**** WARNING ** WARNING ** WARNING ** WARNING ****
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STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS

AND

SPECIAL PROVISIONS

FOR CONSTRUCTION ON STATE HIGHWAY IN

CONTRA COSTA COUNTY IN LAFAYETTE AND ORINDA FROM THE CALDECOTT TUNNEL TO EL CURTOLA ROAD OVERCROSSING

DISTRICT 04, ROUTE 24

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

CONTRACT NO. 04-269604

04-CC-24-0.2/13.3

Federal Aid Project

ACNH-P024(029)E

Bids Open: January 30, 2007
Dated: November 27, 2006

OSD

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IMPORTANT SPECIAL NOTICES

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A+B BIDDING SPECIAL NOTICE

The bidder's attention is directed to Section 2, "Proposal Requirements and Conditions," Section 3, "Award and Execution of Contract," and Section 4, "Beginning of Work, Time of Completion and Liquidated Damages," in the special provisions. In addition to the item prices and totals, the proposal shall set forth the number of working days bid to complete the work on the contract. Bids will be compared on the basis of the sum of the item totals on the Engineer's Estimate for the work to be done (TOTAL BID (A)), plus the product of the number of working days bid to complete all work and the cost per day shown on the Engineer's Estimate (TOTAL BID (B)). The lowest bid will be determined on the basis of the "Total Basis for Comparison of Bids (A+B)" set forth in the Engineer's Estimate.

Bids in which the number of working days bid for completion of the work exceed the maximum number of days specified will be considered non-responsive and will be rejected.

- Attention is directed to Section 3, "Award and Execution of Contract," of these special provisions regarding submittal of the documents identified in Section 3-1.025, "Insurance Policies," of the Standard Specifications.

- 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 specifications for this project require the production of asphalt-rubber binder. The Air Quality Management District must approve the production and placement of asphalt-rubber binder and rubberized asphalt concrete, in addition to the Operating Permits required to produce asphalt concrete. Air Quality Management Districts have stopped production of these products due to failure to obtain necessary approvals.

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DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS

CONTRACT NO. 04-269604

04-CC-24-0.2/13.3

Sealed proposals for the work shown on the plans entitled:

STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROJECT PLANS FOR CONSTRUCTION ON STATE HIGHWAY IN CONTRA COSTA COUNTY IN LAFAYETTE AND ORINDA FROM THE CALDECOTT TUNNEL TO EL CURTOLA ROAD OVERCROSSING

will be received at the Department of Transportation, 1120 N Street, Room 0200, MS #26, Sacramento, CA 95814, until 2 o'clock p.m. on January 30, 2007, at which time they will be publicly opened and read in Room 0100 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 CONTRA COSTA COUNTY IN LAFAYETTE AND ORINDA FROM THE CALDECOTT TUNNEL TO EL CURTOLA ROAD OVERCROSSING

General work description: Rehabilitate existing roadway.

Bidders are advised that, as required by federal law, the Department has established a statewide overall DBE goal. The Department is required to report to FHWA on DBE participation for all Federal-aid contracts each year so that attainment efforts may be evaluated. In order to ascertain whether the statewide overall DBE goal is being achieved, the Department is tracking DBE participation on all Federal-aid contracts.

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-12,

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

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

Bidder inquiries may be made as follows:

Submit Bidder Inquiries by e-mail to the Duty Senior at duty_senior_district04@dot.ca.gov. To the extent feasible and at the discretion of the Department, completed Bidder Inquiries submitted for consideration will be investigated, and responses will be posted on the Internet at

http://www.dot.ca.gov/dist4/construction/Inquiries/index.html

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

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

The Department of Transportation affirms 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 (USDOT) 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 USDOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the USDOT 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 on the internet at http://www.dot.ca.gov/hq/esc/oe/federal-wages/. 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 November 27, 2006

TLM

COPY OF ENGINEER'S ESTIMATE

(NOT TO BE USED FOR BIDDING PURPOSES)

04-269604

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
1	070012	PROGRESS SCHEDULE (CRITICAL PATH METHOD)	LS	LUMP SUM
2	070018	TIME-RELATED OVERHEAD	LS	LUMP SUM
3	074019	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	LUMP SUM
4	074020	WATER POLLUTION CONTROL	LS	LUMP SUM
5	074034	TEMPORARY COVER	M2	100
6	074041	STREET SWEEPING	EA	1
7	074042	TEMPORARY CONCRETE WASHOUT (PORTABLE)	LS	LUMP SUM
8 (S)	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM
9 (S)	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM
10 (S)	120165	CHANNELIZER (SURFACE MOUNTED)	EA	140
11 (S)	128650	PORTABLE CHANGEABLE MESSAGE SIGN	LS	LUMP SUM
12	129000	TEMPORARY RAILING (TYPE K)	M	7740
13 (S)	129100	TEMPORARY CRASH CUSHION MODULE	EA	140
14 (S)	150662	REMOVE METAL BEAM GUARD RAILING	M	2650
15 (S)	039930	REMOVE DOUBLE METAL BEAM GUARD RAILING	M	57
16 (S)	150704	REMOVE YELLOW THERMOPLASTIC TRAFFIC STRIPE	M	35 500
17 (S)	150705	REMOVE YELLOW THERMOPLASTIC PAVEMENT MARKING	M2	5
18 (S)	150714	REMOVE THERMOPLASTIC TRAFFIC STRIPE	M	54 000
19 (S)	150715	REMOVE THERMOPLASTIC PAVEMENT MARKING	M2	700
20 (S)	150722	REMOVE PAVEMENT MARKER	EA	35 000

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
21	039931	REMOVE ASPHALT CONCRETE DITCH	M	510
22	150771	REMOVE ASPHALT CONCRETE DIKE	M	7500
23	039932	REMOVE EDGE DRAIN	M	27 800
24 (S)	151266	SALVAGE DOUBLE THRIE BEAM BARRIER	M	300
25	152430	ADJUST INLET	EA	244
26	039933	ADJUST MANHOLE COVER TO GRADE	EA	6
27	152469	ADJUST UTILITY COVER TO GRADE	EA	5
28	152500	ADJUST METAL BEAM GUARD RAILING	M	46
29 (S)	153103	COLD PLANE ASPHALT CONCRETE PAVEMENT	M2	124 000
30	153214	REMOVE CONCRETE CURB	M	4200
31	153221	REMOVE CONCRETE BARRIER	M	1760
32 (S)	156590	REMOVE CRASH CUSHION (SAND FILLED)	EA	2
33	160101	CLEARING AND GRUBBING	LS	LUMP SUM
34	190101	ROADWAY EXCAVATION	M3	1260
35	190105	ROADWAY EXCAVATION (TYPE Z-2) (AERIALLY DEPOSITED LEAD)	M3	380
36	190110	LEAD COMPLIANCE PLAN	LS	LUMP SUM
37	198007	IMPORTED MATERIAL (SHOULDER BACKING)	TONN	3110
38	198050	EMBANKMENT	M3	75
39	200002	ROADSIDE CLEARING	LS	LUMP SUM
40	203021	FIBER ROLLS	M	1020

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
41	208000	IRRIGATION SYSTEM	LS	LUMP SUM
42	208304	WATER METER	EA	1
43	208798	200 MM WELDED STEEL PIPE CONDUIT (6.35 MM THICK)	M	500
44	250401	CLASS 4 AGGREGATE SUBBASE	M3	12
45	260210	AGGREGATE BASE (APPROACH SLAB)	M3	98
46	260301	CLASS 3 AGGREGATE BASE	M3	840
47	374002	ASPHALTIC EMULSION (FOG SEAL COAT)	TONN	2
48	374206	SEAL RANDOM CRACKS	LNKM	110
49	390095	REPLACE ASPHALT CONCRETE SURFACING	M3	730
50	390102	ASPHALT CONCRETE (TYPE A)	TONN	75 200
51	390126	RUBBERIZED ASPHALT CONCRETE (TYPE G)	TONN	68 000
52	390127	RUBBERIZED ASPHALT CONCRETE (TYPE O)	TONN	44 600
53	391005	PAVING ASPHALT (BINDER-PAVEMENT REINFORCING FABRIC)	TONN	600
54	393001	PAVEMENT REINFORCING FABRIC	M2	301 000
55	394002	PLACE ASPHALT CONCRETE (MISCELLANEOUS AREA)	M2	5400
56	394040	PLACE ASPHALT CONCRETE DIKE (TYPE A)	M	1190
57	394044	PLACE ASPHALT CONCRETE DIKE (TYPE C)	M	410
58	394048	PLACE ASPHALT CONCRETE DIKE (TYPE E)	M	4500
59	394049	PLACE ASPHALT CONCRETE DIKE (TYPE F)	M	1670
60	397001	ASPHALTIC EMULSION (PAINT BINDER)	TONN	500

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
61	401108	REPLACE CONCRETE PAVEMENT (RAPID STRENGTH CONCRETE)	M3	3800
62	415101	CRACK EXISTING CONCRETE PAVEMENT	M2	164 000
63 (S)	420201	GRIND EXISTING CONCRETE PAVEMENT	M2	24 700
64	510087	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE R)	M3	933
65	510526	MINOR CONCRETE (BACKFILL)	M3	1880
66	510800	PAVING NOTCH EXTENSION	M3	23.5
67	511118	CLEAN EXPANSION JOINT	M	688
68 (S)	519117	JOINT SEAL (MR 30 MM)	M	59
69 (S)	519120	JOINT SEAL (MR 15 MM)	M	292
70 (S)	519142	JOINT SEAL (MR 40 MM)	M	338
71	665733	450 MM SLOTTED CORRUGATED STEEL PIPE (2.01 MM THICK)	M	65
72	700617	DRAINAGE INLET MARKER	EA	52
73	731501	MINOR CONCRETE (CURB)	M3	510
74	039934	MINOR CONCRETE (WEED BARRIER)	M3	170
75	039935	MINOR CONCRETE (PAVING)	M3	320
76 (S)	802585	1.2 M CHAIN LINK GATE (TYPE CL-1.8)	EA	2
77	039936	CONCRETE BARRIER MARKER	EA	130
78	820107	DELINEATOR (CLASS 1)	EA	760
79	039937	HIGHWAY POST MARKER	EA	19
80	820118	GUARD RAILING DELINEATOR	EA	280

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
81	820141	OBJECT MARKER (TYPE K-1)	EA	39
82	820151	OBJECT MARKER (TYPE L-1)	EA	100
83 (S)	832002	METAL BEAM GUARD RAILING (STEEL POST)	M	1580
84 (S)	039938	DOUBLE METAL BEAM GUARD RAILING (STEEL POST)	M	57
85 (S)	839303	SINGLE THRIE BEAM BARRIER (STEEL POST)	M	350
86 (S)	839312	DOUBLE THRIE BEAM BARRIER (STEEL POST)	M	10
87 (S)	839555	END CAP	EA	2
88 (S)	839581	END ANCHOR ASSEMBLY (TYPE SFT)	EA	30
89 (S)	839582	END ANCHOR ASSEMBLY (TYPE CA)	EA	2
90 (S)	839585	ALTERNATIVE FLARED TERMINAL SYSTEM	EA	33
91 (S)	839605	CRASH CUSHION (REACT 9SCBS)	EA	4
92	839701	CONCRETE BARRIER (TYPE 60)	M	870
93	839703	CONCRETE BARRIER (TYPE 60C)	M	740
94	839705	CONCRETE BARRIER (TYPE 60E)	M	310
95 (S)	840515	THERMOPLASTIC PAVEMENT MARKING	M2	700
96 (S)	840561	100 MM THERMOPLASTIC TRAFFIC STRIPE	M	71 900
97 (S)	840563	200 MM THERMOPLASTIC TRAFFIC STRIPE	M	9000
98 (S)	840564	200 MM THERMOPLASTIC TRAFFIC STRIPE (BROKEN 3.66 M - 0.92 M)	M	1620
99 (S)	840571	100 MM THERMOPLASTIC TRAFFIC STRIPE (BROKEN 5.18 M - 2.14 M)	M	2600
100 (S)	850101	PAVEMENT MARKER (NON-REFLECTIVE)	EA	24 500

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
101 (S)	850102	PAVEMENT MARKER (REFLECTIVE)	EA	11 200
102 (S)	861502	MODIFY SIGNAL	LS	LUMP SUM
103 (S)	861503	MODIFY LIGHTING	LS	LUMP SUM
104 (S)	039939	TRAFFIC OPERATION SYSTEM	LS	LUMP SUM
105 (S)	039940	CAMERA UNIT INCLUDING TESTING	EA	1
106 (S)	039941	PAN AND TILT UNIT INCLUDING TEST	EA	1
107 (S)	039942	EXTINGUISHABLE MESSAGE SIGN RADIO CONTROLLER ASSEMBLY	EA	1
108 (S)	039943	EXTINGUISHABLE MESSAGE SIGN PANELS (LED)	EA	4
109 (S)	039944	GENERAL PACKET RADIO SYSTEM WIRELESS MODEM ASSEMBLY	EA	2
110 (S)	860520	HIGHWAY ADVISORY RADIO SYSTEM	EA	1
111	999990	MOBILIZATION	LS	LUMP SUM

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISIONS

Annexed to Contract No. 04-269604

SECTION 1. SPECIFICATIONS AND PLANS

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

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

AMENDMENTS TO JULY 1999 STANDARD SPECIFICATIONS

UPDATED NOVEMBER 3, 2006

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

SECTION 1: DEFINITIONS AND TERMS

Issue Date: October 6, 2006

Section 1-1.01, "General," of the Standard Specifications is amended by adding the following:

- The Department is gradually changing the style and language of the specifications. The new style and language includes:

1. Use of:
   - 1.1. Imperative mood
   - 1.2. Introductory modifiers
   - 1.3. Conditional clauses

2. Elimination of:
   - 2.1. Language variations
   - 2.2. Definitions for industry-standard terms
   - 2.3. Redundant specifications
   - 2.4. Needless cross-references

- The use of this new style does not change the meaning of a specification not yet using this style.
- The specifications are written to the Bidder before award and the Contractor after. Before award, interpret sentences written in the imperative mood as starting with "The Bidder must" and interpret "you" as "the Bidder" and "your" as "the Bidder's." After award, interpret sentences written in the imperative mood as starting with "The Contractor must" and interpret "you" as "the Contractor" and "your" as "the Contractor's."

