. Stolon type weeds shall be killed with glyphosate.
- B. Removed weeds shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Roadside clearing work shall not include work required to be performed as clearing and grubbing as specified in Section 16, "Clearing and Grubbing," of the Standard Specifications.

**PESTICIDES**

Pesticides used to control weeds shall conform to the provisions in Section 20-4.026, "Pesticides," of the Standard Specifications. Except as otherwise provided in these special provisions, pesticide use shall be limited to the following materials:

- Cacodylic Acid
- Diquat
- Fluazifop-butyl
- Glyphosate
- Sethoxydim
- Oxadiazon - 50 percent WP (Preemergent)
- Oryzalin (Preemergent)
- Pendimethalin (Preemergent)
- Prodiamine (Preemergent)
- Trifluralin (Preemergent)

Ammonium Sulfate  
Magnesium Chloride

Preemergents shall be applied prior to the application of mulch. Mulch applications shall be completed in these areas on the same working day. Photosensitive dye will not be required.

Glyphosate shall be used to kill stolon type weeds.

Oxadiazon shall be of the emulsifiable concentration or wettable powder type.

Prior to the application of preemergents, ground cover plants shall have been planted a minimum of 3 days and shall have been thoroughly watered.

A minimum of 100 days shall elapse between applications of preemergents.

Except for ground cover plants, preemergents shall not be applied within 450 mm of plants.

Ammonium sulfate and magnesium chloride shall be used only in areas planted to *Carpobrotus* or *Delosperma*. Ammonium sulfate and magnesium chloride shall not be applied in a manner that allows the pesticides to come in contact with trees or shrubs.

If the Contractor elects to request the use of other pesticides on this project, the request shall be submitted, in writing, to the Engineer not less than 15 days prior to the intended use of the other pesticides. Except for the pesticides listed in these special provisions, no pesticides shall be used or applied without prior written approval of the Engineer.

Pesticides shall not be applied within the limits of the plant basins. Pesticides shall not be applied in a manner that allows the pesticides to come in contact with the foliage and woody parts of the plants.

### **PREPARING PLANTING AREAS**

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

### **PREPARE HOLES**

Holes for plants shall be excavated to the minimum dimensions shown on the plans.

Backfill material for plant holes shall be a mixture of soil and other materials shown on the Plant List. Backfill material shall be thoroughly mixed and uniformly distributed throughout the entire depth of the plant hole without clods and lumps.

### **PLANTING**

Commercial fertilizer shall be applied at the time of planting and at the rates shown on the plans.

Mulch placed in areas outside of plant basins shall be spread to a uniform depth of 100 mm.

Mulch shall not be placed within one meter of the center line of earthen drainage ditches, within one meter of the edge of paved ditches, within one meter of the center line of drainage flow lines, and within one meter from the edge of curb or dike.

Attention is directed to "Irrigation Systems Functional Test" of these special provisions regarding functional tests of the irrigation systems. Planting shall not be performed in an area until the functional test has been completed for the irrigation system serving that area.

### **PLANT ESTABLISHMENT WORK**

The plant establishment period shall be Type 2 and shall be not less than 250 working days.

Attention is directed to "Relief From Maintenance and Responsibility" in these special provisions regarding relief from maintenance and protection.

Commercial fertilizer (slow release) shall be applied to trees, shrubs, vines and ground cover during the first week of May and July of each year. Commercial fertilizer shall be applied at the rates shown on the plans and shall be spread with a mechanical spreader wherever possible.

The center to center spacing of replacement plants for unsuitable ground cover plants shall be determined by the number of completed plant establishment working days at the time of replacement and the original spacing in conformance with the following:

| ORIGINAL SPACING<br>(Millimeters) | SPACING OF REPLACEMENT GROUND COVER PLANTS<br>(Millimeters) |         |                                   |
|-----------------------------------|---|---------|-----------------------------------|
|                                   | Number of Completed Plant Establishment Working Days        |         |                                   |
|                                   | 1-125   | 126-190 | 191-End of Plant<br>Establishment |
| 230                               | 230   | 150     | 150                               |
| 300                               | 300   | 230     | 150                               |
| 460                               | 460   | 300     | 230                               |
| 600                               | 600   | 460     | 300                               |
| 910                               | 910   | 600     | 460                               |

Weeds within plant basins, including basin walls and ground cover, shall be controlled by hand pulling.

Weeds within mulched and ground cover areas and outside of plant basins shall be controlled by killing.

Weeds within pavement, curbs, sidewalk, and other surfaced areas shall be controlled by killing.

Vines shall be trained onto fences.

At the option of the Contractor, plants of a larger container size than those originally specified may be used for replacement plants during the plant establishment period. The use of plants of a larger container size than those originally specified for replacement plants shall be at the Contractor's expense.

After 125 working days of the plant establishment period have been completed, replacement of plants, except for ground cover plants, shall be No. 5 size for No. one size plants; No. 15 size for No. 5 size plants; and other plant replacement plants shall be the same size as originally specified.

When ordered by the Engineer, one application of a preemergent pesticide conforming to the provisions in "Pesticides" of these special provisions, shall be applied between 40 and 50 working days prior to completion of the plant establishment period. This work will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

Previously installed filters shall be removed, cleaned and reinstalled at least 15 days prior to the completion of the plant establishment period.

The final inspection shall be performed in conformance with the provisions in Section 5-1.13, "Final Inspection," of the Standard Specifications and shall be completed a minimum of 20 working days before the estimated completion of the contract.

### 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.

Attention is directed to the provisions in "Obstructions" of these special provisions, regarding work over or adjacent to existing underground facilities. Excavation for proposed irrigation facilities shall not be started until the existing underground facilities have been located.

Pipe supply lines shall be pressure tested in conformance with the provisions in Section 20-5.03H, "Pressure Testing," of the Standard Specifications, except the pipe (supply line) on the discharge side of the control valve shall be tested by Method B as specified in Section 20-5.03H(2), "Method B," of the Standard Specifications.

Only pipeline trenches and excavation pits for supply lines being supplied from one water service point shall be open at one time. After pressure testing is complete, trenches and pits excavated for pipe supply lines, being supplied from one water service point, shall be backfilled prior to commencing excavations for pipe supply lines being supplied from another water service point.

Gate valves, 75 mm and larger in size, shall be furnished with a square lug and shall be operated by use of long shank keys. Prior to acceptance of the contract, 3 long shank keys shall be delivered to the Engineer.

### 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. Cast iron and steel covers shall be hinged with brass hinge pins for valve boxes containing valves smaller than 50 mm.

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 polyurethane with contrasting colors for the base, letters, and numbers.

## **ELECTRIC AUTOMATIC IRRIGATION COMPONENTS**

### **Irrigation Controllers**

Irrigation controllers shall be single, solid-state independent controllers conforming to the following:

- A. Irrigation controllers shall be fully automatic and shall operate a complete 14-day or longer irrigation program.
- B. A switch or switches shall be provided on the face of the control panel that will turn the irrigation controller "on" or "off" and provide for automatic or manual operation. Manual operation shall allow cycle start at the desired station and shall allow activation of a single station.
- C. The watering time of each station shall be displayed on the face of the control panel.
- D. The irrigation controller and the low voltage output source shall be protected by fuses or circuit breakers, located on the face of the controller.
- E. The irrigation controller mechanism, panel and circuit board shall be connected to the low voltage control and neutral conductors by means of plug and receptacle connectors located in the irrigation controller enclosure.
- F. Each station shall have a variable or incremental timing adjustment with a range of 12 hours to a minimum of one minute.
- G. Irrigation controllers shall be capable of a minimum of 4 program schedules.
- H. Irrigation controllers shall have an output that can energize a pump start circuit or a remote control valve (master).
- I. Irrigation controllers shall be manufactured by the same company.
- J. Where direct burial conductors are to be connected to the terminals strip, the conductors shall be connected with the proper size open-end crimp-on wire terminals. No exposed wire shall extend beyond the crimp of the terminal and the wires shall be parallel on the terminal strip.

Attention is directed to the provisions in Section 10-3, "Signals, Lighting and Electrical Systems," of these special provisions, regarding electrical power for irrigation controllers and irrigation controller enclosure cabinets.

### **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, bronze, or cast iron construction.
- B. Valves shall be angle pattern (bottom inlet) or 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.

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 1.05 mm for wire sizes 10AWG and smaller.

At the option of the Contractor, other types of splice sealing materials and methods may be used provided other materials and methods have been approved in writing by the Engineer prior to installation of the connectors.

### **REMOTE CONTROL VALVE ACTUATOR SYSTEM**

A remote control valve actuator system shall consist of a portable (hand held) receiver, a transmitter, a field carrying case, an AC power charging unit, and a receiver connector. The remote control valve actuator equipment shall be manufactured by the same manufacturer as the irrigation controller and shall be fully compatible with the irrigation controller. The receiver and transmitter shall comply with Federal Communications Commission (FCC) Rules and Regulations, Part 15, as of the date of manufacture.

The receiver connector shall be attached directly to the terminal strip gutter of each irrigation controller and continue out to the socket head mounted to the outside of the irrigation controller enclosure cabinet as shown on the plans. The connector shall have an 460-mm jacketed multi-conductor cable with a spade lug terminal and shall have a "D" subminiature connector with gold plated contacts which allows the receiver unit to be plugged directly into the connector. The connector housing shall be weather resistant thermoplastic with a hinged socket head cap with a screw to be used as a locking mechanism. The socket head cap screw shall be operated by means of a key which shall be provided by the manufacturer.

The receiver shall be plugged into the receiver connector and shall operate the stations of the irrigation controller on radio signals from the transmitter. The receiver shall receive radio signals at a minimum distance of 1.6 km. Receiver circuitry shall be protected from overload by a field replaceable fuse. The receiver shall operate on 24 V(ac).

The transmitter shall provide a 2-way FM, radio signal for a minimum range of 1.6 km to the receiver located at the irrigation controller enclosure cabinet. The transmitter shall have a digital key pad and instant actuation of the stations, master valves or pumps in random, numerical or reverse numerical sequences by pressing a single key for each function. The transmitter shall allow for remote data retrieval, manual control and programming. The transmitter shall operate a master valve or pump independently of the controller stations. The transmitter shall transmit a radio frequency of 27.250 MHz.

The power source for the portable units shall consist of a nine (9) volt replaceable battery.

The field carrying case shall allow complete and convenient operation of the unit while in the case.

Before the irrigation system functional test begins, 1 complete remote control valve actuator system, except for receiver connectors, shall be delivered to the Engineer.

Full compensation for the remote control valve actuator system shall be considered as included in the contract price paid for the various irrigation controllers involved and no additional compensation will be allowed therefor.

### **IRRIGATION SYSTEMS FUNCTIONAL TEST**

Functional tests for the irrigation controllers and associated automatic irrigation systems shall conform to the provisions in Section 20-5.027J, "Testing," of the Standard Specifications and these special provisions.

Tests shall demonstrate to the Engineer, through one complete cycle of the irrigation controllers in the automatic mode, that the associated automatic components of the irrigation systems operate properly. If automatic components of the irrigation systems fail a functional test, these components shall be repaired at the Contractor's expense and the testing repeated until satisfactory operation is obtained.

Associated automatic components shall include, but not be limited to, remote control valve actuator systems, remote control valves, and rain sensors.

Upon completion of work on an irrigation system, including correction of deficiencies and satisfactory functional tests for the systems involved, the plants to be planted in the area watered by the irrigation system may be planted provided the planting areas have been prepared as specified in these special provisions.

### **OPEN TRENCHES IN EXISTING SURFACING**

Pipe supply lines to be installed under existing asphalt concrete surfacing and portland cement concrete sidewalks, shall be installed in open trenches. Open trenches shall not be excavated across traffic lanes. Pipe supply line installations shall conform to the provisions in Section 20-5.03D, "Trenching and Backfilling," of the Standard Specifications.

For pipe supply lines 75 mm or less in diameter the trench widths in asphalt concrete surfacing shall not exceed 300 mm and in portland cement concrete sidewalks shall not exceed 450 mm. Tops of the installed pipe supply lines shall be a minimum of 300 mm below finished grade.

Where no joint exists in a monolithic concrete sidewalk, the concrete sidewalk shall be cut on a neat line at the location designated by the Engineer.

Portland cement concrete curbs shall not be cut or removed for installation of the supply lines.

The outline of areas of surfacing to be removed shall be cut with an abrasive type saw or a rock cutting excavator specifically designed for this purpose. The minimum depth of cuts in asphalt concrete and portland cement concrete shall be 50 mm. Cuts shall be neat and true with no shatter outside the removal area. Removed asphalt concrete, portland cement

concrete, and surplus excavated material shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Pipe supply lines shall be installed at the bottom of trenches and the trenches shall be backfilled with sand to a depth of 50 mm over the top of the pipes. The remainder of the trench, excluding the surfacing or pavement, shall be backfilled with material excavated from the trenches, except that rocks, broken concrete, asphalt concrete and other lumps larger than 50 mm in greatest dimension shall not be used.

The compacted thicknesses of the replacement underlying material, asphalt concrete surfacing and portland cement concrete pavement shall be not less than the thickness of the respective material removed. The finished surface of the compacted asphalt concrete and portland cement concrete shall be flush with the adjacent surface. Where asphalt concrete surfacing or portland cement concrete is placed adjacent to curbs, the finished surface of the asphalt concrete surfacing and portland cement concrete shall be flush with the top of the adjacent curb.

Asphalt concrete for replacing removed asphalt concrete facilities and surfacing shall conform to the provisions in "Asphalt Concrete" of these special provisions.

Portland cement concrete for replacing removed concrete facilities shall be minor concrete conforming to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications, except that the concrete shall contain not less than 300 kg of cement per cubic meter. Placing and finishing portland cement concrete for trench surfaces and removed facilities shall be performed by methods which will produce a concrete surface of uniform smoothness and texture equal to or better than the adjacent concrete surface.

Placing and finishing portland cement concrete to replace removed facilities and improvements shall be performed by methods which will produce a concrete surface of uniform smoothness and texture equal to or better than the adjacent concrete surface.

## **PIPE**

### **Steel Pipe**

Galvanized steel pipe supply lines installed between water meters and backflow preventer assemblies shall be installed not less than 450 mm below finished grade, measured to the top of the 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 shall have solvent cemented type joints. Primers shall be used on the solvent cemented type joints.

Plastic pipe supply lines (main) shall have a minimum cover of 0.45 m.

Plastic pipe supply lines downstream from the remote control valves for Type C sprinklers shall have a minimum cover of 150 mm.

Fittings for plastic pipe supply lines with a pressure rating (PR) of 315 shall be Schedule 80.

## **WATER METER**

Water meters for the irrigation systems will be furnished and installed by the serving utility at the locations shown on the plans.

Upon receipt of a written request from the Contractor, the Engineer will make arrangements with the serving utility to install the water meters. The State will pay the costs and fees charged by the serving utility for the installations.

## **RELOCATE WATER METER**

Water meters to be relocated for the irrigation systems will be removed from locations as shown on the plans and reinstalled by the serving utility at the locations shown on the plans.

The Contractor shall make the arrangements and pay the costs and fees required by the serving utility.

The City of Camarillo Water District has established a fee of \$1000 for relocating a water meter. If, at the time of relocation, this fee has been changed, the State will take a credit for the reduction in the fee, or the State will pay the difference for the increase in the fee. The credit or payment will be taken or paid on the first monthly progress payment made after the meter is relocated. The Contractor shall furnish the Engineer with a copy of the invoice for the relocation fee.

Attention is directed to Section 20-4.06, "Watering," of the Standard Specifications. The Contractor shall make the arrangements for furnishing and applying water until the water meters have been relocated by the serving utility.

### **BACKFLOW PREVENTER ASSEMBLIES**

Backflow preventers shall conform to the provisions in Section 20-2.25, "Backflow Preventers," of the Standard Specifications and these special provisions.

Pressure loss through the backflow preventers shall not exceed the following:

| BACKFLOW PREVENTER SIZE<br>(millimeters) | FLOW RATE<br>(Liters per minute) | PRESSURE LOSS<br>(kPa) |
|--|----------------------------------|------------------------|
| 40                                       | 228                              | 68                     |
| 50                                       | 378                              | 41                     |
| 65                                       | 378                              | 75                     |

Backflow preventer assemblies shall be painted with a minimum of 2 applications of a commercial quality enamel paint. The color of the paint shall be light brown.

### **TESTING BACKFLOW PREVENTERS**

New backflow preventers installed by the Contractor shall be tested for proper operation in conformance with the provisions in Section 20-5.03J, "Check and Test Backflow Preventers," of the Standard Specifications and these special provisions.

Tests for new backflow preventers shall be satisfactorily completed after installation of the backflow preventer assembly and before operation of the irrigation systems.

New backflow preventers shall be retested one year after the satisfactory completion of the previous test or 10 days prior to completion of the plant establishment period, whichever occurs first.

### **SPRINKLERS**

Sprinklers shall conform to the type, pattern, material, and operating characteristics listed in the "Sprinkler Schedule" shown on the plans.

### **FLUSH VALVES**

Flush valves shall consist of a garden valve and riser. Flush valves shall be installed at the ends of main lines as shown on the plans.

Garden valves, as specified herein, shall be furnished with a handle for manual operation.

### **BALL VALVES**

Ball valves shall be polyvinyl chloride (PVC) and shall be capable of withstanding a cold-water working pressure of 1034 Kilopascals (Kpa). The pressure seats shall be teflon coated. The valve shall have threaded unions.

Full compensation for the different sizes of ball valves shall be considered as included in the contract lump sum price paid for Irrigation System and no additional compensation will be allowed therefor.

### **FILTER ASSEMBLY UNIT**

A filter assembly unit shall consist of a filter housing, a reusable filter cartridge, a ball valve, fittings, pipe, and valve box as shown on the plans.

Filter assembly units shall withstand a cold water working pressure of 1034 kPa.

Pressure loss through the filter assembly units shall not exceed the following:

| FILTER ELEMENT SIZE<br>(Millimeters) | MAX FLOW RATE<br>(Liters Per Minute) | PRESSURE LOSS AT MAX FLOW<br>(kPa) |
|--------------------------------------|--------------------------------------|------------------------------------|
| 40                                   | 132                                  | 16                                 |

Filter housings shall be manufactured of reinforced polypropylene plastic.

Filter cartridges shall be threaded plastic rings attached to one another to produce a reusable cylindrical form filter. Filters shall be capable of 130 µm size mesh filtration.

### **FINAL IRRIGATION SYSTEM CHECK**

A final check of existing and new irrigation facilities shall be performed not more than 20 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 lump sum price paid for plant establishment work and no additional compensation will be allowed therefor.

### **SECTION 10-3. SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS**

#### **10-3.01 DESCRIPTION**

Signals and lighting modify lighting and sign illumination, pedestrian overhead lighting, ramp metering system, irrigation controller enclosure cabinet, electric service (irrigation), automatic vehicle classification (AVC) station, communication conduit and innerduct shall conform to the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and these special provisions.

Lighting equipment is included in the following structures:

- A. Camarillo Overhead Separation (Bridge No. 52-0016)
- B. Arneill Road Overhead (Bridge No. 52-0447)
- C. Camarillo Pedestrian Overhead (Bridge No. 52-0448)

Communication conduit is included in the following structure:

Arneill Road Overhead (Bridge No. 52-0447)

Traffic signal work shall be performed at the following locations:

- A. Modify Location 3 - Lewis Road at Daily Drive (Temporary) (Stage 1, 2, 3 and 4)
- B. Modify Location 4 - Lewis Road at Ventura Boulevard (Temporary) (Stage 1, 2, 3 and 4)
- C. City-Location 1 - Arneill Road at Daily Drive
- D. City-Location 2 - Arneill Road at Ventura Boulevard
- E. Location 1 - Route 101 northbound on-off ramp at Daily Drive
- F. Location 2 - Route 101 southbound on-off ramp at Ventura Boulevard

#### **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.

#### **10-3.03 MAINTAINING EXISTING AND TEMPORARY ELECTRICAL SYSTEMS**

Traffic signal system shutdowns shall be limited to periods between the hours of 9:00 a.m. and 3:00 p.m.

Lighting system shall be shut down from the time the modification is started until 4:00 p.m. on the following Friday, except that the normal lighting schedule shall be maintained on weekends and on designated holidays as defined under "Maintaining Traffic" of these special provisions. No two adjacent lighting circuits shall be shut down at the same time.

The Contractor shall obtain written approval from the Engineer not less than 72 hours prior to any testing, disconnection or disruption of service from the existing lighting and sign illumination system.

### 10-3.04 STANDARDS, STEEL PEDESTALS AND POSTS

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.

The sign panels will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

Type 1 standards shall be assembled and set with the handhole on the downstream side of the pole in relation to traffic or as shown on the plans.

### 10-3.05 CONDUIT

All conduit to be installed underground shall be Type 1. The conduit in a foundation and between a foundation and the nearest pull box shall be Type 1.

When a standard coupling cannot be used for joining Type 1 conduit, a UL listed threaded union coupling conforming to the provisions in Section 86-2.05C, "Installation," of the Standard Specifications, shall be used.

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.

### COMMUNICATION CONDUIT

Communication conduit shall conform to the provisions specified above under "Conduit" and the following.

Communication conduit shall enter communication pull boxes through knockouts. Communication conduits entering the ends of these communication pull boxes shall be vertically and horizontally aligned with the communication conduits at the opposite end of the communication pull box. The space around communication conduits through end walls of communication pull boxes shall be filled with Portland cement mortar conforming to the provisions in Section 51-1.135, "Mortar," of the Standard Specifications. In no case shall a communication conduit body or communication pull box be used in lieu of a specified bend to change the direction of the communication conduit run, except where specified.

No bends shall be placed in a section of communication conduit in excess of those indicated in the plans without the approval of the Engineer. The total degrees of bending in a section of conduit between communication pull boxes shall not exceed a total of 180 degrees, except where specified otherwise.

Changes in indicated communication conduit bends may be made in order to suit field conditions, as long as the change reduces the degree of the bend or increases the radius of the bend. In no case shall the angle of the bend be increased without the approval of the Engineer.

Minimum bending radius for Size 103 communication conduit shall be 1220 mm. Bends of greater than 22 degrees shall be factory bends with any necessary adapters.

Deflections from the indicated communication conduit routing to avoid obstructions shall not exceed 83.3 mm/m. Communication conduit from the typical trench sections shall not deflect by more than 83.3 mm/m from the alignment preceding or following communication pull boxes.

Where edge drains are in the path of communication conduit routing the Contractor must first locate the edge drains and install the communication conduit maintaining a minimum depth. In the event an edge drain is damaged by the Contractor's work, the Contractor will be responsible for a full repair cost.

A flat, woven, lubricated, polyester tape with a minimum tensile strength of 80 k N minimum shall be placed in all communication conduits. At least four feet of tape shall extend beyond the termination. At least 1.2 m of tape shall be extended beyond termination

When fiberglass communication conduit is placed in a trench after the bedding material is placed and the conduit is installed, the trench shall be backfilled with slurry cement backfill conforming to the requirements in Section 19-3.062 of the Standard Specification, except the maximum size of aggregate shall be 10 mm (pea gravel) containing not less than 250 kg of Portland cement per cubic meter and commercial quality concrete sand, to not less than 300 mm above the conduit before additional backfill material is placed, and the backfilling over or placing any material over slurry cement backfill shall not commence until 12 hours after the slurry cement backfill has been placed.

Trench excavation and backfill for communication conduit shall follow the stage, as shown on the plans.

Communication conduits located within the same trench shall have not less than 53 mm separation.

Attention is directed to "Aerially Deposited Lead," of these special provisions.

Communication conduit trenches shall be less than or equal to 200 mm wide.

After communication conduit have been installed, all communication conduits shall be blown out with compressed air until all foreign material is removed. After innerduct have been installed, the ends of communication conduits terminating in communication pull boxes shall be sealed with an approved sealing compound.

Communication conduit shall not be installed by trenching along the pavement of freeway lanes except in those section of the highway where there is insufficient clearance to locate a longitudinal trench off the traveled way, or where obstructions off the traveled way would necessitate bends in the conduits in excess of those allowed.

Trenching method is not allowed across freeway lanes, connectors and ramps.

**Colored Cement Backfill:** The slurry cement backfill for the installation of communication conduits that will contain fiber optic cable shall be a medium to dark, red or orange color to clearly distinguish the concrete backfill from other concrete and soil. The concrete shall be pigmented by the addition of commercial quality cement pigment to the concrete mix. The red or orange concrete pigment shall be LM Scofield Company; Orange Chromix Colorant; Davis Colors; or equal.

For trenches in pavement areas, only the top 100 mm of slurry cement backfill will be required to be pigmented concrete. At the option of the Contractor, the full depth may have the pigment.

Full compensation for furnishing and incorporating the cement pigment to achieve the color required shall be considered as included in the contract price paid per meter for the various sizes and types of two size 103 communication conduit (trench in pavement) involved and no separate payment will be made therefor.

#### **COMMUNICATION CONDUIT (BRIDGE)**

At the locations shown on the plans, where communication conduit is to be installed on bridges, fiberglass conduit shall be used and shall conform to the details shown on the plans, and to these special provisions. Communication conduit (bridge) shall include excavation, installation of the fiberglass conduit, and placing sand and slurry cement backfill.

Excavation and slurry cement backfill shall conform to Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications. The slurry cement backfill shall reach initial set prior to placing of reinforced concrete for the approach slab.

**MEASUREMENT AND PAYMENT.-** Communication conduit (bridge) will be measured by the meter.

#### **HANGERS AND CONCRETE SUPPORTS (BRIDGE)**

Pipe hanger assemblies shall consist of a concrete clevis plate or embedded steel welded linked eye rods, an adjustable steel yoke, a cast iron pipe roller, a steel roller rod and hex nuts. Parts shall be galvanized. The pipe hanger assembly shall be suitable for the type and size of pipe installed and shall be as shown on the plans.

Concrete pipe supports shall consist of a precast concrete pipe cradle, galvanized steel pipe clamp, 2 anchor bolts and, where shown on the plans, a stainless steel pipe protection shield.

Concrete pipe supports shall conform to the dimensions shown on the plans and shall be constructed of commercial quality concrete with a cement content not less than 350 kg of Portland cement per cubic meter and commercial quality wire mesh. The concrete for pipe supports and pipe stops shall be moist cured for not less than 3 days.

Epoxy adhesive shall conform to the provisions in Section 95-1, "General," of the Standard Specifications and at the option of the Contractor, shall conform to the provisions in Section 95-2.03, "Epoxy Resin Adhesive for Bonding New Concrete to Old Concrete," or in Section 95-2.04, "Rapid Set Epoxy Adhesive for Pavement Markers," or in Section 95-2.05, "Standard Set Epoxy Adhesive for Pavement Markers," of the Standard Specifications.

**PAYMENT.-**Full compensation for furnishing and installing mechanical expansion bolt anchors, steel hangers, steel brackets and other fittings, concrete supports, pipe wrapping tape and epoxy-adhesives shall be considered as included in the contract price paid per meter of communication conduit (suspended from bridge) involved and no additional compensation will be allowed therefor.

#### **FIBERGLASS CONDUIT**

**GENERAL:** Fiberglass conduit and components shall comply with the specifications in ANSI/NEMA Standards Publication TC-14A or TC-14B. Fiberglass conduit components shall be free of defects including delaminations, foreign inclusions, etc. Fiberglass conduit components shall be nominally uniform (as commercially practical) in color, density, and physical properties. Fiberglass conduit shall be straight and the ends shall be cut square and true.

**CONDUIT SIZES:** Fiberglass conduit shall be supplied in 6 m minimum lengths.

**SYSTEM COMPONENTS:** Fiberglass conduit components shall include compatible fittings, adapters, expansion joints, and factory bends at nominal radii of 0.6 m, 1 m and 1.3 m for size 53, 78 and 103 conduits, respectively.

**MATERIAL:** Fiberglass conduit system components shall be produced from heat cured, corrosion resistant epoxy resin and continuous fiberglass rovings. Materials shall be manufactured for use at temperatures from -40°C to 110°C). Fiberglass

conduit components shall be manufactured using a homogeneously dispersed UV inhibitor. When exposed to direct diurnal sunlight, the UV inhibitor shall prevent the degradation of all physical material properties, except for surface cosmetic appearance. Materials shall contain no halogens above trace levels and shall be fire resistant.

**JOINING METHOD:** Joints shall be water tight and withstand a minimum 4450 N of pullout tension.

**STIFFNESS:** Under a load of 1.3 kN/m of conduit, the deflection of the inside diameter shall not exceed 5 percent.

**IMPACT RESISTANCE:** The minimum impact resistance values for the fiberglass conduit shall be as follows when measured as described in ASTM Designation: D2444-70, using a 9 kg.tup "B" with a 50 mm radius nose:

|                  |         |
|------------------|---------|
| Size 53 conduit  | 40 N/m  |
| Size 78 conduit  | 68 N/m  |
| Size 103 conduit | 108 N/m |

**10-3.06 EXPANSION-DEFLECTION FITTINGS**

Expansion-deflection fittings shall be installed where the communication conduit crosses any expansion joint in the structure. Each expansion-deflection fitting for metal communication conduit shall be provided with a copper bonding jumper having the ampacity required by the Code.

Each expansion-deflection fitting for expansion joints of 38-mm movement rating shall be watertight and shall consist of a molded neoprene sleeve, a bonding jumper and 2 silicon bronze or zinc-plated iron hums. Each fitting shall permit a minimum of 19 mm expansion and contraction and a minimum of 19 mm lateral deflection.

Details of expansion-deflection fittings for joints of movement rating of more than 38 mm shall be as shown on the plans and specified in the special provisions.

**10-3.07 SIZE 32 INNERDUCT**

Innerduct shall be installed to provide protection for the fiber optic cable. A separate innerduct shall be installed for each fiber optic cable along the communication conduit as shown on the plans.

All innerduct shall be 32 mm smooth, ribbed or corrugated high tensile polyethylene duct. Innerduct shall have the following characteristics:

- Inner diameter greater than or equal to 32 mm, nominal.
- Environmental stress crack resistance in excess of 2000 hours at -100° C., no failures.
- Cold impact resistance to -76°C not brittle until -100°C.
- Minimum tensile strength of 2670 N for finished product.
- Minimum crush strength of 2900 N.
- Coefficient of friction shall be less than 0.4 unlubricated on nonmetallic conduit and with common polyethylene cable jackets.

Different innerducts within the same conduit shall be different colors, and consistent throughout the project. The exterior of the innerduct shall be marked with sequential measurement markings each meter.

Innerduct shall be installed using the manufacturer’s recommended practices Innerduct shall be installed using a cable pulling lubricant recommended by the innerduct manufacturer and a non-abrasive pull tape conforming to the provisions in "Communication Conduit" of these special provisions. If innerduct is to be installed with adjacent cables in the same conduit, the innerduct shall be installed in one operation. Innerduct shall be installed in continuous runs between communication pull boxes without splices or joints.

All ends shall be smoothed to prevent scraping of the cable. A dynamometer shall be used to record installation tension and a tension limiting device shall be used to prevent exceeding the maximum pulling tension during installation. A fusable link shall be used to limit the pulling tension. One link shall be placed in series with every element rated for less than the maximum pulling tension of that element. The innerduct shall not be stressed beyond the minimum bending radius allowed by either the innerduct manufacturer. The maximum pulling tension shall be recorded for each innerduct run.

Innerduct shall be blown out with compressed air until all foreign material is removed. After cables have been installed, the ends of innerducts shall be sealed with an approved type of sealing compound.

**10-3.08 PULL BOXES**

Grout shall not be placed in the bottom of pull boxes.

## COMMUNICATION PULL BOXES

Communication pull boxes and covers shall have a vertical proof-load strength of 111kN. The 111 kN load shall be distributed through a 229-mm x 229-mm x 51-mm steel plate according to Federal Specification RR-F-621e. This load shall be placed anywhere on the box and cover for a period of one minute without causing any cracks or permanent deformations.

The communication pull boxes shall be reinforced with a galvanized Z-bar welded frame and cover similar to that shown on the plans for No. 6(T) pull boxes. Frames shall be anchored to the boxes by means of 6-mm x 57-mm long concrete anchors. Six concrete anchors shall be provided for each communication pull box, one placed in each corner and one placed near the middle of each of the longer sides.

Hold down screws shall be 9-mm hex flange cap screws of Type 316 stainless steel. The nut shall be zinc plated carbon steel and shall be made vibration resistant with a wedge ramp at the root of the thread. The nut shall be spot welded to the underside of, or fabricated with, the galvanized Z-bar pull box frame.

Steel covers shall be countersunk approximately 6-mm to accommodate the bolt head. The bolt head shall not extend more than 3-mm above the top of the cover when tightened down. A 6 mm tapped hole and brass bonding screw shall be provided.

Communication pull boxes shall have "CALTRANS COMMUNICATION" marking on the steel cover.

The opening of communication pull boxes shall have the following dimensions.

| Pull Box Type | Width<br>(±25 mm) | Length<br>(±25 mm) |
|---------------|-------------------|--------------------|
| Communication | 432 mm            | 762 mm             |

Concrete placed around and under communication pull boxes as shown on the plans shall contain a minimum of 325 kg of cement per cubic meter.

After the installation of communication pull boxes, the steel covers shall be installed and kept bolted down during periods when work is not actively in progress at the pull box. When placing the steel cover for the final time, the cover and the Z-bar frame shall be cleaned of all debris and securely tightened down.

Communication pull boxes shown on the plans in the shoulder are shown for general location only. The exact location shall be outside the paved shoulder and shall be determined by the Engineer.

Communication pull boxes will be measured as units determined from actual count in place. Additional communication pull boxes shall not be installed without the Engineer written approval.

### 10-3.09 CONDUCTORS AND WIRING

Splices shall be insulated by "Method B".

The minimum insulation thickness, at any point, for Type USE, RHH or RHW wire shall be 1.0 mm for conductor sizes No. 14 to No. 10, inclusive, and 1.3 mm for No. 8 to No. 2, inclusive. The minimum insulation thickness, at any point, for Type THW and TW wires shall be 0.69 mm for conductor sizes No. 14 to No. 10, inclusive, 1.02 mm for No. 8, and 1.37 mm for No. 6 to No. 2, inclusive.

#### SIGNAL INTERCONNECT CABLE.

Signal Interconnect Cable (SIC) shall be the 12-pair type.

#### TELEPHONE CABLE

Telephone cable shall consist of four No. 18 AWG conductors with braided copper shield and outer jacket. Each conductor shall have a minimum of 16 tinned copper strands. Conductor insulation shall be rubber or thermoplastic rated for 600 V. Insulation of the four conductors shall be color coded with one each of the following colors: Black, white, red and green. Jacket shall be neoprene, polyethylene, polyvinyl chloride with a nominal thickness of 0.89-mm.

Approximately 1-m of telephone cable shall be neatly coiled in the telephone demarcation box. The telephone cable shall be run from controller cabinet to telephone demarcation box without splices, except in runs greater than 30-m in length, where splices will be permitted at 150-m intervals.

### 10-3.10 SERVICE

Continuous welding of exterior seams in service equipment enclosures is not required.

Each service shall be provided with up to 2 main circuit breakers which shall disconnect ungrounded service entrance conductors. Where the "Main" circuit breaker consists of 2 circuit breakers as shown on the plans or required in the special provisions, each of the circuit breakers shall have a minimum interrupting capacity of 40 000 A, rms.

An engraved phenolic nameplate shall be installed with stainless steel rivets on the exterior of the front panel indicating the identification number and the service address of the service equipment enclosure. Character size shall be 5-mm.

Service conduits between the utility owned power poles and the service equipment enclosures shall not be installed until service locations have been verified by the serving utility.

### **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.

Irrigation Controller (IC) A, B, D, E, F, AA and BB : Electric service (irrigation) shall be a metered 120/240 V(ac), single-phase service in a Type III service equipment enclosure.

The contract lump sum price paid for electric service (irrigation) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing electric service (irrigation) for irrigation controllers, complete in place, including numbering electrical equipment, conductors, conduit and pull boxes to the pull box adjacent to irrigation controller enclosure cabinets and irrigation controllers, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

#### **10-3.11 NUMBERING ELECTRICAL EQUIPMENT**

The Contractor shall place the numbers and edge sealer on the equipment as directed by the Engineer.

Where new numbers are to be placed on existing or relocated equipment, the existing numbers shall be removed.

Reflective numbers shall be applied to a clean surface. Only the edges of the numbers shall be treated with edge sealer.

Five digit, self-adhesive equipment numbers shall be placed for all electroliers, soffit lighting, sign lighting, and service pedestals. On service pedestals, the numbers shall be placed on the front door. On electroliers, the numbers shall be placed as shown on the plans.

Numbers for illuminated signs mounted on overcrossings or for soffit luminaires shall be placed on the nearest adjacent bent or abutment at approximately the same station as the sign or soffit luminaire. Where no bent or abutment exists near the sign or soffit luminaire, the number shall be placed on the underside of the structure adjacent to the sign or soffit luminaire. Arrangement of numbers shall be the same as those used for electroliers.

#### **10-3.12 STATE-FURNISHED CONTROLLER ASSEMBLIES**

The Model 170 controller assemblies, including controller unit, completely wired controller cabinet and inductive loop detector sensor units, but without anchor bolts, will be State-furnished as provided under "Materials" of these special provisions.

The Contractor shall construct each controller cabinet foundation as shown on the plans for Model 332 and 334 cabinets (including furnishing and installing anchor bolts), shall install the controller cabinet on the foundation, and shall make field wiring connections to the terminal blocks in the controller cabinet.

A listing of field conductor terminations, in each State-furnished controller cabinet, will be furnished free of charge to the Contractor at the site of the work.

State forces will maintain controller assemblies. The Contractor's responsibility for controller assemblies shall be limited to conforming to the provisions in Section 6-1.02, "State-Furnished Materials," of the Standard Specifications.

#### **10-3.13 IRRIGATION CONTROLLER ENCLOSURE CABINET**

Irrigation controller enclosure cabinets (CEC) shall be constructed and the equipment within the cabinets shall be installed in conformance with the details shown on the plans, the provisions in the Standard Specifications, and these special provisions.

Irrigation controller enclosure cabinet shall have the following features:

1. A closed cell neoprene gasket around door.
2. A stainless steel full length door hinge.
3. Welded construction fabricated from 12-gage Type 304 stainless steel.
4. Louver ventilation.
5. Padlock shield.
6. Size shall be 890-mm (H) x 585-mm (W) x 280-mm (D) for single enclosure.
7. The controller enclosure cabinet shall be bolted to the concrete foundation as recommended by the manufacturer.

A padlock with a removable core mortise cam cylinder shall be installed with the lock core for the irrigation controller enclosure cabinet. The cam cylinder shall be capable of receiving the State's lock core. The State's lock core is a "Best" No. 21B72 construction core. Keys shall be removable from the locks in the locked position only. Two keys for each door lock shall be delivered to the Engineer.

The padlock shackle shall be 19-mm in height and 8-mm in diameter and shall have a 7-pin housing. Padlock shall be corrosion resistant and have a dust cover.

Irrigation controller enclosure cabinet doors shall not be furnished with integral door locks. Padlocks will be State-furnished as provided under "Materials" of these special provisions.

The plywood mounting panel shall be 19-mm exterior AC grade veneer plywood. The panel shall be painted with one application of an exterior, latex based, wood primer and 2 applications of an exterior, vinyl acrylic enamel, white in color. The plywood panel shall be painted on all sides and edges prior to installation of the panel in the cabinet and equipment on the panel.

Inside of the doors shall have provisions for storage of the irrigation plans.

Duplex convenience receptacles shall have ground-fault circuit interruption as defined by the Code. Circuit interruption shall occur on 6 mA of ground-fault current and shall not occur on less than 4 mA. Receptacles shall be installed in a weatherproof housing with rainproof lift covers.