- Unless an object or activity is specified to be less than the total, the quantity or amount is all of the object or activity.
- A list in the specifications is inclusive unless the items listed are specified as choices.
- Interpret terms as defined in the Contract documents. A term not defined in the Contract documents has the meaning defined in Means Illustrated Construction Dictionary, Condensed Version, Second Edition.

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

1-1.082 BUSINESS DAY

- Day on the calendar except Saturday or holiday.

1-1.084 CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES

- The California Manual on Uniform Traffic Control Devices for Streets and Highways (California MUTCD) is issued by the Department of Transportation and is the Federal Highway Administration's MUTCD 2003 Edition, as amended for use in California. Part 6 of the California MUTCD, "Temporary Traffic Control," supersedes the Department's Manual of Traffic Controls.

1-1.245 HOLIDAY

- Day designated as a State holiday under Govt Code § 6700 et seq. except September 9th, "Admission Day." The day after Thanksgiving Day is a non-working day. Interpret "legal holiday" as "holiday."

Section 1-1.25, "Laboratory," of the Standard Specifications is amended to read:

1-1.25 LABORATORY

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

Section 1-1.255, "Legal Holidays," of the Standard Specifications is deleted.

Section 1-1.265, "Manual of Traffic Controls," of the Standard Specifications is deleted.

Section 1-1.275, "Office of Structure Design," of the Standard Specifications is amended to read:

1-1.275 OFFICES OF STRUCTURE DESIGN

- The Offices of Structure Design of the Department of Transportation. When the specifications require working drawings to be submitted to the Offices of Structure Design, the drawings shall be submitted to: Offices of Structure Design, Documents Unit, Mail Station 9-4/4I, 1801 30th Street, Sacramento, CA 95816, Telephone (916) 227-8252.

Section 1-1.39, "State," of the Standard Specifications is amended to read:

1-1.39 STATE

- The State of California, including its agencies, departments, or divisions, whose conduct or action is related to the work.

SECTION 2: PROPOSAL REQUIREMENTS AND CONDITIONS

Issue Date: June 19, 2003

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

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

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

SECTION 3: AWARD AND EXECUTION OF CONTRACT

Issue Date: November 3, 2006

Section 3, "Award and Execution of Contract," of the Standard Specifications is amended by adding the following section after Section 3-1.02, "Contract Bonds":

3-1.025 INSURANCE POLICIES

- The successful bidder shall submit:

1. Copy of its commercial general liability policy and its excess policy, including the declarations page, all amendments, riders, endorsements, and other modifications in effect at the time of contract execution. Standard ISO form No. CG 0001 or similar exclusions are allowed if not inconsistent with Section 7-1.12, "Indemnification and Insurance." Allowance of any additional exclusions is at the discretion of the Department.
2. Certificate of Insurance showing all other required coverages. Certificates of Insurance, as evidence of required insurance for the auto liability and any other required policy shall set forth deductible amounts applicable to each policy and all exclusions that are added by endorsement to each policy. The evidence of insurance shall provide that no cancellation, lapse, or reduction of coverage will occur without 10 days prior written notice to the Department.

- If the successful bidder uses any form of self-insurance, it shall submit:

1. A notice of election to self-insure
2. The coverages for which self-insurance applies
3. The amount of self-insurance
4. Declaration under the penalty of perjury by a certified public accountant certifying the accountant has applied Generally Accepted Accounting Principles (GAAP) guidelines and the successful bidder has sufficient funds or other resources to cover the self-insurance amounts
5. Copy of its commercial general liability policy and its excess policy, including the declarations page, all amendments, riders, endorsements and other modifications in effect at the time of contract execution, for those amounts not covered by self-insurance

Section 3-1.03, "Execution of Contract," of the Standard Specifications is amended to read:

3-1.03 EXECUTION OF CONTRACT

- The contract shall be signed by the successful bidder and returned, together with the contract bonds and the documents identified in Section 3-1.025, "Insurance Policies," within 10 business days of receiving the contract for execution.

Section 3-1.04, "Failure to Execute Contract," of the Standard Specifications is amended to read:

3-1.04 FAILURE TO EXECUTE CONTRACT

- Failure of the lowest responsible bidder, the second lowest responsible bidder, or the third lowest responsible bidder to execute the contract as required in Section 3-1.03, " Execution of Contract," within 10 business days of receiving the contract for execution shall be just cause for the forfeiture of the proposal guaranty. The successful bidder may file with the Department a written notice, signed by the bidder or the bidder's authorized representative, specifying that the bidder will refuse to execute the contract if it is presented. The filing of this notice shall have the same force and effect as the failure of the bidder to execute the contract and furnish acceptable bonds within the time specified.

SECTION 5: CONTROL OF WORK

Issue Date: December 31, 2001

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

5-1.02A Excavation Safety Plans

- The Construction Safety Orders of the Division of Occupational Safety and Health shall apply to all excavations. For all excavations 1.5 m or more in depth, the Contractor shall submit to the Engineer a detailed plan showing the design and details of the protective systems to be provided for worker protection from the hazard of caving ground during excavation. The detailed plan shall include any tabulated data and any design calculations used in the preparation of the plan. Excavation shall not begin until the detailed plan has been reviewed and approved by the Engineer.
- Detailed plans of protective systems for which the Construction Safety Orders require design by a registered professional engineer shall be prepared and signed by an engineer who is registered as a Civil Engineer in the State of California, and shall include the soil classification, soil properties, soil design calculations that demonstrate adequate stability of the protective system, and any other design calculations used in the preparation of the plan.
- No plan shall allow the use of a protective system less effective than that required by the Construction Safety Orders.

• If the detailed plan includes designs of protective systems developed only from the allowable configurations and slopes, or Appendices, contained in the Construction Safety Orders, the plan shall be submitted at least 5 days before the Contractor intends to begin excavation. If the detailed plan includes designs of protective systems developed from tabulated data, or designs for which design by a registered professional engineer is required, the plan shall be submitted at least 3 weeks before the Contractor intends to begin excavation.

• Attention is directed to Section 7-1.01E, "Trench Safety."

SECTION 7: LEGAL RELATIONS AND RESPONSIBILITY

Issue Date: October 6, 2006

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

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

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

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

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

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

Section 7-1.01A(6), "Workers' Compensation," of the Standard Specifications is amended to read:

7-1.101A(6) (Blank)

Section 7-1.12, "Indemnification and Insurance," of the Standard Specifications is amended to read:

7-1.12 INDEMNIFICATION AND INSURANCE

• The Contractor's obligations regarding indemnification of the State of California and the requirements for insurance shall conform to the provisions in Section 3-1.025, "Insurance Policies," and Sections 7-1.12A, "Indemnification," and 7-1.12B, "Insurance," of this Section 7-1.12.

7-1.12A Indemnification

• The Contractor shall defend, indemnify, and save harmless the State, including its officers, employees, and agents (excluding agents who are design professionals) from any and all claims, demands, causes of action, damages, costs, expenses, actual attorneys' fees, losses or liabilities, in law or in equity (Section 7-1.12A Claims) arising out of or in connection with the Contractor's performance of this contract for:

1. Bodily injury including, but not limited to, bodily injury, sickness or disease, emotional injury or death to persons, including, but not limited to, the public, any employees or agents of the Contractor, the State, or any other contractor; and
2. Damage to property of anyone including loss of use thereof; caused or alleged to be caused in whole or in part by any negligent or otherwise legally actionable act or omission of the Contractor or anyone directly or indirectly employed by the Contractor or anyone for whose acts the Contractor may be liable.

• Except as otherwise provided by law, these requirements apply regardless of the existence or degree of fault of the State. The Contractor is not obligated to indemnify the State for Claims arising from conduct delineated in Civil Code

Section 2782 and to Claims arising from any defective or substandard condition of the highway that existed at or before the start of work, unless this condition has been changed by the work or the scope of the work requires the Contractor to maintain existing highway facilities and the Claim arises from the Contractor's failure to maintain. The Contractor's defense and indemnity obligation shall extend to Claims arising after the work is completed and accepted if the Claims are directly related to alleged acts or omissions by the Contractor that occurred during the course of the work. No inspection by the State is a waiver of full compliance with these requirements.

- The Contractor's obligation to defend and indemnify shall not be excused because of the Contractor's inability to evaluate liability or because the Contractor evaluates liability and determine that the Contractor is not liable. The Contractor shall respond within 30 days to the tender of any Claim for defense and indemnity by the State, unless this time has been extended by the State. If the Contractor fails to accept or reject a tender of defense and indemnity within 30 days, in addition to any other remedy authorized by law, the Department may withhold such funds the State reasonably considers necessary for its defense and indemnity until disposition has been made of the Claim or until the Contractor accepts or rejects the tender of defense, whichever occurs first.
- With respect to third-party claims against the Contractor, the Contractor waives all rights of any type to express or implied indemnity against the State, its officers, employees, or agents (excluding agents who are design professionals).
- Nothing in the Contract is intended to establish a standard of care owed to any member of the public or to extend to the public the status of a third-party beneficiary for any of these indemnification specifications.

7-1.12B Insurance

7-1.12B(1) General

- Nothing in the contract is intended to establish a standard of care owed to any member of the public or to extend to the public the status of a third-party beneficiary for any of these insurance specifications.

7-1.12B(2) Casualty Insurance

- The Contractor shall procure and maintain insurance on all of its operations with companies acceptable to the State as follows:

1. The Contractor shall keep all insurance in full force and effect from the beginning of the work through contract acceptance.
2. All insurance shall be with an insurance company with a rating from A.M. Best Financial Strength Rating of A- or better and a Financial Size Category of VII or better.
3. The Contractor shall maintain completed operations coverage with a carrier acceptable to the State through the expiration of the patent deficiency in construction statute of repose set forth in Code of Civil Procedure Section 337.1.

7-1.12B(3) Workers' Compensation and Employer's Liability Insurance

- In accordance with Labor Code Section 1860, the Contractor shall secure the payment of worker's compensation in accordance with Labor Code Section 3700.
- In accordance with Labor Code Section 1861, the Contractor shall submit to the Department the following certification before performing the work:

> I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.

- Contract execution constitutes certification submittal.
- The Contractor shall provide Employer's Liability Insurance in amounts not less than:

1. $1 000 000 for each accident for bodily injury by accident
2. $1 000 000 policy limit for bodily injury by disease
3. $1 000 000 for each employee for bodily injury by disease

- If there is an exposure of injury to the Contractor's employees under the U.S. Longshoremen's and Harbor Workers' Compensation Act, the Jones Act, or under laws, regulations, or statutes applicable to maritime employees, coverage shall be included for such injuries or claims.

7-1.12B(4) Liability Insurance

7-1.12B(4)(a) General

• The Contractor shall carry General Liability and Umbrella or Excess Liability Insurance covering all operations by or on behalf of the Contractor providing insurance for bodily injury liability and property damage liability for the following limits and including coverage for:

1. Premises, operations, and mobile equipment
2. Products and completed operations
3. Broad form property damage (including completed operations)
4. Explosion, collapse, and underground hazards
5. Personal injury
6. Contractual liability

• The Contractor shall ensure that all of its subcontractors carry sufficient insurance coverage that the Contractor deems adequate based on the size, duration, and hazards of the subcontracted work.

7-1.12B(4)(b) Liability Limits/Additional Insureds

• The limits of liability shall be at least the amounts shown in the following table:

Total Bid	For Each Occurrence[1]	Aggregate for Products/Completed Operation	General Aggregate[2]	Umbrella or Excess Liability[3]
≤$25 000 000	$1 000 000	$2 000 000	$2 000 000	$5 000 000
>$25 000 000	$1 000 000	$2 000 000	$2 000 000	$15 000 000

1. Combined single limit for bodily injury and property damage.
2. This limit shall apply separately to the Contractor's work under this contract.
3. The umbrella or excess policy shall contain a clause stating that it takes effect (drops down) in the event the primary limits are impaired or exhausted.

• The State, including its officers, directors, agents (excluding agents who are design professionals), and employees, shall be named as additional insureds under the General Liability and Umbrella Liability Policies with respect to liability arising out of or connected with work or operations performed by or on behalf of the Contractor under this contract. Coverage for such additional insureds does not extend to liability:

1. Arising from any defective or substandard condition of the roadway which existed at or before the time the Contractor started work, unless such condition has been changed by the work or the scope of the work requires the Contractor to maintain existing roadway facilities and the claim arises from the Contractor's failure to maintain;
2. For claims occurring after the work is completed and accepted unless these claims are directly related to alleged acts or omissions of the Contractor that occurred during the course of the work; or
3. To the extent prohibited by Insurance Code Section 11580.04.

• Additional insured coverage shall be provided by a policy provision or by an endorsement providing coverage at least as broad as Additional Insured (Form B) endorsement form CG 2010, as published by the Insurance Services Office (ISO), or other form designated by the Department.

7-1.12B(4)(c) Contractor's Insurance Policy is Primary

• The policy shall stipulate that the insurance afforded the additional insureds applies as primary insurance. Any other insurance or self-insurance maintained by the State is excess only and shall not be called upon to contribute with this insurance.

7-1.12B(5) Automobile Liability Insurance

• The Contractor shall carry automobile liability insurance, including coverage for all owned, hired, and nonowned automobiles. The primary limits of liability shall be not less than $1 000 000 combined single limit each accident for bodily injury and property damage. The umbrella or excess liability coverage required under Section 7-1.12B(4)(b) also applies to automobile liability.

7-1.12B(6) Policy Forms, Endorsements, and Certificates

• The Contractor shall provide its General Liability Insurance under Commercial General Liability policy form No. CG0001 as published by the Insurance Services Office (ISO) or under a policy form at least as broad as policy form No. CG0001.

7-1.12B(7) Deductibles

• The State may expressly allow deductible clauses, which it does not consider excessive, overly broad, or harmful to the interests of the State. Regardless of the allowance of exclusions or deductions by the State, the Contractor is responsible for any deductible amount and shall warrant that the coverage provided to the State is in accordance with Section 7-1.12B, "Insurance."

7-1.12B(8) Enforcement

• The Department may assure the Contractor's compliance with its insurance obligations. Ten days before an insurance policy lapses or is canceled during the contract period, the Contractor shall submit to the Department evidence of renewal or replacement of the policy.

• If the Contractor fails to maintain any required insurance coverage, the Department may maintain this coverage and withhold or charge the expense to the Contractor or terminate the Contractor's control of the work in accordance with Section 8-1.08, "Termination of Control."

• The Contractor is not relieved of its duties and responsibilities to indemnify, defend, and hold harmless the State, its officers, agents, and employees by the Department's acceptance of insurance policies and certificates.

• Minimum insurance coverage amounts do not relieve the Contractor for liability in excess of such coverage, nor do they preclude the State from taking other actions available to it, including the withholding of funds under this contract.

7-1.12B(9) Self-Insurance

• Self-insurance programs and self-insured retentions in insurance policies are subject to separate annual review and approval by the State.

• If the Contractor uses a self-insurance program or self-insured retention, the Contractor shall provide the State with the same protection from liability and defense of suits as would be afforded by first-dollar insurance. Execution of the contract is the Contractor's acknowledgement that the Contractor will be bound by all laws as if the Contractor were an insurer as defined under Insurance Code Section 23 and that the self-insurance program or self-insured retention shall operate as insurance as defined under Insurance Code Section 22.

SECTION 9: MEASUREMENT AND PAYMENT

Issue Date: June 30, 2006

The third paragraph of Section 9-1.03, "Work Performed by Contractor," of the Standard Specifications is amended to read:

• The above markups shall constitute full compensation for all delay costs, overhead costs and profit which shall be deemed to include all items of expense not specifically designated as cost or equipment rental in Sections 9-1.03A(1), "Labor," 9-1.03A(2), "Materials," and 9-1.03A(3), "Equipment Rental." The total payment made as provided above shall be deemed to be the actual cost of the work and shall constitute full compensation therefor.

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

9-1.04 NOTICE OF POTENTIAL CLAIM

• It is the intention of this section that disputes between the parties arising under and by virtue of the contract be brought to the attention of the Engineer at the earliest possible time in order that the matters may be resolved, if possible, or other appropriate action promptly taken.

• Disputes will not be considered unless the Contractor has first complied with specified notice or protest requirements, including Section 4-1.03, "Changes," Section 5-1.116, "Differing Site Conditions," Section 8-1.06, "Time of Completion," Section 8-1.07, "Liquidated Damages," and Section 8-1.10, "Utility and Non-Highway Facilities."

• For disputes arising under and by virtue of the contract, including an act or failure to act by the Engineer, the Contractor shall provide a signed written initial notice of potential claim to the Engineer within 5 days from the date the dispute first arose. The initial notice of potential claim shall provide the nature and circumstances involved in the dispute which shall remain consistent through the dispute. The initial notice of potential claim shall be submitted on Form

CEM-6201A furnished by the Department and shall be certified with reference to the California False Claims Act, Government Code Sections 12650-12655. The Contractor shall assign an exclusive identification number for each dispute, determined by chronological sequencing, based on the date of the dispute.

- The exclusive identification number for each dispute shall be used on the following corresponding documents:

1. Initial notice of potential claim
2. Supplemental notice of potential claim
3. Full and final documentation of potential claim
4. Corresponding claim included in the Contractor's written statement of claims

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

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

- The information provided in items 1 and 2 above shall provide the Contractor's complete reasoning for additional compensation or adjustments.
- The supplemental notice of potential claim shall be submitted on Form CEM-6201B furnished by the Department and shall be certified with reference to the California False Claims Act, Government Code Sections 12650-12655. The Engineer will evaluate the information presented in the supplemental notice of potential claim and provide a written response to the Contractor within 20 days of its receipt. If the estimated cost or effect on the scheduled completion date changes, the Contractor shall update information in items 3 and 4 above as soon as the change is recognized and submit this information to the Engineer.
- Within 30 days of the completion of work related to the potential claim, the Contractor shall provide the full and final documentation of potential claim to the Engineer that provides the following information:

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

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

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

    4.1. The specific dates for which contract time is being requested
    4.2. The specific reasons for entitlement to a contract time adjustment
    4.3. The specific provisions of the contract that provide the basis for the requested contract time adjustment

4.4. A detailed time impact analysis of the project schedule. The time impact analysis shall show the effect of changes or disruptions on the scheduled completion date to demonstrate entitlement to a contract time adjustment.

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

• The full and final documentation of the potential claim shall be submitted on Form CEM-6201C furnished by the Department and shall be certified with reference to the California False Claims Act, Government Code Sections 12650-12655.

• Pertinent information, references, arguments, and data to support the potential claim shall be included in the full and final documentation of potential claim. Information submitted subsequent to the full and final documentation submittal will not be considered. Information required in the full and final documentation of potential claim, as listed in items 1 to 5 above, that is not applicable to the dispute may be exempted as determined by the Engineer. No full and final documentation of potential claim will be considered that does not have the same nature and circumstances, and basis of claim as those specified on the initial and supplemental notices of potential claim.

• The Engineer will evaluate the information presented in the full and final documentation of potential claim and provide a written response to the Contractor within 30 days of its receipt unless otherwise specified. The Engineer's receipt of the full and final documentation of potential claim shall be evidenced by postal receipt or the Engineer's written receipt if delivered by hand. If the full and final documentation of potential claim is submitted by the Contractor after acceptance of the work by the Director, the Engineer need not provide a written response.

• Provisions in this section shall not apply to those claims for overhead costs and administrative disputes that occur after issuance of the proposed final estimate. Administrative disputes are disputes of administrative deductions or retentions, contract item quantities, contract item adjustments, interest payments, protests of contract change orders as provided in Section 4-1.03A, "Procedure and Protest," and protests of the weekly statement of working days as provided in Section 8-1.06, "Time of Completion." Administrative disputes that occur prior to issuance of the proposed final estimate shall follow applicable requirements of this section. Information listed in the supplemental notice and full and final documentation of potential claim that is not applicable to the administrative dispute may be exempted as determined by the Engineer.

• Unless otherwise specified in the special provisions, the Contractor may pursue the administrative claim process pursuant to Section 9-1.07B, "Final Payment and Claims," for any potential claim found by the Engineer to be without merit.

• Failure of the Contractor to conform to specified dispute procedures shall constitute a failure to pursue diligently and exhaust the administrative procedures in the contract, and is deemed as the Contractor's waiver of the potential claim and a waiver of the right to a corresponding claim for the disputed work in the administrative claim process in conformance with Section 9-1.07B, "Final Payment of Claims," and shall operate as a bar to arbitration pursuant to Section 10240.2 of the California Public Contract Code.

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

9-1.07B Final Payment and Claims

• After acceptance by the Director, the Engineer will make a proposed final estimate in writing of the total amount payable to the Contractor, including an itemization of the total amount, segregated by contract item quantities, extra work and other bases for payment, and shall also show each deduction made or to be made for prior payments and amounts to be kept or retained under the provisions of the contract. Prior estimates and payments shall be subject to correction in the proposed final estimate. The Contractor shall submit written approval of the proposed final estimate or a written statement of claims arising under or by virtue of the contract so that the Engineer receives the written approval or statement of claims no later than close of business of the thirtieth day after receiving the proposed final estimate. If the thirtieth day falls on a Saturday, Sunday or legal holiday, then receipt of the written approval or statement of claims by the Engineer shall not be later than close of business of the next business day. The Contractor's receipt of the proposed final estimate shall be evidenced by postal receipt. The Engineer's receipt of the Contractor's written approval or statement of claims shall be evidenced by postal receipt or the Engineer's written receipt if delivered by hand.

• On the Contractor's approval, or if the Contractor files no claim within the specified period of 30 days, the Engineer will issue a final estimate in writing in conformance with the proposed final estimate submitted to the Contractor, and within 30 days thereafter the State will pay the entire sum so found to be due. That final estimate and payment thereon shall be conclusive and binding against both parties to the contract on all questions relating to the amount of work done and the compensation payable therefor, except as otherwise provided in Sections 9-1.03C, "Records," and 9-1.09, "Clerical Errors."

• If the Contractor within the specified period of 30 days files claims, the Engineer will issue a semifinal estimate in conformance with the proposed final estimate submitted to the Contractor and within 30 days thereafter the State will pay the sum found to be due. The semifinal estimate and corresponding payment shall be conclusive and binding against both parties

to the contract on each question relating to the amount of work done and the compensation payable therefor, except insofar as affected by the claims filed within the time and in the manner required hereunder and except as otherwise provided in Sections 9-1.03C, "Records," and 9-1.09, "Clerical Errors."

- Except for claims for overhead costs and administrative disputes that occur after issuance of the proposed final estimate, the Contractor shall only provide the following two items of information for each claim:
  1. The exclusive identification number that corresponds to the supporting full and final documentation of potential claim
  2. The final amount of requested additional compensation

- If the final amount of requested additional compensation is different than the amount of requested compensation included in the full and final documentation of potential claim, the Contractor shall provide in the written statement of claims the reasons for the changed amount, the specific provisions of the contract which support the changed amount, and a statement of the reasons the provisions support and provide a basis for the changed amount. If the Contractor's claim fails to provide an exclusive identification number or if there is a disparity in the provided exclusive identification number, the Engineer will notify the Contractor of the omission or disparity. The Contractor shall have 15 days after receiving notification from the Engineer to correct the omission or disparity. If after the 15 days has elapsed, there is still an omission or disparity of the exclusive identification number assigned to the claim, the Engineer will assign the number. No claim will be considered that has any of the following deficiencies:
  1. The claim does not have the same nature, circumstances, and basis as the corresponding full and final documentation of potential claim.
  2. The claim does not have a corresponding full and final documentation of potential claim.
  3. The claim was not included in the written statement of claims.
  4. The Contractor did not comply with applicable notice or protest requirements of Sections 4-1.03, "Changes," 5-1.116, "Differing Site Condition," 8-1.06, "Time of Completion," 8-1.07, "Liquidated Damages," 8-1.10, "Utility and Non-Highway Facilities," and 9-1.04, "Notice of Potential Claim."

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

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

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

- Failure to submit the notarized certificate will be sufficient cause for denying the claim.
- Any claim for overhead, in addition to being certified as stated above, shall be supported and accompanied by an audit report of an independent Certified Public Accountant. Omission of a supporting audit report of an independent Certified Public Accountant shall result in denial of the claim and shall operate as a bar to arbitration, as to the claim, in conformance with the requirements in Section 10240.2 of the California Public Contract Code. Any claim for overhead shall be subject to audit by the State at its discretion. The costs of performing an audit examination and submitting the report shall be borne by the Contractor. The Department will deduct an offset amount for field and home office overhead paid on all added work from any claim for overhead as appropriate, as determined by the Department. The value of the added work equals the value of the work completed minus the total bid. The home office overhead offset equals 5 percent of the added work. The field office overhead offset equals 5-1/2 percent of the added work. The Certified Public Accountant's audit examination shall be performed in conformance with the requirements of the American Institute of Certified Public Accountants Attestation Standards. The audit examination and report shall depict the Contractor's project and company-wide financial records and shall specify the actual overall average daily rates for both field and home office overhead for the entire duration of the project, and whether the costs have been properly allocated. The rates of field and home office overhead shall exclude unallowable costs as determined in Title 48 of the Federal Acquisition Regulations, Chapter 1, Part 31. The audit examination and report shall determine if the rates of field and home office overhead are:
  1. Allowable in conformance with the requirements in Title 48 of the Federal Acquisition Regulations, Chapter 1, Part 31.
  2. Adequately supported by reliable documentation.
  3. Related solely to the project under examination.

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

The final determination of claims will be sent to the Contractor by hand delivery or deposit in the U.S. mail. The Engineer will then make and issue the Engineer's final estimate in writing and within 30 days thereafter the State will pay the entire sum, if any, found due thereon. That final estimate shall be conclusive and binding against both parties to the contract on all questions relating to the amount of work done and the compensation payable therefor, except as otherwise provided in Sections 9-1.03C, "Records," and 9-1.09, "Clerical Errors."

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

SECTION 12: CONSTRUCTION AREA TRAFFIC CONTROL DEVICES

Issue Date: October 6, 2006

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

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

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

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

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

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

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

- Retroreflective sheeting shall conform to the requirements in ASTM Designation: D 4956 and to the special provisions.

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

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

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

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

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

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

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

SECTION 15: EXISTING HIGHWAY FACILITIES

Issue Date: November 2, 2004

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

• Full compensation for removing, salvaging, reconstructing, relocating or resetting end caps, return caps, terminal sections, and buried post anchors, for metal beam guard railings and thrie beam barriers, and for connecting reconstructed, relocated or reset railings and barriers to new and existing facilities, including connections to concrete, shall be considered as included in the contract price paid per meter for the type of railing or barrier work involved and no additional compensation will be allowed therefor.

SECTION 19: EARTHWORK

Issue Date: December 31, 2001

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

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

SECTION 20: EROSION CONTROL AND HIGHWAY PLANTING

Issue Date: November 18, 2005

Section 20-2.25, "Backflow Preventers," of the Standard Specifications is amended to read:

20-2.25 BACKFLOW PREVENTERS

• Backflow preventers shall be one of the reduced pressure principle devices as specified in these specifications and the special provisions.

• Backflow preventers shall be factory assembled and shall include 2 check valves, one pressure differential relief valve, 2 shut-off valves and 4 test cocks. Backflow preventer and valves shall be the same size as the pipeline in which they are installed, unless otherwise shown on the plans.

• Backflow preventer shut-off valves shall be manufactured from iron or bronze and shall be either resilient wedged gate valves, resilient seated and fully ported ball valves, or resilient seated butterfly valves. Threaded type shut-off valves shall be provided with a union on one side of each valve. Unions shall be brass or malleable iron.

Section 20-5.03J, "Check and Test Backflow Preventers," of the Standard Specifications is amended to read:

20-5.03J Check and Test Backflow Preventers

• Backflow preventers shall be checked and tested for proper operation by a certified Backflow Preventer Tester. The tester shall hold a valid certification as a Backflow Preventer Tester from the local governing authority in which the device to be tested is located. The local governing authority shall be the county, city or water purveyor having the governing authority over testing of backflow preventers involved. If the local governing authority does not have a certification program for Backflow Preventer Testers, the tester shall have a certificate from one of the following:

A. The American Water Works Association.
B. A county which has a certification program for Backflow Preventer Testers.

• Tests for proper operation shall conform to the requirements of the governing authority.
• The Engineer shall be notified at least 5 days prior to testing backflow preventers.
• One copy of the test results for each backflow preventer tested shall be furnished to the Engineer.
• Backflow preventers, installed by the Contractor, failing required tests shall be repaired at the Contractor's expense.

SECTION 29: TREATED PERMEABLE BASES

Issue Date: November 18, 2005

The fourth paragraph of Section 29-1.02A, "Asphalt Treated Permeable Base," of the Standard Specifications is amended to read:

- The type and grade of asphalt binder to be mixed with aggregate will be specified in the special provisions.