A solid-state automatic shut-off rain sensor units shall be installed for the irrigation controller enclosure cabinets. The rain sensor units shall automatically interrupt the master remote control valves when approximately 3 mm of rain has fallen. The irrigation system shall automatically be enabled again when the accumulated rainfall evaporates from the rain sensor unit collection cup. Rain sensor units shall be rated 24 V (ac) to 30 V (ac). Static charge protection shall be included to protect against lightning damage.

All equipment, except for field wiring, shall be installed in the irrigation controller enclosure cabinet in a shop prior to field installation.

Irrigation controller enclosure cabinets will be measured by the unit as determined from actual count in place.

The contract lump sum price paid for irrigation controller enclosure cabinet shall include full compensation for furnishing all labor, materials, tools, equipment (including rain sensor units), and incidentals, and for doing all the work involved in fabricating and installing irrigation controller enclosure cabinets, complete in place, including constructing foundations, pull boxes, pads and conduits to pull box adjacent to cabinets, and installing equipment within the cabinets, except controllers, as shown on the plans, as specified in the Standard Specifications.

#### **10-3.14 VEHICLE SIGNAL FACES AND SIGNAL HEADS**

Type SV-1-T mountings with 5 sections mountings shall be bolted to the standard through the upper pipe fitting in the same manner shown for bolting the terminal compartment.

#### **10-3.15 LIGHT EMITTING DIODE SIGNAL MODULE**

Traffic signal faces with 300-mm sections, 200-mm sections or arrow sections shall use light emitting diode (LED) signal modules as the light source in conformance with these special provisions. Incandescent lamps in existing traffic signal faces shall be replaced with LED signal modules as shown on the plans and in conformance with these special provisions.

#### **GENERAL**

Type 1 LED signal modules shall be installed in the doorframes of standard traffic signal housings. Lamp sockets, reflectors, reflector holders and lenses used with incandescent lamps shall not be used when Type 1 LED signal modules are installed.

LED signal modules, including green, yellow, red, circular balls and arrow indications shall be from the same manufacturer, and each size shall be the same model.

Type 1 LED signal modules shall be sealed units with two color-coded conductors for power connection, a printed circuit board, a power supply, a lens and a gasket. LED signal modules shall be weatherproof after installation and connection. Circuit boards and power supplies shall be contained inside Type 1 LED signal modules. Circuit boards shall conform to the requirements in Chapter 1, Section 6 of the "Transportation Electrical Equipment Specifications," (TEES) published by the Department.

Conductors for Type 1 LED signal modules shall be one meter in length with quick disconnect terminals attached, and shall conform to the provisions in Section 86-4.01C, "Electrical Components," of the Standard Specifications.

Lenses of Type 1 LED signal modules shall be integral to the units, shall be convex with a smooth outer surface and shall be made of ultraviolet (UV) stabilized plastic or glass. The lenses shall be capable of withstanding ultraviolet exposure from direct sunlight for a minimum period of 36 months without exhibiting evidence of deterioration.

Type 1 LED signal modules shall be sealed in doorframes with one-piece ethylene propylene rubber (EPDM) gaskets.

LEDs used in signal modules shall be of Aluminum Indium Gallium Phosphide (AlInGaP) technology for red and yellow indications and of Gallium Nitride (GaN) technology for green indications. LEDs shall be the ultra bright type rated for 100,000 hours of continuous operation from -40°C to +74°C.

Individual LEDs shall be wired so that a total failure of one LED will result in the loss of not more than 5 percent of the signal module light output. Failure of an individual LED in a string shall not result in the loss of the entire string or any other indication.

Maximum power consumption requirements for LED signal modules shall be as follows:

| LED Signal Module | Power Consumption in Watts |      |        |      |       |      |
|-------------------|----------------------------|------|--------|------|-------|------|
|                   | Red                        |      | Yellow |      | Green |      |
|                   | 25°C                       | 74°C | 25°C   | 74°C | 25°C  | 74°C |
| 300 mm circular   | 11                         | 17   | 22     | 25   | 12    | 12   |
| 200 mm circular   | 8                          | 13   | 13     | 16   | 10    | 10   |
| 300 mm arrow      | 9                          | 12   | 10     | 12   | 13    | 13   |

Installation of LED signal modules shall only require the removal of the optical unit components such as the lens, lamp module, gaskets and reflector. LED signal modules shall be weather tight, fit securely to the housing and connect directly to electrical wiring.

Arrow modules shall conform to the requirements in Section 9.01 of the Institute of Transportation Engineers (ITE) Publication: Equipment and Materials Standards, "Vehicle Traffic Control Signal Heads" for arrow indications. LEDs shall be spread evenly across the illuminated portion of the arrow area.

#### **LED Signal Module Lens**

The LED signal module shall be capable of replacing the optical unit. The lens may be tinted or may use transparent film or materials with similar characteristics to enhance "ON/OFF" contrasts. The use of tinting or other materials to enhance "ON/OFF" contrast shall not affect chromaticity and shall be uniform across the face of the lens.

If a polymeric lens is used, a surface coating or chemical surface treatment shall be used to provide front surface abrasion resistance.

#### **Environmental Requirements**

LED signal modules shall be rated for use in the operating temperature range of -40°C to +74°C.

LED signal modules shall be protected against dust and moisture intrusion in conformance with the requirements in NEMA Standard 250-1991 for Type 4 enclosures to protect internal components.

#### **Construction**

LED signal modules shall be single, self-contained devices, not requiring on-site assembly for installation into existing traffic signal housings. The power supply for LED signal modules shall be integral to the module.

Assembly and manufacturing processes for LED signal modules shall be designed to assure all internal components will be adequately supported to withstand mechanical shock and vibration from high winds and other sources.

#### **Materials**

Materials used for lenses and LED signal modules shall conform to the requirements in ASTM Specifications for the materials.

Enclosures containing the power supply or electronic components of LED signal modules shall be made of UL94VO flame-retardant materials. Lenses of LED signal modules are excluded from this requirement.

#### **Module Identification**

LED signal modules shall have the manufacturer's name, trademark, model number, serial number, lot number, month and year of manufacture, and required operating characteristics permanently marked on the back of the module. Required operating characteristics shall include rated voltage, power consumption and volt-ampere (VA).

Type 1 LED signal modules shall have prominent and permanent vertical markings for correct indexing and orientation within the signal housings. Markings shall consist of an up arrow or the word "UP" or "TOP."

## PHOTOMETRIC REQUIREMENTS

Initial luminous intensity values for LED signal modules, operating at 25°C, shall meet or exceed the following minimum values:

| Circular Indications (in cd) |        |        |       |        |        |       |
|------------------------------|--------|--------|-------|--------|--------|-------|
| Angle (v,h)                  | 200 mm |        |       | 300 mm |        |       |
|                              | Red    | Yellow | Green | Red    | Yellow | Green |
| 2.5, ±2.5                    | 157    | 314    | 314   | 399    | 798    | 798   |
| 2.5, ±7.5                    | 114    | 228    | 228   | 295    | 589    | 589   |
| 2.5, ±12.5                   | 67     | 133    | 133   | 166    | 333    | 333   |
| 2.5, ±17.5                   | 29     | 57     | 57    | 90     | 181    | 181   |
| 7.5, ±2.5                    | 119    | 238    | 238   | 266    | 532    | 532   |
| 7.5, ±7.5                    | 105    | 209    | 209   | 238    | 475    | 475   |
| 7.5, ±12.5                   | 76     | 152    | 152   | 171    | 342    | 342   |
| 7.5, ±17.5                   | 48     | 95     | 95    | 105    | 209    | 209   |
| 7.5, ±22.5                   | 21     | 43     | 43    | 45     | 90     | 90    |
| 7.5, ±27.5                   | 12     | 24     | 24    | 19     | 38     | 38    |
| 12.5, ±2.5                   | 43     | 86     | 86    | 59     | 119    | 119   |
| 12.5, ±7.5                   | 38     | 76     | 76    | 57     | 114    | 114   |
| 12.5, ±12.5                  | 33     | 67     | 67    | 52     | 105    | 105   |
| 12.5, ±17.5                  | 24     | 48     | 48    | 40     | 81     | 81    |
| 12.5, ±22.5                  | 14     | 29     | 29    | 26     | 52     | 52    |
| 12.5, ±27.5                  | 10     | 19     | 19    | 19     | 38     | 38    |
| 17.5, ±2.5                   | 19     | 38     | 38    | 26     | 52     | 52    |
| 17.5, ±7.5                   | 17     | 33     | 33    | 26     | 52     | 52    |
| 17.5, ±12.5                  | 12     | 24     | 24    | 26     | 52     | 52    |
| 17.5, ±17.5                  | 10     | 19     | 19    | 26     | 52     | 52    |
| 17.5, ±22.5                  | 7      | 14     | 14    | 24     | 48     | 48    |
| 17.5, ±27.5                  | 5      | 10     | 10    | 19     | 38     | 38    |

| Arrow Indications (in cd/m <sup>2</sup> ) |      |        |        |
|---|------|--------|--------|
|   | Red  | Yellow | Green  |
| Arrow Indication                          | 5500 | 11 000 | 11 000 |

LED signal modules shall meet or exceed the following minimum illumination values for a minimum period of 36 months, based on normal use in traffic signal operation over an operating temperature range of -40°C to +74°C. In addition, yellow LED signal modules shall meet or exceed the following minimum illumination values for a minimum period of 36 months, based on normal use in traffic signal operation at 25°C:

| Angle (v,h) | 200 mm |        |       | 300 mm |        |       |
|-------------|--------|--------|-------|--------|--------|-------|
|             | Red    | Yellow | Green | Red    | Yellow | Green |
| 2.5, ±2.5   | 133    | 267    | 267   | 339    | 678    | 678   |
| 2.5, ±7.5   | 97     | 194    | 194   | 251    | 501    | 501   |
| 2.5, ±12.5  | 57     | 113    | 113   | 141    | 283    | 283   |
| 2.5, ±17.5  | 25     | 48     | 48    | 77     | 154    | 154   |
| 7.5, ±2.5   | 101    | 202    | 202   | 226    | 452    | 452   |
| 7.5, ±7.5   | 89     | 178    | 178   | 202    | 404    | 404   |
| 7.5, ±12.5  | 65     | 129    | 129   | 145    | 291    | 291   |
| 7.5, ±17.5  | 41     | 81     | 81    | 89     | 178    | 178   |
| 7.5, ±22.5  | 18     | 37     | 37    | 38     | 77     | 77    |
| 7.5, ±27.5  | 10     | 20     | 20    | 16     | 32     | 32    |
| 12.5, ±2.5  | 37     | 73     | 73    | 50     | 101    | 101   |
| 12.5, ±7.5  | 32     | 65     | 65    | 48     | 97     | 97    |
| 12.5, ±12.5 | 28     | 57     | 57    | 44     | 89     | 89    |
| 12.5, ±17.5 | 20     | 41     | 41    | 34     | 69     | 69    |
| 12.5, ±22.5 | 12     | 25     | 25    | 22     | 44     | 44    |
| 12.5, ±27.5 | 9      | 16     | 16    | 16     | 32     | 32    |
| 17.5, ±2.5  | 16     | 32     | 32    | 22     | 44     | 44    |
| 17.5, ±7.5  | 14     | 28     | 28    | 22     | 44     | 44    |
| 17.5, ±12.5 | 10     | 20     | 20    | 22     | 44     | 44    |
| 17.5, ±17.5 | 9      | 16     | 16    | 22     | 44     | 44    |
| 17.5, ±22.5 | 6      | 12     | 12    | 20     | 41     | 41    |
| 17.5, ±27.5 | 4      | 9      | 9     | 16     | 32     | 32    |

|                  | Red   | Yellow | Green  |
|------------------|-------|--------|--------|
| Arrow Indication | 5 500 | 11 000 | 11 000 |

Measured chromaticity coordinates of LED signal modules shall conform to the chromaticity requirements of the following table, for a minimum period of 36 months, over an operating temperature range of -40°C to +74°C.

|        |  |
|--------|--|
| Red    | Y: not greater than 0.308, or less than 0.998 - x                                      |
| Yellow | Y: not less than 0.411, nor less than 0.995 - x, nor less than 0.452                   |
| Green  | Y: not less than 0.506 - 0.519x, nor less than 0.150 + 1.068x, nor more than 0.730 - x |

LED signal modules tested or submitted for testing shall be representative of typical production units. Circular LED modules shall be tested in conformance with California Test 604. Optical testing shall be performed with LED signal modules mounted in standard traffic signal sections without visors or hoods attached to the signal sections.

LEDs for arrow indications shall be spread evenly across the illuminated portion of the arrow area. Arrow LED signal modules shall be tested in conformance with California Test 3001. Optical testing shall be performed with LED signal modules mounted in standard traffic signal sections without visors or hoods attached to the signal sections. LED arrow signal section indication shall provide minimum initial luminous intensity as listed herein. Measurements shall be performed at the rated operating voltage of 120 V (ac).

## **ELECTRICAL**

Maximum power consumption requirements for LED signal modules shall not exceed those listed in "General." LED signal modules shall operate at a frequency of 60 Hz  $\pm$  3 Hz over a voltage range from 95 V (ac) to 135 V (ac) without perceptible flicker. Fluctuations of line voltage shall have no visible effect on luminous intensity of the indications. Rated voltage for all measurements shall be 120 V (ac).

Wiring and terminal blocks shall conform to the requirements of Section 13.02 of the ITE Publication: Equipment and Material Standards, (Vehicle Traffic Control Signal Heads). Two secured, color coded, 1 meter long, 600 V, 20 AWG minimum, jacketed wires, conforming to the National Electronic Code, rated for service at +105°C, shall be provided for electrical connection for each Type 1 LED signal module.

LED signal module on-board circuitry shall include voltage surge protection to withstand high repetition noise transients in conformance with the requirements in Section 2.1.6 of NEMA Standard TS2-1992.

LED signal modules shall be operationally compatible with currently used controller assemblies including solid state load switches, flashers and conflict monitors. When a current of 20 milliamperes (ac) or less is applied to the unit, the voltage read across the two leads shall be 15 V (ac) or less.

LED signal modules and associated on-board circuitry shall conform to the requirements in Federal Communications Commission (FCC) Title 47, SubPart B, Section 15 regulations concerning the emission of electronic noise.

LED signal modules shall provide a power factor of 0.90 or greater.

Total harmonic distortion from current and voltage induced into an alternating current power line by LED signal modules shall not exceed 20 percent at an operating temperature of 25°C.

## **QUALITY CONTROL PROGRAM**

LED signal modules shall be manufactured in conformance with a vendor quality control (QC) program. The QC program shall include two types of testing: (1) design qualification and (2) production quality. Production quality testing shall include statistically controlled routine tests to ensure minimum performance levels of LED signal modules built to meet these specifications.

Documentation of the QC process and test results shall be kept on file for a minimum period of seven years.

LED signal module designs not satisfying design qualification testing and the production quality testing performance requirements specified herein shall not be labeled, advertised or sold as conforming to these specifications.

Identification of components and subassemblies of LED signal modules, which may affect reliability and performance, shall be traceable to the original manufacturers.

### **Design Qualification Testing**

Design qualification testing (DQT) shall be performed by the manufacturer or an independent testing lab hired by the manufacturer on new LED signal module designs, and on existing designs when a major design change has been implemented. Failure to conform to the requirements of any design qualification test shall be cause for rejection.

A major design change is defined as a design change, electrical or physical, which changes any of the performance characteristics of the LED signal module, results in a different circuit configuration for the power supply, or changes the layout of the individual LEDs in the signal module.

Two LED modules for each design shall be used for DQT. The two LED signal modules shall be selected at random. These signal modules shall be submitted to the Transportation Laboratory after the DQT is complete. Testing data shall be submitted with the modules to the Transportation Laboratory for verification of DQT data.

LED signal modules shall be energized for a minimum of 24 hours, at 100 percent on-time duty cycle, at a temperature of 74°C before performing any DQT.

After burn-in, LED signal modules shall be tested for rated initial luminous intensity in conformance with the provisions in "Photometric Requirements." Before measurement, LED signal modules shall be energized at rated voltage, with 100 percent on-time duty cycle, for a time period of 30 minutes. Photometrics, luminous intensity and color measurements for yellow LED signal modules shall be taken immediately after the modules are energized. The ambient temperature for these measurements shall be 25°C. Test results for this testing shall record the current, voltage, total harmonic distortion (THD) and power factor (PF) associated with each measurement.

LED signal modules shall be tested by measuring for chromaticity (color) in conformance with the provisions in "Photometric Requirements." A spectra radiometer shall be used for this measurement. The ambient temperature for this measurement shall be 25°C.

LED signal modules shall be tested by measuring the current flow in amperes. The measured current values shall be used for quality comparison of production quality assurance on production modules.

LED signal modules shall be tested by measuring the power factor. A commercially available power factor meter may be used to perform this measurement.

LED signal modules shall be tested by measuring the total harmonic distortion. A commercially available total harmonic distortion meter may be used to perform this measurement.

LED signal modules shall be tested in conformance with the provisions in "Electrical," with reference to Class A emission limits referenced in Federal Communications Commission (FCC) Title 47, SubPart B, Section 15.

LED signal modules shall be tested for compatibility with the controller unit, conflict monitor and load switch. Each signal module shall be connected to the output of a standard load switch connected to an alternating current voltage supply between the values of 95 and 135 V (ac) with the input to the load switch in the "OFF" position. The alternating current voltage developed across each LED signal module so connected shall not exceed 15 V rms as the input alternating current voltage is varied from 95 V (ac) rms to 135 V (ac) rms.

LED signal modules shall be tested for transient immunity in conformance with the provisions in "Electrical," and conforming to the procedure described in NEMA Standard TS2-1992.

Mechanical vibration testing shall be performed on LED signal modules in conformance with the requirements in MIL-STD-883, Test Method 2007, using three 4-minute cycles along each x, y, and z axis, at a force of 2.5 Gs, with a frequency sweep from 2 Hz to 120 Hz. The loosening of the lens, internal components, or other physical damage shall be cause for rejection.

Temperature cycling shall be performed on LED signal modules in conformance with the requirements of MIL-STD-883, Test Method 1010. The temperature range shall conform to the provisions in "Environmental Requirements." A minimum of 20 cycles shall be performed with a 30 minute transfer time between temperature extremes and a 30 minute dwell time at each temperature. LED signal module under test shall be non-operating. Failure of LED signal modules to function properly or evidence of cracking of LED signal module lenses or housings after temperature cycling shall be cause for rejection.

Moisture resistance testing shall be performed on LED signal modules in conformance with the requirements in NEMA Standard 250-1991 for Type 4 enclosures. Evidence of internal moisture after testing shall be cause for rejection.

### **Production Quality Testing**

Production quality testing shall be performed on each LED signal module prior to shipment. Failure to conform to the requirements of any production quality test shall be cause for rejection. The manufacturer shall retain test results for seven years for warranty purposes.

LED signal modules shall be tested for rated initial intensity after burn-in. The burn-in period shall consist of signal modules being energized at rated voltage for a 30 minute stabilization period before the measurements are made. A single point measurement with a correlation to the minimum initial luminous intensity requirements of "Photometric Requirements" for circular modules may be used. The ambient temperature for this measurement shall be +25°C.

LED signal modules shall be tested for luminous intensity requirements in "Photometric Requirements."

LED signal modules shall be tested for required power factor after burn-in.

LED signal modules shall be tested by measuring current flow in amperes after burn-in. The measured current values shall be compared against current values resulting from design qualification measurements under "Design Qualification Testing." The current flow shall not exceed the rated value. The measured ampere values with rated voltage shall be recorded as volt-ampere (VA) on the product labels.

LED signal modules shall be visually inspected for any exterior physical damage or assembly anomalies. The surface of the lens shall be free of scratches, abrasions, cracks, chips, discoloration, or other defects. Any such defects shall be cause for rejection.

### **CERTIFICATE OF COMPLIANCE**

The Contractor shall provide the Engineer a Certificate of Compliance from the manufacturer, in conformance with the provisions of Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall certify that the LED signal modules comply with the requirements of these specifications. The certificate shall also include a copy of all applicable test reports on the LED signal modules.

### **QUALITY ASSURANCE TESTING (RANDOM SAMPLE TESTING)**

The State may perform random sample testing on all shipments. Random sample testing will be completed within 30 days after delivery to the Transportation Laboratory. Circular LED signal modules shall be tested in conformance with California Test 604 and these special provisions. Arrow signal modules shall be tested in conformance with California Test 3001 and these special provisions. Optical testing shall be performed with the module mounted in a standard traffic signal section, but without a visor or hood attached to the section or housing. The number of modules tested shall be determined by the quantity of each model in the shipment. The sample size shall conform to ANSI/ASQC Z1.4. The Transportation Laboratory shall determine the sampling parameters to be used for the random sample testing. All parameters of the specification may be tested on the modules. Acceptance or rejection of the shipment shall conform to ANSI/ASQC Z1.4 for random sampled shipments.

## **WARRANTY**

The manufacturer shall provide a written warranty against defects in materials and workmanship for LED signal modules for a period of 36 months after installation of LED signal modules. Replacement LED signal modules shall be provided within 5 days after receipt of failed LED signal modules at no cost to the State, except the cost of shipping the failed modules. All warranty documentation shall be given to the Engineer prior to installation. Replacement LED signal modules shall be delivered to the Caltrans Maintenance Electrical Shop at 4821 Adhor Lane, telephone 805-388-1426, Camarillo, California 93012.

### **10-3.16 LIGHT EMITTING DIODE PEDESTRIAN SIGNAL FACE MODULES**

Light emitting diode (LED) pedestrian signal face (PSF) modules shall be installed in standard Type A pedestrian signal housing, "UPRAISED HAND" and "WALKING PERSON," and shall use light emitting diodes as the light source as shown on the plans and in conformance with these special provisions.

#### **GENERAL**

PSF modules shall be designed to mount in standard Type A housings. PSF modules shall be designed to mount behind or replace face plates of standard Type A housings in conformance with the requirements of the Institute of Transportation Engineers (ITE) Standards: "Pedestrian Traffic Control Signal Indications" and the "Manual on Uniform Traffic Control Devices" (MUTCD). Where existing Type A pedestrian signal faces contain both incandescent and LED light sources, both light sources shall be removed and replaced by a new LED pedestrian signal face module in conformance with these special provisions.

PSF modules used on this project shall be from a single manufacturer.

Circuit boards and power supplies shall be contained inside the LED modules. Circuit boards shall conform to the requirements in Chapter 1, Section 6 of the "Transportation Electrical Equipment Specifications," (TEES) published by the Department.

PSF modules shall fit into existing Type A housings and shall not require a specific mounting orientation and shall not vary in light output, pattern or visibility for any mounting orientation.

LEDs for "UPRAISED HAND" symbols shall utilize Aluminum Indium Gallium Phosphide (AlInGaP) technology and shall be the ultra bright type rated for 100,000 hours of continuous operation from -40°C to +74°C.

Individual LEDs shall be wired so that a total failure of one LED will result in the loss of not more than 5 percent of the PSF module light output. Failure of an individual LED in a string shall not result in the loss of the entire string or any other indication.

PSF modules tested and those submitted for testing shall be representative of typical production units. PSF modules shall be tested in conformance with California Test 610 and as specified herein.

#### **Luminance Requirements**

Luminance of the "UPRAISED HAND" symbol shall be 3750 cd/m<sup>2</sup> minimum. Color of "UPRAISED HAND" shall be Portland orange conforming to the requirements of the ITE Standards: "Pedestrian Traffic Control Signal Indications" and the MUTCD.

Luminance of the "WALKING PERSON" symbol shall be 5300 cd/m<sup>2</sup> minimum. Color of "WALKING PERSON" shall be white (Luminous Tubing) conforming to the requirements of the ITE Standards: "Pedestrian Traffic Control Signal Indications" and the MUTCD.

Height and width of each symbol shall not be less than 250 mm and 165 mm respectively. Uniformity ratio of illuminated symbols shall not exceed 4 to 1 between the highest luminance area and the lowest luminance area.

PSF modules shall be rated for a minimum useful life of 36 months and shall maintain at least 85 percent of 3750 cd/m<sup>2</sup> for "UPRAISED HAND" symbols and 85 percent of 5300 cd/m<sup>2</sup> for "WALKING PERSON" symbols after 36 months of continuous use in traffic signal operation over a temperature range of -40°C to +74°C.

#### **Physical and Mechanical Requirements**

PSF modules shall be designed as retrofit replacement for existing optical units of signal lamps, or existing pedestrian signal faces with both LED and incandescent light sources, and shall not require special tools for installation. PSF modules shall fit into pedestrian signal section housings built in conformance with the ITE Publication: Equipment and Materials Standards, Chapter 2 "Vehicle Traffic Control Signal Heads" (VTC SH) without modification to the housing.

Installation of PSF modules into pedestrian signal faces shall require only removal of lenses, reflectors, lamps and existing LED modules as indicated on the plans.

## Environmental Requirements

PSF modules shall be rated for use in the operating temperature range of  $-40^{\circ}\text{C}$  to  $+74^{\circ}\text{C}$ .

## Construction

PSF modules shall be single, self-contained devices, not requiring on-site assembly for installation into standard Type A housings. Power supplies for PSF modules shall be integral to the modules.

Assembly and manufacturing processes for PSF modules shall be designed to assure all internal components will be adequately supported to withstand mechanical shock and vibration from high winds and other sources.

## Materials

Material used for PSF modules shall conform to the requirements in ASTM specifications for the materials.

Enclosures containing either the power supply or electronic components of the PSF module shall be made of UL94VO flame-retardant materials.

## Module Identification

PSF modules shall have the manufacturer's name, trademark, model number, serial number, lot number, month and year of manufacture, and required operating characteristics permanently marked on the back of the module. Required operating characteristics shall include rated voltage, power consumption and volt-ampere (VA).

Type A pedestrian signal face, combination "UPRAISED HAND"/"WALKING PERSON" section, housings without the reflectors shall be used for PSF modules.

## PHOTOMETRIC REQUIREMENTS

PSF modules shall maintain at least 85 percent of the following luminous intensity values over 36 months of continuous use in signal operation over the temperature range of  $-40^{\circ}\text{C}$  to  $+74^{\circ}\text{C}$ . In addition, PSF modules shall meet or exceed the following luminous intensity values upon initial testing at  $25^{\circ}\text{C}$ .

| PSF module     | Luminous Intensity     |
|----------------|------------------------|
| UPRAISED HAND  | 3750 cd/m <sup>2</sup> |
| WALKING PERSON | 5300 cd/m <sup>2</sup> |

The measured chromaticity coordinates of PSF modules shall conform to the requirements for chromaticity in Section 5.3.2.1 and Figure C of the VTCSH standards.

## ELECTRICAL

PSF module power consumption shall not exceed the following maximum values:

| PSF module     | Power Consumption<br>@ $25^{\circ}\text{C}$ | Power Consumption<br>@ $74^{\circ}\text{C}$ |
|----------------|---|---|
| UPRAISED HAND  | 10.0 W                                      | 12.0 W                                      |
| WALKING PERSON | 12.0 W                                      | 15.0 W                                      |

PSF modules shall operate at a frequency of  $60\text{ Hz} \pm 3\text{ Hz}$  over a voltage range from 95 V (ac) to 135 V (ac) without perceptible flicker. Fluctuations of line voltage shall have no visible effect on the luminous intensity of the indications. Rated voltage for all measurements shall be 120 V (ac).

PSF module on-board circuitry shall include voltage surge protection to withstand high-repetition noise transients in conformance with the requirements in Section 2.1.6 of NEMA Standard TS2-1992.

Wiring and terminal blocks shall conform to the requirements of Section 13.02 of the ITE Publication: Equipment and Material Standards, "Vehicle Traffic Control Signal Heads."

PSF modules shall be operationally compatible with currently used controller assemblies including solid state load switches, flashers and conflict monitors. When a current of 20 milliamperes (ac) or less is applied to the unit, the voltage read across the two leads shall be 15 V (ac) or less.

PSF modules and associated on-board circuitry shall conform to the requirements in Federal Communications Commission (FCC) Title 47, SubPart B, Section 15 regulations concerning the emission of electronic noise.

PSF modules shall provide a power factor of 0.90 or greater.

Total harmonic distortion from current and voltage induced into an alternating current power line by PSF modules shall not exceed 20 percent at an operating temperature of  $25^{\circ}\text{C}$ .

## **QUALITY CONTROL PROGRAM**

PSF modules shall be manufactured in conformance with a vendor quality control (QC) program. The QC program shall include two types of testing: (1) design qualification and (2) production quality. Production quality testing shall include statistically controlled routine tests to ensure minimum performance levels of PSF modules built to meet these specifications.

Documentation of the QC process and test results shall be kept on file for a minimum period of seven years.

PSF module designs not satisfying design qualification testing and the production quality testing performance requirements specified herein shall not be labeled, advertised or sold as conforming to these specifications.

Identification of components and subassemblies of PSF modules, which may affect reliability and performance, shall be traceable to the original manufacturers.

### **Design Qualification Testing**

Design qualification testing (DQT) shall be performed by the manufacturer or an independent testing lab hired by the manufacturer on new PSF module designs, and on existing designs when a major design change has been implemented. Failure to conform to the requirements of any design qualification test shall be cause for rejection.

A major design change is defined as a design change, electrical or physical, which changes any of the performance characteristics of the PSF module, results in a different circuit configuration for the power supply, or changes the layout of the individual LEDs in the PSF module.

Two PSF modules for each design shall be used for DQT. The two PSF modules shall be selected at random. These PSF modules shall be submitted to the Transportation Laboratory after the DQT is complete. The testing data shall be submitted with the PSF modules to the Transportation Laboratory for verification of DQT data.

The PSF modules shall be energized for a minimum of 24 hours, at 100 percent on-time duty cycle, at a temperature of 74 °C before performing any DQT.

After burn-in, the PSF modules shall be tested for rated initial luminous intensity in conformance with the provisions in "Photometric Requirements." Before measurement, PSF modules shall be energized at rated voltage, with 100 percent on-time duty cycle, for a time period of 30 minutes. The ambient temperature for these measurements shall be 25 °C. The test results shall include the recorded current, voltage, total harmonic distortion (THD) and power factor (PF) associated with each measurement.

PSF modules shall be tested by measuring for chromaticity (color) in conformance with the provisions in "Photometric Requirements." A spectra radiometer shall be used for these measurements. The ambient temperature for these measurements shall be 25 °C.

PSF modules shall be tested by measuring for current flow in amperes. The measured current values shall be used for comparison of production quality assurance on production modules.

PSF modules shall be tested by measuring for power factor. A commercially available power factor meter may be used to perform this measurement.

PSF modules shall be tested by measuring for total harmonic distortion. A commercially available total harmonic distortion meter may be used to perform this measurement.

PSF modules shall be tested in conformance with the provisions in "Electrical," with reference to Class A emission limits referenced in Federal Communications Commission (FCC) Title 47, SubPart B, Section 15.

PSF modules shall be tested for compatibility with the controller unit, conflict monitor and load switch. Each PSF module shall be connected to the output of a standard load switch connected to an alternating current voltage supply between the values of 95 and 135 V (ac) with the input to the load switch in the "OFF" position. The alternating current voltage developed across each PSF module shall not exceed 10 V rms as the input alternating current voltage is varied from 95 V (ac) rms to 135 V (ac) rms.

PSF modules shall be tested for transient immunity in conformance with the provisions in "Electrical" and conforming to the procedure described in NEMA Standard TS2-1992.

Mechanical vibration testing shall be performed on PSF modules in conformance with the requirements in MIL-STD-883, Test Method 2007, using three 4-minute cycles along each x, y, and z axis, at a force of 2.5 Gs, with a frequency sweep from 2 Hz to 120 Hz. The loosening of the lens, of any internal components, or other physical damage shall be cause for rejection.

Temperature cycling shall be performed on PSF modules in conformance with the requirements of MIL-STD-883, Test Method 1010. The temperature range shall conform to the provisions in "Environmental Requirements." A minimum of 20 cycles shall be performed with a 30 minute transfer time between temperature extremes and a 30 minute dwell time at each temperature. Signal under test shall be non-operating. Failure of PSF modules to function properly or evidence of cracking of PSF module lenses or housings after temperature cycling shall be cause for rejection.

Moisture resistance testing shall be performed on PSF modules in conformance with the requirements in NEMA Standard 250-1991 for Type 4 enclosures. Evidence of internal moisture after testing shall be cause for rejection.

### **Production Quality Testing**

Production quality tests shall be performed on each PSF module prior to shipment. Failure to conform to the requirements of any production quality tests shall be cause for rejection. The manufacturer shall retain test results for seven years for warranty purposes.

PSF modules shall be tested for rated initial intensity after burn-in. The burn-in period shall consist of signal modules being energized at rated voltage for a 30 minute stabilization period before the measurements are made.

PSF modules shall be tested for luminous intensity requirements in "Photometric Requirements."

PSF modules shall be tested for required power factor after burn-in.

PSF modules shall be tested by measuring current flow in amperes after burn-in. The measured current values shall be compared against current values resulting from design qualification measurements under "Design Qualification Testing." The current flow shall not exceed the rated value. The measured ampere values with rated voltage shall be recorded as volt-ampere (VA) on the product labels.

PSF modules shall be visually inspected for any exterior physical damage or assembly anomalies. The surface of the lens shall be free of scratches, abrasions, cracks, chips, discoloration, or other defects. Any such defects shall be cause for rejection.

### **CERTIFICATE OF COMPLIANCE**

The Contractor shall provide the Engineer a Certificate of Compliance from the manufacturer, in conformance with the provisions of Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall certify that the PSF modules comply with the requirements of these specifications. The certificate shall also include a copy of all applicable test reports on the PSF modules.

### **QUALITY ASSURANCE TESTING (RANDOM SAMPLE TESTING)**

The State may perform random sample testing on all shipments. Random sample testing will be completed within 30 days after delivery to the Transportation Laboratory. PSF modules shall be tested in conformance with California Test 606 and these special provisions. Optical testing shall be performed with the module mounted in a standard traffic signal section or in a standard Type A pedestrian housing, but without a visor or hood attached to the section or housing. The number of modules tested shall be determined by the quantity of each model in the shipment. The sample size shall conform to ANSI/ASQC Z1.4. The Transportation Laboratory shall determine the sampling parameters to be used for the random sample testing. All parameters of the specification may be tested on the modules. Acceptance or rejection of the shipment shall conform to ANSI/ASQC Z1.4 for random sampled shipments.

### **WARRANTY**

The manufacturer shall provide a written warranty against defects in materials and workmanship for the PSF modules for a period of 36 months after installation of the PSF modules. Replacement PSF modules shall be provided within 5 days after receipt of failed PSF modules at no cost to the State, except the cost of shipping the failed modules. All warranty documentation shall be given to the Engineer prior to installation. Replacement PSF modules shall be delivered to the Caltrans Maintenance Electrical Shop at 4821 Adhor Lane, telephone 805-388-1426, Camarillo, California 93012.

### **10-3.17 DETECTORS**

Loop detector sensor units will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

Loop wire shall be Type 2.

Loop detector lead-in cable shall be Type B.

Detector loops shall be Type E. For Type E detector loops, sides of the slot shall be vertical and the minimum radius of the slot entering and leaving the circular part of the loop shall be 40 mm. Slot width shall be a maximum of 20 mm. Slots of circular loops shall be filled with hot melt rubberized asphalt sealant.

The depth of loop sealant above the top of the uppermost loop wire in the sawed slots shall be 50 mm, minimum.

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 (State Specification 8040-06)," of the Standard Specifications.

### **PREFORMED INDUCTIVE LOOPS**

Prefomed inductive loops shall be the type shown on the plans.

The loop shall be 1.8 m square unless otherwise shown. The loop shall consist of 4 turns of No. 16, or larger, wire with Type THWN or TFFN insulation.

The loop wires shall be encased in Size 10, minimum, Schedule 40 or Schedule 80 Type 3 or polypropylene conduit. The conduit shall be sealed to prevent the entrance of water and the movement of wires within the conduit.

The loop wires from the preformed loop to the adjacent pull box shall be twisted together into a pair (at least 7 turns per meter) and encased in Schedule 40 or Schedule 80 Type 3 or polypropylene conduit between the preformed loop and the adjacent pull box or detector handhole. The lead-in conduit shall be sealed to prevent the entrance of water at the pull box or handhole end.

In new roadways, the preformed loops and lead-in conduits shall be placed in the base course, with the top of the conduit flush with the top of the base, and then covered with asphalt concrete or portland cement concrete pavement. Preformed loops and lead-in conduits shall be protected from damage prior to and during pavement placement.

In new reinforced concrete structure decks, the preformed loops shall be secured to the top of the uppermost layer of reinforcing steel using nylon wire ties. The loop shall be held parallel to the structure deck by using PVC or polypropylene spacers where necessary. Conduit for lead-in conductors shall be placed between the uppermost 2 layers of reinforcing steel.

Preformed inductive loops shall not be installed in existing structure decks.

In existing pavement, preformed loop installation shall conform to the following:

- A. Preformed loops and lead-in conduits shall be placed in slots, 32 mm, minimum width, cut into the existing pavement. The top of the conduit shall be 50 mm, minimum, below the top of pavement.
- B. Slots in asphalt concrete pavement shall be filled with elastomeric sealant or hot-melt rubberized asphalt sealant.
- C. Slots in portland cement concrete pavement shall be filled with epoxy sealant or hot melt rubberized asphalt sealant.

### **10-3.18 MODIFY AUTOMATIC VEHICLE CLASSIFICATION STATION**

Modify automatic vehicle classification (AVC) station shall consist, in general, of installing piezo-electric axle sensors, epoxy grout for axle sensor installation, inductive loop detectors, pull boxes, conduits, conductors and incidentals, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

A listing of field conductor terminations for the automatic vehicle classification (AVC) controller cabinet will be supplied to Contractor at the site of work.

Inductive loop detector sensors and piezo-electric axle sensors for automatic vehicle classification station and installation thereof shall conform to provisions under "Detectors" and "Piezo-Electric Axle Sensors" elsewhere in these special provisions.

Attention is directed to Section 86-2.14C, "Function Testing", of the Standard Specifications.

### **10-3.19 STATE FURNISHED PIEZO-ELECTRIC AXLE SENSORS**

Piezo-electric axle sensors (without installation plates) and epoxy grout (for installation of axle sensors only) will be State-furnished at the work site as provided under "Materials" of these special provisions.

The Contractor shall notify the Engineer at least 10 working days before he/she intends to install the axle sensors to allow time for the axle sensors and epoxy grout to be ordered from the manufacturer and for an experienced State personal to oversee the installation procedure.

Piezo-electric axle sensors consist of a piezo-electric copolymer surrounded by a 6.6 mm wide x 1.6 mm thick outer brass sheath. Each sensor is approximately 1.9 m in length and comes with a screened coaxial transmission cable attached. The sensors are installed in a combination of one inductive loop detector and 2 axle sensors per lane. The exact location of the Piezo-electric axle sensors and inductive loop detector arrays will be as determined by the Engineer.

The axle sensor shall be installed 9 mm beneath the road surface. In order to accomplish this, a channel is cut in the pavement. The measurements for the channel are 19 mm + 2 mm in width, 25 mm in depth, 2.1 m in length. The channel shall be cut with a concrete saw in a single pass, and shall be perpendicular to the direction of travel. A slot shall be cut from the end of the channel to the nearest pull box. 13 mm holes, 25 mm deep are drilled at the bottom corners of the channel. The holes shall be 300 mm apart and on alternating sides of the channel. The channel is then half-filled with epoxy grout. The sensor is then properly positioned in the channel using installation clips supplied with each sensor. The channel is then fully-filled with epoxy grout. The epoxy grout shall be adequately set before re-opening the lane to traffic. A detailed installation procedure is shown on the project plans.

Temperature of epoxy grout components shall be between 20°C to 25°C before mixing.

The temperature of sawed pavement channel shall be between 20°C to 40°C before epoxy grout is poured, and shall be maintained at a minimum temperature of 20°C and a maximum of 50°C during curing time.

When pavement temperature is too low, a fan-forced portable heater, or similar tool, shall be used to heat the channel before the grout is poured. After the sensor is installed, the pavement around the channel may be heated. Care shall be taken not to scorch the axle sensor or epoxy grout.