SECTION 39: ASPHALT CONCRETE

Issue Date: November 18, 2005

The fifth paragraph of Section 39-2.01, "Asphalts," of the Standard Specifications is amended to read:

- 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," and shall be Grade PG 70-10.

SECTION 40: PORTLAND CEMENT CONCRETE PAVEMENT

Issue Date: June 30, 2006

The fourth paragraph of Section 40-1.08, "Joints," of the Standard Specifications is amended to read:

- Straight tie bars shall be deformed reinforcing steel bars conforming to the requirements in ASTM Designation: A 615/A 615M, Grade 280 or 420; ASTM Designation: A 996/A 996M, Grade 350 or 420; or ASTM Designation: A 706/A 706M.

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: June 30, 2006

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

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

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

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

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

• Indicator compression pile load testing shall conform to the requirements in ASTM Designation: D 1143-81. The pile shall sustain the first compression test load applied which is equal to the nominal resistance in compression, as shown on the plans, with no more than 13 mm total vertical movement at the top of the pile measured relative to the top of the pile prior to the start of compression load testing.

• Indicator tension pile load testing shall conform to the requirements in ASTM Designation: D 3689-90. The loading apparatus described as "Load Applied to Pile by Hydraulic Jack(s) Acting at One End of Test Beam(s) Anchored to the Pile" shall not be used. The pile shall sustain the first tension test load applied which is equal to the nominal resistance in tension, as shown on the plans, with no more than 13 mm total vertical movement at the top of the pile measured relative to the top of the pile prior to the start of tension load testing.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

• Timber piles shall be fresh-headed and square and when permitted by the Engineer, the heads of the piles may be protected by means of heavy steel or wrought iron rings. During driving operations timber piling shall be restrained from lateral movement at intervals not to exceed 6 m over the length between the driving head and the ground surface. During

driving operations, the timber pile shall be kept moving by continuous operation of the hammer. When the blow count exceeds either 2 times the blow count required in 300 mm, or 3 times the blow count required in 75 mm for the nominal resistance as shown on the plans, computed in conformance with the provisions in Section 49-1.08, "Pile Driving Acceptance Criteria," additional aids shall be used to obtain the specified penetration. These aids may include the use of water jets or drilling, where permitted, or the use of a larger hammer employing a heavy ram striking with a low velocity.

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

49-1.08 PILE DRIVING ACCEPTANCE CRITERIA

- Except for piles to be load tested, driven piles shall be driven to a value of not less than the nominal resistance shown on the plans unless otherwise specified in the special provisions or permitted in writing by the Engineer. In addition, when a pile tip elevation is specified, driven piles shall penetrate at least to the specified tip elevation, unless otherwise permitted in writing by the Engineer. Piles to be load tested shall be driven to the specified tip elevation.
- When the pile nominal resistance is omitted from the plans or the special provisions, timber piles shall be driven to a nominal resistance of 800 kN, and steel and concrete piles shall be driven to a nominal resistance of 1250 kN.
- The nominal resistance for driven piles shall be determined from the following formula in which "R_u" is the nominal resistance in kilonewtons, "E_r" is the manufacturer's rating for joules of energy developed by the hammer at the observed field drop height, and "N" is the number of hammer blows in the last 300 millimeters. (maximum value to be used for N is 100):

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

• Steel pipe piles shall conform to the following requirements:

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

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

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

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

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

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

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

• The contract unit price paid for drive pile shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in driving timber, concrete and steel piles, driving steel shells for cast-in-place concrete piles, placing filling materials for cast-in-place concrete piles and cutting off piles, all complete in place to the required nominal resistance and penetration as shown on the plans and as specified in these specifications and the special provisions, and as directed by the Engineer.

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

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

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

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

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

SECTION 50: PRESTRESSING CONCRETE

Issue Date: June 30, 2006

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.

The eighth paragraph of Section 50-1.02, "Drawings," of the Standard Specifications is deleted.

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

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

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

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

A. The coating material shall be on the Department's list of approved coating materials for epoxy-coated strand, available from the Transportation Laboratory.
B. The film thickness of the coating after curing shall be 381 µm to 1143 µm.
C. Prior to coating the strand, the Contractor shall furnish to the Transportation Laboratory a representative 230-g sample from each batch of epoxy coating material to be used. Each sample shall be packaged in an airtight container identified with the manufacturer's name and batch number.
D. Prior to use of the epoxy-coated strand in the work, written certifications referenced in ASTM Designation: A 882/A 882M, including a representative load-elongation curve for each size and grade of strand to be used and a copy of the quality control tests performed by the manufacturer, shall be furnished to the Engineer.
E. In addition to the requirements in Section 50-1.10, "Samples for Testing," four 1.5-m long samples of coated strand and one 1.5-m long sample of uncoated strand of each size and reel shall be furnished to the Engineer for testing. These samples, as selected by the Engineer, shall be representative of the material to be used in the work.
F. Epoxy-coated strand shall be cut using an abrasive saw.
G. All visible damage to coatings caused by shipping and handling, or during installation, including cut ends, shall be repaired in conformance with the requirements in ASTM Designation: A 882/A 882M. The patching material shall be furnished by the manufacturer of the epoxy powder and shall be applied in conformance with the manufacturer's written recommendations. The patching material shall be compatible with the original epoxy coating material and shall be inert in concrete.

- All bars in any individual member shall be of the same grade, unless otherwise permitted by the Engineer.
- When bars are to be extended by the use of couplers, the assembled units shall have a tensile strength of not less than the manufacturer's minimum guaranteed ultimate tensile strength of the bars. Failure of any one sample to meet this requirement will be cause for rejection of the heat of bars and lot of couplers. The location of couplers in the member shall be subject to approval by the Engineer.
- Wires shall be straightened if necessary to produce equal stress in all wires or wire groups or parallel lay cables that are to be stressed simultaneously or when necessary to ensure proper positioning in the ducts.
- Where wires are to be button-headed, the buttons shall be cold formed symmetrically about the axes of the wires. The buttons shall develop the minimum guaranteed ultimate tensile strength of the wire. No cold forming process shall be used that causes indentations in the wire. Buttonheads shall not contain wide open splits, more than 2 splits per head, or splits not parallel with the axis of the wire.
- Prestressing steel shall be protected against physical damage and rust or other results of corrosion at all times from manufacture to grouting or encasing in concrete. Prestressing steel that has sustained physical damage at any time shall be rejected. The development of visible rust or other results of corrosion shall be cause for rejection, when ordered by the Engineer.
- Epoxy-coated prestressing steel strand shall be covered with an opaque polyethylene sheeting or other suitable protective material to protect the strand from exposure to sunlight, salt spray, and weather. For stacked coils, the protective covering shall be draped around the perimeter of the stack. The covering shall be adequately secured; however, it should allow for air circulation around the strand to prevent condensation under the covering. Epoxy-coated strand shall not be stored within 300 m of ocean or tidal water for more than 2 months.
- Prestressing steel shall be packaged in containers or shipping forms for the protection of the steel against physical damage and corrosion during shipping and storage. Except for epoxy-coated strand, a corrosion inhibitor which prevents rust or other results of corrosion, shall be placed in the package or form, or shall be incorporated in a corrosion inhibitor carrier type packaging material, or when permitted by the Engineer, may be applied directly to the steel. The corrosion inhibitor shall have no deleterious effect on the steel or concrete or bond strength of steel to concrete. Packaging or forms damaged from any cause shall be immediately replaced or restored to original condition.
- The shipping package or form shall be clearly marked with a statement that the package contains high-strength prestressing steel, and the type of corrosion inhibitor used, including the date packaged.
- Prestressing steel for post-tensioning which is installed in members prior to placing and curing of the concrete, and which is not epoxy-coated, shall be continuously protected against rust or other results of corrosion, until grouted, by means of a corrosion inhibitor placed in the ducts or applied to the steel in the duct. The corrosion inhibitor shall conform to the provisions specified herein.
- When steam curing is used, prestressing steel for post-tensioning shall not be installed until the steam curing is completed.
- Water used for flushing ducts shall contain either quick lime (calcium oxide) or slaked lime (calcium hydroxide) in the amount of 0.01-kg/L. Compressed air used to blow out ducts shall be oil free.

- When prestressing steel for post-tensioning is installed in the ducts after completion of concrete curing, and if stressing and grouting are completed within 10 days after the installation of the prestressing steel, rust which may form during those 10 days will not be cause for rejection of the steel. Prestressing steel installed, tensioned, and grouted in this manner, all within 10 days, will not require the use of a corrosion inhibitor in the duct following installation of the prestressing steel. Prestressing steel installed as above but not grouted within 10 days shall be subject to all the requirements in this section pertaining to corrosion protection and rejection because of rust. The requirements in this section pertaining to tensioning and grouting within 10 days shall not apply to epoxy-coated prestressing steel strand.
- Any time prestressing steel for pretensioning is placed in the stressing bed and is exposed to the elements for more than 36 hours prior to encasement in concrete, adequate measures shall be taken by the Contractor, as approved by the Engineer, to protect the steel from contamination or corrosion.
- After final fabrication of the seven-wire prestressing steel strand, no electric welding of any form shall be performed on the prestressing steel. Whenever electric welding is performed on or near members containing prestressing steel, the welding ground shall be attached directly to the steel being welded.
- Pretensioned prestressing steel shall be cut off flush with the end of the member. For epoxy-coated prestressing steel, only abrasive saws shall be used to cut the steel. The exposed ends of the prestressing steel and a 25-mm strip of adjoining concrete shall be cleaned and painted. Cleaning shall be by wire brushing or abrasive blast cleaning to remove all dirt and residue on the metal or concrete surfaces. Immediately after cleaning, the surfaces shall be covered with one application of unthinned zinc-rich primer (organic vehicle type) conforming to the provisions in Section 91, "Paint," except that 2 applications shall be applied to surfaces which will not be covered by concrete or mortar. Aerosol cans shall not be used. The paint shall be thoroughly mixed at the time of application and shall be worked into any voids in the prestressing tendons.

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

- The following formula and friction coefficients shall be used in calculating friction losses in tendons:

$$To = Txe^{(\mu\alpha + KL)}$$

Where:

To = steel stress at jacking end
Tx = steel stress at any point x
e = base of Naperian logarithms
μ = friction curvature coefficient
α = total angular change of prestressing steel profile in radians from jacking end to point x
K = friction wobble coefficient (=0.00066/m)
L = length of prestressing steel from jacking end to point x

Type of Steel Tendon	Length of Tendon L(m)	Type of Duct	μ
Wire or Strand	0 to less than 183	Rigid or semi-rigid galvanized sheet metal	0.15
	183 to less than 275		0.20
	275 to less than 366		0.25
	Greater than or equal to 366		0.25*
Wire or Strand	All	Plastic	0.23
	All	Rigid Steel Pipes	0.25*
High Strength Bar	All	Rigid or semi-rigid galvanized sheet metal	0.30

* With the use of lubrication

The thirteenth and fourteenth paragraphs in Section 50-1.08, "Prestressing," of the Standard Specifications are 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.

• When ordered by the Engineer, prestressing steel strands in pretensioned members, if tensioned individually, shall be checked by the Contractor for loss of prestress not more than 48 hours prior to placing concrete for the members. The method and equipment for checking the loss of prestress shall be subject to approval by the Engineer. Strands which show a loss of prestress in excess of 3 percent shall be retensioned to the original computed jacking stress.

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

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

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

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

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

SECTION 51: CONCRETE STRUCTURES

Issue Date: January 28, 2005

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

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

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

• The Contractor shall submit to the Engineer working drawings and design calculations for falsework proposed for use at bridges. For bridges where the height of any portion of the falsework, as measured from the ground line to the soffit of the superstructure, exceeds 4.25 m; or where any individual falsework clear span length exceeds 4.85 m; or where provision for vehicular, pedestrian, or railroad traffic through the falsework is made; the drawings shall be signed by an engineer who is registered as a Civil Engineer in the State of California. Six sets of the working drawings and 2 copies of the design

calculations shall be furnished. Additional working drawings and design calculations shall be submitted to the Engineer when specified in "Railroad Relations and Insurance" of the special provisions.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

A. The seal shall consist of a multi-channel, nonporous, homogeneous material furnished in a finished extruded form.
B. The minimum depth of the seal, measured at the contact surface, shall be at least 95 percent of the minimum uncompressed width of the seal as designated by the manufacturer.
C. When tested in conformance with the requirements in California Test 673 for Type B seals, joint seals shall provide a Movement Rating (MR) of not less than that shown on the plans.
D. The top and bottom edges of the joint seal shall maintain continuous contact with the sides of the groove over the entire range of joint movement.
E. The seal shall be furnished full length for each joint with no more than one shop splice in any 18-m length of seal.

F. The Contractor shall demonstrate the adequacy of the procedures to be used in the work before installing seals in the joints.
G. Shop splices and field splices shall have no visible offset of exterior surfaces, and shall show no evidence of bond failure.
H. At all open ends of the seal that would admit water or debris, each cell shall be filled to a depth of 80 mm with commercial quality open cell polyurethane foam, or closed by other means subject to approval by the Engineer.

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

(c) Joint Seal Assemblies and Seismic Joints

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

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

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

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

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

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

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

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

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

C. Elastomer for steel reinforced elastomeric bearings shall conform to the provisions for elastomer in Section 51-1.12H(1), "Plain and Fabric Reinforced Elastomeric Bearing Pads."
D. A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," shall be furnished to the Engineer certifying that the bearings to be furnished conform to all of the above provisions. The Certificate of Compliance shall be supported by a certified copy of the results of tests performed by the manufacturer on the bearings.
E. One sample bearing shall be furnished to the Engineer from each lot of bearings to be furnished for the contract. Samples shall be available at least 3 weeks in advance of intended use. The sample bearing shall be one of the following:

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

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

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

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

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

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

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

• The smoothness of completed roadway surfaces of structures, approach slabs and the adjacent 15 m of approach pavement, and the top surfaces of concrete decks which are to be covered with another material, will be tested by the Engineer with a bridge profilograph in conformance with the requirements in California Test 547 and the requirements herein.

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

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

SECTION 52: REINFORCEMENT

Issue Date: June 30, 2006

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

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

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

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

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

The third paragraph of Section 52-1.06, "Bending," of the Standard Specifications is amended to read:

• Hooks and bends shall conform to the provisions of the Building Code Requirements for Structural Concrete of the American Concrete Institute.

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

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

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

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

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

52-1.08 SPLICING

• Splices of reinforcing bars shall consist of lap splices, service splices, or ultimate butt splices.

• Splicing of reinforcing bars will not be permitted at a location designated on the plans as a "No-Splice Zone." At the option of the Contractor, reinforcing bars may be continuous at locations where splices are shown on the plans. The location of splices, except where shown on the plans, shall be determined by the Contractor using available commercial lengths where practicable.

• Unless otherwise shown on the plans, splices in adjacent reinforcing bars at any particular section shall be staggered. The minimum distance between staggered lap splices or mechanical lap splices shall be the same as the length required for a lap splice in the largest bar. The minimum distance between staggered butt splices shall be 600 mm, measured between the midpoints of the splices along a line which is centered between the axes of the adjacent bars.

52-1.08A Lap Splicing Requirements

• Splices made by lapping shall consist of placing reinforcing bars in contact and wiring them together, maintaining the alignment of the bars and the minimum clearances. Should the Contractor elect to use a butt welded or mechanical splice at a location not designated on the plans as requiring a service or ultimate butt splice, this splice shall conform to the testing requirements for service splice.

• Reinforcing bars shall not be spliced by lapping at locations where the concrete section is not sufficient to provide a minimum clear distance of 50 mm between the splice and the nearest adjacent bar. The clearance to the surface of the concrete specified in Section 52-1.07, "Placing," shall not be reduced.

• Reinforcing bars Nos. 43 and 57 shall not be spliced by lapping.

• Where ASTM Designations: A 615/A 615M, Grade 420 or A 706/A 706M reinforcing bars are required, the length of lap splices shall be as follows: Reinforcing bars No. 25 or smaller shall be lapped at least 45 diameters of the smaller bar joined; and reinforcing bars Nos. 29, 32, and 36 shall be lapped at least 60 diameters of the smaller bar joined, except when otherwise shown on the plans.

• Where ASTM Designation: A 615/A 615M, Grade 280 reinforcing bars are permitted, the length of lap splices shall be as follows: Reinforcing bars No. 25 or smaller shall be lapped at least 30 diameters of the smaller bar joined; and reinforcing bars Nos. 29, 32, and 36 shall be lapped at least 45 diameters of the smaller bar joined, except when otherwise shown on the plans.

• Splices in bundled bars shall conform to the following:

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

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

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

52-1.08B Service Splicing and Ultimate Butt Splicing Requirements

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

52-1.08B(1) Mechanical Splices

• Mechanical splices to be used in the work shall be on the Department's current prequalified list before use. The prequalified list can be obtained from the Department's internet site listed in the special provisions or by contacting the Transportation Laboratory directly.

• When tested in conformance with the requirements in California Test 670, the total slip shall not exceed the values listed in the following table:

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

• Slip requirements shall not apply to mechanical lap splices, splices that are welded, or splices that are used on hoops.

• Splicing procedures shall be in conformance with the manufacturer's recommendations, except as modified in this section. Splices shall be made using the manufacturer's standard equipment, jigs, clamps, and other required accessories.

• Splice devices shall have a clear coverage of not less than 40 mm measured from the surface of the concrete to the outside of the splice device. Stirrups, ties, and other reinforcement shall be adjusted or relocated, and additional reinforcement shall be placed, if necessary, to provide the specified clear coverage to reinforcement.

• The Contractor shall furnish the following information for each shipment of splice material in conformance with the provisions in Section 6-1.07, "Certificates of Compliance:"

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

52-1.08B(2) Butt Welded Splices

• Except for resistance butt welds, butt welded splices of reinforcing bars shall be complete joint penetration butt welds conforming to the requirements in AWS D 1.4, and these specifications.

• Welders and welding procedures shall be qualified in conformance with the requirements in AWS D 1.4.

• Only the joint details and dimensions as shown in Figure 3.2, "Direct Butt Joints," of AWS D 1.4, shall be used for making complete joint penetration butt welds of bar reinforcement. Split pipe backing shall not be used.

• Butt welds shall be made with multiple weld passes using a stringer bead without an appreciable weaving motion. The maximum stringer bead width shall be 2.5 times the diameter of the electrode and slagging shall be performed between each weld pass. Weld reinforcement shall not exceed 4 mm in convexity.

• Electrodes used for welding shall meet the minimum Charpy V-notch impact requirement of 27°J at –20°C.

• For welding of bars conforming to the requirements of ASTM Designation: A 615/A 615M, Grade 280 or Grade 420, the requirements of Table 5.2, "Minimum Preheat and Interpass Temperatures," of AWS D 1.4 are superseded by the following:

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

- When welding different grades of reinforcing bars, the electrode shall conform to Grade 280 bar requirements and the preheat shall conform to the Grade 420 bar requirements.
- In the event that any of the specified preheat, interpass, and post weld cooling temperatures are not met, all weld and heat affected zone metal shall be removed and the splice rewelded.
- Welding shall be protected from air currents, drafts, and precipitation to prevent loss of heat or loss of arc shielding. The method of protecting the welding area from loss of heat or loss of arc shielding shall be subject to approval by the Engineer.
- Reinforcing bars shall not be direct butt spliced by thermite welding.
- Procedures to be used in making welded splices in reinforcing bars, and welders employed to make splices in reinforcing bars, shall be qualified by tests performed by the Contractor on sample splices of the type to be used, before making splices to be used in the work.

52-1.08B(3) Resistance Butt Welds

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

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

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

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

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

- The Contractor shall provide samples for quality assurance testing in conformance with the provisions in these specifications and the special provisions.
- Prequalification and production sample splices shall be 1) a minimum length of 1.5 meters for reinforcing bars No. 25 or smaller, and 2 meters for reinforcing bars No. 29 or larger, with the splice located at mid-point; and 2) suitably identified before shipment with weatherproof markings that do not interfere with the Engineer's tamper-proof markings or seals. Splices that show signs of tampering will be rejected.
- Shorter length sample splice bars may be furnished if approved in writing by the Engineer.

• The Contractor shall ensure that sample splices are properly secured and transported to the testing laboratory in such a manner that no alterations to the physical conditions occur during transportation. Sample splices shall be tested in the same condition as received. No modifications to the sample splices shall be made before testing.

• Each set or sample splice, as defined herein, shall be identified as representing either a prequalification or production test sample splice.

• For the purpose of production testing, a lot of either service splices or ultimate butt splices is defined as 1) 150, or fraction thereof, of the same type of mechanical splices used for each bar size and each bar deformation pattern that is used in the work, or 2) 150, or fraction thereof, of complete joint penetration butt welded splices or resistance butt welded splices for each bar size used in the work. If different diameters of hoop reinforcement are shown on the plans, separate lots shall be used for each different hoop diameter.

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

52-1.08C(1) Splice Prequalification Report

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

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

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

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

52-1.08C(2) Service Splice Test Criteria

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

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

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

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

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

• Before performing any tensile tests on production test sample splices, one of the 4 samples shall be tested for, and shall conform to, the requirements for total slip. Should this sample not meet the total slip requirements, one retest, in which

the 3 remaining samples are tested for total slip, will be allowed. Should any of the 3 remaining samples not conform to the total slip requirements, all splices in the lot represented by this production test will be rejected.

- If 3 or more sample splices from a production test conform to the provisions in this Section 52-1.08C(2),"Service Splice Test Criteria," all splices in the lot represented by this production test will be considered acceptable, provided each of the 4 samples develop a minimum tensile strength of not less than 420 MPa.
- Should only 2 sample splices from a production test conform to the provisions in this Section 52-1.08C(2), "Service Splice Test Criteria," one additional production test shall be performed on the same lot of splices. This additional production test shall consist of testing 4 samples splices that have been randomly selected by the Engineer and removed by the Contractor from the actual completed lot of splices. Should any of the 4 splices from this additional test fail to conform to these provisions, all splices in the lot represented by these production tests will be rejected.
- If only one sample splice from a production test conforms to the provisions in this Section 52-1.08C(2), "Service Splice Test Criteria," all splices in the lot represented by this production test will be rejected.
- If a production test for a lot fails, the Contractor shall repair or replace all reinforcing bars from which sample splices were removed before the Engineer selects additional splices from this lot for further testing.

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

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

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

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

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

- Production tests shall be performed for all ultimate butt splices used in the work. A production test shall consist of testing 4 sets of sample splices and control bars removed from each lot of completed splices, except when quality assurance tests are performed.

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

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

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

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

- When the specifications allow for welded sample splices to be taken from other than the completed lot of splices, the Contractor shall meet the following additional requirements.
- Except for resistance butt welded splices, radiographic examinations shall be performed on 25 percent of all complete joint penetration butt welded splices from a production lot. The size of a production lot will be a maximum of 150 splices. The Engineer will select the splices which will compose the production lot and also the splices within each production lot to be radiographically examined.
- All required radiographic examinations of complete joint penetration butt welded splices shall be performed by the Contractor in conformance with the requirements in AWS D 1.4 and these specifications.
- Before radiographic examination, welds shall conform to the requirements in Section 4.4, "Quality of Welds," of AWS D 1.4.

- Should more than 12 percent of the splices which have been radiographically examined in any production lot be defective, an additional 25 percent of the splices, selected by the Engineer from the same production lot, shall be radiographically examined. Should more than 12 percent of the cumulative total of splices tested from the same production lot be defective, all remaining splices in the lot shall be radiographically examined.
- Additional radiographic examinations performed due to the identification of defective splices shall be at the Contractor's expense.
- All defects shall be repaired in conformance with the requirements in AWS D 1.4.
- The Contractor shall notify the Engineer in writing 48 hours before performing any radiographic examinations.
- The radiographic procedure used shall conform to the requirements in AWS D1.1, AWS D1.4, and the following:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

52-1.08D Reporting Test Results

• A Production Test Report for all testing performed on each lot shall be prepared by the independent testing laboratory performing the testing and submitted to the QCM for review and approval. The report shall be signed by an engineer who represents the laboratory and is registered as a Civil Engineer in the State of California. The report shall include, as a minimum, the following information for each test: contract number, bridge number, lot number and location, bar size, type of splice, length of mechanical splice, length of test specimen, physical condition of test sample splice and any associated control bar, any notable defects, total measured slip, ultimate tensile strength of each splice, and for ultimate butt splices, limits of affected zone, location of visible necking area, ultimate tensile strength and 95 percent of this ultimate tensile strength for each control bar, and a comparison between 95 percent of the ultimate tensile strength of each control bar and the ultimate tensile strength of its associated splice.

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

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

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

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

SECTION 55: STEEL STRUCTURES

Issue Date: July 21, 2006

The third and fourth paragraphs of Section 55-1.01, "Description," of the Standard Specifications are amended to read:

• Details of connections for highway bridges selected for use by the Contractor shall conform to the AASHTO LRFD Bridge Design Specifications with Caltrans Amendments.

• Details of design selected by the Contractor, fabrication and workmanship, for steel railway bridges shall conform to the requirements of the Specifications for Steel Railway Bridges, for Fixed Spans Not Exceeding 400 Feet in Length of the AREMA, as set forth in the special provisions.

The third paragraph of Section 55-1.05, "Falsework," of the Standard Specifications is amended to read:

• Construction methods and equipment employed by the Contractor shall conform to the provisions in Section 7-1.02, "Load Limitations." Loads imposed on existing, new or partially completed structures shall not exceed the load carrying capacity of the structure, or portion of structure, as determined by the AASHTO LRFD Bridge Design Specifications with Caltrans Amendments.

The fourth and fifth paragraphs of Section 55-2.01, "Description," of the Standard Specifications are amended to read:

• All structural steel plate used for the fabrication of tension members, tension flanges, eyebars and hanger plates and for splice plates of tension members, tension flanges and eyebars shall meet the longitudinal Charpy V-notch impact value requirements specified herein. Sampling procedures shall conform to the requirements in ASTM Designation: A 673. The H (Heat) frequency of testing shall be used for structural steels conforming to the requirements in ASTM Designations: A 709/A 709M, Grades 36 [250], 50 [345], 50W [345W], and HPS 50W [345W]. The P (Piece) frequency of testing shall be used for structural steel conforming to the requirements in ASTM Designation: A 709/A 709M, Grades HPS 70W [485W], 100 [690], and 100W [690W]. Charpy V-notch impact values shall be determined in conformance with the requirements in ASTM Designation: E 23.

• Charpy V-notch (CVN) impact values shall conform to the following minimum values for non fracture critical members:

Material Conforming to ASTM Designation: A 709/A 709M	CVN Impact Value (Joules at Temp.)
Grade 36 [250]	20 at 4°C
Grade 50 [345]* (50 mm and under in thickness)	20 at 4°C
Grade 50W [345W]* (50 mm and under in thickness)	20 at 4°C
Grade 50 [345]* (Over 50 mm to 100 mm in thickness)	27 at 4°C
Grade 50W [345W]* (Over 50 mm to 100 mm in thickness)	27 at 4°C
Grade HPS 50W [345W]* (100 mm and under in thickness)	27 at -12°C
Grade HPS 70W [485]* (100 mm and under in thickness)	34 at -23°C
Grade 100 [490] (65 mm and under in thickness)	34 at -18°C
Grade 100W [490W] (Over 65 mm to 100 mm in thickness)	48 at -18°C

* If the yield point of the material exceeds 450 MPa, the temperature for the CVN impact value for acceptability shall be reduced 8°C for each increment of 70 MPa above 450 MPa.