All sawed pavement slots containing screened transmission cable shall be filled with elastomeric sealant.

The contract lump sum price paid for modify automatic vehicle classification (AVC) station shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals; and for doing all work involved in modify

automatic vehicle classification station, including installing conductors and screened transmission cable (STC), conduits, pull boxes, inductive loop detectors, and piezo-electric axle sensors, 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 inductive loop detectors, preformed inductive loops and piezo-electric axle sensors shall include furnishing all labor, materials, tools, equipment, testing and incidentals and for doing all work involved in installing inductive loop detectors, preformed inductive loops and piezo-electric axle sensors, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer, shall be considered as included in the contract lump sum price paid for the various items requiring inductive loop detectors, preformed inductive loops and piezo-electric axle sensors as shown on the plans and no additional and separate compensation will be allowed therefor.

### **10-3.20 SCREENED TRANSMISSION CABLE**

Screened transmission cable (STC) shall be RG-58C/U coaxial cable. Cable shall be rated for direct burial. Sufficient cable to reach the nearest pull box will be supplied with each piezo-electric axle sensor. The Contractor shall be responsible for supplying any additional cable required to reach existing Model 334 controller cabinet and for splicing the cables together and no additional compensation shall be allowed therefor.

Splice in screened transmission cable shall be made with appropriate splice kits as recommended by the Piezo-electric axle sensor manufacturer or per Engineer provided splicing procedures. Examples of approved splice kits are the Focus Ruggedized Splice Kit and the 3M Scotch #82-F1 Flexible Power Cable Inline Splicing Kit. Other splice kits may be used with the approval of the Engineer. It shall be the Contractor's responsibility for supplying all necessary splice kits and no additional compensation shall be allowed therefor.

Splices in screened transmission cable shall be made using the following procedures:

1. Strip outer jacket off transmission cable, being careful not to cut the braided shield.
2. Unbraid shield and neatly twisted together.
3. Strip core wires and crimp together using butt splices.
4. Fill butt splice with solder. Insulate using 3 half-lapped layers of vinyl electrical tape.
5. Crimp shield wires together using butt splice. Filled with solder. Insulated using 3 half-lapped layers of vinyl electrical tape.
6. Overwrap entire splice with half-lapped layers of vinyl electrical tape.
7. Install 3M Scotchcast 82-F1 splice kit according to manufacturer's instructions or equal. Other splice kits may be used with the approval of the Engineer.

### **10-3.21 PEDESTRIAN PUSH BUTTONS**

At the option of the Contractor, pedestrian push button housings may be the plastic type.

### **10-3.22 LUMINAIRES**

Ballasts shall be the lag regulator type.

### **10-3.23 SOFFIT AND WALL LUMINAIRES**

A No. 7 pull box shall be installed adjacent to each soffit luminaire as shown on the plans.

### **10-3.24 PEDESTRIAN OVERHEAD FIXTURES**

Fluorescent lighting fixtures for installation in the top railing of a pedestrian overhead chain link sidewalk railing shall conform to the details shown on the plans and these special provisions.

If the design of the fixtures deviates in any way from the details shown on the plans, the design shall be submitted to the Engineer for review before fabrication of the fixtures. If deemed necessary by the Engineer, one complete prototype fixture shall be delivered to the Engineer for review at least 30 days before fabrication of the fixtures to be used in the work. The prototype fixture will be returned to the Contractor, and if permitted by the Engineer, the fixture may be installed in the work.

The shell of the fixture shall consist of a top section and a door section of extruded 6063-T5 aluminum alloy (each with a nominal 3-mm wall thickness), 2 cast-end sections of 319 aluminum alloy, and an internal wireway cover of 505-H32 aluminum alloy, as detailed on the plans.

The top section and the door section shall be joined together on one side by a continuous hinge formed as part of the 2 extrusions and shall overlay to permit locking on the other side. The hinge shall be treated with a suitable silicone grease that will prevent the entrance of water by capillary action.

Fasteners requiring a special socket wrench, as detailed on the plans, shall be provided on the overlap to secure the door section in the closed position. Two special socket wrenches that operate the fasteners shall be furnished to the Engineer.

The top section of the shell shall have a fin with 5-mm holes spaced uniformly on 300-mm centers to permit the use of 3.76-mm (9-gage) tie wires to support the chain link fence fabric.

The end sections shall fit on the ends of the fixture and shall be welded to the top section only. Each end section shall have an open extension with an outside diameter equal to that of Size 35, Type 1, conduit. A 75-mm sleeve shall be provided with each end section for securing the fixture to the top rail as shown on the plans.

The wireway cover (with 5-mm hemmed ends up) complete with terminal blocks and circuit conductors shall be inserted before welding the end sections and shall provide clearance at both ends for conductors. The cover shall be fastened by at least two 6-mm, No. 4 self-threading sheet metal screws with binding head and blunt point. Blind rivets of equivalent strength may be substituted.

The lens units in the door section shall be formed of 38-mm methyl methacrylate rod, cut and fire glazed to provide a clear finish or of cast units providing equivalent tolerances and finish. Units shall conform to the dimensions shown on the plans.

The lenses shall be secured to the door section with an extruded lens retainer of 6063-T5 aluminum alloy conforming to the lens shape. The lens retainers shall fit the full length of the lens on both sides. Lens retainers which are continuous for the full length of the 3 lenses will be permitted. "Zee" bars of 5052-H32 or 5005-H14 aluminum alloy, 1.6 mm, minimum thickness, may be substituted for the extruded lens retainer, if approved by the Engineer.

One or more bronze sash chains or other satisfactory devices shall be provided to prevent the door from opening to such an extent that the hinge will be damaged.

Each fixture shall contain an F48T12/CW, rapid start fluorescent lamp with recessed, double-contact bases installed on the back side of the door directly behind the lenses.

Lampholders shall be listed by the UL for outdoor use, shall be provided with heat resistant, circular cross section, neoprene sealing gasket, silver-coated contacts and waterproofed lead entrance for use with a 1500-mA, rapid start, fluorescent lamp. One lampholder for each lamp shall be of the spring-loaded type.

The distance between the faces of the lampholder for each lamp shall be designed to provide a compression of at least 2.5 mm on the spring type lampholder when the lamp is in place. The lamp shall have positive mechanical and electrical contact when the lamp is in place. The socket on the spring type lampholder shall have sufficient travel to permit installation of the lamp. Springs shall not be a part of the current carrying circuit.

The ballast shall be 34.3 mm long (maximum) and shall be the high power factor type with weatherproof leads for operation of one 1220-mm rapid-start lamp. Ballasts shall be listed by the UL for outdoor operation on 110-V (ac) to 125-V (ac), 60 Hz circuits and shall be rated at 1500 mA.

Circuit conductors entering the fixture shall be terminated on molded, phenolic, barrier-type, 3-pole terminal blocks rated at 15 A, 600 V (ac) and shall have integral-type white waterproof marking strips labeled "Line 1", "Neutral" and "Line 2". Current carrying parts of the terminal blocks shall be insulated from the fixture with integral plugs or strips to provide an insulating value in excess of the line to ground flash-over voltage. The terminal blocks shall be attached to the wireway cover in the top section. If the Contractor elects to use sectionalized terminal blocks, each section shall be provided with an integral barrier on each side and shall be capable of rigid mounting and alignment.

The electrical system of the pedestrian overhead shall be effectively grounded by a No. 8 copper wire installed in the conduit from fixture to fixture, from the end fixture to conduit fitting on the end post and from conduit fitting on the end post to the grounding bushing in the nearest pull box.

The ground wire shall be secured to the inside of the telescoping sleeve end casting where conductors are carried and to the inside of the Type LB conduit fitting on the end post by means of a connecting lug and a No. 8, self-threading, pan-screw.

The lamp, with lampholders, ballast and fixture wires, shall be attached to the door section. The terminal blocks shall be attached to the top section or wireway cover.

Three No. 10, solid copper circuit conductors shall be installed between terminal blocks as part of each completed fixture.

Conductors from ballast to lampholders shall be No. 16 minimum size, stranded copper wire.

Conductors in the fixture, except ballast leads and entrance line conductors, shall be UL listed appliance wiring material (AWM).

Splicing of lampholder conductors to secondary ballast leads shall be done by use of mechanically secure connectors.

Sufficient slack shall be provided in the conductors between the ballast and the terminal blocks to allow the fixture door to be fully opened.

Exposed surfaces of the fixture shall be clean, uniform in appearance and free from defects such as improper fit, dents, deep scratches and abrasions, burrs, roughness, off-square ends, holes off center or jagged, surface irregularities and other significant defects.

Screws for attaching components to the fixture shell such as lens retainers, "Zee" bars, ballast and lampholders shall be tapped into the shell from inside only with the ends of screws ground even with the outside surface of the fixture. No screwheads, nuts or other fasteners shall be removable from the outside.

Defective parts of the fixture, as determined by the Engineer before or after the fixture is installed, shall be removed and replaced at the Contractor's expense.

The fixture shall be completely fabricated and assembled in the shop and shall be ready for installation before shipment to the project.

### **10-3.25 INTERNALLY ILLUMINATED STREET NAME SIGNS**

Internally illuminated street name signs shall be Type A.

### **10-3.26 PHOTOELECTRIC CONTROLS**

Contactors shall be the mechanical armature type.

### **10-3.27 DISPOSING OF ELECTRICAL EQUIPMENT**

Ballasts and transformers and fluorescent and mercury lamps shall be disposed of in conformance with California Department of Health Services Regulations set forth in Title 22, Division 4, Chapter 30, of the California Code of Regulations.

Ballasts and transformers that contain polychlorinated biphenyl (PCB) are designated as extremely hazardous wastes and fluorescent tubing and mercury lamps are designated as hazardous wastes under Title 22, Chapter 30, Article 9, Section 66680, of the California Code of Regulations.

The following electrical materials on the project are known to contain polychlorinated biphenyl (PCB):

Fluorescent ballasts

When 25 or more fluorescent lamps and mercury lamps, in combination, are to be disposed of, the lamps shall be treated as recyclable hazardous waste and shall be recycled within the State of California in conformance with Title 22, Chapter 30, Article 12, of the California Code of Regulations by a currently certified recycler such as, but not limited to, the following:

- A. Exceltrans Inc., P.O. Box 866, Benicia, CA 94510, Telephone (707) 745-8907.
- B. Roberts Enterprises, 2021 South Myrtle Avenue, Monrovia, CA 91016, Telephone (818) 303-2053.

The recyclable hazardous waste shall be packaged and then shipped via a currently certified hauler in conformance with Title 22, Chapter 30, Article 12, of the California Code of Regulations and other applicable local, State, and Federal regulations.

The Engineer shall be furnished with a statement noting which certified hauler and which certified recycler is proposed for utilization, together with a copy of the recycler's interim status document or a copy of the variance letter from the Department of Health Services. The statement shall be furnished within 15 calendar days after the contract has been approved by the Attorney General.

The State assumes generator responsibility for these wastes. The Engineer will prepare the Hazardous Waste Manifest for Shipment.

Full compensation for hauling, stockpiling, and disposing of fluorescent tubing and mercury lamps shall be considered as included in the contract lump sum price paid for modify lighting and sign illumination and no additional compensation will be allowed therefor.

After removal, handling and disposing of electrical material containing polychlorinated biphenyl (PCB) will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

### **10-3.28 VIDEO IMAGING DETECTION SYSTEM**

#### **GENERAL**

The video image detection system shall consist of an automatic control unit (ACU), modems, four synchronous television image sensors (video imaging detection cameras) or other synchronous video source(s) and associated cables, as shown on the plans, and a supervisor computer system.

Prototype equipment is not acceptable. All equipment shall be current standard production units and shall have been in production for a minimum of 6 months. Rebuilt or reconditioned equipment will not be allowed.

#### **SYSTEM SOFTWARE**

The system software shall be able to detect vehicles in multiple traffic lanes. A minimum of 255 detection zones shall be user-definable through interactive graphics by placing lines and/or boxes in an image on a VGA monitor. The user shall be able to redefine previously defined detection zones. The ACU shall calculate traffic parameters in real-time and provide local non-volatile data storage for later downloading and analysis.

## SYSTEM HARDWARE

The system hardware shall consist of four synchronous television image sensor (video imaging detection cameras), or other video sources, with mounting hardware and associated cables, compatible modems (28.8 baud minimum) to US Robotics Sportster modem, an automatic control unit (ACU) to process the video input and output detector data to a traffic controller, wiring harnesses to connect the ACU to a Model 170 signal controller for detector inputs, phase outputs and power and software for the ACU, and a supervisor computer system. The system shall be able to incorporate a fifth high resolution color surveillance image sensor.

## FUNCTIONAL CAPABILITIES

**REAL-TIME DETECTION.**—The ACU shall be capable of simultaneously processing information from up to eight video sources including CCTV video image sensors and video tape players. The video sources may be, but are not required to be, synchronized or line locked. The video shall be digitized and analyzed at a rate of 30 times per second.

A ninth or tenth image sensor input shall be provided as a surveillance video input to be switched as one of five live video sources.

The system shall be able to detect the presence of vehicles in a minimum of 255 detection zones within the combined field of view of the image sensors.

Different detector types shall be selectable via software. Detector types shall include count detectors, presence detectors, directional presence detectors, speed detectors, station detectors, input detectors, and detector logical functions. The speed detectors shall report vehicle speed and vehicle classification based on length. Five length categories shall be user-definable in software.

Once the VIP board has been properly set up using supervisor computer, it shall be possible to disconnect the supervisor computer. The ACU shall then detect vehicles as a stand-alone unit, calculate traffic parameters in real-time, and store traffic parameters in its own non-volatile memory.

**LOCAL DATA STORAGE.**—The ACU shall count vehicles in real-time and compute the average of traffic parameters over user-defined time intervals (or time slices), as follows:

|                        |   |
|------------------------|---|
| Volume                 | Number of vehicles detected during the time interval.   |
| Occupancy              | Lane occupancy measured in percent of time.   |
| Vehicle Classification | Number of automobiles, single unit trucks or tractor trailers, as defined by length.                          |
| Flow Rate              | Vehicles per hour per lane.   |
| Headway                | Average time interval between vehicles.   |
| Speed                  | Time mean and space mean vehicle speed in mph or km/h   |
| Level of Service       | Determined by user defined thresholds for average speed and flow rate.  |
| Space Occupancy        | Sum of the Vehicle lengths divided by average distance traveled during the time interval measured as percent. |
| Density                | Average flow divided by space mean speed expressed in vehicles/mile or vehicles/kilometer.                    |
| Red Runners            | Vehicles that enter an intersection after a red is displayed for that approach.                               |

The duration of the time intervals (or time slices) shall be user-selectable as 10, 20 or 30 seconds, 1, 5, 10, 15, 30 or 60 minutes.

**OPERATION WITH SUPERVISOR ON-LINE.**— Once the detector configuration has been downloaded from the supervisor computer into the ACU, it shall be possible to operate the video detection system either with the supervisor computer disconnected or on-line.

When the supervisor computer is on-line, it shall be possible to view vehicle detection in real-time as they occur on the color VGA display.

It shall be possible to save the time-interval traffic data on the supervisor computer hard disk. The traffic data is described elsewhere in these special provisions. It shall also be possible to save on hard disk the complete time data or actuation data for each vehicle detection. The collected traffic and detection data shall be made available in readily-accessible ASCII format. The supervisor computer software shall provide file management routines for efficiently filing, retrieving and reporting of the collected traffic data.

It shall be possible to display the captured traffic data on the VGA screen of the supervisor computer in numeric format. The data displayed shall be for the last complete interval. Selection of the data to be displayed shall be by pull-down menus and shall be in the form of Windows under the Microsoft Windows 98 graphics operating environment.

The ACU shall include the capability to capture a bitmap image (snapshot) from a selected image sensor input and transmit the image to the supervisor computer for display. The captured video image shall be compressed to minimize the time needed to transmit the image. An option shall be provided to allow continuing or suspending detection while the video image is being compressed and transmitted.

It shall be possible to capture and store as a file the video image currently being displayed at the supervisor computer. The file formats shall include, at a minimum, Windows bitmap (BMP). Moving video formats (MOV), and additional formats are desirable. The video image stored shall be selectable to include, or not include, detector zones at the user's option.

Communications with the supervisor computer shall be done using either a point-to-point or a multi-drop communications. At least 24 ACU units shall be addressable using a single communication port using RS232 or RS422 protocol. An error-checking and retransmission communications protocol shall be used for file transfer operations.

## **VEHICLE DETECTION**

**DETECTION ZONE PLACEMENT.**—The video detection system shall provide flexible detection zone placement anywhere and at any orientation within the combined field of view of the image sensors. Preferred presence detector configurations shall be lines placed across lanes of traffic or lines placed in-line with lanes of traffic. A single detector line shall be able to replace multiple conventional detector loops connected in series.

Detection zones shall be able to be overlapped. In addition, detection zones shall have the capability of rejecting images based upon movement, direction, and of implementing logical functions including AND, OR, NAND, N of M and delay/extend timing.

**DETECTION ZONE PROGRAMMING.**—Placement of detection zones shall be by means of a supervisor computer operating in the Window 98 graphics environment and a mouse. The VGA monitor shall show images of the detection zones superimposed on the video image of traffic.

The detection zones shall be created by using the mouse to draw detection lines on the supervisor computer's VGA monitor. The detection zones shall be capable of being sized, shaped and overlapped to provide optimal road coverage and detection. It shall be possible to save the detector configurations on disk, to download detector configurations to the ACU, and to retrieve the detector configuration that is currently running in the ACU.

It shall be possible to use the mouse to edit previously defined detector configurations so as to fine-tune the detection zone placement size and shape. Once a detection configuration has been created, the supervisor computer system shall provide a graphic display to the new configuration on its own VGA screen.

When a vehicle is under a detection zone the detection zone shall change in color or intensity on the VGA monitor thereby verifying proper operation of the detection system. Color changes shall also be used to indicate detection delay and extension timing.

**OPTIMAL DETECTION.**—The video detection system shall reliably detect vehicle presence when the image sensor is mounted 10 m or higher above the roadway, when the image sensor is adjacent to the desired coverage area, and when the length of the detection area or field of view (FOV) is not greater than ten times the mounting height of the image sensor. The image sensor shall not be required to be mounted directly over the roadway. A single image sensor, placed at the proper mounting height with the proper lens, shall be able to monitor six to eight traffic lanes simultaneously.

**DETECTION PERFORMANCE.**—Overall performance of the video detection system shall be comparable to inductive loops. Using standard image sensor optics and in the absence of occlusion, the system shall be able to detect vehicle presence with 98 percent accuracy under normal conditions, (day and night) and 96 percent accuracy under adverse conditions (fog, rain, snow).

The system shall have a method to reduce detections from vehicles in an adjacent lane caused by shadows and from motion of the camera due to wind. These systems shall be 95 percent effective. A 95 percent of all shadows that are cast near sunrise or sunset and enter an adjacent detection area shall be rejected.

## **ACU HARDWARE**

**ACU MOUNTING.**—The VIP board shall mount into a 482 mm EIA equipment rack assembly or be shelf-mountable. Nominal outside dimensions excluding connectors shall be 127 mm (H) x 292 mm (W) x 178 mm (D).

**ACU ENVIRONMENTAL.**—The ACU shall be designed to operate reliably in the adverse environment found in the typical roadside controller cabinet. It shall meet the environmental requirements set forth by the NEMA (National Electrical Manufacturers Association) TS-1 and TS-2 requirements as well as the environmental requirements for Type 170 and Type 179 controllers. Operating temperature shall be from  $-35^{\circ}\text{C}$  to  $+75^{\circ}\text{C}$  at 0 percent to 95 percent relative humidity, non-condensing.

**ACU ELECTRICAL.**—The ACU shall be modular in design and provide proceeding capability equivalent to the Intel Pentium microprocessor. The ACU shall utilize 3U VME open architecture The bus connection used to interconnect the modules of the ACU shall be gold-plated DIN connectors.

The ACU shall be powered by 95-135 V, 60 Hz, single phase, and draw less than 0.5 A. The power supply shall automatically adapt to the input power level. Surge ratings shall be as set forth in the NEMA TS-1 and TS-2 specifications.

Serial communications to the supervisor computer shall be through an RS-232/RS-422 serial port.

Serial communications to the modem shall be through an RS-232 serial port. Serial communications to the supervisor shall be through an RS-232/RS-422 serial port. This port shall be able to download traffic data stored in non-volatile memory as well as the real-time detection information needed to show detector actuation. A 9-pin "D" subminiature connector or 25-pin RS232 connector on the front of the ACU shall be used for serial communications.

The ACU shall be available with a NEMA TS1 detector interface for 32 detector outputs. Output level shall be compatible with the NEMA TS1, NEMA TS2 Type 2, Type 170 and Type 179 standards.

NEMA red and green inputs for up to 16 phases shall be available as inputs to provide controller state information for detection and Extend/Delay timing functions. A 37-pin "D" subminiature connector on the front of the ACU shall be used for these inputs. A cable assembly to make these connections shall be provided with each system.

The ACU shall be available with eight RS-170 (NTSC) composite video inputs, so that signals from up to eight synchronous image sensors or other synchronous video sources can be processed in real-time. Up to two additional spare video inputs shall be provided to allow connection of a local surveillance camera or other non-detection video source. The video from this auxiliary video input shall not be processed for detection. BNC connectors on the front of the ACU shall be used for video input.

The ACU shall be equipped with a single RS-170 (NTSC) composite video output. This output shall be capable of being switched to correspond to any one of the five video inputs, as selected remotely via the supervisor computer or front panel switch. Multiple video outputs requiring external cable connections to create a combined single video output shall not be acceptable. A BNC connector on the front of the ACU shall be used for video output.

## **IMAGE SENSOR (CAMERA) SYSTEM**

**1. Image Sensors (cameras).**—The video image detection system shall use five medium resolution, color, image sensors as the video source for real-time vehicle detection. These image sensors shall be provided with 12 mm lenses, unless indicated otherwise on the plans or field recommended by manufacturer representative. As a minimum, each image sensor shall provide the following capabilities:

- A. Images shall be produced with a CCD sensing element with horizontal resolution of at least 500 lines and vertical resolution of at least 350 lines, and images shall be output:
  1. As a video signal conforming to RS170 or RS170A specifications for installations in North America or as an option specified at time of order.
  2. As a video signal conforming to CCIR/PAL specifications for installations outside North America.
- B. Useable video and resolvable features in the video image shall be produced when those features have luminance levels as low as 0.1 lux at night.
- C. Useable video and resolvable features in the video image shall be produced when those features have luminance levels as high as 10 000 lux during the day.
- D. Useable video and resolvable features in the video image shall be produced when the ratio of the luminance of the resolved features in any single video frame is 300:1.
- E. Automatic gain, automatic iris, and absolute black reference controls shall be furnished.
  1. Automatic iris shall operate in a damped manner with a time constant of 0.25 seconds or longer.
  2. Automatic gain shall operate in a damped manner with a time constant of one second, and automatic gain shall not be applied to the video signal until the lens aperture is fully opened by the automatic iris control.
  3. Automatic gain, automatic iris, and sensitivity shall be factory adjusted and/or modified as required for proper performance with the video detection system.

4. The black level shall be adjusted to 0 IRE units.
  5. The iris video level shall be adjusted so that a no-contrast image has 50 IRE units of video.
  6. The lens ALC shall be adjusted to average.
- F. An optical filter and appropriate electronic circuitry shall be included in the image sensor to suppress "blooming" effects at night.
  - G. It is preferred that the image sensor video signal be crystal synchronized. Line lock synchronization, however, is acceptable.
  - H. Gamma for the image sensor shall be adjustable in the range from 0.6 to 1.0 and shall be preset at the factory to a value of 1.0.

The image sensor shall be equipped with an auto-iris lens with fixed focal length to suite the site. The maximum aperture of the lens shall not be larger than f300. The image sensor lens shall be pre-focused at infinity at the factory.

The image sensor and lens assembly shall be housed in an environmental enclosure that provides the following capabilities:

- A. The enclosure shall be waterproof and dust-tight to NEMA-4 specifications.
- B. The enclosure shall allow the image sensor to operate satisfactorily over an ambient temperature range from -34°C to +60°C while exposed to precipitation as well as direct sunlight.
- C. The enclosure shall allow the image sensor horizon to be rotated in the field during installation.
- D. The enclosure shall be equipped with separate, weather-tight connections for power and video cables (fabricated at the factory) at the rear of the enclosure to allow diagnostic testing and viewing of video at the camera while the camera is installed on a mast arm or pole. Video and power shall not be connected with the same connector. Input power to the environmental enclosure shall be 120 V, 60 Hz, with 240 V as an option.
- E. A thermostatically controlled heater shall be at the front of the enclosure to prevent moisture condensation on the optical faceplate of the enclosure and the formation of ice and condensation in cold weather as well as to assure proper operation of the iris mechanism at low temperatures. The heater shall not interfere with the operation of the image sensor electronics, and it shall not cause interference with the video signal.
- F. The enclosure shall be light-colored and shall include a sunshield to minimize solar heating. The front edge of the sunshield shall project beyond the front edge of the environmental enclosure and shall include provision to divert water flow to the sides of the sunshield. The amount of overhang of the sunshield shall be adjustable to prevent direct sunlight from entering the lens.
- G. The total weight of the image sensor in the environmental enclosure with sunshield shall be less than 11.34 kg. When operating in the environmental enclosure with power and video signal cables connected, the image sensor shall meet FCC Class B requirements for electromagnetic interference emissions.

The video output of the image sensor shall be isolated from earth ground. All video connections from the image sensor to the video interface panel shall also be isolated from earth ground.

Connections for both video and power shall be made to the image sensor using a single 18 pin circular metal shell connector (Bendix PT07C-14-18P or equivalent). The mating cable shall use a right angle shell and shall be available in lengths of 1.52, 3.05, 9.14 and 18.28 meters to accommodate various installations.

A galvanized steel junction box shall be available as an option with each image sensor for installation on the signal pole used for image sensor mounting. The junction box shall contain a terminal block for power supply to the image sensor and connection points for coaxial cables from the image sensor (camera) and from the ACU. The junction box shall be located on the signal pole at approximately 4.5 m above the ground.

A video interface panel shall be available as an option for installation inside of the controller cabinet. The panel shall provide coaxial cable connection points and an Edco CX06-BNCY or approved equal transient suppressor for each image sensor. The shield side of the coaxial cable connection at the transient suppressor shall be connected to earth ground via the transient suppressor.

If the coaxial cable used to connect the video signal from the image sensor to the ACU is to be routed through a conduit containing unbundled AC power cable, a video isolation amplifier shall be installed in place of the video interface panel. The isolation amplifier shall buffer the video signal and provide transient suppression. The isolation amplifier shall have a minimum common mode rejection ratio at 60 Hz of 100 dB.

The image sensor shall be connected to the ACU such that the video signal originating from the image sensor is not attenuated more than 3 dB when measured at the ACU. When the connection between the image sensor and the ACU is coaxial cable, the coaxial cable used shall be a low loss 75 precision video cable suited for outdoor installation such as Belden 8281, West Penn P806, or approved equal.

## **SUPERVISOR COMPUTER SYSTEM**

- A. The supervisor computer shall be portable computer with a proprietary digitizer card which permits viewing of real-time vehicle detections overlaying live roadway video on a integrated SVGA monitor.
- B. Peek Video Trak 900 software or equal.

The control software shall be compatible with Peek Video Trak 900 system. This software shall provide real-time display of the video input from the cameras. Camera and intersections shall be user selectable. The software shall run on a Pentium computer with 16 MB of RAM under Windows 95. It shall provide freeze frame video and detector placement. If real-time video display requires a special video driver or video card, vendor shall provide the driver and/or card with the initial purchase.

The master software shall be capable of accessing, programming and displaying all functions of the ACU.

A minimum of 255 detection zones shall be user-definable through interactive graphics by placing lines and/or boxes in an image on a VGA monitor or the portable computer display. The user shall be able to redefine previously defined detection zones. Detection zones and functions shall be downloaded from the supervisor computer to the ACU over a 14,000 baud minimum communication line or from the portable computer through a direct connection to the serial input of the ACU.

The State shall have the right to install the control software on as many computers as it deems necessary. The State shall not install the software on any computer other than those utilized to interface with State signal system including signals where the State provides maintenance.

If new master or control unit software is released during a five-year period from the last purchases under this contract or an extension of this contract, the vendor shall supply it at no additional cost for all installed system.

**INSTALLATION.**—The Contractor shall arrange to have a technician, qualified to work on the video imaging detection system employed by the video imaging detection equipment manufacturer or his representative, present at the time the equipment is installed.

**TRAINING.**—A two day training class shall be provided to State personnel in the operation, setup, and maintenance of the video imaging detection system. Instruction with materials shall be provided for a maximum of 10 persons and shall be conducted at 120 South Spring Street, Los Angeles, CA 90012.

**VIDEO HARDWARE SYSTEM.**—The video hardware system shall meet the following specifications:

- A. Be capable of driving and equalizing a broadcast-quality color video signal utilizing the 525 line NTSC.
- B. Be capable of driving and equalizing a high resolution black and white video signal up to and including 1023 lines at 60 Hz.
- C. System shall have an amplitude frequency response of +1.0 dB to -1.5 dB (50 Hz to 10 MHz).
- D. System shall operate over twisted pair or coaxial cables.

**Video Driver Amplifier.**—Video Driver Amplifier shall meet the following specifications:

- A. Input: 0.7 to 1.4 V p-p composite color or black and white video signal into 75 ohms.
- B. Output: 0 to 2.8 V p-p balanced composite video signal into 124 ohm (symmetrical) or 0 to 1.5 V p-p into 75 ohms (asymmetrical) lines.
- C. Amplitude frequency response: +0 dB to -0.5 dB 50 Hz to 10 MHz.
- D. Preemphasis: (switchable) 10 dB (4 MHz and 10 MHz).
- E. Voltage requirement: The driver amplifier must operate from a supply voltage of 115 V (ac) and be capable of operating with an externally supplied voltage of 12 to 15 V (dc).
- F. Power consumption: Shall be no greater than 80 mA when used on 115 V (ac) supply with two drivers. Current requirement when used with externally supplied DC shall be no greater than 90 mA per channel.
- G. Size: Enclosure shall be no greater than 112 mm (L) x 38 mm (W) x 33 mm (H) including input and output connectors.

Rack-mounted version shall require a maximum of 89 mm of vertical rack space and be capable of accommodating 10 channels of video drivers and a power supply.

- H. Gain switch and gain adjustments shall be on front of driver.

**Video Equalizer Amplifier/Driver.**-Video Equalizer Amplifier/Driver shall meet the following specifications:

- A. Input: 0.6 to 2 V p-p balanced, composite video signal into 124 (symmetrical) or single ended 75 (asymmetrical). The input of the equalizer amplifier and driver must be isolated from the output of the driver amplifier by a dielectric strength of up to 10 kg/mm.
- B. Alternate input: 0.7 to 1.4 V p-p composite video signal into 75 ohms. There shall be a provision to switch from input to alternate input so a test signal or alternate video signal can be inserted for ease of maintenance. This option, if requested, will be remotely switchable.
- C. Output: 0 to 2.8 V p-p balanced composite video signal into 124 (symmetrical). Output signal shall contain no DC offset.
- D. Single ended output: 0 to 1.4 V p-p composite video signal into 75
- E. Voltage flashover of the input module shall be 10 kVrms.
- F. Amplitude frequency response shall be +1 dB to 1.5 dB (50 Hz to 10 MHz).
- G. Correction: 6 to 60 dB, continuously adjustable.
- H. All equalizer adjustments, gain switch, and gain adjustments must be front mounted and capable of being aligned while equipment is "on-line".
- I. Preemphasis: (switchable) 10 dB (5 MHz and 10 MHz).
- J. Voltage requirement: The equalizer amplifier/driver must operate on 40 to 135 V (ac) or +20 to +72 V (dc) switch selectable.
- K. Power consumption: No greater than 80 mA at 115 VAC with two EQ/A/D channels installed.

**Video Equalizer Amplifier.**-Video Equalizer Amplifier shall meet the following specifications:

- A. Input: 0.6 to 2 V p-p balanced, composite video signal into 124 (symmetrical) or 0.7 to 1.4 V p-p into 75 (asymmetrical). The input of the equalizer amplifier must be isolated from the output of the driver amplifier by a dielectric strength of up to 10 kg/mm.
- B. Output: 0 to 1.5 V p-p composite video signal into 75 . Output signal shall contain no DC offset.
- C. Voltage flashover of the input module shall be 10 kVrms.
- D. Amplitude frequency response shall be +11.0 dB to -1.5 dB (50 Hz to 10 MHz).
- E. Correction: 6 to 60 dB, continuously adjustable.
- F. Voltage requirement: The equalizer amplifier must operate on 40 to 135 V (ac) or +20 to +72 V (dc) switch selectable.
- G. Power consumption: No greater than 80 mA at 115 V (ac) with two EQ/A channels installed.

## **PHYSICAL AND ENVIRONMENTAL**

- A. Temperature: System must operate in an ambient temperature range of -36°C to +66°C, protected from direct sun.
- B. Size shall not exceed 267 mm (W) x 121 mm (H) x 108 mm (D) including mounting brackets and be capable of accommodating two equalizer amplifiers or two equalizer amplifier/drivers.  
Rack mounted version shall require a maximum 133 mm of vertical rack space and be capable of accommodating 10 channels of equalizer amplifiers or equalizer amplifier/drivers and a power supply.
- C. Two channel case shall be rain-proof.

**TWISTED PAIR CONDUCTORS.**-Solid annealed copper in 22 AWG. All wire cores shall conform to the requirements of PE-88 for filled buried service wires.

### **Insulation:**

Each conductor is insulated with color-coded, high-density polyethylene that exceeds industry specifications for dielectric material and results in excellent electrical and mechanical properties. Standard color codes are used or pair identification with color compound chosen for electrical balance and permanency.

### **Wire Assembly:**

Individual conductors are carefully twisted into pairs in a manner designed to minimize resistance unbalance. Pair twist lays are varied to minimize crosstalk and meet capacitance unbalance limits for quality telecommunications cable. The wire core is completely flooded with Waterbloc compound, filling the air spaces between insulated conductor.

### **Core Covering:**

A non-hygroscopic core wrap protects the core and provides improved mechanical and electrical characteristics. The inner and outer surfaces of the core wrap are coated with Waterbloc compound.

### **Shield:**

BSW A - A smooth, copolymer-coated 0.2 mm aluminum tape is applied longitudinally over the core. The outer surface of the tape is flooded with Envirobloc compound.

### **Outer Jacket:**

Black, high molecular weight polyethylene provides a tough, flexible, protective covering that withstands exposure to sunlight, atmospheric temperatures, ground chemicals and stresses expected in standard installations.

### **SYSTEM TESTING**

The system testing shall cover pre-installation testing, functional testing, sub-system testing, video detection testing, physical inspection, performance testing and final acceptance testing that is required to validate the operational performance of the video imaging detection system and described elsewhere in these special provisions. Records of all tests shall be delivered to the Engineer.

**Test plan.--**The Contractor shall develop and submit within 20 working days to the Engineer an installation and test plan for approval, which details the method of installation and all testing for all material, equipment, and cables and the associated schedule of activities, based on these special provisions, plans, the manufacturer's recommended test procedures, and industry standard practices. Three copies of the test plan shall be submitted to the Engineer for approval. The Engineer will review then approve or disapprove the plan within four weeks. If the Engineer rejects the test plan the Contractor shall submit a revised test plan within 10 working days for review and approval by the Engineer. No testing shall be performed until the Contractor's test plan has been approved by the Engineer. The tests shall demonstrate that the design and production of material and equipment meet the requirements of these special provisions and plans. All test results, including results of failed test or re-tests, shall be submitted and delivered to the Engineer and a copy placed with the equipment at the site. The Contractor shall provide or arrange all test equipment, labor and ancillary items required to perform the system testing.

The test plan shall include the following major test and acceptance categories. The Contractor shall notify the Engineer of his intent to proceed with functional and sub-system testing 48 hours prior to commencement of each test. Full environmental conditions shall be tested as part of the functional tests for field equipment. Sub-system testing and inspections shall include visual inspection for damaged in correct installation, adjustments and alignment, and measurement of parameters and operating conditions.

**Pre-Installation Testing.--**Pre-installation testing shall include testing of all material, equipment and cable prior to delivery to the site. The tests shall either be conducted at the equipment manufacturer's premises or at a laboratory arranged by the Contractor.

All material, except test equipment and special tools, shall be bench tested in accordance with the following paragraphs, which include those items described elsewhere requiring pre-installation testing for each individual item where applicable.

All active equipment shall be connected to normal operating power, energized and subjected to normal operating conditions for a continuous period of time of not less than 48 hours.

**Functional testing.--** Functional testing shall be performed by the manufacturer on all material prior to delivery to the site. The functional tests shall be performed in accordance with the approved test plan. All system function shall be tested to demonstrate that all circuits, cameras, and all equipment satisfies the functional requirements of these special provisions. This testing shall include subjective testing of the camera image. The Contractor shall provide all documents of all functional test results.

Any material or equipment which fails to meet the requirements of the contract shall be repaired or replaced and the test shall be repeated until satisfactory. All functional test results, including results of failed tests or re-tests, shall be submitted and delivered with all material and equipment delivered to the site.

**Sub-system Testing.--**Sub-system testing shall encompass the testing of all material, equipment and cable after installation, but prior to final acceptance tests. These tests shall be done in accordance with the performance testing called elsewhere and under various individual items in these special provisions.

Equipment and hardware shall be installed in accordance with the plans and special provisions. All material, equipment and cable shall be tested after installation at the site. Sub-system testing and inspections shall include visual inspection for damaged or incorrect installation, adjustments and alignment, and measurement of parameters and operating conditions. The Contractor shall notify the Engineer of his intent to proceed with sub-system testing 48 hours prior to commencement of each test.

Installation documentation and test results shall be provided for all material, equipment and cable prior to commencement of acceptance tests. Installation documentation shall be in accordance with these special provisions and shall include the following as appropriate:

- Model, part number and serial number for all material and equipment.
- Test equipment model number, serial number, settings, and date of last calibration.
- All strap and switch settings.
- Record of all adjustments and levels.
- Alignment measurements.
- Identification of interconnections.
- All factory, laboratory and site test results.

**Video Detection Testing.**--The video detection testing shall be conducted after the Contractor submits a test plan and receives approval from the Engineer, based on these special provisions, plans and the manufacture's recommended test procedures for the equipment involved. The video test set shall be approved by the Engineer.

A video detection shall include detection zone placement and programming, optimal detection of six to eight lanes simultaneously and accuracy percentage under different weather conditions as described elsewhere in these special provisions. Video detection performance tests shall be performed only after the associated camera has been installed and tested. The Contractor shall perform all level adjustments and alignments required on the video imaging detection in order for it to operate in accordance with these special provisions. If any video imaging detection fails to meet the performance requirements, the Contractor shall take all steps necessary to restore the failed video imaging detection to the required performance.

Each video imaging detection in the system shall be tested for qualitative performance with its associated camera turned on and connected to a Model 170 controller. The Contractor shall measure, record and tabulated the received detection of the presence of vehicles in a minimum of 255 detection zones that are within the combined field of view of the image sensors. This measurement shall be repeated for each video image sensor (camera). The output video signal shall be connected to a video display monitor. The observed picture on the video display monitor shall be assessed for qualitative performance. All qualitative comments shall be recorded for each camera.

**Physical inspection.**--The Contractor shall provide the document to prove delivery of all material, equipment, cable and documentation. If any material or documentation is outstanding or has been replaced under pre-acceptance warranty, a physical inspection and documentation shall be provided for the material. The physical inspection shall consist of inspecting installed material to ensure workmanship satisfies the specified requirements.