Structural Steel Materials

Material	Specification
Structural steel:	
Carbon steel	ASTM: A 709/A 709M, Grade 36 [250] or {A 36/A 36M}a
High strength low alloy columbium vanadium steel	ASTM: A 709/A 709M, Grade 50 [345]or {A 572/A 572M, Grade 50 [345]}a
High strength low alloy structural steel	ASTM: A 709/A 709M, Grade 50W [345W], Grade HPS 50W [HSP 345W], or {A 588/A 588M}a
High strength low alloy structural steel plate	ASTM: A 709/A 709M, Grade HPS 70W [HPS 485W]
High-yield strength, quenched and tempered alloy steel plate suitable for welding	ASTM: A 709/A 709M, Grade 100 [690] and Grade 100W [690W], or {A 514/A 514M}a
Steel fastener components for general applications:	
Bolts and studs	ASTM: A 307
Headed anchor bolts	ASTM: A 307, Grade B, including S1 supplementary requirements
Nonheaded anchor bolts	ASTM: A 307, Grade C, including S1 supplementary requirements and S1.6 of AASHTO: M 314 supplementary requirements or AASHTO: M 314, Grade 36 or 55, including S1 supplementary requirements
High-strength bolts and studs	ASTM: A 449, Type 1
High-strength threaded rods	ASTM: A 449, Type 1
High-strength nonheaded anchor bolts	ASTM: A 449, Type 1
Nuts	ASTM: A 563, including Appendix X1b
Washers	ASTM: F 844

Components of high-strength steel fastener assemblies for use in structural steel joints:	
Bolts	ASTM: A 325, Type 1
Tension control bolts	ASTM: F 1852, Type 1
Nuts	ASTM: A 563, including Appendix X1b
Hardened washers	ASTM : F 436, Type 1, Circular, including S1 supplementary requirements
Direct tension indicators	ASTM: F 959, Type 325, zinc-coated
Carbon steel for forgings, pins and rollers	ASTM: A 668/A 668M, Class D
Alloy steel for forgings	ASTM: A 668/A 668M, Class G
Pin nuts	ASTM: A 36/A 36M
Carbon-steel castings	ASTM: A 27/A 27M, Grade 65-35, Class 1
Malleable iron castings	ASTM: A 47, Grade 32510 or A 47M, Grade 22010
Gray iron castings	ASTM: A 48, Class 30B
Carbon steel structural tubing	ASTM: A 500, Grade B or A 501
Steel pipe (Hydrostatic testing will not apply)	ASTM: A 53, Type E or S, Grade B; A 106, Grade B; or A 139, Grade B
Stud connectors	ASTM: A 108 and AASHTO/AWS D1.5

a Grades that may be substituted for the equivalent ASTM Designation: A 709 steel, at the Contractor's option, subject to the modifications and additions specified and to the requirements of A 709.

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

The first sentence of the first paragraph of Section 55-2.02, " Structural Steel," of the Standard Specifications is amended to read:

• Unless otherwise specified or shown on the plans, all structural steel plates, shapes, and bars shall conform to ASTM Designation: A 709/A 709M, Grade 50 [345].

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 second paragraph of Section 55-3.17, "Welding," of the Standard Specifications is amended to read:

• The minimum size of all fillet welds, except those to reinforce groove welds, shall be as shown in the following table:

Base Metal Thickness of the Thicker Part Joined (Millimeters)	*Minimum Size of Fillet Weld (Millimeters)
To 19 inclusive	6
Over 19	8

* Except that the weld size need not exceed the thickness of the thinner part joined.

The third paragraph of Section 55-3.19, "Bearings and Anchorages," is amended to read:

• Immediately before setting bearing assemblies or masonry plates directly on ground concrete surfaces, the Contractor shall thoroughly clean the surfaces of the concrete and the metal to be in contact and shall apply a coating of polysulfide or polyurethane caulking conforming to the requirements in ASTM Designation: C 920, Type S, Grade NS, Class 25, Use M, to contact areas to provide full bedding.

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

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

SECTION 56: SIGNS

Issue Date: November 2, 2004

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

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

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

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

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

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

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

56-1.02B Sheets

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

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

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

56-1.02F Steel Walkway Gratings

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

A. Gratings shall be the standard product of an established grating manufacturer.
B. Material for gratings shall be structural steel conforming to the requirements in ASTM Designation: A 1011/A 1011M, Designation CS, Type B.
C. For welded type gratings, each joint shall be full resistance welded under pressure, to provide a sound, completely beaded joint.
D. For mechanically locked gratings, the method of fabrication and interlocking of the members shall be approved by the Engineer, and the fabricated grating shall be equal in strength to the welded type.

E. Gratings shall be accurately fabricated and free from warps, twists, or other defects affecting their appearance or serviceability. Ends of all rectangular panels shall be square. The tops of the bearing bars and cross members shall be in the same plane. Gratings distorted by the galvanizing process shall be straightened.

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

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

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

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

SECTION 57: TIMBER STRUCTURES

Issue Date: October 12, 2004

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

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

SECTION 58: PRESERVATIVE TREATMENT OF LUMBER, TIMBER AND PILING

Issue Date: November 18, 2005

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

- Timber, lumber, and piling shall be pressure treated after millwork is completed. Preservatives, treatment, and results of treatment shall conform to the requirements in AWPA Standards U1 and T1. Treatment of lumber and timber shall conform to the specified AWPA Use Category cited in the special provisions, on the plans, or elsewhere in these specifications.

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

SECTION 59: PAINTING

Issue Date: June 30, 2006

The first paragraph of Section 59-1.02, "Weather Conditions," of the Standard Specifications is amended to read:

• Paint shall be applied only on thoroughly dry surfaces and during periods of favorable weather. Blast cleaning or application of solvent-borne paint will not be permitted when the atmospheric or surface temperature is at or below 2°C or above 38°C, or when the relative humidity exceeds 85 percent at the site of the work. Application of water-borne paint will not be permitted when the atmospheric or surface temperature is at or below 10°C, or above 38°C, or when the relative humidity exceeds 75 percent at the site of the work. Application of paint will not be permitted when the steel surface temperature is less than 3°C above the dew point, or when freshly painted surfaces may become damaged by rain, fog or condensation, or when it can be anticipated that the atmospheric temperature or relative humidity will not remain within the specified application conditions during the drying period, except as provided in the following paragraph for enclosures. If uncured paint is damaged by the elements, it shall be replaced or repaired by the Contractor at the Contractor's expense.

The second paragraph of Section 59-1.05, "Protection Against Damage," of the Standard Specifications is amended to read:

• Paint or paint stains on surfaces not designated to be painted shall be removed by the Contractor at the Contractor's expense and to the satisfaction of the Engineer.

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

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

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

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

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

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

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

The third and fourth paragraphs of Section 59-2.12, "Painting," of the Standard Specifications are amended to read:

- Contact surfaces of stiffeners, railings, built up members or open seam exceeding 6 mils in width that would retain moisture, shall be caulked with polysulfide or polyurethane sealing compound conforming to the requirements in ASTM Designation: C 920, Type S, Grade NS, Class 25, Use O, or other approved material.
- 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 in SSPC-PA 2, "Measurement of Dry Coating Thickness with Magnetic Gages," of the "SSPC: The Society for Protective Coatings," except that there shall be no limit to the number or location of spot measurements to verify compliance with specified thickness requirements.

SECTION 72: SLOPE PROTECTION

Issue Date: November 18, 2005

The sixth paragraph of Section 72-4.04, "Construction," of the Standard Specifications is amended to read:

- Pervious backfill material, if required by the plans, shall be placed as shown. A securely tied sack containing 0.03-m^3 of pervious backfill material shall be placed at each weep hole and drain hole. The sack material shall conform to the provisions in Section 88-1.03, "Filter Fabric."

SECTION 75: MISCELLANEOUS METAL

Issue Date: June 30, 2006

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

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

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

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

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

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

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

• Sheet steel for access doors shall be galvanized sheet conforming to the requirements in ASTM Designation: A 653/A 653M, Coating Designation Z600 {G210}.

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

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

* Maximum stud diameter permitted for mechanical expansion anchors.

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

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

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

Installation Torque Values, (newton meters)

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

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

- Sealing compound, for caulking and adhesive sealing, shall be a polysulfide or polyurethane material conforming to the requirements in ASTM Designation: C 920, Type S, Grade NS, Class 25, Use O.

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

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

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

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

SECTION 80: FENCES

Issue Date: October 12, 2004

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

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

SECTION 81: MONUMENTS

Issue Date: June 30, 2006

The fifth paragraph of Section 81-1.02, "Materials," of the Standard Specifications is amended to read:

- At the option of the Contractor, the frame and cover for Type B and Type D survey monuments shall be fabricated from either cast steel or gray cast iron. The covers shall fit into the frames without rocking.

The seventh paragraph of Section 81-1.02, "Materials," of the Standard Specifications is amended to read:

• Granular material for Type B and Type D survey monuments shall be gravel, crushed gravel, crushed rock or any combination thereof. Granular material shall not exceed 37.5 mm in greatest dimension.

SECTION 82: MARKERS AND DELINEATORS

Issue Date: June 30, 2006

The first paragraph of Section 82-1.02B, "Metal Posts," of the Standard Specifications is amended to read:

• Steel for metal posts shall conform to the requirements in ASTM Designation: A 36/A 36M. The posts shall be galvanized in conformance with the requirements in Section 75-1.05, "Galvanizing."

The third paragraph of Section 82-1.02D, "Target Plates," of the Standard Specifications is amended to read:

• The zinc-coated steel sheet shall conform to the requirements in ASTM Designation: A 653/A 653M, Classification: Commercial Steel (CS Types A, B and C). The steel sheets shall be galvanized in conformance with the requirements in Section 75-1.05, "Galvanizing." The zinc-coated surface shall be prepared for painting in a manner designed to produce optimum paint adherence. The surface preparation shall be accomplished without damaging or removing the zinc coating. Any evidence of damage or removal of the zinc coating shall be cause for rejection of the entire lot.

The eleventh paragraph of Section 82-1.02D, "Target Plates," of the Standard Specifications is amended to read:

• When tested in conformance with the requirements in California Test 671, the painted metal target plates shall, in general, have satisfactory resistance to weathering, humidity, salt spray and chemicals; the enamel coating shall have satisfactory adherence and impact resistance, a pencil lead hardness of HB minimum, 60° specular gloss of 80 percent minimum, an excitation purity of 3 percent maximum as received and after 1000 hours in an artificial weathering device in conformance with the requirements in ASTM Designation: G 155, Table X3.1, Cycle 1, and a daylight luminous directional reflectance ("Y" value) of 70 minimum.

The second paragraph of Section 82-1.02F, "Reflectors," of the Standard Specifications is amended to read:

• Reflectors for flexible target plates on Type K object markers and target plates on Class 2 delineators, and reflectors for Class 1 delineators shall be made from impact resistant retroreflective sheeting as specified in the special provisions. The color of the retroreflective sheeting shall conform to the color designated on the plans and the Chromaticity Coordinates specified in ASTM Designation: D 4956, or the PR color number specified by the Federal Highway Administration's Color Tolerance Chart.

The fourth paragraph of Section 82-1.02F, "Reflectors," of the Standard Specifications is amended to read:

The instrumental method of determining color shall conform to the requirements specified in ASTM Designation: D 4956. In the event of any dispute concerning the test results of instrumental testing, the visual test shall prevail.

SECTION 83: RAILINGS AND BARRIERS

Issue Date: January 28, 2005

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- The above prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing the barrier, complete in place, including drilling holes for wood posts, driving posts, backfilling the space around posts, excavating and backfilling end anchor assembly holes, connecting thrie beam barrier to concrete surfaces and disposing of surplus excavated material, and for furnishing, placing, removing and disposing of the temporary railing for closing the gap between existing barrier and the barrier being constructed as shown on the plans, and as specified in these specifications and the special provisions, and as directed by the Engineer.

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

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

SECTION 84: TRAFFIC STRIPES AND PAVEMENT MARKINGS

Issue Date: July 21, 2006

The first paragraph of Section 84-2.02, "Materials," of the Standard Specifications is amended to read:

- The thermoplastic material shall conform to State Specification PTH-02SPRAY, PTH-02HYDRO or PTH-02ALKYD. Glass beads to be applied to the surface of the molten thermoplastic material shall conform to the requirements of State Specification 8010-004 (Type II).

The first paragraph of Section 84-3.02, "Materials," of the Standard Specifications is amended to read:

- Paint for traffic stripes and pavement markings shall conform to the following State Specifications:

Paint Type	Color	State Specification No.
Waterborne Traffic Line	White, Yellow and Black	PTWB-01
Acetone-Based	White, Yellow and Black	PT-150VOC(A)
Waterborne Traffic Line for disabled persons' parking, and other curb markings	Blue, Red and Green	Federal Specification No. TT-P-1952D

The fourth paragraph of Section 84-3.02, "Materials," of the Standard Specifications is amended to read:

- The kind of paint to be used (waterborne or acetone-based) shall be determined by the Contractor based on the time of year the paint is applied and local air pollution control regulations.

The first paragraph of Section 84-3.05, "Application," of the Standard Specifications is amended to read:

Traffic stripes and pavement markings shall be applied only on dry surfaces and only during periods of favorable weather. Painting shall not be performed when the atmospheric temperature is below 5°C when using acetone-based paint or

below 10°C when using water borne paint; when freshly painted surfaces may become damaged by rain, fog, or condensation; nor when it can be anticipated that the atmospheric temperature will drop below the aforementioned 5°C or 10°C temperatures during the drying period.

The third paragraph of Section 84-3.05, "Application," of the Standard Specifications is deleted.

The tenth paragraph of Section 84-3.05, "Application," of the Standard Specifications is amended to read:

- Paint to be applied in 2 coats shall be applied approximately as follows:

Paint Type	Square Meter Coverage Per Liter	
	First Coat	Second Coat
Waterborne Paint	6	6
Acetone-Based Paint	10	5

SECTION 85: PAVEMENT MARKERS

Issue Date: June 30, 2006

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

Sampling

- Twenty markers selected at random will constitute a representative sample for each lot of markers.
- The lot size shall not exceed 25 000 markers.

Tolerances

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

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

85-1.04 Non-Reflective Pavement Markers

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

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

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

Testing

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

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

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

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

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

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

Testing

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

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

a. Failure of the marker body or filler material prior to reaching 3.4 MPa shall constitute a failing bond strength test.

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

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

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

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

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

The seventh sentence of the fourteenth paragraph of Section 85-1.06, "Placement," of the Standard Specifications is amended to read:

- Soft rags moistened with mineral spirits conforming to Army Mil-PRF-680A(1) or kerosene may be used, if necessary, to remove adhesive from exposed faces of pavement markers.

SECTION 86: SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

Issue Date: October 6, 2006

The second paragraph of Section 86-1.01, "Description," of the Standard Specifications is amended to read:

- The locations of signals, beacons, standards, lighting fixtures, signs, controls, services and appurtenances shown on the plans are approximate and the exact locations will be approved by the Engineer in the field.

The tenth paragraph of Section 86-1.06, "Maintaining Existing and Temporary Electrical Systems," of the Standard Specifications is amended to read:

- These provisions will not relieve the Contractor in any manner of the Contractor's responsibilities as provided in Section 7-1.12, "Indemnification and Insurance," and Section 7-1.16, "Contractor's Responsibility for the Work and Materials."