**Full performance test.**-- The full performance test shall be performed in accordance with a test plan developed by the Contractor and approved by the Engineer and shall be performed by the manufacturer or by the Contractor on at least one unit of material selected at random. Vehicle volume test shall satisfy the vehicle detection performance requirements under different lighting conditions. The Contractor shall videotape traffic condition with the superimposed detection zones from each camera. The videotaping portion of the test shall be done between the hours of 7:30 to 8:30 a.m., 4:00 to 5:00 p.m., and 8:30 to 9:30 p.m. at five minute interval of a normal business day. The count accuracy for each approach of the individual camera shall be ninety five percent or better. The Contractor shall furnish the original videotape(s) to the Engineer to verify results

**Acceptance testing.**--The acceptance testing shall be conducted in accordance with the approved test plan. The acceptance testing shall include conducting acceptance tests and subsequent re-tests, and documentation of the test results. All material, equipment, and cable shall be installed, adjusted, and aligned. The Contractor shall notify the Engineer of his intent to proceed with the testing 48 hours prior to the commencement of each test. In the event that any aspect of the acceptance tests are determined by the Engineer to have failed, the Contractor shall cease all acceptance testing, determine the cause of the failure and make repairs to the satisfaction of the Engineer.

All acceptance test results shall be fully documented and such documentation provided as a condition of acceptance.

### 10-3.29 PAYMENT

The contract lump sum prices paid for signal and lighting shall include highway lighting at intersections in connection with signals only.

Other roadway lighting on the project shall be considered as included in the contract lump sum price paid for lighting and sign illumination.

The contract lump sum price paid for signal and lighting (Location 1) 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 installation of signal and lighting at various locations, including the installation of inductive loop detectors, signal standards, conduits of various sizes and types, conductors, pull boxes and incidentals, in the sidewalks and payments, complete in place, as shown on the electrical plans entitled "Signal and Lighting (Location 1)," as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for signal and lighting (Location 2) 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 installation of signal and lighting at various locations, including the installation of inductive loop detectors, signal standards, conduits of various sizes and types, conductors, pull boxes and incidentals, in the sidewalks and payments, complete in place, as shown on the electrical plans entitled "Signal and Lighting (Location 2)," as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for signal and lighting (City street location 1) 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 installation of signal and lighting, including the installation of inductive loop detectors, signal standards, conduits of various sizes and types, conductors, pull boxes and incidentals, in the sidewalks and payments, complete in place, as shown on the electrical plans entitled "Signal and Lighting (Modify) (City-Location 1)," as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for signal and lighting (City street location 2) 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 installation of signal and lighting, including the installation of inductive loop detectors, signal standards, conduits of various sizes and types, conductors, pull boxes and incidentals, in the sidewalks and payments, complete in place, as shown on the electrical plans entitled "Signal and Lighting (City-Location 2)," as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for pedestrian overhead lighting 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 installation of lighting, including the installation of lighting fixtures, conduits of various sizes and types, conductors, pull boxes and incidentals, complete in place, as shown on the electrical plans entitled "Camarillo pedestrian OH (Lighting)," as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for lighting (City parking lot) 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 installation of parking lot lighting, lighting standards, conduits of various sizes and types, conductors, pull boxes and incidentals, complete in place, as shown on the electrical plans entitled "Lighting (City parking lot)," as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for automatic vehicle classification station shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing automatic vehicle classification station, including installing conduits, conductors, pull boxes, inductive loop detectors, piezo-electric axle sensors and screened transmission cable, 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 ramp metering system (Location 1) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing ramp metering system (Location 1), including installing conduits, conductors, pull boxes, inductive loop detectors, telephone cable, 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 ramp metering system (Location 2) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing ramp metering system (Location 2), including installing conduits, conductors, pull boxes, inductive loop detectors, telephone cable, 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 modify signal and lighting (Location 3) 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 installation of signal and lighting, including the installation of temporary signal and lighting in various stages, inductive loop detectors, signal standards, conduits of various sizes and types, conductors, pull boxes and incidentals, in the

sidewalks and payments, complete in place, as shown on the electrical plans entitled "Signal and Lighting (Temporary) (Location 3) Stage 1 through Stage 4," as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for modify signal and lighting (Location 4) 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 installation of signal and lighting, including the installation of temporary signal and lighting in various stages, inductive loop detectors, signal standards, conduits of various sizes and types, conductors, pull boxes and incidentals, in the sidewalks and payments, complete in place, as shown on the electrical plans entitled "Signal and Lighting (Temporary) (Location 4) Stage 1 through Stage 4," as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for modify lighting and sign illumination 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 installation of lighting and sign illumination in various stages, including the installation lighting standards, conduits and conductors of various sizes and types, pull boxes and incidentals, complete in place, as shown on the electrical plans entitled "Lighting and Sign Illumination (Modify) Stage 1 through Stage 3," as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for lighting -in various bridge structures shall be considered as included in the contract lump sum price paid for modify lighting and sign illumination and irrigation, complete in place, as shown on the electrical plans entitled "Bridge Electrical," as specified in the Standard Specifications and these special provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

Full compensation for video imaging detection system, shall include furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installation of video imaging detection system at various locations and various stages, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer, shall be considered as included in the contract lump sum price paid for the items of work involved in modify signal and lighting (Location 4) and no additional compensation will be allowed therefor.

Full compensation for video imaging detection system testing shall include furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in video imaging detection system testing, including various system tests, documentation and final acceptance, shall be considered as included in the contract lump sum price paid for the items of work involved in modify signal and lighting (Location 4) and no additional compensation will be allowed therefor.

Full compensation for providing a two day training class for video imaging detection system shall be considered as included in the contract unit price paid for the items of work involved in modify signal and lighting (Location 4) and no additional compensation will be allowed therefor.

The contract price paid per meter for communication conduit of 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, for doing all the work involved in installing communication conduit on the bridge structures (bridge-interior-attached) and other methods shown on the plans, complete in place, including all trenching and backfill material required and pull boxes not otherwise paid for, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract price paid per meter for innerduct listed in the Engineer's Estimate, shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, for doing all the work involved in installing innerduct, 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 unit price paid for communication pull boxes, shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the installation of communication pull boxes, 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 unit price paid for access opening, soffit, shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in soffit access opening, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

## **SECTION 10-4. SEWER**

### **10-4.01 GENERAL**

This work shall consist of removing and adjusting existing sewer facilities and constructing sewer facilities, complete in place, as shown on the plans, in accordance with these special provisions, the Standard Specifications for Camarillo Sanitary District, revised July, 1999, herein referred to as SSPCSD, and as directed by the Engineer. The sewer is owned and operated by the City of Camarillo. The Contractor shall notify the owner 2 working days before work is begun on any existing sewer facility.

The requirements of these special provisions shall govern if there is a conflict with any of the provisions of the SSPCSD.

#### **10-4.02 MAINTENANCE OF FLOWS**

The existing City of Camarillo sanitary sewer system shall collect incoming wastewater at all times, except for short periods of shutdown as specified elsewhere in these special provisions. A temporary shutdown, not greater than 2 continuous hours, of wastewater flow from existing buildings may be allowed upon approval by the Engineer. The Contractor shall submit a detailed schedule, including dates, times of day for the stoppage and the specific buildings affected to the Engineer. The Engineer will have 30 days to review the shutdown plan. Upon approval of the Engineer, the Contractor shall notify the Owner and occupants of each affected building of the exact date and times of day of the shutdown 10 working days preceding the shutdown. If shutdowns of longer duration are required, temporary pumping, piping and bypasses as specified in "Temporary Sewer System," of these special provisions shall be installed, maintained and removed at the Contractor's expense. When temporary facilities are required, a detailed construction plan and schedule of events, including pipe sizes and capacities of all piping and equipment shall be submitted to the Engineer for review and approval 30 working days preceding their use.

#### **10-4.03 EXISTING SEWER FACILITIES**

When the new facilities interfere with the existing flow of sewage, the Contractor shall provide satisfactory bypass facilities at his expense as specified in "Temporary Sewer System" of these special provisions. Existing manholes shall be adjusted to grade or removed, as shown on the plans and in accordance with the provisions in Section 15, "Existing Highway Facilities," of the Standard Specifications.

Existing manholes and sewer pipes shown on the plans to be removed, shall be completely removed and disposed of. Frames and grates shall be removed and disposed of.

Frames and covers of existing sewer manholes shall be adjusted to grade, as shown on the plans.

#### **10-4.04 TEMPORARY SEWER SYSTEM**

The Contractor shall provide all necessary equipment, manpower and resources to provide a safe and reliable temporary sewer system on a 24 hour basis during construction and testing. The temporary sewer shall divert the entire domestic wastewater flow which can consist of rags, towels, sheets, grease, food waste, fecal material, etc.

The Contractor shall design the temporary sewer system. Two sets of working drawings shall be submitted for approval to the Engineer for review. The submittal shall include design drawings, installation procedures and description of operation. The working drawings shall be signed by an Engineer who is registered as a Civil Engineer in the State of California.

Attention is directed to Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications.

The Contractor shall reconnect any active side sewers encountered during replacement of the existing sewer main by the end of each working day.

The Contractor shall be responsible for any damage and cost of repair caused to private or public property from the failure or problems of the temporary sewer system installation or operation. The Contractor shall remove the temporary sewer system at the completion of the project to the satisfaction of the Engineer.

#### **10-4.05 PIPING AND APPURTENANCES**

##### **Contractor Submittals**

Manufacturer's Data. Manufacturer's data, complete with material grade, and class for all pipe, fittings, and couplings and for all joints, and appurtenances and such other data as may be requested by the Engineer shall be submitted for approval. Detailed catalog and engineering data sheets shall be submitted for all components such as flexible couplings, rubber gaskets, and joints, and a proposed schedule for delivering and installing the piping shall be included. Expansion joint submittal shall include a leak-proof certificate and expansion joint's preset dimension for each installation.

Installation Procedure. The installation drawings shall be supplemented with a set of written procedures for performing the field piping installation. The procedures shall cover in detail the preparation and making of the push-on joints and couplings.

Testing Procedures. Procedures for testing the piping, and arrangements for obtaining and disposing of water for the tests shall be fully described. The equipment for testing shall be itemized. Details of bulkheads, flanges, or caps for the testing of the pipe shall be included with the submittals.

Manufacturer's warranties and guarantees for materials or equipment as listed in the product data paragraph shall be delivered to the Engineer at the job site prior to acceptance of the contract.

##### **Product Handling, Delivery And Storage**

General. Pipe shall be handled at all times with equipment designed to prevent damage to the pipe materials. Pipe shall only be handled with wide canvas or rubber covered slings. Bare cables, chains, hooks, or metal bars shall not be allowed to come in contact with the pipe. Pipe slings used during handling and tie-down straps used during transit shall be a minimum

100-millimeters wide flat fiber or plastic straps. Pipes shall be placed on saddles or a support system approved by the Engineer, to prevent damage to barrel and bell during transit and storage.

Shipping. During shipping, all chains, cables, and hold-down equipment shall be carefully padded where in contact with the pipe.

Unloading. Pipe shall be unloaded using slings as indicated above. Pipes shall be unloaded using a crane or forklift and not allowed to fall.

Gaskets. Gaskets shall be stored in containers or wrappers which will protect them from ozone and other atmospheric deterioration. Gaskets, gasket lubricant, bolts, and joining materials shall be delivered in separate, clearly marked boxes.

### **Products General**

General Requirements. All pipe, fittings, couplings, and appurtenant items shall be new, free from defects and contamination, and wherever possible, shall be the standard product of the manufacturer. All components shall be furnished in strength or thickness classes as specified or shown. Unless otherwise indicated the size shown shall be the nominal pipe diameter. All pipe shall be furnished in standard length, unless otherwise shown.

### **10-4.06 MATERIALS**

Pipe shall be clearly marked with type, class, and thickness. Lettering shall be legible and permanent under normal conditions of handling and storage. If the quality of the pipe is such that more the 25 percent of any lot delivered to the jobsite becomes subject to rejection, as determined by the Engineer, the entire lot shall be rejected and removed from the jobsite, at the expense of the Contractor.

**Concrete.**--Concrete materials shall conform to the provisions in Section 90, "Portland Cement Concrete," and Section 51, "Concrete Structures," of the Standard Specifications and these special provisions. Concrete for sewer manholes shall be Class 2 unless otherwise shown on the plans.

**Reinforcement.**--Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

**Miscellaneous Iron And Steel.**--Miscellaneous iron and steel items shall conform to the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

Manhole frame and covers shall be cast iron conforming to ASTM A 48, Class 30.

Frames and covers shall be coated with a commercial quality bituminous coating or painted with a standard protective coating as recommended by the manufacturer.

**Vitrified Clay Sewer Pipe.**--Clay bell and spigot sewer pipe and fittings shall conform to the specifications for extra strength, unglazed vitrified clay pipe of ASTM Designation: C 700-78. Vitrified clay pipe shall be first quality bell and spigot type.

The ends of the pipe shall be so formed that, when the pipes are laid together and jointed, the pipe will form a continuous line with a smooth interior surface.

Clay sewer pipe shall conform to the absorption requirements of ASTM Designation: C 700.

Ells, tees, reducing tees, wyes, couplings, increasers, crosses, transitions and end caps shall be of the same type and class of materials as the pipe, or of material having equal physical and chemical properties.

Vitrified clay pipe shall be furnished with compression joints such as "Wedge-Lock", "Speed-Seal," or equal. The joint on the spigot and bell ends of the pipe shall be factory-made of plasticized compound bonded to the pipe and molded and cured to a uniform hardness and compressibility to form a tight compression coupling when assembled. Compression joints for vitrified clay pipe and fittings shall be factory manufactured in accordance with ASTM Designation: C 425.

**Banded Rubber Couplings.**--Banded rubber coupling used to connect new pipe to existing pipe shall be band seal adjustable repair couplings (or equal) completed by a flexible coupling consisting of a neoprene gasket and stainless steel shear ring.

**Tracer Tape.**--The pipe shall be marked with warning tape. Warning tape shall be 150 mm wide, green plastic coated metallic tape with the words "CAUTION BURIED SEWER LINE BELOW" printed on each side. The tape shall be a minimum of 0.14 mm thick and have an aluminum foil center. Minimum tensile strength shall be 35 MPa.

**Precast Concrete Manholes.**--Precast concrete sections shall be inspected when delivered to the job site. Cracked or defective sections will be rejected and removed from the job-site. Precast Materials such as the Eccentric Cone, and Riser Sections shall conform to ASTM C478. The cone and riser sections shall have Rubber Gasketed Joints conforming to

ASTM C443 Manhole waterstops shall be manufactured of elastomeric plastic. The waterstops shall be corrosion, acid and alkali resistant and suitable for use in wastewater. The waterstop shall be used when grouting sewer line penetrations of existing manholes or installation in new manholes as shown on the plans.

**Watertight Caulking.**—Watertight caulking for pipe penetrations in precast manhole assemblies shall be polyurethane sealant conforming to the requirements for polyurethane sealant in Section 51-1.12F(3), “Materials and Installation,” (a) type A and AL seal, of the Standard Specifications for flow-type sealant which provides non-sag properties for use in overhead or sloping joints.

Back-up performed joint filler shall be impervious, compatible, compressible foam material recommended for retaining sealant depth in expansion joints while curing. Bituminous or oil saturated material shall not be used.

Bond breakers shall be polyethylene tape or as recommended by the sealant manufacturer to prevent adherence of sealant to back-up material.

**Penetrations.**—Pipes penetrating precast concrete structures shall be cast-in-place or grouted in place with non-shrink grout. Cold joints shall be tightly caulked between pipe and grout or pipe and concrete at the interior (liquid bearing) surface to provide a leak-free installation.

**Pipe To Manhole Flexible Couplings.**—Pipe to manhole flexible couplings shall consist of a flexible connector designed to produce a positive, watertight connection for pipes entering precast manholes and other concrete structures.

The connector shall conform to the requirements of ASTM Designation: C 923M (ASTM C 923). The flexible connector seal shall be made by mechanical means or by compression of the resilient material against the inside of the pipe. The connector shall withstand 70 kPa (7.1 m) of hydrostatic pressure and be capable of sustaining an axial deflection of at least 7 degrees in any direction. The test methods shall be in conformance with the requirements of ASTM Designation: C 923M (ASTM C 923), Section 7.

The gaskets shall be manufactured from a synthetic elastomer and shall contain not less than 50 percent by volume of first-grade synthetic rubber. Rubber gaskets shall be molded or extruded and cured in such a manner that any cross-section shall be dense, homogeneous and free of porosity blisters, pitting and other imperfections. The gaskets shall comply with the requirements of ASTM Designation: C 923M (ASTM: C 923) (Table 1), except chemical resistance will be tested in accordance with Section 210-2.3.3 of the Standard Specifications for Public Works Construction. Metal components shall be fabricated from AISI Type 316 stainless steel for all bands and nuts and bolts shall be AISI Type 305 stainless steel. Gaskets shall conform with the installation time requirements in Section 208-1.2 of the Standard Specifications for Public Works Construction.

A minimum of one performance test of the connector shall be made when the manhole producer begins using a pipe to manhole connector system. The test methods and requirements shall be in conformance with the requirements of ASTM Designation: C 923M (ASTM 923), Section 7. The connector shall be clearly marked by the manufacturer with his trade name and size designation or part number. The trade name and size designation or part number shall be visible on the gasket when installed in the manhole.

The flexible connector shall be installed in accordance with the manufacturer’s recommendations. Foreign materials shall be removed from the connector and the connector shall be inspected by the Contractor for defects in the rubber or splice.

#### **10-4.07 EXCAVATION AND BACKFILL**

Excavation and backfill shall conform to the provisions in Sections 19-1.02, “Preservation of Property,” and 19-3, “Structure Excavation and Backfill,” of the Standard Specifications, these special provisions and the requirements of Section 306 of SSPCSD.

Pipeline construction shall be coordinated with roadway earthwork to prevent damage to the pipeline. Where roadway excavation and embankment work may damage pipeline, the Contractor shall prepare the rough pavement sub-grade before installing the pipeline.

The pipe shall be installed in a trench excavated to the lines and grades shown on the plans and as directed by the Engineer. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the barrel. The width of the trench shall not be less than 457 mm nor more than 914 mm greater than the outside diameter of the barrel of the pipe to be laid therein. Where shoring is required, this width shall be increased by the thickness of the shoring.

Pipe may be laid in open trenches or in sections of open trenches connected by tunnels, as permitted by the Engineer.

Suitable excavation shall be made to receive the bell of the pipe and the joint shall not bear upon the bottom of the trench. Adjustments to line and grade shall be made by scraping away or filling with sand, gravel or granular material under the barrel of the pipe and not by wedging or blocking.

Care shall be taken to have all fire hydrants and gate valves on water mains accessible at all times. The Contractor shall not obstruct the drainage of any street or alley, and shall use proper means to provide for the free passage of surface water along the gutters into storm water inlets. The Contractor shall provide channels where necessary, acceptable to the Engineer.

The Contractor shall cooperate with the owners and tenants of the private property through which the right-of-way extends. The Contractor shall be liable for all damages suffered by owners or tenants resulting from the Contractor's negligence or lack of cooperation.

The Contractor shall excavate to approximate bottoms and trim to lines and elevations in manner specified in "Embedment (Bedding And Initial Backfill)" of this special provision. Embedment shall begin at final trimmed trench elevation and end 457 mm above the top of the pipe or component. Backfill shall begin 457 mm above pipe or component. Manual methods of compaction of embedment and backfill materials in areas adjacent to buried construction and utilities shall be used to avoid damage or unscheduled service interruption. Trench width or embankment conditions shall be limited to preclude excessive earth loads on installed piping system.

Supports required by the Trench Excavation Safety Plans shall be removed after construction is completed, unless otherwise directed by the Engineer, and shall be withdrawn in a manner that will prevent the caving of the sides of the excavation. Openings caused by the removal of supports shall be filled with a suitable, properly compacted material.

**Embedment (Bedding And Initial Backfill).**—The Contractor shall trim rough trenches to subgrade and provide embedment as indicated on the plans for the full width of the trench. Bedding shall be shaped to provide full length barrel support and to prevent point loading at pipe joints. bedding shall be carefully placed under pipe haunches. No ponding and jetting will be allowed.

The base shall be hand graded to proper grade prior to pipe laying. The base shall provide a firm, unyielding support along entire pipe length. The top of the base to the bottom of the pipe shall be graded ahead of pipe laying for the full width of the trench.

Bell holes at each joint shall be excavated to permit proper assembly and inspection of entire joint.

Attention shall be given to the area of the pipe bedding from the flow line to the centerline of the pipe to ensure that firm support is obtained to prevent any lateral movement of the pipe during final backfilling.

The area of the pipe bedding from the bottom of the trench to the springline of the pipe shall be backfilled with trench bedding material. The material around the pipe shall be placed in 100 mm layers and thoroughly tamped with approved tamping sticks supplemented by "walking in" and slicing with a shovel. The area of the pipe zone from the springline to a point 457 mm above the top outside surface of the barrel of the pipe shall be backfilled with trench bedding and backfill material as shown on the plans.

#### **10-4.08 PIPE INSTALLATION**

Prior to lowering pipe and fittings into the trench, the pipe and fittings shall be cleaned and visually inspected for apparent defects. Defective pipe shall be promptly removed from the site. Pipe shall be protected against impact shocks during handling and shall not be allowed to free fall. Pipe damaged before placement shall not be used, and shall be replaced by new pipe and fittings shall be carefully lowered into the trench with suitable tools or equipment to prevent damage to the pipe, lining, coating, fitting or other appurtenances. Excavations shall be maintained dry and clear of water and extraneous materials.

Unless otherwise approved by the Engineer, the laying of the pipe shall commence at the lowest point of the project, with the spigot ends abutting and pointing in the direction of the flow. The joints shall be carefully centered so that when laid to proper grade and alignment as designated on the plans, they will form a sewer with a uniform invert.

Pipes and fittings shall be laid accurately to the lines and grades given by the Engineer, with joints closed and even, abutting all around. Care shall be taken that there is no sagging of the spigot end in the hub and that a true surface is given to the invert throughout the entire length of the sewer.

The foundation for the pipe shall be free of all grade irregularities and bell holes shall be provided for all sizes of pipe. Joints of previously laid pipe shall not be disturbed.

Where existing sewer pipe is embedded in an underground concrete structure, joints capable of absorbing movement without leakage shall be provided, within the specified distances of the exterior surface of the structure as shown on the plans.

Elastomer joints shall be cleaned and lubricated prior to assembly. Recessed gaskets shall be checked with feeler gages. If any previous length of pipe is moved or disturbed so as to break any joint, the joint shall be repaired or the pipe replaced as determined by the Engineer.

Whenever work ceases for any reason, open ends of pipes shall be securely closed with a tight fitting plug or cover to prevent the admission of foreign matter. Plugs shall be commercially manufactured products. Plugs shall not be removed unless or until the trench is dry.

Joints shall be cleaned then sealed with the type of materials specified or required by the Engineer. Sealing materials shall be protected from air and sun to prevent deterioration.

Joints shall be carefully cleaned on the inside. Stoppers for pipes and branches left unconnected shall be made of the same material as the pipe or of resilient joint material conforming to the requirements of ASTM Designation: C 425. The stopper shall be covered with a layer of sealant after placing. The sealant shall be sufficiently fluid to insure free flow around the stopper.

The pipe shall be laid in a trench excavated to the lines and grades shown on the plans and as designated by the Engineer. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel. When bell-end pipe is used, suitable excavation shall be made so the bell portion of the pipe will not bear on the bottom of the trench. All adjustment to line and grade shall be made by scraping away or filling with bedding (sand equivalent of 30) under the body of the pipe and not by wedging or blocking. Trenches shall not be left open farther than 60 m in advance of pipe laying operations or 60 m to the rear thereof, unless otherwise permitted by the Engineer.

Pipe may be laid in open trenches or in sections of open trenches connected by tunnels, as permitted by the Engineer. The length of the tunnel shall not exceed the depth of cut, except that if the depth of the cut is over 6.1 m, the pipe may be laid in a continuous tunnel. Tunnels shall be driven from shafts at the locations of manholes or at other locations approved by the Engineer. Tunnels shall have a height of not less than 600 mm above the top of the sewer to allow proper workmanship. When bell-end pipe is used, suitable excavation shall be made so the bell portion of the pipe will not bear on the bottom of the tunnel. Continuous tunnels shall be completely backfilled as soon as the sewer pipe is laid and the joint material has properly set. The backfilling may be done by air-blown methods provided the required compaction as specified in Section 19-3.06, "Structure Backfill," of the Standard Specifications is obtained, or it shall be rammed with proper tools until compacted the required amount.

All supports required by the Trench Excavation Safety Plans shall be removed after construction is completed, unless otherwise directed by the Engineer, and shall be withdrawn in a manner that will prevent the caving of the sides of the excavation. Openings caused by the removal of supports shall be filled with suitable material and properly compacted.

#### **10-4.09 SEWER MANHOLES**

New and modified existing manholes for sewers shall be constructed in accordance with the details shown on the plans, as specified in these special provisions and the Standard Specifications and as directed by the Engineer.

The Contractor shall have the option of constructing manholes of precast concrete or cast-in-place concrete.

Attention is directed to "Materials," of this special provision for precast concrete manhole materials requirements.

The inside bottoms of existing manholes, where new connections are made, and of new manholes shall be shaped to provide channels conforming to the size and shape of the lower portion of the inlets and outlets of the manholes. The channels shall vary uniformly in size and shape from inlet to outlet.

The bell of a pipe shall not be built into the wall of a manhole.

The cover or grating of a manhole shall not be grouted to final grade until the final elevation of the pavement, gutter, ditch or sidewalk in which it is to be constructed has been established, and until approved by the Engineer. Covers shall be seated properly to prevent rocking.

If a pipe enters the manhole through the precast concrete units, the Contractor shall make the necessary cut through the manhole wall and steel mesh. The steel shall be cut flush with the face of the concrete and shall be cut in such a manner that it will not loosen the reinforcement in the manhole wall.

The ends of pipes shall be trimmed flush with the inside walls.

Rubber gaskets or flexible plastic gaskets may be used in tongue and groove joints of precast units. Joints between precast manhole units used for sanitary sewers shall be rubber gasketed. Other joints and all openings cut through the walls shall be grouted and watertight.

Handling of the precast units after the gasket has been affixed shall be done to avoid disturbing or damaging the gasket or contaminating it with foreign material. Care shall be exercised to attain proper alignment before the joints are fully seated. During insertion of the tongue or spigot, the units shall be partially supported to minimize unequal lateral pressure on the gasket and to maintain concentricity until the gasket is properly positioned.

Backfilling will not be allowed until the concrete or mortar has thoroughly set.

Drainage inlet, grate inlet, and drop inlet connections to the sewer shall be placed so the connecting pipe may be easily rodded over its entire length. After the connections are made, the Contractor shall rod all inlet and outlet pipes. All connections that cannot be successfully rodded shall be removed and new connections made.

Backfilling of manholes shall conform to the requirements of Section 19, "Earthwork," of the Standard Specifications.

Manholes shall be constructed on a compacted or undisturbed level foundation. A grout pad shall be placed to attain full bearing for precast units if deemed necessary by the Engineer. Upon final acceptance of the work, manholes and other drainage structures shall be open, clean, and free draining.

When connecting a sewer pipe to an existing manhole, the connection shall be in accordance with the requirements for new construction. Care shall be taken not to damage (crack) the concrete manhole base. If the Contractor damages the concrete base, as determined by the Engineer, the contractor shall, at the Contractor's expense, remove and discard the damaged concrete base and form a new concrete base in accordance with the requirements for new construction.

Manhole rings, tops and cones shall be reinforced conforming to AASHTO H-20 highway loading and shall conform to the plans, the requirements of ASTM C-478 and the following:

Manhole rings shall be centrifugally spun or compactly vibrated in forms.

Manhole tops and cones shall be compactly vibrated in forms.

Watertight gasket seals shall be installed at mating joints of precast concrete sections in high water table locations. Gaskets shall be sized to suit the dimensions and surface conditions. Compressible, closed-cell neoprene rods with a compactible bonding agent or non-bituminous joint sealing compressible gaskets shall be used.

#### **10-4.10 FLUSHING WORK**

The Contractor shall provide temporary and permanent piping, equipment, and materials required for flushing work and shall coordinate cleaning of connections to existing systems with the Engineer.

If equipment and piping systems are not properly cleaned and flushed, the Contractor shall be responsible for resultant damage, necessary cleaning and flushing of systems to which the connection was made, and subsequent inspection at no additional cost to the State

Settled debris and dirt in manholes shall be cleaned after the flushing operation.

Flushing water shall be disposed of per governing codes and regulations and as directed by the Engineer. The Contractor shall provide the necessary equipment and labor to properly dispose of the flushing water.

#### **10-4.11 CLEANING GRAVITY LINES**

New sanitary sewer lines and sewer lines at least 150 m downstream to the closest manhole shall be cleaned by means of a pneumatic sewer cleaning ball and/or hydroflushing as directed by the Engineer. The sewer ball shall be of the Wayne type or approved equal. The sewer ball shall be the appropriate size to fit flush with the inside diameter of the sewer main to be cleaned. The cleaning ball shall be introduced into the sewer at the uppermost manhole and passed down grade by a line with a sufficient head of water to carry the ball slowly along the inside of the pipe. Where sewer balls will not pass through the sewer, the cleaning ball shall be removed and the obstruction removed.

The Contractor shall remove and properly dispose of all debris collected during the cleaning operation.

#### **10-4.12 SEWER PIPE TESTING REQUIREMENTS**

Prior to acceptance, the sewer piping system shall be tested prior to finish grading in the presence of the Engineer. Backfill or provide supports shall be provided as necessary to prevent movement of the pipe.

The Contractor shall provide necessary equipment and materials and make necessary test connections required to properly execute tests.

The Contractor shall prepare and maintain records of piping systems tests. The records shall include State and Contractor personnel responsibilities, dates, test gage identification numbers, ambient temperature, pressure ranges, rates of pressure drop and leakage rates.

Air from air release valves and system high points shall be bled off.

In the event testing demonstrates leakage rates in excess of specified limits, the Contractor shall determine source(s) of leakage, repair or replace defective materials and workmanship and retest installation until compliance with specified requirements is met.

Testing of temporary sewer line shall not be required.

Other gravity lines shall be air tested between subgrade preparation time and before final grading. The air testing shall be conducted for the section of sewer installed each day and after connection of side sewers. Each side sewer shall be blocked with an Engineer approved temporary removable plug just upstream of the new to existing side sewer joint.

The test shall be done in the presence of the Engineer in accordance with the following procedure:

1. Immediately prior to testing, the sewer line shall be cleaned and test plugs properly installed at each end of the section of line to be tested.
2. When all necessary test equipment is in place, a compressed air supply shall be attached to the air fitting on the test equipment and the air pressure within the line shall be increased to 27,600 Pa gauge.
3. After an internal pressure of 27,600 Pa gauge is obtained, the Contractor shall allow at least 2 minutes for air temperature to stabilize, adding only the amount of air required to maintain the specified pressure.
4. After the 2-minute period, the Contractor shall disconnect the air supply.

5. The Engineer shall observe the pressure gauge connected to the sewer line being tested and when the pressure decreases to 24,200 Pa, the Engineer will start a stop watch and stop the stop watch when the pressure gauge reaches 17,300 Pa for VCP.

6. The pipe test section shall be considered to pass the air test if the time required for the pressure to decrease from 24,200 Pa to 17,300 PA for VCP is **not** less than the minimum holding time shown on the following charts for respective size, kind and length of pipe.

7. If the pipe installation fails to meet these requirements, the Contractor shall determine the source or sources of leakage and shall repair or replace all defective materials or workmanship. The repaired pipe installation shall meet the requirements of this test.

8. The Contractor shall correct, stop or otherwise remedy apparent individual leaks in the section of the sewer line being tested, even if such leakage is within the allowable maximum.

9. The test shall include side lateral sewers within public streets.

The air test as noted above is considered the "official test". However, preliminary air testing is recommended and may be conducted by the Contractor at any time prior to the "official test".

**VCP, ONLY**

| Diameter Of Pipe | Length of Line (m) | Minimum Holding Time (Min:Sec) |
|------------------|--------------------|--------------------------------|
| 200              | 0 to 52            | 2:00                           |
| 200              | 52 to 64           | 2:30                           |
| 200              | 64 to 76           | 3:00                           |
| 200              | 76 to 89           | 3:30                           |
| 200              | 89 or greater      | 3:45                           |

**NOTE:**

If the section of sewer to be tested is composed of both a main and more than 30 m of total side sewer, add 2 minutes to the length of test required for the VCP main only.

Testing equipment shall be set up so that test gages are at ground level during testing.

Temporary sewer system shall be in place during testing of the section of sewer.

**10-4.13 TRENCH RESURFACING**

Trenches in existing streets or paved areas shall be resurfaced with the type and thickness of bases, surfacing or pavement shown on the plans or designated by the Engineer. In no case shall the thickness of trench resurfacing be less than 100 mm. The Contractor shall immediately to resurface any part of any excavation upon notice from the Engineer without waiting for completion of the full length of the sewer.

On completion of trenching, pipe laying, testing and backfill, the contractor shall restore all lawn, landscaping, unimproved surfaces, pavement, sidewalks, driveways and curbs to their original condition or better within 7 days of completion of the sewer installation. The Engineer's decision on the comparative preconstruction and postconstruction conditions of the damaged improvements shall be final.

All restoration work shall be in accordance with the SSPCSD and the following:

Lawns—Damaged lawns shall be restored with healthy, imported sod of commercial quality to match the existing lawn.

Landscaping—Fences, retaining walls, borders, posts, statues, rocks gravel, bricks, patios, etc., damaged during installation of sewer and appurtenances shall be restored. The Contractor may reuse existing materials as approved by the Engineer.

Unimproved areas—The Contractor shall restore unimproved areas to original grade. Unimproved areas shall be seeded, fertilized and watered in accordance with the seed manufacturer's recommendations for 2 weeks. Seed shall be of a popular commercial grade approved by the Engineer.

**10-4.14 MEASUREMENT**

Sewer work performed under these special provisions will be designated in the contract item by size, type, thickness, quality, or whatever information is necessary for identification.

The lengths of the various types of sewer pipe to be paid for by the meter will be the slope length as shown on the plans or as designated by the Engineer. Pipe placed in excess of the length designated will not be paid for, unless pipes are cut to fit a structure. When pipes are cut to fit a structure, the quantity to be paid for will be the length of pipe placed before cutting, measured in 0.6 m increments. Pipe bends, wyes, tees and other branches will be measured by the meter for the sizes of pipes involved. Bends will be measured along center lines. Wyes, tees and other branches will be measured along center lines to the point of intersections.

Quantities of sewer manholes will be determined as units from actual count.

New frames and covers required by the plans will be measured and paid for as units. A frame and cover together will be considered as a single unit.

#### **10-4.15 PAYMENT**

The contract prices per meter for the various sizes and types of sewer pipe, the contract unit prices for manholes; and the contract unit price for sewer manhole frames and covers shall include full compensation for furnishing all labor, tools, equipment and incidentals, and for doing all the work involved in constructing the sewer facilities, 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 structure excavation, structure backfill, imported bedding material placement, bar reinforcement, various types of pavement surfacing and bases, providing temporary sewer system, tunneling and jacking of pipe, capping open ends of pipe, joining of pipe to other pipe or structure, shaping bottoms of existing and new manholes, remodeling manhole bases, utility support and protective work operations required to accommodate or safeguard public traffic, testing, flushing, and cleaning the sewer line, furnishing and disposing of water used for testing and flushing work and cleaning gravity lines and other incidental work and material required to construct the sewer system shall be considered as included in the prices paid for the various contract items of sewer work involved and no additional compensation will be allowed therefor.

The above prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing sewers, complete in place, as shown on the plans, and as specified in the specifications and these special provisions, and as directed by the Engineer.

### **SECTION 11. MODIFIED STANDARD SPECIFICATION SECTIONS**

#### **SECTION 11-1. QUALITY CONTROL / QUALITY ASSURANCE**

Asphalt concrete shall conform to the provisions in this Section 11-1, "Quality Control / Quality Assurance," and the section entitled "Asphalt Concrete" in Section 10-1, "General," of these special provisions. Section 39, "Asphalt Concrete," of the Standard Specifications shall not apply to Type A and Type B asphalt concrete.

#### **SECTION 39: ASPHALT CONCRETE**

##### **39-1 GENERAL**

##### **39-1.01 DESCRIPTION**

This work shall consist of furnishing and mixing aggregate and asphalt binder at a central mixing plant, transporting, spreading and compacting the mixture, and furnishing and placing pavement reinforcing fabric, in conformance with this Section 11-1, "Quality Control / Quality Assurance," and with "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

The Contractor shall be responsible for controlling the quality of the asphalt concrete product entering the work, including aggregate, asphalt binder, additives, and asphalt concrete mixture; for controlling the quality of the work performed, including mix design, and mixing, transporting, spreading, and compacting the asphalt concrete; for controlling the quality of the finished roadway surface; and for developing, implementing, and maintaining a quality control program. The Contractor shall be responsible for the inspection, sampling, and testing required to control the quality of the asphalt concrete and the work performed.

The inspection, sampling, and testing required to control the quality of the workmanship and the asphalt concrete shall conform to this Section 11-1. Sampling shall be in conformance with the requirements of this Section 11-1 and with California Test 125. Testing shall be performed using California Tests unless otherwise directed by the Engineer or this Section 11-1.

Asphalt concrete is designated as Type A or Type B. The type of asphalt concrete will be shown on the plans or specified in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

## 39-2 MATERIALS

### 39-2.01 ASPHALTS

Asphalt binder to be mixed with aggregate shall be steam-refined paving asphalt conforming to the provisions in Section 92, "Asphalts," of the Standard Specifications. Asphalt binder shall be Grade AR-4000 unless the grade is designated in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

Liquid asphalt for prime coat shall conform to the provisions in Section 93, "Liquid Asphalts," of the Standard Specifications and shall be the grade designated by the contract item or conform to the provisions in "Asphalt Concrete," in Section 10-1, "General," of these special provisions.

Asphalt emulsion for paint binder (tack coat) shall conform to the provisions in Section 94, "Asphaltic Emulsions," of the Standard Specifications for the rapid-setting or slow-setting type and grade approved by the Engineer.

Paving asphalt to be used as a binder for pavement reinforcing fabric shall be a steam-refined paving asphalt conforming to the provisions in Section 92, "Asphalts," of the Standard Specifications, and shall be Grade AR-4000, unless otherwise ordered by the Engineer or designated in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

### 39-2.02 AGGREGATE

Aggregate and combined aggregate shall conform to the quality and gradation provisions in this Section 11-1, "Quality Control / Quality Assurance," for the asphalt concrete types and sizes conforming to the provisions in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

Aggregates shall be clean and free from decomposed or organic materials and other deleterious substances. Coarse aggregate is material retained on the 4.75-mm sieve, fine aggregate is material passing the 4.75-mm sieve, and supplemental fine aggregate is added fine material passing the 600- $\mu$ m sieve, including, but not limited to, cement and stored fines from dust collectors.

The target value for the percent passing each designated sieve size for the aggregate blend used in the proposed asphalt concrete mix design shall fall within the "Target Value Limits" of the following table:

Table 39-1 - AGGREGATE GRADATION  
Type A and Type B Asphalt Concrete  
Percentage Passing

| 19-mm Maximum, Coarse |                     | 19-mm Maximum, Medium |                     |
|-----------------------|---------------------|-----------------------|---------------------|
| Sieve Sizes           | Target Value Limits | Sieve Sizes           | Target Value Limits |
| 25-mm                 | 100                 | 25-mm                 | 100                 |
| 19-mm                 | 90-100              | 19-mm                 | 90-100              |
| 9.5-mm                | 60-75               | 9.5-mm                | 65-80               |
| 4.75-mm               | 45-50               | 4.75-mm               | 49-54               |
| 2.36-mm               | 32-36               | 2.36-mm               | 36-40               |
| 600- $\mu$ m          | 15-18               | 600- $\mu$ m          | 18-21               |
| 75- $\mu$ m           | 3-7                 | 75- $\mu$ m           | 3-8                 |

| 12.5-mm Maximum, Coarse |                     | 12.5-mm Maximum, Medium |                     |
|-------------------------|---------------------|-------------------------|---------------------|
| Sieve Sizes             | Target Value Limits | Sieve Sizes             | Target Value Limits |
| 19-mm                   | 100                 | 19-mm                   | 100                 |
| 12.5-mm                 | 95-100              | 12.5-mm                 | 95-100              |
| 9.5-mm                  | 75-90               | 9.5-mm                  | 80-95               |
| 4.75-mm                 | 55-61               | 4.75-mm                 | 59-66               |
| 2.36-mm                 | 40-45               | 2.36-mm                 | 43-49               |
| 600- $\mu$ m            | 20-25               | 600- $\mu$ m            | 22-27               |
| 75- $\mu$ m             | 3-7                 | 75- $\mu$ m             | 3-8                 |

During asphalt concrete production, aggregate gradation shall be within the limits specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. Conformance with the grading requirements shall be determined by California Test 202, modified by California Test 105, when there is a difference in specific gravity of 0.2 or more between the coarse and fine portions of the aggregate or between the blends of the different aggregates. The percent passing the 75- $\mu$ m sieve shall be reported to the first decimal place (tenths).

The combined aggregate shall conform to the following quality requirements prior to the addition of the asphalt binder:

Table 39-2 - AGGREGATE QUALITY REQUIREMENTS

| Quality  | California Test | Asphalt Concrete |        |
|--|-----------------|------------------|--------|
|  |                 | Type A           | Type B |
| Percent of Crushed Particles                                 | 205             |                  |        |
| Coarse Aggregate (Min.)                                      |                 | 90%              | 25%    |
| Fine Aggregate (Passing 4.75-mm, Retained on 2.36-mm) (Min.) |                 | 70%              | 20%    |
| Los Angeles Rattler  | 211             |                  |        |
| Loss at 100 Rev. (Max.)                                      |                 | 12%              |        |
| Loss at 500 Rev. (Max.)                                      |                 | 45%              | 50%    |
| Sand Equivalent (Min.) <sup>1</sup>                          | 217             | 47               | 42     |
| Kc Factor (Max.)   | 303             | 1.7              | 1.7    |
| Kf Factor (Max.)   | 303             | 1.7              | 1.7    |

Note:

1. Reported value shall be the average of 3 tests split from a single sample.

### 39-2.03 ASPHALT CONCRETE MIXTURE

The asphalt concrete mixture, composed of the proposed aggregate blend and the proposed asphalt binder content as determined by California Test 367, shall conform to the following requirements:

Table 39-3 - ASPHALT CONCRETE MIXTURE REQUIREMENTS

| Design Parameters  | California Test    | Asphalt Concrete Type and Location |                  |                          |                  |
|--|--------------------|------------------------------------|------------------|--------------------------|------------------|
|  |                    | Coast and Valley                   |                  | Desert<br>(per Engineer) |                  |
|  |                    | Type A                             | Type B           | Type A                   | Type B           |
| Hveem Stabilometer Value (Min.)                                    | 367 <sup>1,2</sup> | 37                                 | 35               | 37                       | 35               |
| Percent air voids (Mix Design)<br>(Start-Up Production Evaluation) | 367 <sup>1</sup>   | 3-5 <sup>3</sup>                   | 3-5 <sup>3</sup> | 4-6 <sup>4</sup>         | 4-6 <sup>4</sup> |
| Swell <sup>5</sup> (mm) (Max)                                      | 305                | 0.76                               | 0.76             | 0.76                     | 0.76             |

Notes:

1. Reported value shall be the average of 3 tests from a single split sample.
2. If the range of stability for the 3 briquettes is more than 12 points, the briquettes shall be discarded and new samples shall be fabricated.
3. Modify California Test 367, paragraph C5, to "most nearly 4%."
4. Modify California Test 367, paragraph C5, to "most nearly 5%."
5. Measured at Mix Design only.

During production and placement, the asphalt concrete mixture shall conform to the requirements of Table 39-4, "Minimum Process Control Requirements," and Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. Changes in cold feed or hot bin proportions to conform to the aggregate grading requirements shall not be considered changes in the mix design.

Whenever asphalt concrete production has been suspended for longer than 30 days, the Contractor, on the first day of resumption of production, shall sample and test the asphalt concrete to demonstrate conformance with the requirements of Table 39-3, "Asphalt Concrete Mixture Requirements," Table 39-4, "Minimum Process Control Requirements," and Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1.

The target value for asphalt content may be changed by as much as  $\pm 0.2$  percent during the production start-up evaluation specified in Section 39-10.02A, "Production Start-Up Evaluation," of this Section 11-1 or after production start-up evaluation and before the first day of regular production with the Engineer's approval. The Contractor shall demonstrate that asphalt concrete that has been produced through the plant using the modified target value for asphalt content is in conformance with this Section 11-1 by submitting test results for samples obtained from the first 500 tonnes of production. Stability and percent air voids shall be determined using 3 briquettes constructed from a single sample taken from 4 locations across the mat in conformance with the requirements of California Test 125.

Changes from one mix design to another shall not be made during the progress of the work, unless approved by the Engineer. Changes in asphalt content, other than those allowed during the start-up evaluation process, or in aggregate grading target values shall be considered to be a change in the asphalt concrete mixture and shall require a new mix design

proposal. Changes in the asphalt content or aggregate grading target values approved by the Engineer will not be applied retroactively for acceptance or payment.

**39-2.04 PAVEMENT REINFORCING FABRIC**

Pavement reinforcing fabric shall conform to the provisions in Section 88, "Engineering Fabrics," of the Standard Specifications.

**39-3 ASPHALT CONCRETE MIX DESIGN PROPOSAL AND REVIEW**

**39-3.01 CONTRACTOR MIX DESIGN PROPOSAL**

The Contractor shall submit for the Engineer's review a proposed asphalt concrete mix design for each asphalt concrete mixture to be used at least 14 days prior to production of that asphalt concrete mixture. The asphalt concrete mix design shall be prepared by a laboratory (or laboratories) whose proficiency has been reviewed and qualified in conformance with the Department's Quality Assurance Program. Aggregate quality and asphalt concrete mix design test results shall be no more than one year old when production of the asphalt concrete mixture starts. For projects of more than one year's duration, asphalt concrete may be produced using the asphalt concrete mix design that was reviewed and accepted at the start of the project provided the asphalt concrete mixture continues to conform to the provisions of this Section 11-1, "Quality Control / Quality Assurance."

The Contractor shall submit a mix design letter that indicates the target values proposed for gradation, asphalt content, and percent air voids. This submittal shall include test results for aggregate and asphalt mixture quality; plots of the combined gradings showing the production tolerances; plots of unit weight, stability, and percent air voids versus asphalt content for the asphalt contents considered in the design process. In addition, this submittal shall include test results for stability, percent air voids, and swell for 3 briquettes constructed using the submitted aggregate and asphalt blended at the proposed target values for each asphalt concrete mixture to be used.

The Contractor shall submit the following for each asphalt concrete mixture proposed:

A. Aggregate and mineral filler:

1. Target values for percent passing each sieve size for the aggregate blend;
2. Results of tests for aggregate quality requirements;
3. Source of each aggregate to be used including producer, location, and California Mine Identification number;
4. Percentage of each aggregate stockpile, cold feed or hot bin to be used;
5. Gradation of each aggregate stockpile, cold feed or hot bin to be used; and
6. Samples that are representative of the aggregate to be used. Minimum sample sizes shall be as follows:

|   |
|---|
| 60 kg of each coarse aggregate;           |
| 40 kg of each fine aggregate; and         |
| 5 kg of each supplemental fine aggregate. |

B. Asphalt binder:

1. Asphalt binder source and target value;
2. Four one-liter samples of the asphalt binder;
3. Results of the asphalt binder quality tests conforming to the provisions in Section 92, "Asphalts," of the Standard Specifications; and
4. Material Safety Data Sheets.

C. Antistrip additives, when applicable:

1. A 5-kg sample of the dry additive or a one-liter sample of the liquid antistrip additive, including name of product, manufacturer, manufacturer's designation and proposed rate, location, and method of addition; and
2. Material Safety Data Sheets.

The proposed asphalt concrete mix design submittal will be considered complete only when the mix design letter, test results, plots, and samples have been received by the Engineer.

### **39-3.02 ENGINEER REVIEW OF ASPHALT CONCRETE MIX DESIGN**

The Engineer will review the proposed aggregate and asphalt concrete mixture for conformance with this Section 11-1, "Quality Control / Quality Assurance." The proposed asphalt concrete mixture will be reviewed at the proposed target values for aggregate grading and asphalt content. The Engineer will have 14 days to review each submittal of a proposed mix design. Production of asphalt concrete shall not begin until written notification has been received from the Engineer that the aggregates and proposed mix design meet the quality requirements of this Section 11-1.

The Engineer will reject a proposed asphalt concrete mixture that, during review, fails to meet the quality requirements of Table 39-2, "Aggregate Quality Requirements," and Table 39-3, "Asphalt Concrete Mixture Requirements," of this Section 11-1. The Contractor shall resubmit a mix design letter providing new test results, plots, and material samples.

Disagreements in mix design review shall be resolved in conformance with Section 39-6, "Dispute Resolution," of this Section 11-1. The Contractor shall use a mix design on the project only after the Engineer concurs that the aggregate and asphalt concrete represented by the proposed mix design conforms to the provisions of this Section 11-1.

The Engineer will review one proposed asphalt concrete mix design for each asphalt concrete type and aggregate size from each plant proposed for use on this project at the State's expense. Costs for additional reviews due to failure to conform to the quality requirements of this Section 11-1 and for reviewing other proposed asphalt concrete mix designs will be deducted from moneys due or to become due the Contractor. The cost for each review will be \$1,500. Costs for reviewing changes in a mix design that are initiated by the Engineer will be waived. Contractor's retesting due to errors in the Engineer's testing will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. Costs for reviewing mix designs not used in this project will be deducted from moneys due or to become due the Contractor.

## **39-4 CONTRACTOR QUALITY CONTROL**

### **39-4.01 GENERAL**

The Contractor shall be responsible for the quality of the asphalt concrete entering into the work and of the work performed. In addition, the Contractor shall be responsible for the quality of asphalt concrete or ingredients procured from subcontractors or vendors. A quality control system shall be established, maintained, and modified, if needed, that will provide assurance that materials and completed work conform to contract requirements.

At least 14 days prior to the start of production of asphalt concrete, the Contractor shall submit a written Quality Control Plan. At the request of the Engineer or the Contractor, the Contractor shall discuss the Quality Control Plan with the Engineer.

### **39-4.02 QUALITY CONTROL PLAN**

The Quality Control Plan shall describe the organization and procedures that will be used to administer the quality control system including the procedures used to control the production process, the procedures used to determine when changes to the production process are needed, and the procedures proposed to be used to implement the required changes. The Quality Control Plan shall meet the minimum standards set forth in the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete," available as specified in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

Asphalt concrete production and placement shall not begin until the Quality Control Plan has been approved by the Engineer. Approval of the Quality Control Plan does not imply a warranty by the Engineer that adherence to the plan will result in production of asphalt concrete that complies with this Section 11-1. It shall remain the responsibility of the Contractor to demonstrate such compliance.

The Quality Control Plan shall include the name and qualifications of a Quality Control Manager. The Quality Control Manager shall be responsible for the administration of the Quality Control Plan, including compliance with the plan and plan modifications. The Quality Control Manager shall be responsible to the Contractor, shall have the authority to make decisions concerning quality of the work or product, and shall be available to the project within less than 3 hours during paving. Except in cases of emergency and with the approval of the Engineer, the Quality Control Manager cannot be a foreman, member of the production or paving crew, an inspector or tester on this project during pavement production and placement.

The Quality Control Plan shall identify personnel, equipment and documentation required for a complete inspection, sampling and testing program. The Quality Control Plan shall include, but not be limited to, a list of inspectors, samplers and testers, their duties, their certifications if required, and their experience if no certification is required. It shall also list the name and location of laboratories that shall be providing information to the Engineer, the testers who conducted the tests and their certifications and the name of the Laboratory Quality Control Manager responsible for oversight of the testing program. It shall also show examples of the test result forms (if different from those in the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete"), the roadway and plant inspection forms, the Quality Control Manager's daily summary form, and the compliance charts. It shall include the method by which random sampling shall be determined, a list

of the testing and sampling equipment to be used and the current calibration dates and calibration charts, and copies of nuclear gauge licenses.

The Quality Control Plan shall include the name and certification of a testing consultant to be an Independent Third Party in dispute resolution. By mutual agreement during dispute resolution, the Independent Third Party may be a District Independent Assurance Sampler and Tester, the testing consultant or both. The proficiency of the testing consultant shall be reviewed and certified in conformance with the requirements of the Department's Quality Assurance Program before the test consultant participates in dispute resolution. Attention is directed to Section 39-6, "Dispute Resolution," of this Section 11-1.

The Quality Control Plan may be modified as work progresses. A supplement shall be submitted whenever there are changes to quality control procedures or personnel. Asphalt concrete production and placement shall not resume or continue until revisions to the Quality Control Plan or quality control personnel have been approved by the Engineer.

### **39-4.03 CONTRACTOR QUALITY CONTROL INSPECTION, SAMPLING, AND TESTING**

The Contractor shall perform process and quality control sampling and testing, provide inspection, and exercise management control to ensure that asphalt concrete production and placement conforms to the provisions of this Section 11-1. Staffing for process and quality control shall meet the minimum requirements outlined in the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete."

Process and quality control, sampling, testing, and inspection shall be provided during the asphalt concrete work. Sampling, testing, and inspection shall be performed at a rate sufficient to ensure that asphalt concrete conforms to the provisions of this Section 11-1.

A roadway inspector shall be provided while asphalt concrete paving operations are in progress. The roadway inspector shall ensure that asphalt concrete placement conforms to industry standards and to the spreading, compacting, and finishing requirements of this Section 11-1, "Quality Control / Quality Assurance." Plant inspection shall be performed as necessary to maintain control of the asphalt concrete production.

Minimum sampling and testing requirements for process and quality control are specified in Table 39-4, "Minimum Process Control Requirements," and Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. Sampling shall be statistically based and random.

During production start-up evaluation, the Contractor shall sample and test in conformance with the provisions in Section 39-10.02A, "Production Start-Up Evaluation," of this Section 11-1.

A testing laboratory and personnel shall be provided for the performance of process and quality control testing. The Engineer shall have unrestricted access to mix design, sampling, and testing.

The proficiency of testing laboratories and sampling and testing personnel shall be reviewed, qualified, and certified by the Department's Independent Assurance Sampler and Tester before providing services to the project. Inspectors shall meet the standards set forth in the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete."

### **39-4.04 CONTRACTOR PROCESS CONTROL**

Process control sampling and testing shall be performed and control shall be exercised to ensure that asphalt concrete production conforms with this Section 11-1.

Minimum process control sampling and testing shall be performed in compliance with the following:

Table 39-4 - MINIMUM PROCESS CONTROL REQUIREMENTS

| Quality Characteristic | Action Limit               | California Test   | Minimum Sampling and Testing Frequency | Point of Sampling ‡  | Reporting Time Allowance |
|------------------------|----------------------------|---|--|--|--------------------------|
| Sand Equivalent (Min)  | 47 (Type A)<br>42 (Type B) | 217   | One sample per 2500 tonnes             | Batch plant - from hot bins.<br>Drum plant - from cold feed. | 24 hours                 |
|                        |                            | (Reported value shall be the average of 3) <sup>1</sup>     | Not less than one sample per 2 days    |  |                          |
| Stability              | 37 (Type A)<br>35 (Type B) | 366 <sup>2</sup>  | See Note 4                             | Mat behind paver   | 48 hours                 |
|                        |                            | (Reported value shall be the average of 3) <sup>1,3,5</sup> | Not less than one sample per 5 days    |  |                          |

Notes:

‡ In conformance with the requirements of California Test 125.

1. Samples used for the 3 tests to be averaged shall be from a single split sample.
2. Reheat for sample preparation shall be 2 hours maximum.  
Do not place sample or briquette in oven for 15-hour cure.
3. Briquettes shall be fabricated from a single, combined sample obtained from at least 4 locations across the mat behind the paver in conformance with the requirements of California Test 125. If the range of stability for the three briquettes is more than 12 points, the samples shall be discarded and new samples shall be obtained before the end of the following shift of paving and tested in conformance with the requirements of Table 39-3, "Asphalt Concrete Mixture Requirements."
4. Asphalt concrete will be sampled and tested each of the first 5 days of production and may be decreased to one for each 5 days thereafter unless stability falls below the action limit. When stability falls below the action limit, sampling will be increased to one sample for each of the first 5 days of production and may be decreased to one for each 5 days thereafter. The sequence of the first 5 test results shall not be broken by more than 7 days of suspended operations.
5. During production start-up evaluation, a correlation factor for cured vs. uncured specimens shall be established in conformance with the requirements of Section 39-10.02A, "Production Start-Up Evaluation."

The process control test results shall be plotted on specification compliance charts indicating the action limits for the quality characteristic. When one test result falls below the action limit for an individual measurement, the Contractor shall notify the Engineer, take corrective action, and sample and test within the next 500 tonnes of production. When 2 consecutive test results for an individual characteristic fall below the action limit, the asphalt concrete represented by the 2 tests shall be considered not in compliance. When 2 consecutive test results for an individual characteristic fall below the action limit, the Contractor shall suspend production, notify the Engineer, and take corrective action. With the approval of the Engineer, up to 1000 tonnes of asphalt concrete may be placed to demonstrate that the asphalt concrete is once again in compliance with the provisions of this Section 11-1. Production shall begin only after the Engineer has received test results confirming compliance.

Asphalt concrete that has 2 consecutive stability test results less than or equal to 26 for Type A asphalt concrete or less than or equal to 24 for Type B asphalt concrete shall be removed at the Contractor's expense. Asphalt concrete placed to demonstrate compliance that does not meet the provisions of this Section 11-1 shall be removed at the Contractor's expense.

#### 39-4.05 CONTRACTOR QUALITY CONTROL

Quality control, sampling, testing, and inspection shall be provided during asphalt concrete work. Sampling, testing, and inspection shall be performed at a rate sufficient to ensure that the asphalt concrete product conforms to the requirements in this Section 11-1. Sampling for testing to be reported to the Engineer shall be performed at the minimum frequency specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1, "Quality Control / Quality Assurance."

Quality control samples of aggregates and asphalt concrete mixture shall be obtained and split. One split portion of each sample shall be used for quality control testing and the other portion shall be reserved for possible retest during dispute

resolution, in conformance with Section 39-6, "Dispute Resolution," of this Section 11-1. Quality control samples shall be stored in a location listed in the Quality Control Plan until disposal has been approved by the Engineer.

The Contractor shall obtain a one-liter sample of the asphalt binder in conformance with Section 39-7.01C, "Asphalt Binder Storage," of this Section 11-1 for each day of asphalt concrete production. The sample containers shall be labeled as shown in the "Manual for Quality Control and Quality Assurance for Asphalt Concrete" and shall be sent by the Contractor to the Transportation Laboratory on a weekly basis, except for modified asphalts that shall be shipped daily. A copy of the transmittal form shall be attached to the daily report of inspection.

When test results for a single quality characteristic deviate beyond the limits specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1 the Contractor shall take corrective action and shall bring the asphalt concrete within the specification limits. The corrective action taken shall be documented in the records of inspection in conformance with Section 39-4.06B, "Records of Inspection and Testing," of this Section 11-1. When a single quality characteristic deviates 3 consecutive times beyond the limits specified in Table 39-9, "Minimum Quality Control Test Requirements," of this Section 11-1, the Contractor shall suspend production, shall notify the Engineer, and shall take corrective action. With the approval of the Engineer, up to 1000 tonnes of asphalt concrete may be placed and the requirements of Section 39-10.02A, "Production Start-Up Evaluation," of this Section 11-1 shall be used to demonstrate that the asphalt concrete is once again in compliance with this Section 11-1. Production of asphalt concrete shall start only after the Engineer has received test results confirming compliance. When an individual quality characteristic deviates 3 consecutive times beyond the specification limits and production of asphalt concrete has been suspended, the lot shall be terminated.

If an ignition oven is used for asphalt content in conformance with the requirements of California Test 382, gradations of the remaining aggregates shall be provided for each 5000 tonnes of production. Testing of the aggregates shall be in conformance with the requirements of California Test 202, Sections F and G, "Sieve Analysis of Fine and Coarse Aggregates." Test results from these gradings shall be provided prior to completion of the project. Gradings from the aggregates recovered from the ignition oven will not be used in the statistical analysis for quality or for pay. Payment for these gradings will be made as extra work as provided in Section 4-1.03D of the Standard Specifications at the rate of \$150 per test result for the cost of the additional testing.

#### **39-4.06 CHARTS AND RECORDS**

The Contractor shall record sampling and testing results for both process control and for quality control on forms as provided in the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete" or on forms approved by the Engineer. Complete testing records shall be maintained and posted in the Contractor's laboratory. Models of forms that are different from those in the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete," locations of postings, and times and means of submissions shall be provided in the Quality Control Plan.

For every 5000 tonnes of asphalt concrete produced, the Contractor shall provide an electronic copy of the process and quality control test results using the Department's statistical evaluation program "ACPay" available as specified in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

Compliance charts and inspection and testing records, except stability test results used for process control, shall be submitted within 24 hours after completion of that shift of asphalt concrete production. If the record is incomplete or in error, a copy of the record will be returned with the deficiencies noted by the Engineer. The Contractor shall correct deficiencies and return the updated record by the start of the following working day. When errors or omissions in the inspection or testing records repeatedly occur, asphalt concrete production and placement shall be suspended and the procedures by which the records are produced shall be corrected before production and placement will be restarted.

##### **39-4.06A Compliance Charts**

The Contractor shall develop and maintain time linear specification compliance charts. The compliance charts shall identify the project, test number, test parameter, applicable upper and lower specification limits, and test results.

Compliance charts shall be kept current and shall be posted at a location designated in the Quality Control Plan. Compliance charts shall be updated each day of asphalt concrete production, and up-to-date copies shall be included in the submittals to the Engineer of each day's test results.

##### **39-4.06B Records of Inspection and Testing**

For each day of asphalt concrete production, the Contractor shall prepare an "Asphalt Concrete Construction Daily Record of Inspection," on forms provided in the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete." A form shall be submitted for inspection at the plant and at the roadway.

For each day of asphalt concrete production, the Contractor shall prepare an "Asphalt Concrete Inspection and Testing Summary" on a form provided in the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete." Plant and roadway inspection forms documenting the day's plant production and roadway placement shall be completed. Deviations from the specifications or the Contractor's regular practice shall be listed and explained. Individual inspection forms shall be signed by the inspector and initialed by the Quality Control Manager and attached to the summary

at submittal. Test forms documenting test results shall be complete, signed by the tester, checked and initialed by the Quality Control Manager, and attached to the summary at submittal. Sampling and testing data and calculations that support a test result shall be made available to the Engineer within 48 hours when requested.

The "Asphalt Concrete Inspection and Testing Summary" shall include the following certification signed by the Quality Control Manager:

It is hereby certified that the information contained in this record is accurate, and that information, tests or calculations documented herein comply with the requirements of the contract and the standards set forth in the testing procedures. Exceptions to this certification are documented as a part of this record.

## **39-5 ENGINEER QUALITY ASSURANCE**

### **39-5.01 GENERAL**

The Engineer will assure conformance to contract specifications by review of the Contractor's mix design proposal, by inspection of the Contractor's procedures, by oversight of the Contractor's quality control inspection and records, by splitting and testing samples with the Contractor during evaluation of the plant production start-up and the nuclear density test strip, and by independent verification sampling and testing of the asphalt concrete and aggregates during asphalt concrete production.

The Contractor may witness assurance sampling and testing. However, the Engineer will not be required to notify the Contractor of anticipated sampling schedules or locations and will not delay sampling or testing if the Contractor is unable to attend. The Contractor shall not use samples taken for assurance testing for testing and submittal as a quality control test result.

The Engineer will provide the Contractor with copies of the assurance test results not more than 2 working days after receipt of the results. Sampling and testing data and calculations that support a test result shall be made available to the Contractor within 48 hours when requested.

The Engineer may test the asphalt, aggregates or asphalt concrete mixture to determine conformance with this Section 11-1, "Quality Control / Quality Assurance," whenever an asphalt concrete mixture or ingredient appears defective or inconsistent or whenever a test result indicates a change in the characteristics of the asphalt concrete mixture or an ingredient. Asphalt, aggregates or asphalt concrete that does not conform with this Section 11-1 will be rejected in conformance with Section 39-11, "Acceptance of Work," of this Section 11-1.

The Contractor, when directed by the Engineer, shall obtain representative samples of the asphalt concrete mixture or ingredients that appear defective or inconsistent. The samples shall be split into 4 portions. The Contractor shall retain 1 portion for testing if the Contractor chooses and 3 portions shall be delivered to the Engineer. The asphalt concrete or ingredient need not be sampled if the Contractor elects to remove and replace the asphalt concrete, at the Contractor's expense, or if the Contractor uses a method of correcting the situation that has been approved by the Engineer. Test results from these additional samples shall not be used as a basis for a calculated pay factor.

### **39-5.02 SAMPLING AND TESTING FOR VERIFICATION**

Independent of the Contractor's quality control testing, the Engineer will obtain random samples of the aggregate and asphalt concrete mixture and test for in-place density.

Samples of aggregates and asphalt concrete will be obtained during asphalt concrete production and placement, and will be split into at least 4 portions. One of the split portions will be tested by the Engineer and used to verify quality control test results, one portion will be provided to the Contractor, and 2 portions will be reserved and stored for testing in conformance with the provisions in Section 39-6, "Dispute Resolution," of this Section 11-1. When verifying the relative compaction, the Engineer will obtain a sample of a sample of asphalt concrete from the mat behind the paver, will split the sample and apportion the sample as described above, and will test the sample for test maximum density.

The Engineer will test for material quality characteristics specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. Verification tests will be at a frequency of not less than 10 percent of the minimum quality control sampling and testing frequency and will be performed in conformance with the test methods specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. Verification tests will be performed using the same test methods used for quality control testing.

During the Engineer's verification of the relative compaction, the Engineer will determine the location of 500 tonnes of asphalt concrete to be tested using a random number, will obtain an asphalt concrete sample from within this location for determination of the test maximum density, and will determine the relative compaction of the in-place asphalt concrete as specified in California Test 375. The Contractor shall obtain one of the split samples of asphalt concrete for determination of test maximum density and shall determine the relative compaction of the 500 tonnes of asphalt tested by the Engineer using the same testing sites determined by the Engineer. The results of this common testing will be compared to the allowable testing difference defined in Table 39-6, "Allowable Testing Differences," of this Section 11-1. If the test

maximum density or the relative compaction does not comply with the allowable testing difference, then the Engineer and Contractor will use the first 500 tonnes of the next day's production to re-correlate the nuclear gauges used in testing as defined by California Test 375.

During production start-up evaluation, the Engineer will witness the sampling of asphalt concrete and aggregates and will perform tests on the materials in conformance with Section 39-10.02A, "Production Start-Up Evaluation," of this Section 11-1.

### 39-5.03 VERIFICATION

The Engineer will determine the acceptability of the quality control test results by using the *t*-test for sample means to test whether or not the means of the quality control test results and verification test results are within an allowable testing difference. Quality control test results and verification test results for each indexed quality characteristic will be used in the verification process.

The *t*-value of the group of test data to be verified 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 Contractor's quality control tests (minimum of 2 required)
- $n_v$  = Number of Verification tests (minimum of 1 required)
- $\bar{X}_c$  = Mean of the Contractor's quality control tests
- $\bar{X}_v$  = Mean of the Verification tests
- $S_p$  = Pooled standard deviation  
(When  $n_v = 1$ ,  $S_p = S_c$ )
- $S_c$  = Standard deviation of the Contractor's quality control tests
- $S_v$  = Standard deviation of the Verification tests (when  $n_v > 1$ )

The comparison of quality control test results and verification test results will be considered at a level of significance,  $\alpha = 0.01$ . Compute *t* using the equation above and compare to the critical *t*-value,  $t_{crit}$ , from the following table:

Table 39-5 - CRITICAL *t*-VALUE FOR VERIFICATION OF QUALITY CONTROL TESTING

| degrees of freedom<br>( $n_c+n_v-2$ ) | $t_{crit}$<br>(for $\alpha = 0.01$ ) | degrees of freedom<br>( $n_c+n_v-2$ ) | $t_{crit}$<br>(for $\alpha = 0.01$ ) |
|---------------------------------------|--------------------------------------|---------------------------------------|--------------------------------------|
| 1                                     | 63.657                               | 18                                    | 2.878                                |
| 2                                     | 9.925                                | 19                                    | 2.861                                |
| 3                                     | 5.841                                | 20                                    | 2.845                                |
| 4                                     | 4.604                                | 21                                    | 2.831                                |
| 5                                     | 4.032                                | 22                                    | 2.819                                |
| 6                                     | 3.707                                | 23                                    | 2.807                                |
| 7                                     | 3.499                                | 24                                    | 2.797                                |
| 8                                     | 3.355                                | 25                                    | 2.787                                |
| 9                                     | 3.250                                | 26                                    | 2.779                                |
| 10                                    | 3.169                                | 27                                    | 2.771                                |
| 11                                    | 3.106                                | 28                                    | 2.763                                |
| 12                                    | 3.055                                | 29                                    | 2.756                                |
| 13                                    | 3.012                                | 30                                    | 2.750                                |
| 14                                    | 2.977                                | 40                                    | 2.704                                |
| 15                                    | 2.947                                | 60                                    | 2.660                                |
| 16                                    | 2.921                                | 120                                   | 2.617                                |
| 17                                    | 2.898                                |                                       | 2.576                                |

Quality control test results are verified if the *t*-value computed is less than or equal to  $t_{crit}$  ( $t \leq t_{crit}$ ), and the difference between the means of the quality control test results and verification test results are within an allowable testing difference.

Quality control test results are not verified if the  $t$ -value computed is greater than  $t_{crit}$  ( $t > t_{crit}$ ), and the difference between the means exceeds the allowable testing difference. The allowable testing difference shall be as follows:

Table 39-6 - ALLOWABLE TESTING DIFFERENCE

| Quality                         | California Test | Allowable Testing Difference |
|---------------------------------|-----------------|------------------------------|
| Sand Equivalent (min.)          | 217             | 8                            |
| Hveem Stabilometer Value (min.) | 366             | 10                           |
| Percent Air Voids               | 367             | 1.5                          |
| Asphalt Content                 | 379 or 382      | 0.3%                         |
| Gradation                       | 202             |                              |
| 19 or 12.5 mm                   |                 | 2                            |
| 9.5 mm                          |                 | 4                            |
| 4.75 mm                         |                 | 3                            |
| 2.36 mm                         |                 | 2                            |
| 600 $\mu$ m                     |                 | 2                            |
| 75 $\mu$ m                      |                 | 1.0                          |
| Relative Compaction             | 375             | 0.8%                         |
| Test Maximum Density            |                 | 0.03 g/cc                    |

If quality control test results are not verified, the Contractor will be notified of the difference. The Engineer will sample asphalt concrete production at a more frequent interval. Resolution of the problem shall be in conformance with the provisions in Section 39-6, "Dispute Resolution," of this Section 11-1.

### 39-6 DISPUTE RESOLUTION

#### 39-6.01 GENERAL

The Contractor and the Engineer shall work together to avoid potential conflicts and to resolve differences that may arise from a disagreement regarding test result comparisons.

Should the results of the testing fail to meet the criteria of the stage at which the disagreement arose, production shall be suspended. Production shall not start or resume nor shall asphalt concrete be accepted until the differences have been resolved and the Engineer is assured that the asphalt concrete conforms to this Section 11-1, "Quality Control / Quality Assurance."

When the Engineer and the Contractor, together or separately, are unable to determine the source of error, an Independent Third Party shall act as witness and referee.

In disagreements, if the Engineer's testing process meets the requirements of this Section 11-1, costs related to the review shall be borne by the Contractor. The Contractor's sampling and testing program shall be modified as necessary. New test results shall be submitted to the Engineer. Test results judged to be in error shall be removed from consideration and the new test results shall be substituted. If split samples are not available and retesting is not possible, that portion of the asphalt concrete produced or placed prior to and during the disagreement will be evaluated based on the results of the Engineer's verification test results.

In disagreements, if the Engineer's testing process fails to meet the requirements of this Section 11-1, costs related to the review shall be borne by the State. The Engineer's sampling and testing program will be modified as necessary. Test results judged to be in error shall be removed from consideration and the new test results shall be substituted. Contractor's retesting due to errors in the Engineer's testing will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. If, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of delays or errors in the Engineer's testing, the delay will be considered a right of way delay as provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

In disagreements, if both the Contractor's and the Engineer's testing processes have failed to meet the requirements of this Section 11-1 or if the cause cannot be determined, each party will bear the costs related to their own review. When appropriate, the Contractor's and the Engineer's sampling and testing programs shall be modified as necessary, split samples of the Contractor's quality control samples or the Engineer's verification samples shall be retested, and the new quality control test results shall be submitted to the Engineer. Test results judged to be in error shall be removed from consideration and the new test results shall be substituted. If split samples of aggregates or asphalt concrete mixture from the Contractor's testing are not available where retesting is required, that portion of the asphalt concrete produced prior to and during the disagreement will be evaluated based on the results of the Engineer's verification test results.

### **39-6.02 DURING THE ASPHALT CONCRETE MIX DESIGN REVIEW**

During the asphalt concrete mix design review, if the Engineer's review does not confirm that one or more of the aggregate or the asphalt concrete mixture qualities comply with this Section 11-1, "Quality Control / Quality Assurance," both parties will review their sampling, testing, and test results and shall share their findings. Testers and laboratories shall be made available for witnessing. Calculations and test results shall be made available for review. If an error in the Contractor's testing is detected during this review, the Contractor shall, as is appropriate, recalculate or retest. The new test results shall be submitted to the Engineer. If an error in the Engineer's testing is detected, the Engineer will, as is appropriate, recalculate or retest.

If the Contractor's and Engineer's review does not reveal the source of conflict, the Contractor's and the Engineer's sampling and testing processes shall be witnessed by the Independent Third Party. Testing to resolve the dispute in results for the mix design shall be performed using samples that were obtained and split while being witnessed by the Independent Third Party. Review of sample preparation and testing will be performed at both the Contractor's and the Engineer's laboratory on a portion of the split material while being witnessed by the Independent Third Party. The resulting mix design shall be used for production.

### **39-6.03 DURING THE PRODUCTION START-UP EVALUATION**

When the Contractor's and Engineer's test results during production start-up fail to meet the provisions in Section 39-10.02, "Production Start-Up Evaluation and Nuclear Density Test Strips," both parties will review their sampling, testing, and test results, and shall share their findings. Testers and laboratories shall be made available for witnessing. Calculations and test results shall be made available for review. If an error in the Contractor's testing is detected during this review, the Contractor shall, as is appropriate, recalculate or retest. The new test results shall be submitted to the Engineer. If an error in the Engineer's testing is detected, the Engineer will, as is appropriate, recalculate or retest.

If the Contractor's and the Engineer's review does not resolve the differences, the Contractor's and the Engineer's testing processes shall be witnessed by the Independent Third Party using the 2 remaining portions of the split samples. If necessary, a 250-tonne to 500-tonne quantity of asphalt concrete shall be placed at a location agreed to by the Engineer to provide asphalt concrete and ingredients for sampling and testing for the Independent Third Party review.

If an error in the Contractor's testing is detected by the Independent Third Party, the Contractor shall take corrective action and, as appropriate, recalculate or retest the split portion of the trial quantity of asphalt concrete in question. The new test results shall be submitted to the Engineer. If an error in the Engineer's testing is detected by the Independent Third Party, the Engineer will take corrective action and, as appropriate, recalculate or retest the split portion of the first trial quantity.

Production shall not start nor shall asphalt concrete be accepted until the differences have been resolved and the test results meet the provisions in Section 39-10.02, "Production Start-Up Evaluation and Nuclear Density Test Strips," of this Section 11-1.

### **39-6.04 DURING PRODUCTION**

When it is determined that the quality control test results could not be verified, both parties will review their sampling, testing, and test results, and shall share their findings. Testers and laboratories will be made available for witnessing. Calculations and results will be made available for review.

If an error in the quality control sampling or testing is detected during the Contractor's or the Engineer's review, the Contractor shall either recalculate or, if appropriate, retest using the reserved split portions of the quality control samples. These new test results shall be submitted to the Engineer. If an error in the verification sampling or testing is detected, the Engineer will recalculate or, if appropriate, retest using a reserved split portion of the verification samples. Using the new test results, the Engineer will repeat the calculation of the *t*-test and will determine if the means of the quality control tests and the verification test results are within the allowable testing difference as specified in Section 39-5.03, "Verification," of this Section 11-1.

When the verification test results do not verify the quality control test results 3 consecutive times, both the Contractor's and the Engineer's testers shall be witnessed by the Independent Third Party while sampling, splitting, and testing samples from the production unit or from the mat. The Contractor may produce and place up to 1000 tonnes of asphalt concrete to provide materials and sampling opportunities. Production and placement of asphalt concrete will be suspended until the Independent Third Party has completed the review of the Contractor's and the Engineer's sampling and testing and resolved the differences.

If an error in the Contractor's testing is detected by the Independent Third Party, the Contractor shall take corrective action and, as appropriate, recalculate or retest the split portion of the quality control samples. The new test results shall be submitted to the Engineer. If an error in the Engineer's testing is detected by the Independent Third Party, the Engineer will take corrective action and, as appropriate, recalculate or retest a split portion of the verification samples. When the error has been detected and corrected, production shall resume and the services of the Independent Third Party will be discontinued.

If a problem is not identified during the Independent Third Party review, the Independent Third Party shall be retained for the duration of the project or until a problem has been identified. Until all asphalt concrete has been produced and placed,

the Contractor shall sample and split quality control samples in the presence of the Independent Third Party. One portion of each sample shall be tested by the Contractor in conformance with the intervals specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1, and the other portion shall be delivered to the Engineer by the Independent Third Party. The Engineer will test at least one of every 5 of the split samples for verification purposes. A new lot will be designated for asphalt concrete produced since the Independent Third Party was consulted. The pay factor for this lot will be determined in conformance with Section 39-11.02, "Statistical Evaluation and Determination of Pay Factor," of this Section 11-1 with the exception that both the Contractor's quality control test results and the Engineer's verification test results will be combined and will be the basis for acceptance of that portion of the work. The pay factor for the lot of asphalt concrete which brought about the dispute resolution shall be determined in conformance with Section 39-11.02, "Statistical Evaluation and Determination of Pay Factor," of this Section 11-1 with the exception that both the Contractor's quality control test results and the Engineer's verification test results will be combined and will be the basis for acceptance of that portion of the work.

## **39-7 STORING, PROPORTIONING AND MIXING MATERIALS**

### **39-7.01 STORAGE**

The Contractor shall store the aggregate for asphalt concrete so that separately sized aggregates will not be intermingled and shall store asphalt binder so that different grades of asphalt will not be intermingled. Aggregate that has been intermingled with aggregate of another size shall be removed by the Contractor and replaced with aggregate of specified grading.

When the Contractor adds supplemental fine aggregate, each supplemental fine aggregate used shall be stored separately and kept thoroughly dry.

The measurement and storage provisions of this Section shall not apply to the dust collected in skimmers and expansion chambers (knock-out boxes) or to the dust collected in centrifugal (cyclone) collectors. Dust from these collectors may be returned to the aggregate without being measured or stored separately, provided the dust is returned uniformly at a point in advance of the sampling device in batch-mixing plants or is returned at or before mixing in continuous mixing plants.

Aggregate and asphalt binder shall be stored in conformance with the following requirements.