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

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

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

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

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

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

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

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

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

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

• Bolts, nuts and washers, and anchor bolts for use in signal and lighting support structures shall conform to the provisions in Section 55-2, "Materials." Except when bearing-type connections or slipbases are specified, high-strength bolted connections shall conform to the provisions in Section 55-3.14, "Bolted Connections." Welding, nondestructive testing (NDT) of welds, and acceptance and repair criteria for NDT of steel members shall conform to the requirements of AWS D1.1 and the special provisions.

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

• On each lighting standard except Type 1, one rectangular corrosion resistant metal identification tag shall be permanently attached above the hand hole, near the base of the standard, using stainless steel rivets. On each signal pole support, two corrosion resistant metal identification tags shall be attached, one above the hand hole near the base of the vertical standard and one on the underside of the signal mast arm near the arm plate. As a minimum, the information on each identification tag shall include the name of the manufacturer, the date of manufacture, the identification number as shown on the plans, the contract number, and a unique identification code assigned by the fabricator. This number shall be traceable to a particular contract and the welds on that component, and shall be readable after the support structure is coated and installed. The lettering shall be a minimum of 7 mm high. The information may be either depressed or raised, and shall be legible.

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

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

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

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

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

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

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

Welds shall be continuous.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The traffic signal controller cabinet requirement in the table in Section 86-2.08A, "Conductor Identification," of the Standard Specifications is amended to read:

Traffic Signal Controller Cabinet	Ungrounded between Service	Blk	None	CON-1	6
	Grounded Circuit Conductor	White	None	CON-2	6

The second paragraph of Section 86-2.08B, "Multiple Circuit Conductors," of the Standard Specifications is amended to read by the following 2 paragraphs:

- At any point, the minimum insulation thickness of any Type USE, RHH, or RHW insulation 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.
- At any point, the minimum insulation thickness of any Type THW or TW wires shall be 0.7 mm for conductor sizes No. 14 to No. 10, inclusive; 1.0 mm for No. 8; and 1.4 mm for No. 6 to No. 2, inclusive.

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

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

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

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

Item B of the thirteenth paragraph of Section 86-2.16, "Multiple Circuit Conductors," of the Standard Specifications is amended to read:

B. Salt Spray Resistance - The undercutting of the film of the coating system shall not exceed 3 mm average, from lines scored diagonally and deep enough to expose the base metal, after 336 hours exposure in a salt spray cabinet in conformance with the requirements in ASTM Designation: B 117.

The third paragraph under "Mounting Assemblies" of Section 86-2.16, "Internally Illuminated Street Name Signs," of the Standard Specifications is amended to read:

- At least 16 feet of clearance shall be provided between the bottom of the fixture and the roadway.

The first paragraph of Section 86-4.01, "Vehicle Signal Faces," of the Standard Specifications is amended to read:

- Each vehicle signal face shall be of the adjustable type conforming to the requirements in Institute of Transportation Engineers (ITE) Publication: ST-017B, "Vehicle Traffic Control Signal Heads."

Subparagraphs 1 and 3 of the first paragraph of Section 86-4.01A, "Optical Units," of the Standard Specifications are amended to read:

- Lenses, reflectors, reflector assemblies, lamp receptacles, lamps, wiring and light distribution shall conform to the requirements in ITE Publication: ST-017B.

- All reflectors shall conform to the requirements in ITE Publication: ST-017B except that reflectors shall be made of silvered glass or of specular aluminum with an anodic coating. Reflector ring holder shall be made of cast aluminum.

The first paragraph of Section 86-4.01B, "Signal Sections," of the Standard Specifications is amended to read:

- Each signal section housing shall be either die-cast or permanent mold-cast aluminum conforming to ITE Publication: ST-017B or, when specified in the special provisions, shall be structural plastic.

The first paragraph of Section 86-4.01C, "Electrical Components," of the Standard Specifications is amended to read:

- Lamp receptacles and wiring shall conform to ITE Publication: ST-017B. The metal portion of the medium base lamp socket shall be brass, copper or phosphor bronze.

The first paragraph of Section 86-4.01D, "Visors," of the Standard Specifications is amended to read:

- Each signal section shall be provided with a removable visor conforming to the requirements in ITE Publication: ST-017B. Visors are classified, on the basis of lens enclosure, as full circle, tunnel (bottom open), or cap (bottom and lower sides open). Unless otherwise specified, visors shall be the tunnel type.

The first paragraph of Section 86-4.02A, "Physical and Mechanical Requirements," of the Standard Specifications is amended to read:

- Light emitting diode signal modules shall be designed as retrofit replacements for optical units of standard traffic signal sections and shall not require special tools for installation. Light emitting diode signal modules shall fit into existing traffic signal section housings built in conformance with the requirements in the Institute of Transportation Engineers (ITE) publication ST-017B, "Vehicle Traffic Control Signal Heads (VTCSH)" without modification to the housing.

The seventh paragraph of Section 86-4.02A, "Physical and Mechanical Requirements," of the Standard Specifications is amended to read:

- Light emitting diode signal modules shall be protected against dust and moisture intrusion in conformance with the requirements in NEMA Standard 250 for Type 4 enclosures to protect the internal components.

The first paragraph of Section 86-4.02B, "Photometric Requirements," of the Standard Specifications is amended to read:

- The minimum initial luminous intensity values for light emitting diode signal modules shall conform to the requirements in Section 11.04 of the Institute of Transportation Engineers (ITE) publication ST-017B, "Vehicle Traffic Control Signal Heads (VTCSH)" at 25°C.

The third paragraph of Section 86-4.02C, "Electrical," of the Standard Specifications is amended to read:

- The light emitting diode signal module on-board circuitry shall include voltage surge protection to withstand high-repetition noise transients as specified in Section 2.1.6 of NEMA Standard TS2.

Subparagraph 7 of the fourth paragraph of Section 86-4.02D(1), "Design Qualification Testing," of the Standard Specifications is amended to read:

- Moisture resistance testing shall be performed on light emitting diode signal modules in conformance with the requirements in NEMA Standard 250 for Type 4 enclosures. Evidence of internal moisture after testing shall be cause for rejection.

The second paragraph of Section 86-4.05, "Programmed Visibility Vehicle Signal Faces," of the Standard Specifications is amended to read:

- Each programmed visibility signal section shall provide a nominal 300-mm diameter circular or arrow indication. Color and arrow configuration shall conform to the requirements in ITE Publication: ST-017B.

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

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

Subparagraph 3 of the first paragraph of Section 86-4.06A, "Types," of the Standard Specifications is amended to read:

- Each reflector assembly shall consist of a double reflector or 2 single reflectors. Each reflector shall be made of either aluminum or plastic. Reflectors shall conform to the requirements in Institute of Transportation Engineers Publication: ST-017B, "Vehicle Traffic Control Signal Heads." Plastic reflectors shall consist of molded or vacuum-formed plastic with a vacuum-deposited aluminum reflecting surface. The plastic material shall not distort when the reflector is used with the lamp of the wattage normally furnished with the signal. In addition, the UL nonmechanical loading temperature of the material shall exceed, by at least 10°C, the maximum temperature in the signal section with the lamp "ON" and measured in an ambient air temperature of 25°C in conformance with the requirements in UL Publication UL 746B. Each completed reflector shall, when operated with the appropriate lamp and lens, provide the message brightness specified.

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

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

The second paragraph of Section 86-4.07C, "Electrical," of the Standard Specifications is amended to read:

- On-board circuitry of the light emitting diode pedestrian signal modules shall include voltage surge protection to withstand high-repetition noise transients as stated in Section 2.1.6 of NEMA Standard TS2.

The second paragraph of Section 86-4.07D(1), "Design Qualification Testing," of the Standard Specifications is amended to read:

- A quantity of 2 units for each design shall be submitted for Design Qualification Testing. Test units shall be submitted to the Transportation Laboratory, after manufacturer's testing is complete.

Subparagraphs 5 and 7 of the fourth paragraph of Section 86-4.07D(1), "Design Qualification Testing," of the Standard Specifications are amended to read:

- Mechanical vibration testing shall be in conformance with the requirements in Military Specification 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 or of internal components, or other physical damage shall be cause for rejection.

- Moisture resistance testing shall be performed on modules mounted in a standard pedestrian signal housing in conformance to the requirements in NEMA Standard 250 for Type 4 enclosures. Evidence of internal moisture after testing shall be cause for rejection.

The cone penetration, flow, and resilience requirements in the table in the second paragraph under "Hot-Melt Rubberized Asphalt Sealant" of Section 86-5.01A(5), "Installation Details," of the Standard Specifications is amended to read:

Cone Penetration, 25°C, 150 g, 5 s	D 5329, Sec. 6	3.5 mm, max.
Flow, 60°C	D 5329, Sec. 8	5 mm, max.
Resilience, 25°C	D 5329, Sec. 12	25%, min.

The third paragraph under "Mounting Assemblies" of Section 86-6.065, "Internally Illuminated Street Name Signs," of the Standard Specifications is amended to read:

- At least 4.9-m of clearance shall be provided between the bottom of the fixture and the roadway.

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

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

SECTION 88: ENGINEERING FABRIC

Issue Date: January 15, 2002

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

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

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

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

SECTION 90: PORTLAND CEMENT CONCRETE

Issue Date: November 2, 2004

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

SECTION 90: PORTLAND CEMENT CONCRETE
90-1 GENERAL

90-1.01 DESCRIPTION

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

• The Contractor shall determine the mix proportions for concrete in conformance with these specifications. Unless otherwise specified, cementitious material shall be a combination of cement and mineral admixture. Cementitious material shall be either:

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

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

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

• Whenever the 28-day compressive strength shown on the plans is greater than 25 MPa, the concrete shall be designated by compressive strength. If the plans show a 28-day compressive strength that is 28 MPa or greater, an additional 14 days will be allowed to obtain the specified strength. The 28-day compressive strengths shown on the plans that are 25 MPa or less are shown for design information only and are not a requirement for acceptance of the concrete.
• Concrete designated by compressive strength shall be proportioned such that the concrete will attain the strength shown on the plans or specified in the special provisions.
• Before using concrete for which the mix proportions have been determined by the Contractor, or in advance of revising those mix proportions, the Contractor shall submit in writing to the Engineer a copy of the mix design.
• Compliance with cementitious material content requirements will be verified in conformance with procedures described in California Test 518 for cement content. For testing purposes, mineral admixture shall be considered to be cement. Batch proportions shall be adjusted as necessary to produce concrete having the specified cementitious material content.
• If any concrete has a cementitious material, portland cement, or mineral admixture content that is less than the minimum required, the concrete shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place and the Contractor shall pay to the State $0.55 for each kilogram of cementitious material, portland cement, or mineral admixture that is less than the minimum required. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract. The deductions will not be made unless the difference between the contents required and those actually provided exceeds the batching tolerances permitted by Section 90-5, "Proportioning." No deductions will be made based on the results of California Test 518.
• The requirements of the preceding paragraph shall not apply to minor concrete or commercial quality concrete.

90-2 MATERIALS

90-2.01 CEMENT

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

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

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

90-2.02 AGGREGATES

- Aggregates shall be free from deleterious coatings, clay balls, roots, bark, sticks, rags, and other extraneous material.
- Natural aggregates shall be thoroughly and uniformly washed before use.
- The Contractor, at the Contractor's expense, shall provide safe and suitable facilities, including necessary splitting devices for obtaining samples of aggregates, in conformance with California Test 125.
- Aggregates shall be of such character that it will be possible to produce workable concrete within the limits of water content provided in Section 90-6.06, "Amount of Water and Penetration."
- Aggregates shall have not more than 10 percent loss when tested for soundness in conformance with the requirements in California Test 214. The soundness requirement for fine aggregate will be waived, provided that the durability index, D_f, of the fine aggregate is 60, or greater, when tested for durability in conformance with California Test 229.
- If the results of any one or more of the Cleanness Value, Sand Equivalent, or aggregate grading tests do not meet the requirements specified for "Operating Range" but all meet the "Contract Compliance" requirements, the placement of concrete shall be suspended at the completion of the current pour until tests or other information indicate that the next material to be used in the work will comply with the requirements specified for "Operating Range."
- If the results of either or both the Cleanness Value and coarse aggregate grading tests do not meet the requirements specified for "Contract Compliance," the concrete that is represented by the tests shall be removed. However, if the Engineer

determines that the concrete is structurally adequate, the concrete may remain in place, and the Contractor shall pay to the State $4.60 per cubic meter for paving concrete and $7.20 per cubic meter for all other concrete for the concrete represented by these tests and left in place. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract.

- If the results of either or both the Sand Equivalent and fine aggregate grading tests do not meet the requirements specified for "Contract Compliance," the concrete which is represented by the tests shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place, and the Contractor shall pay to the State $4.60 per cubic meter for paving concrete and $7.20 per cubic meter for all other concrete for the concrete represented by these tests and left in place. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract.
- The 2 preceding paragraphs apply individually to the "Contract Compliance" requirements for coarse aggregate and fine aggregate. When both coarse aggregate and fine aggregate do not conform to the "Contract Compliance" requirements, both paragraphs shall apply. The payments specified in those paragraphs shall be in addition to any payments made in conformance with the provisions in Section 90-1.01, "Description."
- No single Cleanness Value, Sand Equivalent or aggregate grading test shall represent more than 250 m^3 of concrete or one day's pour, whichever is smaller.
- When the source of an aggregate is changed, the Contractor shall adjust the mix proportions and submit in writing to the Engineer a copy of the mix design before using the aggregates.

90-2.02A Coarse Aggregate

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

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

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

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

90-2.02B Fine Aggregate

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

- Fine aggregate shall conform to the following quality requirements:

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

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

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

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

90-2.03 WATER

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

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

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

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

90-2.04 ADMIXTURE MATERIALS

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

A. Chemical Admixtures—ASTM Designation: C 494.
B. Air-entraining Admixtures—ASTM Designation: C 260.
C. Calcium Chloride—ASTM Designation: D 98.
D. Mineral Admixtures—Coal fly ash; raw or calcined natural pozzolan as specified in ASTM Designation: C 618; silica fume conforming to the requirements in ASTM Designation: C 1240, with reduction of mortar expansion of 80 percent, minimum, using the cement from the proposed mix design.