#### **39-7.01A Aggregate Cold Storage**

Material shall be fed from storage with a mechanical feeder. Before being fed to the drier, aggregate shall be separated into 3 or more sizes and stored separately.

#### **39-7.01B Aggregate Hot Storage**

Aggregate for asphalt concrete to be mixed in batch mixing plants shall be stored, after being dried, in conformance with the following requirements:

1. Aggregates for asphalt concrete shall be separated into 3 or more sizes.
2. After the aggregate is separated, each size shall be stored in a separate bin, and shall be recombined in conformance with the provisions in Section 39-7.03A, "Proportioning for Batch Mixing," of this Section 11-1 in order to conform to the gradings specified in Section 39-2, "Materials," of this Section 11-1. Storage bins shall be provided with chutes to prevent overflow into adjacent bins.

#### **39-7.01C Asphalt Binder Storage**

Asphalt to be used as a binder for asphalt concrete shall be stored in heated tanks.

A suitable sampling device shall be provided in asphalt feed lines connecting plant storage tanks to the asphalt weighing system or spray bar. The sampling device shall consist of a valve with a nominal diameter between 10 mm and 20 mm, constructed in such a manner that a one-liter sample may be slowly withdrawn during plant operations. The valve shall be maintained in good condition and, if the valve fails to function properly, the valve shall be replaced. The sampling device shall be readily accessible and in an area free of dangerous obstructions and shall be between 600 mm and 750 mm above the platform. A drainage receptacle shall be provided for flushing the device prior to sampling.

The discharge end of the asphalt binder circulating pipe shall be maintained below the surface of the asphalt binder in the storage tank to prevent discharging hot asphalt binder into open air.

A temperature sensing device shall be installed in the asphalt feed line. The device shall measure the temperature of the asphalt and shall be accurate to 5°C increments. An automatic, continuous recording device shall be provided and used to maintain accurate records of the asphalt temperature during production. Where the plant controller has the capability of capturing production data electronically, including ingredient temperatures, and when this data represents the temperature at the time of production and is captured at intervals of not greater than 5 minutes, this process will be considered to be

continuous recording. Captured data shall be retained for the duration of the contract and shall be submitted to the Engineer on request.

### **39-7.02 DRYING**

Aggregate shall be fed directly to a drier-drum mixer or to a drier at a uniform rate.

Aggregate shall be dried such that, at the time of spreading, the moisture content of the completed asphalt concrete mixture shall not exceed 1.0 percent and the minimum and maximum asphalt concrete mixture temperatures are not exceeded. Moisture content will be determined in conformity with the requirements of California Test 370.

The drier or drier-drum mixer shall be provided with a device that senses the temperature of the material leaving the drier or the drier-drum mixer. The temperature-sensing device shall be accurate to the nearest 5°C. The indicator shall be located and maintained at the point where the proportioning operations are controlled. An automatic continuous recording device shall be provided and used to maintain accurate records of the temperatures during production. Where the plant controller has the capability of capturing production data electronically, including ingredient temperatures, and when this data represents the temperature at the time of production and is captured at intervals of not greater than 5 minutes, this process will be considered to be continuous recording. Captured data shall be retained for the duration of the contract and shall be submitted to the Engineer on request.

The burner used for heating the aggregate shall achieve complete combustion of the fuel.

### **39-7.03 PROPORTIONING**

Proportioning shall be either by hot-feed control or cold-feed control. Hot-feed control and cold-feed control indicate the location of the measuring devices or controls.

The Contractor's mixing equipment shall be equipped with a suitable, safe sampling device that will provide a sample, representative of actual production, of the aggregate being incorporated into the asphalt concrete. The delivery point of samples shall be safe and convenient. When samples are taken from a location above ground level, a means shall be provided for lowering the aggregate samples to the ground.

#### **39-7.03A Proportioning for Batch Mixing**

When the Contractor elects to use batch mixing equipment, each aggregate hot storage bin shall be equipped with a sampling device that will provide a sample of the aggregate discharged into the weigh hopper.

Fine material collected in dust control systems, other than centrifugal collectors or knock-out boxes, shall be considered to be supplemental fine aggregate. When supplemental fine aggregate is used, it shall be proportioned by mass.

A sampling device for supplemental fine aggregate shall be installed in each feed line or surge tank preceding the weigh hopper.

#### **39-7.03A(1) Batching Tolerances**

Aggregate and asphalt shall be proportioned by mass as follows:

- A. The zero tolerance for aggregate scales shall be 0.5-percent of the total batch mass of the aggregate. The zero tolerance for separate scales for weighing supplemental fine aggregate or asphalt binder shall be 0.05-percent of the total batch mass of the aggregate.
- B. Unless otherwise approved by the Engineer, the indicated mass of material drawn from storage shall not vary from the preselected scale setting as defined by target values of the approved mix design by more than the following percentages of the total batch mass of the aggregate:
  1. Aggregate shall be within one percent, except that when supplemental fine aggregate is used and is weighed cumulatively with the aggregate, the draft of aggregate drawn immediately before the supplemental fine aggregate shall be within 0.5-percent.
  2. Supplemental fine aggregate shall be within 0.5-percent.
  3. Asphalt binder shall be within 0.1-percent.

The asphalt binder shall be measured by a tank scale.

#### **39-7.03A(2) Automatic Controls**

Batch proportioning shall be by an automatic plant controller. The proportioning devices shall be automatic to the extent that the only manual operation required for proportioning materials for one batch shall be a single operation of a switch or starter.

Proportioning devices shall be of a type in which materials discharged from the several bins are controlled by gates or by mechanical conveyors. The batching devices shall be so interlocked that no new batch may be started until weigh hoppers are empty, the scales are at zero, and the discharge gates are closed. The means of withdrawal from the bins and of discharge from the weigh box shall be interlocked so that not more than one bin can discharge onto a given scale at one time, and so that the weigh box cannot be tripped until the required quantity from each of the bins has been deposited therein. In addition, automatic proportioning devices shall be interlocked so that the weighing cycle will be interrupted whenever the amount of material drawn from storage varies from the pre-selected amount by more than the tolerances specified in this Section 11-1. Whenever the weighing cycle is interrupted, that specific batch shall not be used in the work unless it can be manually adjusted to meet the specified tolerances based on the total mass of the batch. When partial batches are batched, the interlock tolerances, except the zero tolerance, shall apply to the total mass of aggregate in the partial batch.

Proportioning devices shall be operated so that all mass increments required for a batch are preset at the same time. Controls shall be designed so that these settings may be changed without delay and the order of discharge from the several bins can be changed.

Proportioning controls shall be equipped with the means for inspection of the interlock tolerance settings. Instructions for performing the inspection shall be available at the point of operation.

The necessary means shall be provided to check the mass of various proportioned amounts on a separate vehicle scale located at the plant site.

### **39-7.03B Proportioning for Continuous Mixing**

Asphalt binder shall be introduced into the mixer through a meter conforming to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications. The asphalt meter shall automatically compensate for changes in the asphalt temperature, unless the meter is the mass flow, coriolis effect, type. The system shall be capable of varying the rate of delivery of binder proportionate with the delivery of aggregate. During a day's run, the temperature of asphalt binder shall not vary more than 30°C. The meter and lines shall be heated and insulated. The binder storage shall be equipped with a device for automatic plant cut-off when the level of binder is lowered sufficiently to expose the pump suction line.

When supplemental fine aggregate is used, it shall be proportioned by a method that uniformly feeds the material within 2 percent of the required amount. Supplemental fine aggregate shall be discharged from the proportioning device directly into the mixer.

The supplemental fine aggregate proportioning system shall function with a degree of accuracy such that, when operated between 30 percent and 100 percent of maximum operating capacity, the average difference between the indicated mass of material delivered and the actual mass delivered shall not exceed one percent of the actual mass for three individual 15-minute runs. For the 3 individual 15-minute runs, the indicated mass of material delivered shall not vary from the actual mass delivered by more than 2 percent of the actual mass.

The fine material collected in dust control systems may be returned to the aggregate production stream without proportioning if returned at a rate commensurate with overall plant production, and if returned at or before the mixer. A return rate of less than 100 percent of the collection rate shall be metered as specified above for supplemental fine aggregate.

The asphalt feeder, each of the aggregate feeders, the supplemental fine aggregate feeder, if used, and the combined aggregate feeder shall be equipped with devices by which the rate of feed can be determined while the plant is in full operation.

The combined aggregate shall be weighed using a belt scale. The belt scale shall be of such accuracy that, when the plant is operating between 30 percent and 100 percent of belt capacity, the average difference between the indicated mass of material delivered and the actual mass delivered shall not exceed one percent of the actual mass for three individual 3-minute runs. For the 3 individual 3-minute runs, the indicated mass of material delivered shall not vary from the actual mass delivered by more than 2 percent of the actual mass.

The actual mass of material delivered for proportioning device calibrations shall be determined by a vehicle scale located at the plant site conforming to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications. The vehicle scale shall be error checked within 24 hours of checking the plant's proportioning devices. The plant shall be equipped so that this accuracy check can be made prior to the first production operation for a project and at other times when requested by the Engineer.

The belt scale for the combined aggregate, the proportioning devices for supplemental fine aggregate, if used, and the asphalt proportioning meter shall be interlocked so that the rates of feed of the aggregates and asphalt will be adjusted automatically (at all production rates and production rate changes) to maintain the asphalt ratio (kilograms of asphalt per 100 kg of dry aggregate including supplemental fine aggregate, if used) designated in the mix design in conformance with the provisions in Section 39-2.03, "Asphalt Concrete Mixture," of this Section 11-1. The plant shall not be operated unless this automatic system is functioning and in good working condition.

Asphalt meters and aggregate belt scales used for proportioning aggregates and asphalt shall be equipped with rate-of-flow indicators to show the rates of delivery of asphalt and aggregate. Meters and scales shall be equipped with resettable totalizers so that the total amounts of asphalt and aggregate introduced into the asphalt concrete mixture can be determined.

Rate-of-flow indicators and totalizers for like materials shall be accurate within one percent when compared directly. The asphalt cement totalizer shall not register when the asphalt metering system is not delivering material to the mixer.

The bin or bins containing the fine aggregate and supplemental fine aggregate, if used, shall be equipped with vibrating units or other equipment that will prevent hang-up of material while the plant is operating. Each belt feeder shall be equipped with a device to monitor the depth of aggregate between the troughing rollers. The device for monitoring depth of aggregate shall automatically shut down the plant whenever the depth of aggregate is less than 70 percent of the target depth. To avoid erroneous shut down by normal fluctuations, a delay between sensing less than 70 percent flow and shutdown of the plant will be permitted, as determined by the Engineer, at the time of the initial California Test 109. A second device shall be located either in the stream of aggregate beyond the belt or where it will monitor movement of the belt by detecting revolutions of the tail pulley on the belt feeder. The device for monitoring no-flow or belt movement, as the case may be, shall stop the plant automatically and immediately when there is no flow. The plant shall not be operated unless both low-flow and no-flow monitoring devices are in good working condition and functioning properly.

For continuous pugmill mixing plants, an aggregate sampling device that will provide a 25-kg to 40-kg sample of the combined aggregate while the plant is in full operation shall be provided in advance of the point where the aggregate enters the mixer.

For drier-drum mixing plants, an aggregate sampling device that will provide a 25-kg to 40-kg sample of the combined aggregate while the plant is in full operation shall be provided in advance of the point where the aggregate enters the drier-drum mixer.

When supplemental fine aggregate is used, a sampling device shall be installed in each feed line or surge tank preceding the proportioning device for the supplemental fine aggregate.

#### **39-7.04 (BLANK)**

#### **39-7.05 MIXING**

Aggregate, supplemental fine aggregate, and asphalt binder shall be mixed in a batch mixer, continuous mixing pugmill mixer, or continuous mixing drier-drum. The charge in a batch mixer, or the rate of feed to a continuous mixer, shall not exceed that which will permit complete mixing of the material. Dead areas in the mixer, in which the material does not move or is not sufficiently agitated, shall be corrected by a reduction in the volume of material or by other adjustments.

Asphalt binder shall be at a temperature of not less than 120°C nor more than 190°C when added to the aggregate.

The temperature of the aggregate before adding the binder shall not be more than 165°C.

##### **39-7.05A Batch Mixing**

When asphalt concrete is produced by batch mixing, the mixer shall be equipped with a sufficient number of paddles of a type and arrangement so as to produce a properly mixed batch.

The binder shall be introduced uniformly into the mixer along the center of the mixer parallel to the mixer shafts, or by pressure spraying. When a pan is used, it shall be equipped with movable vanes in order that the flow of binder may be directed across the width of the pan, as desired. The vanes shall be equipped with a means for quick adjustment, and a positive lock to prevent shifting.

The mixer platform shall be of ample size to provide safe and convenient access to the mixer and other equipment. The mixer housing and weighbox housing shall be equipped with gates of ample size to permit ready sampling of the discharge of aggregate from each of the plant bins and from each feed line or surge tank of supplemental fine aggregate, if used. The Contractor shall provide a sampling device capable of delivering a representative sample of sufficient size to permit the required tests.

The mixer shall be equipped with a timing device that will indicate by a definite audible or visual signal the expiration of the mixing period. The device shall measure the time of mixing within 2 seconds.

The time of mixing a batch shall begin on the charging stroke of the weighhopper dumping mechanism and shall end when discharge is started. Mixing shall continue until a homogeneous asphalt concrete mixture of uniformly distributed and properly coated aggregates of unchanging appearance is produced. The time of mixing shall be not less than 30 seconds.

An interval timer shall control the time of mixing. The interval timer shall be interlocked so that the mixer cannot be discharged until the materials have been mixed for the full amount of time specified.

##### **39-7.05B Continuous Mixing**

Continuous mixing plants shall utilize pugmill or drier-drum mixers.

When asphalt concrete is produced by pugmill mixing, the mixer shall be equipped with paddles of a type and arrangement to provide sufficient mixing action and movement to the asphalt concrete mixture to produce properly mixed asphalt concrete. The combined aggregate shall be fed directly from the drier to the mixer at a uniform and controlled rate.

Mixing shall continue until a homogeneous asphalt concrete mixture of thoroughly and uniformly coated aggregates of unchanging appearance is produced at the discharge point from the mixer.

The temperature of the completed asphalt concrete mixture shall not exceed 165°C upon discharge from the mixer.

The mixer shall discharge into a storage silo with a capacity of not less than that specified in Section 39-7.06, "Asphalt Concrete Storage," of this Section 11-1. The Contractor shall provide a means of diverting the flow of asphalt concrete away from the silo to prevent incompletely mixed portions of the asphalt concrete mixture from entering the silo.

### **39-7.06 ASPHALT CONCRETE STORAGE**

When asphalt concrete is stored, it shall be stored only in silos. Asphalt concrete shall not be stockpiled. The minimum quantity of asphalt concrete in a silo during mixing shall be 18 tonnes except for the period immediately following a shut-down of the plant of 2 hours or more. A means shall be provided to indicate that storage in each silo is being maintained as required.

Storage silos shall be equipped with a surge-batcher sized to hold a minimum of 1800 kg of material. A surge-batcher consists of equipment placed at the top of the storage silo that catches the continuous delivery of the completed asphalt concrete mix and changes it to individual batch delivery to prevent the segregation of product ingredients as the completed asphalt concrete mix is placed into storage. The surge-batcher shall be center loading and shall be constructed to prevent material buildup. Rotary chutes shall not be used as surge-batchers.

The surge-batcher shall be independent and distinct from conveyors or chutes used to collect or direct the completed asphalt concrete mixture being discharged into storage silos and shall be the last device to handle the material before it enters the silo. Multiple storage silos shall be served by an individual surge-batcher for each silo. Material handling shall be free of oblique movement between the highest elevation (conveyor outfall) and subsequent placement in the silo. Discharge gates on surge-batchers shall be automatic in operation and shall discharge only after a minimum of 1800 kg of material has been collected and shall close before the last collected material leaves the device. Discharge gate design shall prevent the deflection of material during the opening and closing operation.

Asphalt concrete stored in excess of 18 hours shall not be used in the work. Asphalt concrete mixture containing hardened lumps shall not be used. A storage facility that contained the material with the hardened lumps shall not be used for further storage until the cause of the lumps is corrected.

### **39-7.07 ASPHALT CONCRETE PLANTS**

Plants, including commercial plants, that produce asphalt concrete subject to these specifications shall conform to the provisions in Section 7-1.01F, "Air Pollution Control," of the Standard Specifications, and shall be equipped with a wet-tube dust washer or equal and other devices that will reduce the dust emission to the degree that adjacent property is not damaged. The washer and other equipment shall function efficiently when the plant is in operation.

During production, petroleum products such as diesel fuel and kerosene shall not be used as a release agent on belts, conveyors, hoppers, or hauling equipment.

Plants shall be equipped with an inspection dock constructed so that a quality control technician or inspector standing on the dock can inspect the completed asphalt concrete mixture and take samples, as necessary, from the hauling vehicle before the vehicle leaves the plant site. This inspection dock shall allow the hauling vehicle to pull alongside and shall meet applicable safety requirements of the California Division of Occupational Safety and Health. Haul vehicle drivers shall be instructed to stop at the dock whenever a quality control technician or inspector is on the dock and to remain there until directed to leave by that individual.

## **39-8 SUBGRADE, PRIME COAT, PAINT BINDER (TACK COAT), AND PAVEMENT REINFORCING FABRIC**

### **39-8.01 SUBGRADE**

Immediately prior to applying prime coat or paint binder (tack coat), or immediately prior to placing the asphalt concrete when a prime coat or paint binder (tack coat) is not required, the subgrade to receive asphalt concrete shall conform to the compaction requirement and elevation tolerances specified for the material involved and shall be free of loose or extraneous material. If the asphalt concrete is to be placed on an existing base or pavement that was not constructed as part of the contract, the surface shall be cleaned by sweeping, flushing or other means to remove loose particles of paving, dirt, and other extraneous material immediately before applying the prime coat or paint binder (tack coat).

### **39-8.02 PRIME COAT AND PAINT BINDER (TACK COAT)**

A prime coat of liquid asphalt shall be applied to the areas to be surfaced when there is a contract item for the work or when the work is required in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

Prime coat shall be applied only to those areas designated by the Engineer.

Prime coat shall be applied at the approximate total rate of 1.15 L per square meter of surface covered. The exact rate and number of applications will be determined by the Engineer.

Prime coat shall be applied at a temperature conforming to the range of temperatures specified in Section 93-1.03, "Mixing and Applying," of the Standard Specifications for distributor application of the grade of liquid asphalt being used.

A paint binder (tack coat) of asphaltic emulsion shall be furnished and applied in conformance with the provisions in Section 94, "Asphaltic Emulsions," of the Standard Specifications and shall be applied to vertical surfaces of existing pavement, curbs, gutters, and construction joints in the surfacing against which additional material is to be placed, to a pavement to be surfaced, and to other surfaces designated in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

Paint binder (tack coat) shall be applied in one application at a rate of from 0.10-L to 0.45-L per square meter of surface covered. The exact rate of application will be determined by the Engineer.

At the Contractor's option, paving asphalt may be used for paint binder (tack coat) instead of asphaltic emulsion. If paving asphalt is used, the grade to be used and the rate of application will be determined by the Engineer. The paving asphalt shall be applied at a temperature of not less than 140°C or more than 175°C.

Prime coat or paint binder (tack coat) shall be applied in advance of placing the surfacing only as far as shall be approved by the Engineer. When asphaltic emulsion is used as a paint binder (tack coat), the asphalt concrete shall not be placed until the asphaltic emulsion has cured.

Immediately in advance of placing asphalt concrete, additional prime coat or paint binder (tack coat) shall be applied as directed by the Engineer to areas where the prime coat or paint binder (tack coat) has been damaged. Loose or extraneous material shall be removed and no additional compensation will be allowed therefor.

### **39-8.03 PAVEMENT REINFORCING FABRIC**

Pavement reinforcing fabric shall be placed on existing pavement to be surfaced or between layers of asphalt concrete when such work is shown on the plans, or specified in "Asphalt Concrete" in Section 10-1, of these special provisions, or ordered by the Engineer.

Before placing the pavement reinforcing fabric, a binder of paving asphalt shall be applied to the surface to receive the pavement reinforcing fabric at an approximate rate of 1.15 L per square meter of surface covered. The exact rate will be determined by the Engineer. The binder shall be applied to a width equal to the width of the fabric mat plus 75 mm on each side.

Before applying binder, large cracks, spalls, and depressions in existing pavement shall be repaired as directed by the Engineer and, if not included in the item, the repair work will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

The fabric shall be aligned and placed with no wrinkles that lap. The test for lapping shall be made by gathering together the fabric in a wrinkle. If the height of the doubled portion of extra fabric is 15 mm or more, the fabric shall be cut to remove the wrinkle, then lapped in the direction of paving. Lap in excess of 50 mm shall be removed. Pavement reinforcing fabric shall not be placed in areas of conform tapers where the thickness of the overlying asphalt concrete is 30 mm or less.

If manual laydown methods are used, the fabric shall be unrolled, aligned, and placed in increments of approximately 9 m.

Adjacent borders of the fabric shall be lapped 50 mm to 100 mm. The preceding roll shall be lapped 50 mm to 100 mm over the following roll in the direction of paving at ends of rolls or at a break. At fabric overlays, both the binder and the fabric shall overlap previously placed fabric by the same amount.

Seating of the fabric with rolling equipment after placing will be permitted. Turning of the paving machine and other vehicles shall be gradual and kept to a minimum to avoid damage to the fabric.

A small quantity of asphalt concrete, to be determined by the Engineer, may be spread over the fabric immediately in advance of placing asphalt concrete surfacing in order to prevent fabric from being damaged by construction equipment.

Public traffic shall not be allowed on the bare reinforcing fabric, except that public cross traffic may be allowed to cross the fabric under traffic control after the Contractor has placed a small quantity of asphalt concrete over the fabric.

Care shall be taken to avoid tracking binder material onto the pavement reinforcing fabric or distorting the fabric during seating of the fabric with rolling equipment. If necessary to protect the pavement reinforcing fabric, exposed binder material may be covered lightly with sand.

## **39-9 SPREADING AND COMPACTING EQUIPMENT**

### **39-9.01 SPREADING EQUIPMENT**

Asphalt pavers shall be self-propelled mechanical spreading and finishing equipment provided with a screed or strike-off assembly capable of distributing the material to not less than the full width of a traffic lane unless otherwise approved by the Engineer. Screed action shall include cutting, crowding or other practical action that is effective on the asphalt concrete mixture without tearing, shoving or gouging and that produces a surface texture of uniform appearance. The screed shall be adjustable to the required section and thickness. The screed shall be provided with a suitable full width compacting device.

Pavers that leave ridges, indentations or other marks in the surface shall not be used unless the ridges, indentations or marks are eliminated by rolling or prevented by adjustment in the operation.

When end dump haul vehicles are used, the asphalt paver shall operate independently of the vehicle being unloaded or shall be capable of propelling the vehicle being unloaded. The load of the haul vehicle shall be limited to that which will insure satisfactory spreading. While being unloaded, the haul vehicle shall be in contact with the machine and the brakes on the haul vehicle shall not be depended upon to maintain contact between the vehicle and the machine.

No portion of the mass of hauling or loading equipment, other than the connection, shall be supported by the asphalt paver. No vibrations or other motions of the loader that could have a detrimental effect on the riding quality of the completed pavement shall be transmitted to the paver.

When asphalt concrete is placed directly upon asphalt treated permeable base, the asphalt concrete shall be placed in a manner and with equipment that will not disturb or displace the asphalt treated permeable base.

### 39-9.02 COMPACTING EQUIPMENT

A sufficient number of rollers shall be provided to obtain the specified compaction and surface finish required by this Section 11-1. Rollers shall be sized to achieve the required results.

Rollers shall be equipped with pads and water systems that prevent sticking of the asphalt concrete mixtures to the pneumatic or steel-tired wheels. A parting agent that will not damage the asphalt concrete mixture may be used to aid in preventing the asphalt concrete mixture from sticking to the wheels.

## 39-10 SPREADING AND COMPACTING

### 39-10.01 GENERAL REQUIREMENTS

Asphalt concrete shall be handled, spread, and compacted in a manner which is in conformance with this Section 11-1, "Quality Control / Quality Assurance."

Asphalt concrete shall be placed in such a manner that cracking, shoving, and displacement will be avoided.

Type A and Type B asphalt concrete shall be placed only when the ambient temperature is above 10°C.

Asphalt concrete shall not be placed when the underlying layer or surface is frozen or not dry or when weather conditions will prevent proper handling, finishing or compaction of the mixture.

Asphalt concrete shall be spread and compacted in the layers and thicknesses indicated in the following table:

Asphalt Concrete Layers and Thickness

| Total Thickness Shown on the Plans* | Number of Layers | Top Layer Thickness (Millimeters) |       | Next Lower Layer Thickness (Millimeters) |      | All Other Lower Layers Thickness (Millimeters) |      |
|-------------------------------------|------------------|-----------------------------------|-------|--|------|--|------|
|                                     |                  | Min.                              | Max.  | Min.                                     | Max. | Min.   | Max. |
| 75 mm or less                       | 1                | ----                              | ----- | ----                                     | ---- | ----   | ---- |
| 76 through 89 mm                    | 2                | 35                                | 45    | 35                                       | 45   | ----   | ---- |
| 90 through 135 mm                   | 2                | 45                                | 60    | 45                                       | 75   | —  | —    |
| 136 mm or more                      | **               | 45                                | 60    | 45                                       | 75   | 45   | 120  |

Notes:

\*When pavement reinforcing fabric is shown to be placed between layers of asphalt concrete, the thickness of asphalt concrete above the pavement reinforcing fabric shall be considered to be the "Total Thickness Shown on the Plans" for the purpose of spreading and compacting the asphalt concrete above the pavement reinforcing fabric.

\*\*At least 3 layers if total thickness is more than 135 mm and less than 255 mm. At least 4 layers if total thickness is 255 mm or more.

A layer shall not be placed over a layer that exceeds 75 mm in compacted thickness until the temperature of the layer being covered is less than 70°C at mid-depth unless approved by the Engineer.

Asphalt concrete to be placed on shoulders, and on other areas off the traveled way having a width of 1.50 m or more, shall be spread in the same manner as specified above.

The completed mixture shall be deposited on the roadbed at a uniform quantity per linear meter, as necessary to provide the required compacted thickness without resorting to spotting, picking-up or otherwise shifting the mixture. During transporting, spreading and compacting, petroleum products such as diesel fuel and kerosene shall not be used as a release agent on trucks, spreaders or compactors in contact with the asphalt concrete.

Segregation shall be avoided. Surfacing shall be free from pockets of coarse or fine material. Asphalt concrete containing hardened lumps shall not be used.

Longitudinal joints in the top layer of Type A or Type B asphalt concrete shall correspond with the edges of planned traffic lanes. Longitudinal joints in other layers shall be offset not less than 150 mm alternately each side of the edges of traffic lanes.

Unless otherwise provided herein or approved by the Engineer, the top layer of asphalt concrete for shoulders, tapers, transitions, road connections, private drives, curve widenings, chain control lanes, turnouts, left-turn pockets, and other areas shall not be spread before the top layer of asphalt concrete for the adjoining through lane has been spread and compacted. At locations where the number of lanes is changed, the top layer for the through lanes shall be paved first. When existing pavement is to be surfaced and the specified thickness of asphalt concrete to be spread and compacted on the existing pavement is 75 mm or less, the shoulders or other adjoining areas may be spread simultaneously with the through lane provided the completed surfacing conforms to the requirement of this Section 11-1. Tracks or wheels of spreading equipment shall not be operated on the top layer of asphalt concrete until final compaction has been completed.

At those locations shown on the plans, as specified in "Asphalt Concrete" in Section 10-1, "General," of these special provisions, or as directed by the Engineer, the asphalt concrete shall be tapered or feathered to conform to existing surfacing or to other highway and non-highway facilities.

At locations where the asphalt concrete is to be placed over areas inaccessible to spreading and rolling equipment, the asphalt concrete shall be spread by practical means to obtain the specified results and shall be compacted thoroughly to the required lines, grades, and cross sections by means of pneumatic tampers or by other methods that will produce the same degree of compaction as pneumatic tampers.

### **39-10.02 PRODUCTION START-UP EVALUATION AND NUCLEAR DENSITY TEST STRIPS**

The Contractor shall demonstrate that the proposed asphalt concrete mixture is being produced and placed on the roadway in conformance with this Section 11-1, "Quality Control / Quality Assurance." The production start-up evaluation shall demonstrate that the aggregates and asphalt concrete mixture conform to the requirements of Table 39-3, "Asphalt Concrete Mixture Requirements," and of Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1 when produced using the plant proposed for this project. The nuclear density test strip serves to provide the Contractor with a location to develop a correlation between cores taken from the test strip and the Contractor's and Engineer's nuclear density gage readings taken from the same locations on the test strip and for the Contractor to demonstrate the ability to achieve a minimum of 96 percent relative compaction.

Production start-up evaluation and the nuclear density test strip may be constructed separately or at the same time to serve both purposes. Asphalt concrete used in the nuclear density test strip shall be representative of the asphalt concrete that shall be placed in the project.

Should the test results or testing program fail to meet these criteria, production will be suspended and the Contractor shall resolve the problem in conformance with the provisions in Section 39-6, "Dispute Resolution," of this Section 11-1.

Attention is directed to longitudinal and transverse construction joint requirements specified in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

Test data used for the production start up evaluation and the nuclear gage test strips shall not be included with the test data used for acceptance of the work in conformance with the provisions in Section 39-11, "Acceptance of Work," of this Section 11-1.

A production start-up evaluation and a nuclear density test strip shall be used when production of asphalt concrete has been resumed following a suspension of production due to unsatisfactory material quality as specified in Section 39-4.04, "Contractor Process Control," Section 39-4.05, "Contractor Quality Control," and Section 39-11.02A, "General" of this Section 11-1.

#### **39-10.02A Production Start-Up Evaluation**

Before or on the first day of asphalt concrete production, the Contractor shall produce a trial quantity of between 250 tonnes and 500 tonnes of asphalt concrete to demonstrate that asphalt concrete produced for this project conforms to the quality characteristics of this Section 11-1. The location of the production start-up evaluation shall be approved by the Engineer.

Asphalt concrete shall be produced by production procedures intended for the entire project. Production of asphalt concrete shall stop after placement of the trial quantity of asphalt concrete. Asphalt concrete production and placement may resume after the quality characteristics of the asphalt concrete mixture have been tested and found to be in conformance with the quality requirements of this Section 11-1.

The Contractor shall randomly obtain 3 aggregate samples from the plant and 3 asphalt concrete mixture samples from the mat behind the paver. Each sample from the plant shall be split into 4 portions; each sample from the mat shall be split into 4 portions. One portion of each sample shall be tested by the Contractor and one portion of each sample shall be provided to the Engineer for testing. The remaining portions shall be delivered to the Engineer and stored for dispute resolution should the test results not conform to this Section 11-1. The Contractor and the Engineer shall evaluate the samples for conformance to the requirements for sand equivalent, stability, percent air voids, and the quality characteristics

designated in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. The percent air voids of the asphalt concrete mixture shall be within  $\pm 1.0$  percent of the percent air voids designated in the Contractor's mix design.

The trial quantity of asphalt concrete will be accepted if:

- A. Not more than 3 of the test results from the combined 6 test results from the Contractor's and Engineer's samples for quality characteristics indexed 2, 3, 4, and 5 in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1 are outside the specified limits.
- B. Not more than one of the test results from the combined 6 test results from the Contractor's and the Engineer's samples for sand equivalent, stability, percent air voids or critical start-up characteristics designated in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1 are outside the specified limits.

If the test results from the combined 6 test results fail to meet the conditions above, corrective action shall be taken, and a new trial quantity of asphalt concrete shall be placed and evaluated in conformance with the provisions in this section to demonstrate conformance. If the test results from the combined 6 test results fail to meet the requirements above, then the trial quantity of asphalt concrete will be rejected.

The testing program will be considered adequate only if the average of the Contractor's test results and the average of the Engineer's test results for sand equivalent, stability, percent air voids, and the quality characteristics designated in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1 are within the allowable testing difference designated in Table 39-6, "Allowable Testing Difference," of this Section 11-1.

The Contractor shall not proceed to regular production until the requirements of this Section 39-10.02A, "Production Start-Up Evaluation" have been met. At the request of the Contractor, the Engineer may elect to leave the asphalt concrete which does not meet the requirements of this Section 39-10.02A in place if mitigation at the Contractor's expense can be agreed to. If this quantity of asphalt concrete is left in place, the Contractor will be paid 75 percent of the contract price paid per tonne for asphalt concrete.

The Contractor shall establish a correlation factor for stability of cured versus uncured briquettes. From a single split sample of asphalt concrete, 6 briquettes shall be fabricated. Three of the 6 briquettes shall be cured for 15 hours in conformance with the requirements of California Test 366 and 3 briquettes shall not be cured. The difference between the average stability value determined for the cured and the uncured specimens shall be considered the correlation factor, and shall be applied to stability values determined on uncured samples throughout the life of the project. The correlation factor may range from zero to 4. If the correlation factor is less than zero, a factor of zero shall be applied. If the factor is greater than 4, the correlation factor shall be approved by the Engineer.

#### **39-10.02B Nuclear Density Test Strip**

On the first day of placement of each layer of asphalt concrete the Contractor shall place a test strip in conformance with the requirements of California Test 375. The purpose of the test strip is to determine a correlation between cores taken from the test strip and the nuclear density gage readings taken at the core locations and to demonstrate that the asphalt concrete can be placed and compacted to the standards of this Section 11-1, "Quality Control / Quality Assurance." Asphalt concrete used in the nuclear density test strip shall be representative of the asphalt concrete that shall be placed in the project. The location for the nuclear density test strip shall be approved by the Engineer.

The Contractor shall place nuclear density test strips until conditions of the test method and this Section 11-1 have been met. The requirements of this section and the test method shall apply for the correlation of each gage that is used to determine relative compaction for this project. Relative compaction results will not be accepted if they have been determined using a nuclear gage that has not been correlated using a test strip.

Asphalt concrete in test strips may be left in place under the following conditions:

- A. If the relative compaction for the test strip is determined to be 96 percent or greater, the Contractor will be paid at the contract price per tonne of asphalt concrete.
- B. If the relative compaction for the test strip is determined to be less than 96 percent but greater than 93 percent, the Contractor will be paid at 75 percent of the contract price per tonne of asphalt concrete. A new test strip will be required, and mitigation measures shall be at Contractor's expense.

Asphalt concrete in test strips will be rejected when the relative compaction for the test strip is below 93 percent. Production and placement shall not begin until the Contractor has demonstrated the ability to achieve 96 percent relative compaction in conformance with this Section 11-1.

#### **39-10.03 SPREADING**

Layers shall be spread with an asphalt paver, unless otherwise specified or approved by the Engineer. Asphalt pavers shall be operated in such a manner as to insure continuous and uniform movement of the paver.

In advance of spreading asphalt concrete over an existing base, surfacing or bridge deck, if there is a contract item for asphalt concrete (leveling) or if ordered by the Engineer, asphalt concrete shall be spread by mechanical means that will produce a uniform smoothness and texture. Asphalt concrete (leveling) shall include, but not be limited to, the filling and leveling of irregularities and ruts. Asphalt concrete used to change the cross slope or profile of an existing surface shall not be considered as asphalt concrete (leveling).

Paint binder (tack coat) shall be applied to each layer in advance of spreading the next layer.

Before placing the top layer adjacent to cold transverse construction joints, the joints shall be trimmed to a vertical face on a neat line. Transverse joints shall be tested with a 3.6-m  $\pm$  0.06-m straightedge and shall be cut back for surface smoothness as required in conformance with Section 39-10.04, "Compacting," of this Section 11-1. Connections to existing surfacing shall be feathered to conform to the requirements for smoothness. Longitudinal joints shall be trimmed to a vertical face and on a neat line if the edges of the previously laid surfacing are, in the opinion of the Engineer, in such a condition that the quality of the completed joint will be affected.

#### **39-10.04 COMPACTING**

Compacting equipment shall conform to the provisions in Section 39-9.02, "Compacting Equipment," of this Section 11-1, "Quality Control / Quality Assurance."

Rolling shall commence at the lower edge and shall progress toward the highest portion. When compacting layers that exceed 75 mm in compacted thickness, rolling shall commence at the center and shall progress outwards.

Asphalt concrete shall be compacted to a relative compaction of not less than 96 percent and shall be finished to the lines, grades, and cross sections shown on the plans. In-place density of asphalt concrete will be determined prior to opening the pavement to public traffic. No rolling will be permitted after the asphalt concrete temperature is below 60°C.

Asphalt concrete placed in dig outs, as a leveling course, for slope correction, for detours not included in the finished roadway prism, in areas where in the judgment of the Engineer compaction or compaction measurement by conventional methods is impeded or on the uppermost lift of shoulders with rumble strips shall be compacted by a method approved by the Engineer.

Relative compaction shall be determined in conformance with the requirements of California Test 375 except that only a nuclear gauge with thin lift capability shall be used for asphalt concrete layer of 30 mm to 59 mm in thickness. Laboratory specimens shall be compacted in conformance with the requirements of California Test 304. Test locations will be established for asphalt concrete areas to be tested, as specified in California Test 375. If the Contractor compacts the asphalt concrete in any form or quantity after sites for testing have been chosen in conformance with the requirements of California Test 375 or after California Test 375 has begun, the quality control tester shall choose a new set of random numbers for locating test sites.

Upon completion of rolling operations, if ordered by the Engineer, the asphalt concrete shall be cooled by applying water. Applying water shall conform to the provisions in Section 17, "Watering," of the Standard Specifications.

The completed surfacing shall be thoroughly compacted, smooth, and free from ruts, humps, depressions, or irregularities. Ridges, indentations or other objectionable marks left in the surface of the asphalt concrete by blading or other equipment shall be eliminated by rolling or other suitable means. The use of equipment that leaves ridges, indentations or other objectionable marks in the asphalt concrete shall be discontinued.

When a straightedge 3.6 m  $\pm$  0.06 m long is laid on the finished surface and parallel with the centerline, the surface shall not vary more than 3-mm from the lower edge of the straightedge. The transverse slope of the finished surface shall be uniform to a degree such that no depressions greater than 6 mm are present when tested with a straightedge 3.6 m  $\pm$  0.06-m long in a direction transverse to the centerline and extending from edge to edge of a 3.6-m traffic lane.

Pavement within 15 m of a structure or approach slab shall conform to the smoothness tolerances specified in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications.

### **39-11 ACCEPTANCE OF WORK**

#### **39-11.01 GENERAL**

The Engineer shall select the procedure used to determine the quantities of asphalt concrete for acceptance and payment determination in conformance with the provisions of this Section 11-1, "Quality Control / Quality Assurance."

Quality control test results that have been verified shall form the basis for statistical evaluation of the work in conformance with Section 39-11.02, "Statistical Evaluation and Determination of Pay Factor," of this Section 11-1. The quality requirements on which statistical evaluation will be based are specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1.

Work determined to be in conformance with the provisions of this Section 11-1 will be accepted and paid for at the contract price per tonne for asphalt concrete and may be subject to compensation adjustment in conformance with Section 39-11.02C, "Pay Factor Determination and Compensation Adjustment," of this Section 11-1.

Work that is not in compliance with the provisions of this Section 11-1 may be rejected by the Engineer and shall be removed and replaced at the Contractor's expense.

When there are fewer than 5 verified quality control tests, the work will be accepted or rejected based on whether the individual test results meet the quality requirements specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. Section 39-11.02, "Statistical Evaluation and Pay Factor Determination," of this Section 11-1 shall not apply.

Aggregates, asphalt binder, and asphalt concrete mixtures that do not conform to this Section 11-1 shall not be used.

The Engineer may reject a quantity of material that is determined to be defective based on visual inspection or noncompliance with the provisions of this Section 11-1.

### **39-11.02 STATISTICAL EVALUATION AND DETERMINATION OF PAY FACTOR**

Statistical evaluation of the work shall be used to verify the Contractor's quality control test results to determine compliance with this Section 11-1, "Quality Control / Quality Assurance."

#### **39-11.02A General**

The quality characteristics to be evaluated and the specification limits are specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. Asphalt content, aggregate gradation (600- $\mu$ m and 75- $\mu$ m sieves), and relative compaction shall be considered for purposes of this Section 11-1 to be critical quality characteristics.

A lot represents the total quantity of asphalt concrete placed. More than one lot will occur if changes in the target values, material sources or mix design are requested by the Contractor and made in conformance with this Section 11-1 or if production of asphalt concrete is suspended due to unsatisfactory performance. However, asphalt concrete placed in dig outs, as a leveling course, for slope correction, for detours not to be included in the finished roadway prism, in areas where in the judgment of the Engineer compaction or compaction measurement by conventional methods is impeded or on the uppermost lift of shoulders with rumble strips shall be considered as a separate lot from other asphalt concrete. In addition, a new lot may be designated by the Engineer if the production and placement have been suspended for longer than 30 days due to seasonal suspension of phases of work.

A minimum of 5 samples shall be required to perform a statistical evaluation. The maximum obtainable pay factor with the 5 samples shall be 1.01. A minimum of 8 samples shall be required to obtain a pay factor of 1.05. If the sampling frequencies and quantity of work would otherwise result in fewer than 8 samples, the Contractor may submit a written request to increase the sampling frequency to provide a minimum of 8 samples. The request shall be included in the Quality Control Plan.

The lot will be accepted and a final pay factor determined when the Contractor's sampling, inspection, and test results are completed, have been submitted and evaluated, and the Engineer has visually inspected the pavement. Quality control test results shall be verified using the *t*-test in conformance with the provisions of Section 39-5.03, "Verification," of this Section 11-1 before the results will be used in considering the acceptance of asphalt concrete.

If the current composite pay factor of a lot is greater than 0.90, the lot will be accepted, provided the lowest single pay factor is not within the reject portion of Table 39-8, "Pay Factors," of this Section 11-1. If the lowest single pay factor is within the reject portion of Table 39-8, "Pay Factors," of this Section 11-1, the lot will be rejected. Rejected asphalt concrete shall be removed from the project site at the Contractor's expense.

If the current composite pay factor of a lot is less than 0.90, production of asphalt concrete shall be terminated and corrective action taken. Upon approval of the Engineer, up to 1000 tonnes of asphalt concrete may be placed to demonstrate that the asphalt concrete is once again in conformance with this Section 11-1. Production of asphalt concrete shall not start until the Engineer has received test results confirming conformance with this Section 11-1. A new lot will be established when production resumes.

If a pay factor for a critical quality characteristic designated in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1 is less than 0.90 for the lot or is within the rejection range for the last 5 tests, production of asphalt concrete shall be terminated and corrective action taken. Upon approval of the Engineer, up to 1000 tonnes of asphalt concrete may be placed to demonstrate that the asphalt concrete is once again in conformance with this Section 11-1. Production of asphalt concrete shall not start until the Engineer has received test results confirming conformance with this Section 11-1. A new lot will be established when production resumes.

Defective asphalt concrete may be voluntarily removed and replaced with new asphalt concrete to avoid a low pay factor. New material will be sampled, tested, and evaluated in conformance with this Section 11-1.

#### **39-11.02B Statistical Evaluation**

The Variability-Unknown/Standard Deviation Method will be used to determine the estimated percentage of the lot that is outside specification limits. The number of significant figures used in the calculations will be in conformance with the requirements of AASHTO Designation R-11, Absolute Method.

The estimated percentage of work that is outside of the specification limits for each quality characteristic will be determined as follows:

1. Calculate the arithmetic mean ( $\bar{X}$ ) of the test values;

$$\bar{X} = \frac{\sum x}{n}$$

where:

$\sum x$  = summation of individual test values  
 $n$  = total number of test values

2. Calculate the standard deviation (s);

$$s = \sqrt{\frac{\sum (x^2) - (\sum x)^2}{n(n-1)}}$$

where:

$\sum (x^2)$  = summation of the squares of individual test values  
 $(\sum x)^2$  = summation of the individual test values squared  
 $n$  = total number of test values

3. Calculate the upper quality index ( $Q_u$ );

$$Q_u = \frac{USL - \bar{X}}{s}$$

where:

USL = upper specification limit  
 $s$  = standard deviation  
 $\bar{X}$  = arithmetic mean

(Note: The USL is equal to the upper specification limit or the target value plus the production tolerance.)

4. Calculate the lower quality index ( $Q_L$ );

$$Q_L = \frac{\bar{X} - LSL}{s}$$

where:

LSL = lower specification limit or target value minus production tolerance  
 $s$  = standard deviation  
 $\bar{X}$  = arithmetic mean

5. From Table 39-7, "Estimated Percent of Work Outside Specification Limits," of this Section 11-1, determine  $P_U$ ;

where:

$P_U$  = the estimated percentage of work outside the USL.  
 ( $P_U = 0$ , when USL is not specified.)

- From Table 39-7, "Estimated Percent of Work Outside Specification Limits," of this Section 11-1, determine  $P_L$ ;

where:

$$P_L = \text{the estimated percentage of work outside the LSL.} \\ (P_L = 0, \text{ when LSL is not specified.})$$

- Calculate the total estimated percentage of work outside the USL and LSL, Percent Defective;

$$\text{Percent Defective} = P_U + P_L$$

where:

$$P_U = \text{the estimated percentage of work outside the USL} \\ P_L = \text{the estimated percentage of work outside the LSL}$$

- Repeat Steps 1 through 7 for each quality characteristic listed for acceptance.

### 39-11.02C Pay Factor Determination and Compensation Adjustment

The pay factor and compensation adjustment for a lot will be determined as follows:

- From Table 39-8, "Pay Factors," of this Section 11-1, determine the pay factor for each quality characteristic, ( $PF_{QC}$ ), using the total number of test result values and the total estimated percentage outside the specification limits ( $P_U + P_L$ ) from Step 7 in Section 39-11.02B, "Statistical Evaluation," of this Section 11-1.
- The pay factor for the lot is a composite of single pay factors determined for each quality characteristic designated in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. The following formula is used:

$$PF_C = \sum_{i=1}^8 w_i PF_{QC_i}$$

where:

$$PF_C = \text{the composite pay factor for the lot,} \\ PF_{QC} = \text{the pay factor for the individual quality characteristic,} \\ w = \text{the weighting factor listed in Table 39-9, and} \\ i = \text{the quality characteristic index number in Table 39-9.}$$

- Payment to the Contractor for the lot of asphalt concrete will be subject to a compensation adjustment. The Compensation Adjustment Factor (CAF) will be determined as follows:

$$CAF = PF_C - 1$$

- The amount of the compensation adjustment will be calculated as the product of:
  - the Compensation Adjustment Factor (CAF)
  - the total tonnes represented in the lot, and
  - the contract price paid per tonne for the item of asphalt concrete involved.

If the compensation adjustment is a negative value, the compensation adjustment will be deducted from moneys due, or that may become due, the Contractor under the contract. If the compensation adjustment is a positive value, the compensation adjustment will be added to moneys due, or that may become due, the Contractor under the contract.

Table 39-7.—ESTIMATED PERCENT OF WORK OUTSIDE SPECIFICATION LIMITS

| P <sub>U</sub><br>and/or<br>P <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  |
|  | Upper Quality Index Q <sub>U</sub> or Lower Quality Index Q <sub>L</sub> |      |      |      |      |       |       |       |       |       |       |       |      |
| 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 |

Table continues below

Table 39-7 (cont.).—ESTIMATED PERCENT OF WORK OUTSIDE SPECIFICATION LIMITS

| P <sub>U</sub><br>and/or<br>P <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  |
| Upper Quality Index Q <sub>U</sub> or Lower Quality Index Q <sub>L</sub> |                 |      |      |      |      |       |       |       |       |       |       |       |      |
| 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 |

Notes:

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>.

Table 39-8.—PAY FACTOR

| Pay Factor | Sample Size (n)   |    |    |    |    |       |       |       |       |       |       |       |     |
|------------|---|----|----|----|----|-------|-------|-------|-------|-------|-------|-------|-----|
|            | 5   | 6  | 7  | 8  | 9  | 10-11 | 12-14 | 15-17 | 18-22 | 23-29 | 30-42 | 43-66 | >66 |
|            | Maximum Allowable Percent of Work Outside Specification Limits for A Given Pay Factor ( $P_U + P_L$ ) |    |    |    |    |       |       |       |       |       |       |       |     |
| 1.05       |   |    | 0  | 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 pay factor when the estimated percent outside specification limits from Table 39-7, "Estimated Percent of Work Outside Specification Limits," does not correspond to a value in the table, use the next larger value.
- The maximum obtainable pay factor is 1.05 (with a minimum of 8 test values).

Table 39-9.—MINIMUM QUALITY CONTROL REQUIREMENTS

| Index (i) | Quality Characteristic                         | Specification Limits                          | Weighting Factor (w) | California Test  | Minimum Sampling and Testing Frequency   | Point of Sampling                |
|-----------|--|---|----------------------|------------------|--|----------------------------------|
| 1         | <b>Asphalt Content</b> <sup>2,3</sup>          | TV ± 0.5%                                     | 0.30                 | 379 or 382       | One sample per 500 tonnes or part thereof<br>Not less than one sample per day  | Mat behind paver                 |
| 2         | <b>Gradation</b><br>19 or 12.5 mm <sup>4</sup> | TV ± 5  | 0.01                 | 202              | One sample per 500 tonnes or part thereof                                      | Batch Plant -<br>from hot bins   |
| 3         | 9.5 mm   | TV ± 6  | 0.01                 |                  | Not less than one sample per day   | Drum Plant -<br>from cold feed   |
| 4         | 4.75 mm  | TV ± 7  | 0.05                 |                  |  |                                  |
| 5         | 2.36 mm  | TV ± 5  | 0.05                 |                  |  |                                  |
| 6         | 600 µm <sup>2,3</sup>                          | TV ± 4  | 0.08                 |                  |  |                                  |
| 7         | 75 µm <sup>2</sup>                             | TV ± 2  | 0.10                 |                  |  |                                  |
| 8         | <b>Relative Compaction</b> <sup>2</sup>        | 96%   | 0.40                 | 375 <sup>5</sup> | One sample per 500 tonnes or part thereof<br>Not less than one test per day    | Finished mat after final rolling |
|           | <b>Test Maximum Density</b>                    |   |                      | 375              | Per Test Method  | Mat behind the paver             |
| 9         | <b>Mix Moisture Content</b>                    | 1%  |                      | 370              | One sample per 1000 tonnes or part thereof<br>Not less than one sample per day |                                  |
|           | <b>Asphalt and Mix Temperature</b>             | 120°C to 190°C<br>(Asphalt)<br>165°C<br>(Mix) |                      |                  | Continuous using an automated recording device                                 | Plant                            |

## Notes:

1. TV = Target Value from contractor's proposed mix design.
2. Depending on aggregate gradation specified.
3. Quality characteristics 1, 6, 7, and 8 are defined as critical quality characteristics in the verification testing process.
4. Quality characteristics 1, 6, and 7 are defined as critical start-up characteristics in the Production Start-Up Evaluation.
5. California Test 375, Part 3, Section B, "Testing Frequency," is revised to change 450 tonnes to 500 tonnes and 45 tonnes to 50 tonnes.

## 39-12 MEASUREMENT AND PAYMENT

### 39-12.01 MEASUREMENT

Asphalt concrete will be measured by mass. The quantity to be paid for will be the combined mass of the mixture for the various types of asphalt concrete, as designated in the Engineer's Estimate.

The mass of the materials will be determined in conformance with the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications.

Quantities of paving asphalt, liquid asphalt, and asphaltic emulsion to be paid for as contract items of work will be determined in conformance with the methods provided in Section 92, "Asphalts," Section 93, "Liquid Asphalts," or Section 94, "Asphaltic Emulsions," of the Standard Specifications, as the case may be.

When recorded batch masses are printed automatically, these masses may be used for determining pay quantities provided the following requirements are complied with:

- A. Total aggregate and supplemental fine aggregate mass per batch shall be printed. When supplemental fine aggregate is weighed cumulatively with the aggregate, the total batch mass of aggregate shall include the supplemental fine aggregate.
- B. The total bitumen mass per batch shall be printed.
- C. Zero-tolerance mass shall be printed prior to weighing the first batch and after weighing the last batch of each truckload.
- D. The time, date, mix number, load number, and truck identification shall be correlated with the load slip.
- E. A copy of the recorded batch masses shall be certified by a licensed weighmaster and submitted to the Engineer.

Pavement reinforcing fabric will be measured and paid for by the square meter for the actual pavement area covered.

### 39-12.02 PAYMENT

Asphalt concrete placed in the work, unless otherwise specified, will be paid for at the contract price per tonne for asphalt concrete of the types designated in the Engineer's Estimate.

Compensation adjustment for asphalt concrete will be in conformance with Section 39-11.02C, "Pay Factor Determination and Compensation Adjustment," of this Section 11-1, "Quality Control / Quality Assurance."

When there is a contract item for asphalt concrete (leveling), quantities of asphalt concrete placed for leveling will be paid for at the contract price per tonne for asphalt concrete (leveling). When there is no contract item for asphalt concrete (leveling), and leveling is ordered by the Engineer, asphalt concrete so used will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

For asphalt concrete placed in dig outs, as a leveling course, for slope correction, for detours not included in the finished roadway prism, in areas where in the judgment of the Engineer compaction or compaction measurement by conventional methods is impeded or on the uppermost lift of shoulders with rumble strips the relative compaction provisions of Section 39-11.02, "Statistical Evaluation and Determination of Pay Factor," of this Section 11-1, shall not apply. In the computation of the composite pay factor ( $PF_c$ ) for the lot composed of this asphalt concrete, an individual pay factor of 1.0 for the relative compaction ( $PF_{QC8}$ ) shall be used.

Full compensation for the Contractor's Quality Control Plan, including furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in developing, implementing, modifying, and fulfilling the requirements of the Quality Control Plan shall be considered as included in the contract price paid per tonne for asphalt concrete of the types designated in the Engineer's Estimate and no additional compensation will be allowed therefor.

Full compensation for Contractor sampling, testing, inspection, testing facilities, and preparation and submission of results shall be considered as included in the contract price paid per tonne for asphalt concrete of the types designated in the Engineer's Estimate and no additional compensation will be allowed therefor.

Quantities of pavement reinforcing fabric placed and paving asphalt applied as a binder for the pavement reinforcing fabric will be paid for at the contract price per square meter for pavement reinforcing fabric and per tonne for paving asphalt (binder-pavement reinforcing fabric). Full compensation for furnishing and spreading sand to cover exposed binder material, if necessary, shall be considered as included in the contract price paid per tonne for paving asphalt (binder-pavement reinforcing fabric) and no separate payment will be made therefor.

Small quantities of asphalt concrete placed on pavement reinforcing fabric to prevent the fabric from being displaced by construction equipment or to allow public traffic to cross over the fabric shall be considered as part of the layer of asphalt concrete to be placed over the fabric and will be measured and paid for by the tonne as asphalt concrete of the types designated in the Engineer's Estimate.

When there is a contract item for liquid asphalt (prime coat), the quantity of prime coat will be paid for at the contract price per tonne for the designated grade of liquid asphalt (prime coat). When there is no contract item for liquid asphalt (prime coat) and the special provisions require the application of a prime coat, full compensation for furnishing and applying the prime coat shall be considered as included in the contract price paid per tonne for asphalt concrete of the types designated in the Engineer's Estimate and no separate payment will be made therefor.

When there is a contract item for asphaltic emulsion (paint binder), the quantity of asphaltic emulsion or paving asphalt used as paint binder (tack coat) will be paid for at the contract price per tonne for asphaltic emulsion (paint binder). When there is no contract item for asphaltic emulsion (paint binder), full compensation for furnishing and applying paint binder (tack coat) shall be considered as included in the contract price paid per tonne for asphalt concrete of the types designated in the Engineer's Estimate and no separate payment will be made therefor.

Fog seal coat will be paid for as provided in Section 37-1, "Seal Coats," of the Standard Specifications.

No adjustment of compensation will be made for an increase or decrease in the quantities of paint binder (tack coat) or fog seal coat required, regardless of the reason for such increase or decrease. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications shall not apply to the items of paint binder or fog seal coat.

The above contract prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing asphalt concrete, complete in place, as shown on the plans, as specified in this Section 11-1, "Quality Control / Quality Assurance," and "Asphalt Concrete" in Section 10-1, "General," of these special provisions, and as directed by the Engineer.

**Exhibit "B"**  
**SECTION 13. RAILROAD RELATIONS AND INSURANCE REQUIREMENTS**  
**SECTION 13-1. RELATIONS WITH RAILROAD COMPANY**

**13-1.01 GENERAL.**- The term "Railroad" shall be understood to mean the Union Pacific Railroad Company.

It is expected that the Railroad will cooperate with the Contractor to the end that the work may be handled in an efficient manner. However, except for the additional compensation provided for hereinafter for delays in completion of specific unit of work to be performed by the Railroad, and except as provided in Public Contracts Code Section 7102, the Contractor shall have no claim for damages, extension of time, or extra compensation in the event his work is held up by any of the work to be performed by the Railroad.

The Contractor must understand the Contractor's right to enter Railroads property is subject to the absolute right of Railroad to cause the Contractor's work on Railroad's property to cease if, in the opinion of Railroad, Contractor's activities create a hazard to Railroad's property, employees, and/or operations.

The Contractor will be required to sign and submit to the Railroad the Contractor's Endorsement, in the form attached hereto.

**13-1.02 RAILROAD REQUIREMENTS.** The contractor shall notify Patrick A. Kerr, Manager Industry and Public Projects, 10031 Foothills Boulevard, Roseville, CA 95747 Telephone (916) 789-6334 and the Engineer, in writing, at least ten (10) working days before performing any work on, or adjacent to the property or tracks of the Railroad.

The Contractor shall cooperate with the Railroad where work is over or under the tracks, or within the limits of Railroad property, in order to expedite the work and to avoid interference with the operation of railroad equipment.

The Contractor shall comply with the rules and regulations of Railroad or the instructions of its representatives in relation to the proper manner of protecting the tracks and property of Railroad and the traffic moving on such tracks, as well as the wires, signals and other property of Railroad, its tenants or licensees, at and in the vicinity of the work during the period of construction.

The Contractor shall perform his work in such manner and at such times as shall not endanger or interfere with the safe operation of the tracks and property of Railroad and traffic moving on such tracks, as well as wires, signals and other property of Railroad, its tenants or licensees, at or in the vicinity of the work.

The Contractor shall take protective measures necessary to keep railroad facilities, including track ballast, free of sand or debris resulting from his operations. Any damage to railroad facilities resulting from Contractor's operations will be repaired or replaced by Railroad and the cost of such repairs or replacement shall be deducted from the contractor's progress and final pay estimates.

The Contractor shall contact the Railroad's "Call Before You Dig" at least 48 hours prior to commencing work, at 1-800-336-9193 (a 24 hour number) to determine location of fiber optics. If a telecommunications system is buried anywhere on or near railroad property, the Contractor will co-ordinate with the Railroad and the Telecommunication Company(ies) to arrange for relocation or other protection of the system prior to beginning any work on or near Railroad Property.

The Contractor shall not pile or store any materials nor park any equipment closer than 25'- 0" to the centerline of the nearest track, unless directed by Railroad's representative.

The Contractor shall also abide by the following temporary clearances during the course of construction:

12'-0" horizontally from centerline of track  
21'-0" vertically above top of rail

The temporary vertical construction clearance above provided will not be permitted until authorized by the Public Utilities Commission. It is anticipated that authorization will be received not later than fifteen days after the approval of the contract by the Attorney General. In the event authorization is not received by the time specified, and, if

in the opinion of the Engineer, the Contractor's operations are delayed or interfered with by reason of authorization not being received by the said time, the State will compensate the Contractor for such delay to the extent provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications and not otherwise.

Walkways with railing shall be constructed by Contractor over open excavation areas when in close proximity of tracks, and railings shall not be closer than 8'-6" horizontally from centerline of the nearest track, if tangent, or 9'-6" if curved.

Any infringement on the above temporary construction clearances due to the Contractor's operations shall be submitted to the Railroad by way of Engineer, and shall not be undertaken until approved by the Railroad, and until the Engineer has obtained any necessary authorization from any governmental body or bodies having jurisdiction thereover. No extension of time or extra compensation will be allowed in the event the Contractor's work is delayed pending Railroad approval and governmental authorization.

When the temporary vertical clearance is less than 22'-6" above top of rail, Railroad shall have the option of installing tell-tales or other protective devices Railroad deems necessary for protection of Railroad trainmen or rail traffic.

Four sets of plans, in 11" x 17" format, and two sets of calculations showing details of construction affecting the Railroad's tracks and property not included in the contract plans, including but not limited to shoring and falsework, shall be submitted to the Engineer for review prior to submittal to Railroad for final approval. Falsework shall comply with UPRR guidelines. Demolition of existing structures shall comply with UPRR guidelines. Shoring shall be designed in accordance with UPRR's shoring requirement of Drawing No. 106613 and guidelines for shoring and falsework, latest edition, issued by the Railroad's Office of Chief Engineer. Shoring and falsework plans and calculations shall be prepared and signed by a registered professional engineer. This work shall not be undertaken until such time as the Railroad has given such approval, review by Railroad may take up to six (6) weeks after receipt of all necessary information.

The Contractor shall notify the Engineer in writing, at least 25 calendar days but not more than 40 days in advance of the starting date of installing temporary work with less than permanent clearance at each structure site. The Contractor will not be permitted to proceed with work across railroad tracks unless this requirement has been met. No extension of time or extra compensation will be allowed in the event that the Contractor's work is delayed because of his failure to comply with the requirements in this paragraph.

Private crossings at grade over tracks of Railroad for the purpose of hauling earth, rock, paving or other materials will not be permitted. If the Contractor, for the purpose of constructing highway-railway grade separation structures, including construction ramps thereto, desires to move equipment or materials across Railroad's tracks, Contractor must first obtain permission from Railroad. Should Railroad approved the crossing, Contractor may be required to execute a private crossing agreement. By this agreement, the Contractor would be required to bear the cost of the crossing surface, together with any warning devices that might be required. Contractor shall furnish his own employees as flagmen to control movements of vehicles on the private roadway and shall take all measures necessary to prevent the use of such roadway by unauthorized persons and vehicles.

No blasting will be permitted by Contractor unless approved by the Railroad.

The Contractor shall, upon completion of the work covered by this contract to be performed by Contractor upon the premises or over or beneath the tracks of Railroad, promptly remove from the premises of Railroad all of Contractor's tools, implements and other materials, whether brought upon said premises by said Contractor or any subcontractor, employee or agent of Contractor or of any subcontractor, and cause said premises to be left in a clean and presentable condition.

All under track pipeline installations shall be constructed in accordance with Railroad's current standards which may be obtained from Railroad. The general guidelines are as follows:  
Edges of jacking or boring pit excavations shall be kept a minimum of 20 feet from the centerline of the nearest track. If the pipe to be installed under the track is four (4) inches in diameter or less, the top of the pipe shall be at least 42 inches below base of rail. If the pipe diameter is greater than four (4) inches in diameter, it must be encased and the top of the steel pipe casing shall be at least 66 inches below base of rail. Installation of any pipe or conduit under Railroad's tracks is to be done by dry bore and jack method. No hydraulic jacking or boring will be permitted. Care is to be exercised so as not to damage any underground facilities of Railroad.

### **13-1.03 PROTECTION OF RAILROAD FACILITIES**

(1). Upon advance notification of not less than ten (10) working days by Contractor, Railroad representatives, conductors, flagmen or watchmen will be provided by Railroad to protect its facilities, property and movements of its trains or engines. Said notice shall be made to Patrick A. Kerr, Manager Industry and Public Projects of Railroad at (916) 789-6334. At the time of such notification, Contractor shall provide Railroad with a schedule of dates that flagging services will be needed, as well as times, if outside normal working hours. Any subsequent deviation from said schedule shall also require ten (10) working days advance notice from the first affected date. In general, Railroad will furnish such personnel or other protective devices:

- (a) When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from centerline of any track on which trains may operate, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.
- (b) For any excavation below elevation of track subgrade if, in the opinion of Railroad's representative, track or other Railroad facilities may be subject to settlement or movement.
- (c) During any clearing, grubbing, grading or blasting in proximity to Railroad which, in the opinion of Railroad's representative, may endanger Railroad facilities or operations.
- (d) During any of Contractor's operations when, in the opinion of Railroad's representatives, Railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines or pipe lines, may be endangered.

(2) The cost of flagging and inspection provided by Railroad during the period of constructing that portion of the project located on or near Railroad property, as deemed necessary for the protection of Railroad's facilities and trains, will be borne by the State for a period of 230 working days beginning on the date work commences on or near property of Railroad. The Contractor shall pay to the State liquidated damages in the sum of \$500 per day for each day in excess of the above 230 working days the Contractor works on or near Railroad property, and which requires flagging protection of Railroad's facilities and trains.

**13-1.04 WORK BY RAILROAD.** Railroad will furnish or cause to be furnished as necessary due to construction, labor materials, tools and equipment to perform certain works including relocation of telephone, telegraphy and signal lines and appurtenances and will perform any other work in connection therewith.

The work by Railroad will be performed by its own forces and is not a part of the work under this contract.

- (a) The Railroad will perform preliminary engineering inspection and flagging as specified in Section 13-1.03 "Protection of Railroad Facilities".

**13-1.05 DELAYS DUE TO WORK BY RAILROAD.** No delays due to work by Railroad are anticipated.

If delays due to work by the Railroad occur, and the Contractor sustains loss which, in the opinion of the Engineer, could not have been avoided by the judicious handling of forces, equipment and plant, the amount of said loss shall be determined as provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

If a delay due to work by Railroad occurs, an extension of time determined pursuant to the provisions in Section 8-1.07, "Liquidated Damages," of the Standard Specifications will be granted.

**13-1.06 LEGAL RELATIONS.-** The provisions of this section, "Relations with Railroad Company" and the provisions of the following section, "Railroad Protective Insurance," of these special provisions shall inure directly to the benefit of Railroad

## SECTION 13-2. RAILROAD PROTECTIVE INSURANCE

The term "Railroad" shall be understood to mean the Union Pacific Railroad Company.

In addition to any other form of insurance or bonds required under the terms of the contract and specifications, the Contractor will be required to carry insurance of the kinds and in the amounts hereinafter specified.

Such insurance shall be approved by the Railroad before any work is performed on Railroad's property and shall be carried until all work required to be performed on or adjacent to the Railroad's property under the terms of the contract is satisfactorily completed as determined by the Engineer, and thereafter until all tools, equipment and materials have been removed from Railroad's property and such property is left in a clean and presentable condition.

The insurance herein required shall be obtained by the Contractor, who shall furnish the Railroad with completed certificates, in the form attached hereto, signed by the insurance company or its authorized agent or representative, reflecting the existence of each of the policies required by 1 and 2 below including coverage for X, C and U and completed operations hazards, and the original policy of insurance (or a certified duplicate original policy) required by 3 below, to:

Judy Scott  
Union Pacific Railroad Company  
Insurance Group  
1416 Dodge Street, Room 820  
Omaha, NE 68179

Certificate of insurance shall guarantee that the policy under 1 and 2 will not be amended, altered, modified or canceled insofar as the coverage contemplated hereunder is concerned, without at least thirty (30) days notice mailed by registered mail to the Railroad.

Full compensation for all premiums which the Contractor is required to pay on all the insurance described hereinafter shall be considered as included in the prices paid for the various items of work to be performed under the contract, and no additional allowance will be made therefor or for additional premiums which may be required by extensions of the policies of insurance.

The approximate ratio of the estimated cost of the work over or under or within 50 feet of Railroad's tracks to the total estimated cost is 0.006. Approximate daily train traffic for Camarillo OH & Separation And Camarillo POH is 2 passenger trains and 35 freight trains respectively

### **1. Contractor's Public Liability and Property Damage Liability Insurance**

The Contractor shall, with respect to the operations he performs within or adjacent to Railroad's property, carry regular Contractor's Public Liability and Property Damage Liability Insurance providing for the same limits as specified for Railroad's Protective Public Liability and Property Damage Liability insurance to be furnished for and in behalf of Railroad as hereinafter provided.

If any part of the work within or adjacent to Railroad's property is subcontracted, the Contractor in addition to carrying the above insurance shall provide the above insurance on behalf of the subcontractors to cover their operations.

### **2. Contractor's Protective Public Liability and Property Damage Liability Insurance.**

The Contractor shall, with respect to the operations performed for him by subcontractors who do work within or adjacent to Railroad's property, carry in his own behalf regular Contractor's Protective Public Liability and Property Damage Liability Insurance providing for the same limits as specified for Railroad's Protective Public Liability and Property Damage Liability Insurance to be furnished for and on behalf of Railroad as hereinafter provided.

### **3. Railroad's Protective Public Liability and Property Damage Liability Insurance**

The Contractor shall, with respect to the operations he performs within or adjacent to Railroad's property or that of any of his subcontractors who do work within or adjacent to Railroad's property perform, have issued and furnished in favor of Railroad, Policy or policies of insurance in the Railroad Protective Liability Form as hereinafter specified.

**Railroad Protective Liability Form**

\_\_\_\_\_  
(Name of Insurance Company)

**DECLARATIONS**

Item 1. Named Insured:  
                     Union Pacific Railroad Company  
                     1416 Dodge Street - Mail Code 10049  
                     Omaha, Nebraska 68179

Additional Insured:  
     1. Southern California Regional Rail Authority (SCRRA)  
        700 South Flower Street, 26<sup>th</sup> Floor  
        Los Angeles, CA 90017-4101

Item 2. Policy Period: From \_\_\_\_\_ to \_\_\_\_\_ 12:01 a.m., Standard Time, at the designated job site as stated herein.

Item 3. The insurance afforded is only with respect to such of the following coverage's as are indicated in Item 6 by specific premium charge or charges. The limit of the company's liability against such coverage or coverage's shall be as stated herein, subject to all the terms of this policy having reference thereto.

| Coverage's |                                 | Limits of Liability |                                     |
|------------|---------------------------------|---------------------|-------------------------------------|
|            |                                 | Each Occurrence     | Aggregate                           |
| A          | Bodily Injury Liability         | \$2,000,000         | \$6,000,000 for Coverage's A, B & C |
| B          | Property Damage Liability       | Combined            |                                     |
| &<br>C     | and Physical Damage to Property | Single Limit        |                                     |

Item 4. Name and Address of Contractor:

Item 5. Name and Address of Governmental Authority for whom the work by the Contractor is being performed: State of California, acting by and through its Department of Transportation, P.O. Box 942874, Sacramento, California 94274-0001

Item 6. Designation of the Job Site and Description of Work:

FOR CONSTRUCTION ON \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

| Premium Bases | Rates per \$100 of Cost |                  | Advance Premiums |                  |
|---------------|-------------------------|------------------|------------------|------------------|
|               | Coverage A              | Coverage's B & C | Coverage A       | Coverage's B & C |
| Contract Cost | \$                      | \$               | \$               | \$               |
| Rental Cost   | \$                      | \$               | \$               | \$               |

Countersigned \_\_\_\_\_, 20\_\_\_\_ by \_\_\_\_\_

\_\_\_\_\_  
 Title (Name of Insurance Company)

**POLICY**

A \_\_\_\_\_ insurance company, herein called the company, agrees with the insured, named in the declarations made a part hereof, in consideration of the payment of the premium and in reliance upon the statements in the declaration made by the named insured and subject to all of the terms of this policy:

**INSURING AGREEMENTS**

**I. Coverage A--Bodily Injury Liability.**

To pay on behalf of the insured all sums which the insured shall become legally obligated to pay as damages because of bodily injury, sickness, or disease, including death at any time resulting therefrom, hereinafter called "bodily injury," either (1) sustained by any person arising out of acts or omissions at the designated job site which are related to or are in connection with the work described in Item 6 of the declarations, or (2) sustained at the designated job site by the Contractor or any employee of the Contractor, or by any employee of the Governmental Authority specified in Item 5 of the Declarations, or by any designated employee of the insured whether or not arising out of such acts or omissions.

**Coverage B--Property Damage Liability.**

To pay on behalf of the insured all sums which the insured shall become legally obligated to pay as damages because of physical injury to or destruction of property, including loss of use of any property due to such injury or destruction, hereinafter called "property damage," arising out of acts or omissions at the designated job site which are related to or are in connection with the work described in Item 6 of the declarations.

**Coverage C--Physical Damage to Property.**

To pay for direct and accidental loss of or damage to rolling stock and their contents, mechanical construction equipment, or motive power equipment, hereinafter called "loss," arising out of acts or omissions at the designated job site which are related to or are in connection with the work described in Item 6 of the declarations; provided such property is owned by the named insured or is leased or entrusted to the named insured under a lease or trust agreement.

## II. Definitions.

- (a) **Insured.**--The unqualified word "insured" includes the named insured and also includes any executive officer, director or stockholder thereof while acting within the scope of his duties as such.
- (b) **Contractor.**--The word "contractor" means the Contractor designated in Item 4 of the declarations and includes all subcontractors of said Contractor but shall not include the named insured.
- (c) **Designated employee of the insured.**--The words "designated employee of the insured" mean:
  - (1) any supervisory employee of the insured at the job site,
  - (2) any employee of the insured while operating, attached to or engaged on work trains or other railroad equipment at the job site which are assigned exclusively to the Contractor, or
  - (3) any employee of the insured not within (1) or (2) who is specifically loaned or assigned to the work of the Contractor for prevention of accidents or protection of property, the cost of whose services is borne specifically by the Contractor or by governmental authority.
- (d) **Contract.**--The word "contract" means any contract or agreement to carry a person or property for a consideration or any lease, trust or interchange contract or agreement respecting motive power, rolling stock or mechanical construction equipment.

## III. Defense, Settlement, Supplementary Payments.

With respect to such insurance as is afforded by this policy under Coverage's A and B, the company shall:

- (a) defend any suit against the insured alleging such bodily injury or property damage and seeking damages which are payable under the terms of this policy, even if any of the allegations of the suit are groundless, false or fraudulent; but the company may make such investigation and settlement of any claim or suit as it deems expedient;
- (b) pay, in addition to the applicable limits of liability:
  - (1) all expenses incurred by the company, all costs taxed against the insured in any such suit and all interest on the entire amount of any judgment therein which accrues after entry of the judgment and before the company has paid or tendered or deposited in court that part of the judgment which does not exceed the limit of the company's liability thereon;
  - (2) Premiums on appeal bonds required in any such suit, premiums on bonds to release attachments for an amount not in excess of the applicable limit of liability of this policy, but without obligation to apply for or furnish any such bonds;
  - (3) expenses incurred by the insured for such immediate medical and surgical relief to others as shall be imperative at the time of the occurrence;

- (4) all reasonable expenses, other than loss of earnings, incurred by the insured at the company's request.

#### IV. Policy Period, Territory.

This policy applies only to occurrences and losses during the policy period and within the United States of America, its territories or possessions, or Canada.

#### EXCLUSIONS

This policy does not apply:

- (a) to liability assumed by the insured under any contract or agreement except a contract as defined herein;
- (b) to bodily injury or property damage caused intentionally by or at the direction of the insured;
- (c) to bodily injury, property damage or loss which occurs after notification to the named insured of the acceptance of the work by the governmental authority, other than bodily injury, property damage or loss resulting from the existence or removal of tools, uninstalled equipment and abandoned or unused materials;
- (d) under Coverage's A(1), B and C, to bodily injury, property damage or loss, the sole proximate cause of which is an act or omission of any insured other than acts or omissions of any designated employee of any insured;
- (e) under Coverage A, to any obligation for which the insured or any carrier as his insurer may be held liable under any workmen's compensation, unemployment compensation or disability benefits law, or under any similar law; provided that the Federal Employers' Liability Act, U.S. Code (1946), Title 45, Sections 51-60, as amended, shall for the purposes of this insurance be deemed not to be any similar law;
- (f) under Coverage B, to injury to or destruction of property (1) owned by the named insured or (2) leased or entrusted to the named insured under a lease or trust agreement.
- (g) 1. Under any liability coverage, to injury, sickness, disease, death or destruction
  - (a) with respect to which an insured under the policy is also an insured under a nuclear energy liability policy issued by Nuclear Energy Liability Insurance Association, Mutual Atomic Energy Liability Underwriters or Nuclear Insurance Association of Canada, or would be an insured under any such policy but for its termination upon exhaustion of its limit of liability; or
  - (b) resulting from the hazardous properties of nuclear material and with respect to which (1) any person or organization is required to maintain financial protection pursuant to the Atomic Energy Act of 1954, or any law amendatory thereof, or (2) the insured is, or had this policy not been issued would be, entitled to indemnity from the United States of America, or any agency thereof, under any agreement

entered into by the United States of America, or any agency thereof, with any person or organization.

2. Under any medical payments coverage, or under any Supplementary Payments provision relating to immediate medical or surgical relief, to expenses incurred with respect to bodily injury, sickness, disease or death resulting from the hazardous properties of nuclear material and arising out of the operation of a nuclear facility by any person or organization.

3. Under any liability coverage, to injury, sickness, disease, death or destruction resulting from the hazardous properties of nuclear material, if

(a) the nuclear material (1) is at any nuclear facility owned by, or operated by or on behalf of, an insured or (2) has been discharged or dispersed therefrom;

(b) the nuclear material is contained in spent fuel or waste at any time possessed, handled, used, processed, stored, transported or disposed of by or on behalf of an insured; or

(c) the injury, sickness, disease, death or destruction arises out of the furnishing by an insured of services, materials, parts or equipment in connection with the planning, construction, maintenance, operation or use of any nuclear facility, but if such facility is located within the United States of America, its territories or possessions or Canada, this exclusion (c) applies only to injury to or destruction of property at such nuclear facility.

4. As used in this exclusion:

"hazardous properties" include radioactive, toxic or explosive properties;

"nuclear material" means source material, special nuclear material or byproduct material;

"source material", "special nuclear material", and "byproduct material" have the meanings given them in the Atomic Energy Act of 1954 or in any law amendatory thereof;

"spent fuel" means any fuel element or fuel component, solid or liquid, which has been used or exposed to radiation in a nuclear reactor;

"waste" means any waste material (1) containing byproduct material and (2) resulting from the operation by any person or organization of any nuclear facility included within the definition of nuclear facility under paragraph (a) or (b) thereof;

"nuclear facility" means

(a) any nuclear reactor,

(b) any equipment or device designed or used for (1) separating the isotopes of uranium or plutonium, (2) processing or utilizing spent fuel, or (3) handling, processing or packaging waste,

(c) any equipment or device used for the processing, fabricating or alloying of special nuclear material if at any time the total amount of such material in the custody of the insured at the premises where such equipment or device is located consists of or contains more than 25 grams of plutonium or uranium 233 or any combination thereof, or more than 250 grams of uranium 235,

(d) any structure, basin, excavation, premises or place prepared or used for the storage or disposal of waste, and includes the site on which any of the foregoing is located, all operations conducted on such site and all premises used for such operations;

"nuclear reactor" means any apparatus designed or used to sustain nuclear fission in a self-supporting chain reaction or to contain a critical mass of fissionable material;

with respect to injury to or destruction of property, the word "injury" or "destruction" includes all forms of radioactive contamination of property.

(h) under Coverage C, to loss due to nuclear reaction, nuclear radiation or radioactive contamination, or to any act or condition incident to any of the foregoing.

## CONDITIONS

(The conditions, except conditions 3, 4, 5, 7, 8, 9, 10, 11 and 12, apply to all coverage's. Conditions 3, 4, 5, 7, 8, 9, 10, 11 and 12, apply only to the coverage noted thereunder.)

**1. Premium.--**The premium bases and rates for the hazards described in the declarations are stated therein. Premium bases and rates for hazards not so described are those applicable in accordance with the manuals in use by the company.

The term "contract cost" means the total cost of all work described in Item 6 of the declarations.

The term "rental cost" means the total cost to the Contractor for rental of work trains or other railroad equipment, including the remuneration of all employees of the insured while operating, attached to or engaged thereon.

The advance premium stated in the declarations is an estimated premium only. Upon termination of this policy the earned premium shall be computed in accordance with the company's rules, rates, rating plans, premiums and minimum premiums applicable to this insurance. If the earned premium thus computed exceeds the estimated advance premium paid, the company shall look to the Contractor specified in the declarations for any such excess; if less, the company shall return to the said Contractor the unearned portion paid.

In no event shall payment of premium be an obligation of the named insured.

**2. Inspection.--**The named insured shall make available to the company records of information relating to the subject matter of this insurance.

The company shall be permitted to inspect all operations in connection with the work described in Item 6 of the declarations.

**3. Limits of Liability, Coverage A.--**The limit of bodily injury liability stated in the declarations as applicable to "each person" is the limit of the company's liability for all damages, including damages for care and loss of

services, arising out of bodily injury sustained by one person as the result of any one occurrence; the limit of such liability stated in the declarations as applicable to "each occurrence" is, subject to the above provision respecting each person, the total limit of the company's liability for all such damage arising out of bodily injury sustained by two or more persons as the result of any one occurrence.

**4. Limits of Liability, Coverage's B and C.**--The limit of liability under Coverages B and C stated in the declarations as applicable to "each occurrence" is the total limit of the company's liability for all damages and all loss under Coverage B and C combined arising out of physical injury to, destruction or loss of all property of one or more persons or organizations, including the loss of use of any property due to such injury or destruction under Coverage B, as the result of any one occurrence.

Subject to the above provision respecting "each occurrence," the limit of liability under Coverage's B and C stated in the declarations as "aggregate" is the total limit of the company's liability for all damages and all loss under Coverage's B and C combined arising out of physical injury to, destruction or loss of property, including the loss of use of any property due to such injury or destruction under Coverage B.

Under Coverage C, the limit of the company's liability for loss shall not exceed the actual cash value of the property, or if the loss is of a part thereof the actual cash value of such part, at time of loss, nor what it would then cost to repair or replace the property or such part thereof with other of like kind and quality.

**5. Severalty of Interests, Coverage's A and B.**-- The term "the insured" is used severally and not collectively, but the inclusion herein of more than one insured shall not operate to increase the limits of the company's liability.

**6. Notice.**--In the event of an occurrence or loss, written notice containing particulars sufficient to identify the insured and also reasonably obtainable information with respect to the time, place and circumstances thereof, and the names and addresses of the injured and of available witnesses, shall be given by or for the insured to the company or any of its authorized agents as soon as practicable. If claim is made or suit is brought against the insured, he shall immediately forward to the company every demand, notice, summons or other process received by him or his representative.

**7. Assistance and Cooperation of the Insured, Coverage's A and B.**--The insured shall cooperate with the company and, upon the company's request, attend hearings and trials and assist in making settlements, securing and giving evidence, obtaining the attendance of witnesses and in the conduct of suits. The insured shall not, except at his own cost, voluntarily make any payment, assume any obligation or incur any expense other than for such immediate medical and surgical relief to others as shall be imperative at the time of accident.

**8. Action Against Company, Coverages A and B.**--No action shall lie against the company unless, as a condition precedent thereto, the insured shall have fully complied with all the terms of this policy, nor until the amount of the insured's obligation to pay shall have been finally determined either by judgment against the insured after actual trial or by written agreement of the insured, the claimant and the company.

Any person or organization or the legal representative thereof who has secured such judgment or written agreement shall thereafter be entitled to recover under this policy to the extent of the insurance afforded by this

policy. No person or organization shall have any right under this policy to join the company as a party to any action against the insured to determine the insured's liability. Bankruptcy or insolvency of the insured or of the insured's estate shall not relieve the company of any of its obligations hereunder.

**Coverage C.**--No action shall lie against the company unless, as a condition precedent thereto, there shall have been full compliance with all the terms of this policy nor until 30 days after proof of loss is filed and the amount of loss is determined as provided in this policy.

**9. Insured's Duties in Event of Loss, Coverage C.**--In the event of loss the insured shall:

- (a) protect the property, whether or not the loss is covered by this policy, and any further loss due to the insured's failure to protect shall not be recoverable under this policy; reasonable expenses incurred in affording such protection shall be deemed incurred at the company's request;
- (b) file with the company, as soon as practicable after loss, his sworn proof of loss in such form and including such information as the company may reasonably require and shall, upon the company's request, exhibit the damaged property.

**10. Appraisal, Coverage C.**--If the insured and the company fail to agree as to the amount of loss, either may, within 60 days after the proof of loss is filed, demand an appraisal of the loss. In such event the insured and the company shall each select a competent appraiser, and the appraisers shall select a competent and disinterested umpire. The appraisers shall state separately the actual cash value and the amount of loss and failing to agree shall submit their differences to the umpire. An award in writing of any two shall determine the amount of loss. The insured and the company shall each pay his chosen appraiser and shall bear equally the other expenses of the appraisal and umpire.

The company shall not be held to have waived any of its rights by any act relating to appraisal.

**11. Payment of Loss, Coverage C.**--The company may pay for the loss in money but there shall be no abandonment of the damaged property to the company.

**12. No Benefit to Bailee, Coverage C.**--The insurance afforded by this policy shall not inure directly or indirectly to the benefit of any carrier or bailee, other than the named insured, liable for loss to the property.

**13. Subrogation.**--In the event of any payment under this policy, the company shall be subrogated to all the insured's rights of recovery therefor against any person or organization and the insured shall execute and deliver instruments and papers and do whatever else is necessary to secure such rights. The insured shall do nothing after loss to prejudice such rights.

**14. Application of Insurance.**--The insurance afforded by this policy is primary insurance.

**15. Three Year Policy.**--A policy period of three years is comprised of three consecutive annual periods. Computation and adjustment of earned premium shall be made at the end of each annual period. Aggregate limits of liability as stated in this policy shall apply separately to each annual period.

**16. Changes.--**Notice to any agent or knowledge possessed by any agent or by any other person shall not effect a waiver or a change in any part of this policy or stop the company from asserting any right under the terms of this policy; nor shall the terms of this policy be waived or changed, except by endorsement issued to form a part of this policy.

**17. Assignment.--**Assignment of interest under this policy shall not bind the company until its consent is endorsed hereon.

**18. Cancellation.--**This policy may be canceled by the named insured by mailing to the company written notice stating when thereafter the cancellation shall be effective. This policy may be canceled by the company by mailing to the named insured, Contractor and governmental authority at the respective addresses shown in this policy written notice stating when not less than 30 days thereafter such cancellation shall be effective. The mailing of notice as aforesaid shall be sufficient proof of notice. The effective date and hour of cancellation stated in the notice shall become the end of the policy period. Delivery of such written notice either by the named insured or by the company shall be equivalent to mailing.

If the named insured cancels, earned premium shall be computed in accordance with the customary short rate table and procedure. If the company cancels, earned premium shall be computed pro rata. Premium adjustment may be made either at the time cancellation is effected or as soon as practicable after cancellation becomes effective, but payment or tender of unearned premium is not a condition of cancellation.

**19. Declaration.--**By acceptance of this policy the named insured agrees that such statements in the declarations as are made by him are his agreements and representations, that this policy is issued in reliance upon the truth of such representations and that this policy embodies all agreements existing between himself and the company or any of its agents relating to this insurance.

In witness whereof, the \_\_\_\_\_ Insurance Company has caused this policy to be signed by its president and a secretary at \_\_\_\_\_, and countersigned on the declaration page by a duly authorized agent of the company.

(Facsimile of Signature)

(Facsimile of Signature)

\_\_\_\_\_  
Secretary

\_\_\_\_\_  
President

CERTIFICATE OF INSURANCE  
**Exhibit "C"**

This is to certify to:

RAILROAD FILE NO.:

(1) Railroad Agreements Branch, MS #9-2/9G  
 Engineering Services  
 California Department of Transportation  
 1801 30th Street, Sacramento, California 95816

(2) and to the following Railroad Company

that such insurance as is afforded by the policy or policies described below for bodily injury liability and property damage liability is in full force and effect as of the date of this certificate and covers the following contractor as a named insured with respect to liability for damages arising out of operations performed by or for the named insured in connection with the contract or work described below.

1. Named Insured and Address

This is to certify that policies of insurance listed below have been issued to the insured named above and are in force at this time. Notwithstanding any requirement, term or condition of any contract or other document with respect to which this certificate may be issued or may pertain, the insurance afforded by the policies described herein is subject to all the terms, exclusions and conditions of such policies.

2. Description of Work

Contract No. \_\_\_\_\_

| 3. Coverage's  | Policy Expiration Date | Limits of Liability Each Occurrence | Aggregate |
|--|------------------------|-------------------------------------|-----------|
| Contractor's Bodily Injury Liability and Property Damage Liability |                        |                                     |           |
| Umbrella or Excess Liability                                       |                        |                                     |           |

All of the coverages include coverage for the completed operations hazard, and X, C and U exposures.

Name of Insurance Company by Coverage

| Coverage's                   | Company | Policy Number |
|------------------------------|---------|---------------|
| Bodily Injury Liability      |         |               |
| Property Damage Liability    |         |               |
| Umbrella or Excess Liability |         |               |

4. The policy or policies described above will not be amended, altered, modified or cancelled until thirty (30) days after written notice thereof has been given by registered mail to the Railroad named as certificate holder in this certificate.

Certificate Date:

For \_\_\_\_\_  
 (Insurance Company)

By \_\_\_\_\_  
 (Authorized Agent or Representative)

State of California  
 Department of Transportation  
 DH-0S-A104(8-10-99)

**CONTRACTOR'S ENDORSEMENT**

A. As a condition to entering upon Railroad's right-of-way to perform work pursuant to this agreement, Licensee's contractor, \_\_\_\_\_, whose address is \_\_\_\_\_ (hereinafter "Contractor), agrees to comply with and be bound by all the terms and provisions of this agreement relating to the work to be performed and the insurance requirements set forth in Section 13 of the Contract Special Provisions.

B. Before the Contractor commences any work, the Contractor will provide the Railroad with (1) a binder of insurance for the Railroad Protective Liability Insurance described in Section 13.2 of the Contract Special Provisions, and the original policy (or a certified duplicate original policy), and (2) a certificate issued by its insurance carrier providing the other insurance coverage required pursuant to Section 13.2 of the Contract Special Provisions in a policy or policies which contain the following type endorsement:

UNION PACIFIC RAILROAD COMPANY is named as an additional insured with respect to all liabilities arising out of Insured's performance of work on behalf of the State.

C. This endorsement shall be completed and directed to:

*Mr. Patrick A. Kerr  
Manager Industry & Public Projects  
10031 Foothills Boulevard  
Roseville, CA 95747  
(916) 789-6334*

\_\_\_\_\_  
CONTRACTOR (print name on above line)

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

Title: \_\_\_\_\_

**SECTION 14 FEDERAL REQUIREMENTS FOR FEDERAL-AID CONSTRUCTION PROJECTS**

**GENERAL.**—The work herein proposed will be financed in whole or in part with Federal funds, and therefore all of the statutes, rules and regulations promulgated by the Federal Government and applicable to work financed in whole or in part with Federal funds will apply to such work. The "Required Contract Provisions, Federal-Aid Construction Contracts, "Form FHWA 1273, are included in this Section 14. Whenever in said required contract provisions references are made to "SHA contracting officer", "SHA resident engineer", or "authorized representative of the SHA", such references shall be construed to mean "Engineer" as defined in Section 1-1.18 of the Standard Specifications.

**PERFORMANCE OF PREVIOUS CONTRACT.**—In addition to the provisions in Section II, "Nondiscrimination," and Section VII, "Subletting or Assigning the Contract," of the required contract provisions, the Contractor shall comply with the following:

The bidder shall execute the CERTIFICATION WITH REGARD TO THE PERFORMANCE OF PREVIOUS CONTRACTS OR SUBCONTRACTS SUBJECT TO THE EQUAL OPPORTUNITY CLAUSE AND THE FILING OF REQUIRED REPORTS located in the proposal. No request for subletting or assigning any portion of the contract in excess of \$10,000 will be considered under the provisions of Section VII of the required contract provisions unless such request is accompanied by the CERTIFICATION referred to above, executed by the proposed subcontractor.

**NON-COLLUSION PROVISION.**—The provisions in this section are applicable to all contracts except contracts for Federal Aid Secondary projects.

Title 23, United States Code, Section 112, requires as a condition precedent to approval by the Federal Highway Administrator of the contract for this work that each bidder file a sworn statement executed by, or on behalf of, the person, firm, association, or corporation to whom such contract is to be awarded, certifying that such person, firm, association, or corporation has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the submitted bid. A form to make the non-collusion affidavit statement required by Section 112 as a certification under penalty of perjury rather than as a sworn statement as permitted by 28, USC, Sec. 1746, is included in the proposal.

**PARTICIPATION BY MINORITY BUSINESS ENTERPRISES IN SUBCONTRACTING.**—Part 23, Title 49, Code of Federal Regulations applies to this Federal-aid project. Pertinent sections of said Code are incorporated in part or in its entirety within other sections of these special provisions.

Schedule B—Information for Determining Joint Venture Eligibility

(This form need not be filled in if all joint venture firms are minority owned.)

1. Name of joint venture \_\_\_\_\_
2. Address of joint venture \_\_\_\_\_
3. Phone number of joint venture \_\_\_\_\_
4. Identify the firms which comprise the joint venture. (The MBE partner must complete Schedule A.) \_\_\_\_\_  
\_\_\_\_\_  
  - a. Describe the role of the MBE firm in the joint venture. \_\_\_\_\_
  - b. Describe very briefly the experience and business qualifications of each non-MBE joint venturer: \_\_\_\_\_  
\_\_\_\_\_
5. Nature of the joint venture's business \_\_\_\_\_  
\_\_\_\_\_
6. Provide a copy of the joint venture agreement.
7. What is the claimed percentage of MBE ownership? \_\_\_\_\_
8. Ownership of joint venture: (This need not be filled in if described in the joint venture agreement, provided by question 6.).
  - a. Profit and loss sharing.
  - b. Capital contributions, including equipment.
  - c. Other applicable ownership interests.

9. Control of and participation in this contract. Identify by name, race, sex, and "firm" those individuals (and their titles) who are responsible for day-to-day management and policy decision making, including, but not limited to, those with prime responsibility for:

a. Financial decisions \_\_\_\_\_

b. Management decisions, such as:

(1) Estimating \_\_\_\_\_

(2) Marketing and sales \_\_\_\_\_

(3) Hiring and firing of management personnel \_\_\_\_\_

(4) Purchasing of major items or supplies \_\_\_\_\_

c. Supervision of field operations \_\_\_\_\_

Note.—If, after filing this Schedule B and before the completion of the joint venture's work on the contract covered by this regulation, there is any significant change in the information submitted, the joint venture must inform the grantee, either directly or through the prime contractor if the joint venture is a subcontractor.

**Affidavit**

"The undersigned swear that the foregoing statements are correct and include all material information necessary to identify and explain the terms and operation of our joint venture and the intended participation by each joint venturer in the undertaking. Further, the undersigned covenant and agree to provide to grantee current, complete and accurate information regarding actual joint venture work and the payment therefor and any proposed changes in any of the joint venture arrangements and to permit the audit and examination of the books, records and files of the joint venture, or those of each joint venturer relevant to the joint venture, by authorized representatives of the grantee or the Federal funding agency. Any material misrepresentation will be grounds for terminating any contract which may be awarded and for initiating action under Federal or State laws concerning false statements."

|                       |                       |
|-----------------------|-----------------------|
| _____<br>Name of Firm | _____<br>Name of Firm |
| _____<br>Signature    | _____<br>Signature    |
| _____<br>Name         | _____<br>Name         |
| _____<br>Title        | _____<br>Title        |
| _____<br>Date         | _____<br>Date         |

Date \_\_\_\_\_

State of \_\_\_\_\_

County of \_\_\_\_\_

On this \_\_\_\_ day of \_\_\_\_\_, 19 \_\_, before me appeared (Name) \_\_\_\_\_, to me personally known, who, being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by (Name of firm) \_\_\_\_\_ to execute the affidavit and did so as his or her free act and deed.

Notary Public \_\_\_\_\_

Commission expires \_\_\_\_\_

[Seal]

Date \_\_\_\_\_

State of \_\_\_\_\_

County of \_\_\_\_\_

On this \_\_\_\_ day of \_\_\_\_\_, 19 \_\_, before me appeared (Name) \_\_\_\_\_ to me personally known, who, being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by (Name of firm) \_\_\_\_\_ to execute the affidavit and did so as his or her free act and deed.

Notary Public \_\_\_\_\_

Commission expires \_\_\_\_\_

[Seal]

**REQUIRED CONTRACT PROVISIONS  
FEDERAL-AID CONSTRUCTION CONTRACTS**

**I. GENERAL**

1. These contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.
2. Except as otherwise provided for in each section, the contractor shall insert in each subcontract all of the stipulations contained in these Required Contract Provisions, and further require their inclusion in any lower tier subcontract or purchase order that may in turn be made. The Required Contract Provisions shall not be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with these Required Contract Provisions.
3. A breach of any of the stipulations contained in these Required Contract Provisions shall be sufficient grounds for termination of the contract.
4. A breach of the following clauses of the Required Contract Provisions may also be grounds for debarment as provided in 29 CFR 5.12:

Section I, paragraph 2;  
Section IV, paragraphs 1, 2, 3, 4, and 7;  
Section V, paragraphs 1 and 2a through 2g.

5. Disputes arising out of the labor standards provisions of Section IV (except paragraph 5) and Section V of these Required Contract Provisions shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the U.S. Department of Labor (DOL) as set forth in 29 CFR 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the DOL, or the contractor's employees or their representatives.
6. **Selection of Labor:** During the performance of this contract, the contractor shall not:
  - a. discriminate against labor from any other State, possession, or territory of the United States (except for employment preference for Appalachian contracts, when applicable, as specified in Attachment A), or
  - b. employ convict labor for any purpose within the limits of the project unless it is labor performed by convicts who are on parole, supervised release, or probation.

**II. NONDISCRIMINATION**

(Applicable to all Federal-aid construction contracts and to all related subcontracts of \$10,000 or more.)

1. **Equal Employment Opportunity:** Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, and 41 CFR 60) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The Equal Opportunity Construction Contract Specifications set forth under 41 CFR 60-4.3 and the provisions of the American Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:
  - a. The contractor will work with the State highway agency (SHA) and the Federal Government in carrying out EEO obligations and in their review of his/her activities under the contract.
  - b. The contractor will accept as his operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall

include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, preapprenticeship, and/or on-the-job training."

2. **EEO Officer:** The contractor will designate and make known to the SHA contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active contractor program of EEO and who must be assigned adequate authority and responsibility to do so.
3. **Dissemination of Policy:** All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:
  - a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.
  - b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.
  - c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minority group employees.
  - d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.
  - e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.
4. **Recruitment:** When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minority groups in the area from which the project work force would normally be derived.
  - a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minority group applicants. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority group applicants may be referred to the contractor for employment consideration.
  - b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, he is expected to observe the provisions of that agreement to the extent that the system permits the contractor's compliance with EEO contract provisions. (The DOL has held that where implementation of such agreements have the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Executive Order 11246, as amended.)
  - c. The contractor will encourage his present employees to refer minority group applicants for employment. Information and procedures with regard to referring minority group applicants will be discussed with employees.
5. **Personnel Actions:** Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:
  - a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

- b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.
  - c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.
  - d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with his obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of his avenues of appeal.
6. Training and Promotion:
- a. The contractor will assist in locating, qualifying, and increasing the skills of minority group and women employees, and applicants for employment.
  - b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision.
  - c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.
  - d. The contractor will periodically review the training and promotion potential of minority group and women employees and will encourage eligible employees to apply for such training and promotion.
7. **Unions:** If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use his/her best efforts to obtain the cooperation of such unions to increase opportunities for minority groups and women within the unions, and to effect referrals by such unions of minority and female employees. Actions by the contractor either directly or through a contractor's association acting as agent will include the procedures set forth below:
- a. The contractor will use best efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minority group members and women for membership in the unions and increasing the skills of minority group employees and women so that they may qualify for higher paying employment.
  - b. The contractor will use best efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.
  - c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the SHA and shall set forth what efforts have been made to obtain such information.
  - d. In the event the union is unable to provide the contractor with a reasonable flow of minority and women referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minority group persons and women. (The DOL has held that it shall be no excuse that the union with which the contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority employees.) In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the SHA.

8. **Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment.
- a. The contractor shall notify all potential subcontractors and suppliers of his/her EEO obligations under this contract.
  - b. Disadvantaged business enterprises (DBE), as defined in 49 CFR 23, shall have equal opportunity to compete for and perform subcontracts which the contractor enters into pursuant to this contract. The contractor will use his best efforts to solicit bids from and to utilize DBE subcontractors or subcontractors with meaningful minority group and female representation among their employees. Contractors shall obtain lists of DBE construction firms from SHA personnel.
  - c. The contractor will use his best efforts to ensure subcontractor compliance with their EEO obligations.
9. **Records and Reports:** The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the SHA and the FHWA.
- a. The records kept by the contractor shall document the following:
    - (1) The number of minority and non-minority group members and women employed in each work classification on the project;
    - (2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women;
    - (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees; and
    - (4) The progress and efforts being made in securing the services of DBE subcontractors or subcontractors with meaningful minority and female representation among their employees.
  - b. The contractors will submit an annual report to the SHA each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data.

### III. NONSEGREGATED FACILITIES

(Applicable to all Federal-aid construction contracts and to all related subcontracts of \$10,000 or more.)

- a. By submission of this bid, the execution of this contract or subcontract, or the consummation of this material supply agreement or purchase order, as appropriate, the bidder, Federal-aid construction contractor, subcontractor, material supplier, or vendor, as appropriate, certifies that the firm does not maintain or provide for its employees any segregated facilities at any of its establishments, and that the firm does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The firm agrees that a breach of this certification is a violation of the EEO provisions of this contract. The firm further certifies that no employee will be denied access to adequate facilities on the basis of sex or disability.
- b. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive, or are, in fact, segregated on the basis of race, color, religion, national origin, age or disability, because of habit, local custom, or otherwise. The only exception will be for the disabled when the demands for accessibility override (e.g. disabled parking).

- c. The contractor agrees that it has obtained or will obtain identical certification from proposed subcontractors or material suppliers prior to award of subcontracts or consummation of material supply agreements of \$10,000 or more and that it will retain such certifications in its files.

#### **IV. PAYMENT OF PREDETERMINED MINIMUM WAGE**

(Applicable to all Federal-aid construction contracts exceeding \$2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural minor collectors, which are exempt.)

##### **1. General:**

- a. All mechanics and laborers employed or working upon the site of the work will be paid unconditionally and not less often than once a week and without subsequent deduction or rebate on any account [except such payroll deductions as are permitted by regulations (29 CFR 3)] issued by the Secretary of Labor under the Copeland Act (40 U.S.C. 276c) the full amounts of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment. The payment shall be computed at wage rates not less than those contained in the wage determination of the Secretary of Labor (hereinafter "the wage determination") which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor or its subcontractors and such laborers and mechanics. The wage determination (including any additional classifications and wage rates conformed under paragraph 2 of this Section IV and the DOL poster (WH-1321) or Form FHWA-1495) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. For the purpose of this Section, contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act (40 U.S.C. 276a) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of Section IV, paragraph 3b, hereof. Also, for the purpose of this Section, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in paragraphs 4 and 5 of this Section IV.
- b. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein, provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed.
- c. All rulings and interpretations of the Davis-Bacon Act and related acts contained in 29 CFR 1, 3, and 5 are herein incorporated by reference in this contract.

##### **2. Classification:**

- a. The SHA contracting officer shall require that any class of laborers or mechanics employed under the contract, which is not listed in the wage determination, shall be classified in conformance with the wage determination.
- b. The contracting officer shall approve an additional classification, wage rate and fringe benefits only when the following criteria have been met:
  - (1) the work to be performed by the additional classification requested is not performed by a classification in the wage determination;
  - (2) the additional classification is utilized in the area by the construction industry;
  - (3) the proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and
  - (4) with respect to helpers, when such a classification prevails in the area in which the work is performed.
- c. If the contractor or subcontractors, as appropriate, the laborers and mechanics (if known) to be employed in the additional classification or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the DOL, Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, D.C. 20210. The Wage and Hour Administrator, or an authorized

representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

- d. In the event the contractor or subcontractors, as appropriate, the laborers or mechanics to be employed in the additional classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. Said Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary
- e. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 2c or 2d of this Section IV shall be paid to all workers performing work in the additional classification from the first day on which work is performed in the classification.

**3. Payment of Fringe Benefits:**

- a. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor or subcontractors, as appropriate, shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly case equivalent thereof.
- b. If the contractor or subcontractor, as appropriate, does not make payments to a trustee or other third person, he/she may consider as a part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

**4. Apprentices and Trainees (Programs of the U.S. DOL) and Helpers:**

a. Apprentices:

- (1) Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the DOL, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau, or if a person is employed in his/her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State apprenticeship agency (where appropriate) to be eligible for probationary employment as an apprentice.
- (2) The allowable ratio of apprentices to journeyman-level employees on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate listed in the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor or subcontractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman-level hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.
- (3) Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman-level hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator for the Wage and Hour Division determines that a different

practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

- (4) In the event the Bureau of Apprenticeship and Training, or a State apprenticeship agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor or subcontractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the comparable work performed by regular employees until an acceptable program is approved.

b. Trainees:

- (1) Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the DOL, Employment and Training Administration.
- (2) The ratio of trainees to journeyman-level employees on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.
- (3) Every trainee must be paid at not less than the rate specified in the approved program for his/her level of progress, expressed as a percentage of the journeyman-level hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman-level wage rate on the wage determination which provides for less than full fringe benefits for apprentices, in which case such trainees shall receive the same fringe benefits as apprentices.
- (4) In the event the Employment and Training Administration withdraws approval of a training program, the contractor or subcontractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Helpers:

Helpers will be permitted to work on a project if the helper classification is specified and defined on the applicable wage determination or is approved pursuant to the conformance procedure set forth in Section IV.2. Any worker listed on a payroll at a helper wage rate, who is not a helper under an approved definition, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed.

**5. Apprentices and Trainees (Programs of the U.S. DOT):**

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

**6. Withholding:**

The SHA shall upon its own action or upon written request of an authorized representative of the DOL withhold, or cause to be withheld, from the contractor or subcontractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements which is held by the same prime contractor, as much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or

part of the wages required by the contract, the SHA contracting officer may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

**7. Overtime Requirements:**

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers, mechanics, watchmen, or guards (including apprentices, trainees, and helpers described in paragraphs 4 and 5 above) shall require or permit any laborer, mechanic, watchman, or guard in any workweek in which he/she is employed on such work, to work in excess of 40 hours in such workweek unless such laborer, mechanic, watchman, or guard receives compensation at a rate not less than one-and-one-half times his/her basic rate of pay for all hours worked in excess of 40 hours in such workweek.

**8. Violation:**

**Liability for Unpaid Wages; Liquidated Damages:** In the event of any violation of the clause set forth in paragraph 7 above, the contractor and any subcontractor responsible thereof shall be liable to the affected employee for his/her unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer, mechanic, watchman, or guard employed in violation of the clause set forth in paragraph 7, in the sum of \$10 for each calendar day on which such employee was required or permitted to work in excess of the standard work week of 40 hours without payment of the overtime wages required by the clause set forth in paragraph 7.

**9. Withholding for Unpaid Wages and Liquidated Damages:**

The SHA shall upon its own action or upon written request of any authorized representative of the DOL withhold, or cause to be withheld, from any monies payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph 8 above.

## **V. STATEMENTS AND PAYROLLS**

(Applicable to all Federal-aid construction contracts exceeding \$2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural collectors, which are exempt.)

1. Compliance with Copeland Regulations (29 CFR 3):

The contractor shall comply with the Copeland Regulations of the Secretary of Labor which are herein incorporated by reference.

2. Payrolls and Payroll Records:

a. Payrolls and basic records relating thereto shall be maintained by the contractor and each subcontractor during the course of the work and preserved for a period of 3 years from the date of completion of the contract for all laborers, mechanics, apprentices, trainees, watchmen, helpers, and guards working at the site of the work.

b. The payroll records shall contain the name, social security number, and address of each such employee; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalent thereof the types described in Section 1(b)(2)(B) of the Davis Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. In addition, for Appalachian contracts, the payroll records shall contain a notation indicating whether the employee does, or does not, normally reside in the labor area as defined in Attachment A, paragraph 1. Whenever the Secretary of Labor, pursuant to Section IV, paragraph 3b, has found that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis Bacon Act, the contractor and each subcontractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, that the plan or program has been communicated in writing to the laborers or mechanics affected, and show the cost anticipated or the actual cost incurred in providing benefits. Contractors or subcontractors employing

apprentices or trainees under approved programs shall maintain written evidence of the registration of apprentices and trainees, and ratios and wage rates prescribed in the applicable programs.

- c. Each contractor and subcontractor shall furnish, each week in which any contract work is performed, to the SHA resident engineer a payroll of wages paid each of its employees (including apprentices, trainees, and helpers, described in Section IV, paragraphs 4 and 5, and watchmen and guards engaged on work during the preceding weekly payroll period). The payroll submitted shall set out accurately and completely all of the information required to be maintained under paragraph 2b of this Section V. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal stock number 029-005-0014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.
- d. Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his/her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
  - (1) that the payroll for the payroll period contains the information required to be maintained under paragraph 2b of this Section V and that such information is correct and complete;
  - (2) that such laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in the Regulations, 29 CFR 3;
  - (3) that each laborer or mechanic has been paid not less 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**

1. On all Federal-aid contracts on the National Highway System, except those which provide solely for the installation of protective devices at railroad grade crossings, those which are constructed on a force account or direct labor basis, highway beautification contracts, and contracts for which the total final construction cost for roadway and bridge is less than \$1,000,000 (23 CFR 635) the contractor shall:
  - a. Become familiar with the list of specific materials and supplies contained in Form FHWA-47, "Statement of Materials and Labor Used by Contractor of Highway Construction Involving Federal Funds," prior to the commencement of work under this contract.
  - b. Maintain a record of the total cost of all materials and supplies purchased for and incorporated in the work, and also of the quantities of those specific materials and supplies listed on Form FHWA-47, and in the units shown on Form FHWA-47.

- c. Furnish, upon the completion of the contract, to the SHA resident engineer on Form FHWA-47 together with the data required in paragraph 1b relative to materials and supplies, a final labor summary of all contract work indicating the total hours worked and the total amount earned.
2. At the prime contractor's option, either a single report covering all contract work or separate reports for the contractor and for each subcontract shall be submitted.

#### **VII. SUBLETTING OR ASSIGNING THE CONTRACT**

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the State. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635).
  - a. "Its own organization" shall be construed to include only workers employed and paid directly by the prime contractor and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor, assignee, or agent of the prime contractor.
  - b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid on the contract as a whole and in general are to be limited to minor components of the overall contract.
2. The contract amount upon which the requirements set forth in paragraph 1 of Section VII is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.
3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the SHA contracting officer determines is necessary to assure the performance of the contract.
4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the SHA contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the SHA has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

#### **VIII. SAFETY: ACCIDENT PREVENTION**

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the SHA contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.
2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).
3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).

## **IX. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS**

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, the following notice shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

### **Notice To All Personnel Engaged On Federal-Aid Highway Projects**

18 U.S.C. 1020 READS AS FOLLOWS:

"Whoever being an officer, agent, or employee of the United States, or any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined not more 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.

**FEDERAL-AID FEMALE AND MINORITY GOALS**

In accordance with Section II, "Nondiscrimination," of "Required Contract Provisions Federal-aid Construction Contracts" the following are the goals for female utilization:

Goal for Women (applies nationwide).....(percent) 6.9

The following are goals for minority utilization:

**CALIFORNIA ECONOMIC AREA**

|            |   | <b>Goal<br/>(Percent)</b>                           |
|------------|---|---|
| <b>174</b> | <b>Redding, CA:</b><br>Non-SMSA Counties<br>CA Lassen; CA Modoc;CA Plumas;CA Shasta; CA Siskiyou; CA Tehama.  | 6.8   |
| <b>175</b> | <b>Eureka, CA</b><br>Non-SMSA Counties<br>CA Del Norte; CA Humboldt; CA Trinity.  | 6.6   |
| <b>176</b> | <b>San Francisco-Oakland-San Jose, CA:</b><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.<br>7485 Santa Cruz, CA.<br>CA Santa Cruz.<br>7500 Santa Rosa, CA<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 |
| <b>177</b> | <b>Sacramento, CA:</b><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  |
| <b>178</b> | <b>Stockton-Modesto, CA:</b><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 Tuolumne.  | 12.3<br>24.3<br>19.8                                |

|            |  | <b>Goal<br/>(Percent)</b> |
|------------|--|---------------------------|
| <b>179</b> | <b>Fresno-Bakersfield, CA</b>              |                           |
|            | SMSA Counties:                             |                           |
|            | 0680 Bakersfield, CA                       | 19.1                      |
|            | CA Kern.                                   |                           |
|            | 2840 Fresno, CA                            | 26.1                      |
|            | CA Fresno.                                 |                           |
|            | Non-SMSA Counties                          | 23.6                      |
|            | CA Kings; CA Madera; CA Tulare.            |                           |
| <br>       |  |                           |
| <b>180</b> | <b>Los Angeles, CA:</b>                    |                           |
|            | SMSA Counties:                             |                           |
|            | 0360 Anaheim-Santa Ana-Garden Grove, CA    | 11.9                      |
|            | CA Orange.                                 |                           |
|            | 4480 Los Angeles-Long Beach, CA            | 28.3                      |
|            | CA Los Angeles.                            |                           |
|            | 6000 Oxnard-Simi Valley-Ventura, CA        | 21.5                      |
|            | CA Ventura.                                |                           |
|            | 6780 Riverside-San Bernardino-Ontario, CA. | 19.0                      |
|            | CA Riverside; CA San Bernardino.           |                           |
|            | 7480 Santa Barbara-Santa Maria-Lompoc, CA  | 19.7                      |
|            | CA Santa Barbara.                          |                           |
|            | Non-SMSA Counties                          | 24.6                      |
|            | CA Inyo; CA Mono; CA San Luis Obispo.      |                           |
| <br>       |  |                           |
| <b>181</b> | <b>San Diego, CA:</b>                      |                           |
|            | SMSA Counties                              |                           |
|            | 7320 San Diego, CA.                        | 16.9                      |
|            | CA San Diego.                              |                           |
|            | Non-SMSA Counties                          | 18.2                      |
|            | CA Imperial.                               |                           |

In addition to the reporting requirements set forth elsewhere in this contract the Contractor and subcontractors holding subcontracts, not including material suppliers, of \$10,000 or more, shall submit for every month of July during which work is performed, employment data as contained under Form FHWA PR-1391 (Appendix C to 23 CFR, Part 230), and in accordance with the instructions included thereon.

## FEDERAL REQUIREMENT TRAINING SPECIAL PROVISIONS

As part of the Contractor's equal employment opportunity affirmative action program, training shall be provided as follows:

The Contractor shall provide on-the-job training to develop full journeymen in the types of trades or job classification involved.

The goal for the number of trainees or apprentices to be trained under the requirements of this special provision will be 11.

In the event the Contractor subcontracts a portion of the contract work, he shall determine how many, if any, of the trainees or apprentices are to be trained by the subcontractor, provided however, that the Contractor shall retain the primary responsibility for meeting the training requirements imposed by this special provision. The Contractor shall also insure that this Training Special Provision is made applicable to such subcontract. Where feasible, 25 percent of trainees or apprentices in each occupation shall be in their first year of apprenticeship or training.

The number of trainees or apprentices shall be distributed among the work classifications on the basis of the Contractor's needs and the availability of journeymen in the various classifications within a reasonable area of recruitment. Prior to commencing work, the Contractor shall submit to the Department for approval the number of trainees or apprentices to be trained in each selected classification and training program to be used. Furthermore, the Contractor shall specify the starting time for training in each of the classifications. The Contractor will be credited for each trainee or apprentice employed by him on the contract work who is currently enrolled or becomes enrolled in an approved program and will be reimbursed for such trainees or apprentices as provided hereinafter.

Training and upgrading of minorities and women toward journeymen status is a primary objective of this Training Special Provision. Accordingly, the Contractor shall make every effort to enroll minority and women trainees or apprentices (e.g., by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees or apprentices) to the extent such persons are available within a reasonable area of recruitment. The Contractor will be responsible for demonstrating the steps that he has taken in pursuance thereof, prior to a determination as to whether the Contractor is in compliance with this Training Special Provision. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

No employee shall be employed as a trainee or apprentice in any classification in which he has successfully completed a training course leading to journeyman status or in which he has been employed as a journeyman. The Contractor should satisfy this requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used the Contractor's records should document the findings in each case.

The minimum length and type of training for each classification will be as established in the training program selected by the Contractor and approved by both the Department and the Federal Highway Administration. The Department and the Federal Highway Administration will approve a program if it is reasonably calculated to meet the equal employment opportunity obligations of the Contractor and to qualify the average trainee or apprentice for journeyman status in the classification concerned by the end of the training period. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with the State of California, Department of Industrial Relations, Division of Apprenticeship Standards recognized by the Bureau and training programs approved but not necessarily sponsored by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training shall also be considered acceptable provided it is being administered in a manner consistent with the equal employment obligations of Federal-aid highway construction contracts. Approval or acceptance of a training program shall be obtained from the State prior to commencing work on the classification covered by the program. It is the intention of these provisions that training is to be provided in the construction crafts rather than clerk-typists or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, estimators, timekeepers, etc., where the training is oriented toward construction applications. Training in the laborer classification may be permitted provided that significant and meaningful training is provided and approved by the division office. Some offsite training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training.

Except as otherwise noted below, the Contractor will be reimbursed 80 cents per hour of training given an employee on this contract in accordance with an approved training program. As approved by the Engineer, reimbursement will be made for training of persons in excess of the number specified herein. This reimbursement will be made even though the Contractor receives additional training program funds from other sources, provided such other source does not specifically prohibit the Contractor from receiving other reimbursement. Reimbursement for offsite training indicated above may only be made to the Contractor where he does one or more of the following and the trainees or apprentices are concurrently employed on a Federal-aid project; contributes to the cost of the training, provides the instruction to the trainee or apprentice or pays the trainee's or apprentice's wages during the offsite training period.

No payment shall be made to the Contractor if either the failure to provide the required training, or the failure to hire the trainee or apprentice as a journeyman, is caused by the Contractor and evidences a lack of good faith on the part of the Contractor in meeting the requirements of this Training Special Provision. It is normally expected that a trainee or apprentice will begin his training on the project as soon as feasible after start of work utilizing the skill involved and remain on the project as long as training opportunities exist in his work classification or until he has completed his training program. It is not required that all trainees or apprentices be on board for the entire length of the contract. A Contractor will have fulfilled his responsibilities under this Training Special Provision if he has provided acceptable training to the number of trainees or apprentices specified. The number trained shall be determined on the basis of the total number enrolled on the contract for a significant period.

Only trainees or apprentices registered in a program approved by the State of California's State Administrator of Apprenticeship may be employed on the project and said trainees or apprentices shall be paid the standard wage specified under the regulations of the craft or trade at which they are employed.

The Contractor shall furnish the trainee or apprentice a copy of the program he will follow in providing the training. The Contractor shall provide each trainee or apprentice with a certification showing the type and length of training satisfactorily completed.

The Contractor will provide for the maintenance of records and furnish periodic reports documenting his performance under this Training Special Provision.