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

90-3 AGGREGATE GRADINGS

90-3.01 GENERAL

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

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

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

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

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

90-3.02 COARSE AGGREGATE GRADING

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

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

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

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

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

90-3.03 FINE AGGREGATE GRADING

- Fine aggregate shall be graded within the following limits:

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

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

90-3.04 COMBINED AGGREGATE GRADINGS

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

Grading Limits of Combined Aggregates

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

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

90-4 ADMIXTURES

90-4.01 GENERAL

- Admixtures used in portland cement concrete shall conform to and be used in conformance with the provisions in this Section 90-4 and the special provisions. Admixtures shall be used when specified or ordered by the Engineer and may be used at the Contractor's option as provided herein.

- Chemical admixtures and air-entraining admixtures containing chlorides as Cl in excess of one percent by mass of admixture, as determined by California Test 415, shall not be used in prestressed or reinforced concrete.
- Calcium chloride shall not be used in concrete except when otherwise specified.
- Mineral admixture used in concrete for exposed surfaces of like elements of a structure shall be from the same source and of the same percentage.
- Admixtures shall be uniform in properties throughout their use in the work. Should it be found that an admixture as furnished is not uniform in properties, its use shall be discontinued.
- If more than one admixture is used, the admixtures shall be compatible with each other so that the desirable effects of all admixtures used will be realized.

90-4.02 MATERIALS

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

90-4.03 ADMIXTURE APPROVAL

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

90-4.04 REQUIRED USE OF CHEMICAL ADMIXTURES AND CALCIUM CHLORIDE

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

90-4.05 OPTIONAL USE OF CHEMICAL ADMIXTURES

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

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

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

90-4.06 REQUIRED USE OF AIR-ENTRAINING ADMIXTURES

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

90-4.07 OPTIONAL USE OF AIR-ENTRAINING ADMIXTURES

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

90-4.08 REQUIRED USE OF MINERAL ADMIXTURES

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

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

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

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

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

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

90-4.09 BLANK

90-4.10 PROPORTIONING AND DISPENSING LIQUID ADMIXTURES

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

• Each liquid admixture dispensing system shall be equipped with a sampling device consisting of a valve located in a safe and readily accessible position such that a sample of the admixture may be withdrawn slowly by the Engineer.

• If more than one liquid admixture is used in the concrete mix, each liquid admixture shall have a separate measuring unit and shall be dispensed by injecting equipment located in such a manner that the admixtures are not mixed at high concentrations and do not interfere with the effectiveness of each other. When air-entraining admixtures are used in conjunction with other liquid admixtures, the air-entraining admixture shall be the first to be incorporated into the mix.

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

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

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

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

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

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

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

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

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

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

90-5 PROPORTIONING

90-5.01 STORAGE OF AGGREGATES

• Aggregates shall be stored or stockpiled in such a manner that separation of coarse and fine particles of each size shall be avoided and also that the various sizes shall not become intermixed before proportioning.

• Aggregates shall be stored or stockpiled and handled in a manner that shall prevent contamination by foreign materials. In addition, storage of aggregates at batching or mixing facilities that are erected subsequent to the award of the contract and that furnish concrete to the project shall conform to the following:

A. Intermingling of the different sizes of aggregates shall be positively prevented. The Contractor shall take the necessary measures to prevent intermingling. The preventive measures may include, but are not necessarily limited to, physical separation of stockpiles or construction of bulkheads of adequate length and height; and
B. Contamination of aggregates by contact with the ground shall be positively prevented. The Contractor shall take the necessary measures to prevent contamination. The preventive measures shall include, but are not necessarily limited

to, placing aggregates on wooden platforms or on hardened surfaces consisting of portland cement concrete, asphalt concrete, or cement treated material.

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

90-5.02 PROPORTIONING DEVICES

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

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

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

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

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

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

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

90-5.03 PROPORTIONING

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

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

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

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

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

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

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

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

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

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

90-5.03A Proportioning for Pavement

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

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

• The batching of cement, mineral admixture, or cement plus mineral admixture and aggregate shall be interlocked so that a new batch cannot be started until all weigh hoppers are empty, the proportioning devices are within zero tolerance, and the discharge gates are closed. The interlock shall permit no part of the batch to be discharged until all aggregate hoppers and the cement and mineral admixture hoppers or the cement plus mineral admixture hopper are charged with masses that are within the tolerances specified in Section 90-5.02, "Proportioning Devices."

• When interlocks are required for cement and mineral admixture charging mechanisms and cement and mineral admixtures are weighed cumulatively, their charging mechanisms shall be interlocked to prevent the introduction of mineral admixture until the mass of cement in the cement weigh hopper is within the tolerances specified in Section 90-5.02, "Proportioning Devices."

• The discharge gate on the cement and mineral admixture hoppers or the cement plus mineral admixture hopper shall be designed to permit regulating the flow of cement, mineral admixture, or cement plus mineral admixture into the aggregate as directed by the Engineer.

• When separate weigh boxes are used for each size of aggregate, the discharge gates shall permit regulating the flow of each size of aggregate as directed by the Engineer.

• Material discharged from the several bins shall be controlled by gates or by mechanical conveyors. The means of withdrawal from the several bins, and of discharge from the weigh box, shall be interlocked so that not more than one bin can discharge at a time, and so that the weigh box cannot be tripped until the required quantity from each of the several bins has been deposited therein. Should a separate weigh box be used for each size of aggregate, all may be operated and discharged simultaneously.

• When the discharge from the several bins is controlled by gates, each gate shall be actuated automatically so that the required mass is discharged into the weigh box, after which the gate shall automatically close and lock.

• The automatic weighing system shall be designed so that all proportions required may be set on the weighing controller at the same time.

90-6 MIXING AND TRANSPORTING

90-6.01 GENERAL

• Concrete shall be mixed in mechanically operated mixers, except that when permitted by the Engineer, batches not exceeding 0.25 m^3 may be mixed by hand methods in conformance with the provisions in Section 90-6.05, "Hand-Mixing."

• Equipment having components made of aluminum or magnesium alloys that would have contact with plastic concrete during mixing, transporting, or pumping of portland cement concrete shall not be used.

• Concrete shall be homogeneous and thoroughly mixed, and there shall be no lumps or evidence of undispersed cement, mineral admixture, or cement plus mineral admixture.

• Uniformity of concrete mixtures will be determined by differences in penetration as determined by California Test 533, or slump as determined by ASTM Designation: C 143, and by variations in the proportion of coarse aggregate as determined by California Test 529.

• When the mix design specifies a penetration value, the difference in penetration, determined by comparing penetration tests on 2 samples of mixed concrete from the same batch or truck mixer load, shall not exceed 10 mm. When the mix design specifies a slump value, the difference in slump, determined by comparing slump tests on 2 samples of mixed concrete from the same batch or truck mixer load, shall not exceed the values given in the table below. Variation in the proportion of coarse aggregate will be determined by comparing the results of tests of 2 samples of mixed concrete from the same batch or truck mixer load and the difference between the 2 results shall not exceed 100 kg per cubic meter of concrete.

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

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

90-6.02 MACHINE MIXING

• Concrete mixers may be of the revolving drum or the revolving blade type, and the mixing drum or blades shall be operated uniformly at the mixing speed recommended by the manufacturer. Mixers and agitators that have an accumulation of hard concrete or mortar shall not be used.

• The temperature of mixed concrete, immediately before placing, shall be not less than 10°C or more than 32°C. Aggregates and water shall be heated or cooled as necessary to produce concrete within these temperature limits. Neither aggregates nor mixing water shall be heated to exceed 65°C. If ice is used to cool the concrete, discharge of the mixer will not be permitted until all ice is melted.

• The batch shall be so charged into the mixer that some water will enter in advance of cementitious materials and aggregates. All water shall be in the drum by the end of the first one-fourth of the specified mixing time.

• Cementitious materials shall be batched and charged into the mixer by means that will not result either in loss of cementitious materials due to the effect of wind, in accumulation of cementitious materials on surfaces of conveyors or hoppers, or in other conditions that reduce or vary the required quantity of cementitious material in the concrete mixture.

• Paving and stationary mixers shall be operated with an automatic timing device. The timing device and discharge mechanism shall be interlocked so that during normal operation no part of the batch will be discharged until the specified mixing time has elapsed.

• The total elapsed time between the intermingling of damp aggregates and all cementitious materials and the start of mixing shall not exceed 30 minutes.

• The size of batch shall not exceed the manufacturer's guaranteed capacity.

• When producing concrete for pavement or base, suitable batch counters shall be installed and maintained in good operating condition at jobsite batching plants and stationary mixers. The batch counters shall indicate the exact number of batches proportioned and mixed.

• Concrete shall be mixed and delivered to the jobsite by means of one of the following combinations of operations:

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

• Agitators may be truck mixers operating at agitating speed or truck agitators. Each mixer and agitator shall have attached thereto in a prominent place a metal plate or plates on which is plainly marked the various uses for which the equipment is designed, the manufacturer's guaranteed capacity of the drum or container in terms of the volume of mixed concrete and the speed of rotation of the mixing drum or blades.

• Truck mixers shall be equipped with electrically or mechanically actuated revolution counters by which the number of revolutions of the drum or blades may readily be verified.

• When shrink-mixed concrete is furnished, concrete that has been partially mixed at a central plant shall be transferred to a truck mixer and all requirements for transit-mixed concrete shall apply. No credit in the number of revolutions at mixing speed shall be allowed for partial mixing in a central plant.

90-6.03 TRANSPORTING MIXED CONCRETE

• Mixed concrete may be transported to the delivery point in truck agitators or truck mixers operating at the speed designated by the manufacturer of the equipment as agitating speed, or in non-agitating hauling equipment, provided the consistency and workability of the mixed concrete upon discharge at the delivery point is suitable for adequate placement and consolidation in place, and provided the mixed concrete after hauling to the delivery point conforms to the provisions in Section 90-6.01, "General."

• Truck agitators shall be loaded not to exceed the manufacturer's guaranteed capacity and shall maintain the mixed concrete in a thoroughly mixed and uniform mass during hauling.

• Bodies of non-agitating hauling equipment shall be constructed so that leakage of the concrete mix, or any part thereof, will not occur at any time.

• Concrete hauled in open-top vehicles shall be protected during hauling against rain or against exposure to the sun for more than 20 minutes when the ambient temperature exceeds 24°C.

• No additional mixing water shall be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer. If the Engineer authorizes additional water to be incorporated into the concrete, the drum shall be revolved not less than 30 revolutions at mixing speed after the water is added and before discharge is commenced.

• The rate of discharge of mixed concrete from truck mixer-agitators shall be controlled by the speed of rotation of the drum in the discharge direction with the discharge gate fully open.

• When a truck mixer or agitator is used for transporting concrete to the delivery point, discharge shall be completed within 1.5 hours or before 250 revolutions of the drum or blades, whichever occurs first, after the introduction of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 30°C or above, the time allowed may be less than 1.5 hours.

• When non-agitating hauling equipment is used for transporting concrete to the delivery point, discharge shall be completed within one hour after the addition of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 30°C or above, the time between the introduction of cement to the aggregates and discharge shall not exceed 45 minutes.

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

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

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

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

90-6.04 TIME OR AMOUNT OF MIXING

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

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

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

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

90-6.05 HAND-MIXING

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

90-6.06 AMOUNT OF WATER AND PENETRATION

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

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

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

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

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

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

90-7 CURING CONCRETE

90-7.01 METHODS OF CURING

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

90-7.01A Water Method

• The concrete shall be kept continuously wet by the application of water for a minimum curing period of 7 days after the concrete has been placed.

• When a curing medium consisting of cotton mats, rugs, carpets, or earth or sand blankets is to be used to retain the moisture, the entire surface of the concrete shall be kept damp by applying water with a nozzle that so atomizes the flow that a mist and not a spray is formed, until the surface of the concrete is covered with the curing medium. The moisture from the

nozzle shall not be applied under pressure directly upon the concrete and shall not be allowed to accumulate on the concrete in a quantity sufficient to cause a flow or wash the surface. At the expiration of the curing period, the concrete surfaces shall be cleared of all curing mediums.

- At the option of the Contractor, a curing medium consisting of white opaque polyethylene sheeting extruded onto burlap may be used to cure concrete structures. The polyethylene sheeting shall have a minimum thickness of 100 µm, and shall be extruded onto 283.5 gram burlap.
- At the option of the Contractor, a curing medium consisting of polyethylene sheeting may be used to cure concrete columns. The polyethylene sheeting shall have a minimum thickness of 250 µm achieved in a single layer of material.
- If the Contractor chooses to use polyethylene sheeting or polyethylene sheeting on burlap as a curing medium as specified above, these mediums and any joints therein shall be secured as necessary to provide moisture retention and shall be within 75 mm of the concrete at all points along the surface being cured. When these mediums are used, the temperature of the concrete shall be monitored during curing. If the temperature of the concrete cannot be maintained below 60°C, this method of curing shall be discontinued, and one of the other curing methods allowed for the concrete shall be used.
- When concrete bridge decks and flat slabs are to be cured without the use of a curing medium, the entire surface of the bridge deck or slab shall be kept damp by the application of water with an atomizing nozzle as specified in the preceding paragraph, until the concrete has set, after which the entire surface of the concrete shall be sprinkled continuously with water for a period of not less than 7 days.

90-7.01B Curing Compound Method

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

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

- The infrared scan for the dried vehicle from curing compound (1) shall match the infrared scan on file at the Transportation Laboratory.
- The loss of water for each type of curing compound, when tested in conformance with the requirements in California Test 534, shall not be more than 0.15-kg/m^2 in 24 hours.
- The curing compound to be used will be specified elsewhere in these specifications or in the special provisions.
- When the use of curing compound is required or permitted elsewhere in these specifications or in the special provisions and no specific kind is specified, any of the curing compounds listed above may be used.
- Curing compound shall be applied at a nominal rate of 3.7 m^2/L, unless otherwise specified.
- At any point, the application rate shall be within ±1.2 m^2/L of the nominal rate specified, and the average application rate shall be within ±0.5 m^2/L of the nominal rate specified when tested in conformance with the requirements in California Test 535. Runs, sags, thin areas, skips, or holidays in the applied curing compound shall be evidence that the application is not satisfactory.
- Curing compounds shall be applied using power operated spray equipment. The power operated spraying equipment shall be equipped with an operational pressure gage and a means of controlling the pressure. Hand spraying of small and irregular areas that are not reasonably accessible to mechanical spraying equipment, in the opinion of the Engineer, may be permitted.
- The curing compound shall be applied to the concrete following the surface finishing operation, immediately before the moisture sheen disappears from the surface, but before any drying shrinkage or craze cracks begin to appear. In the event of any drying or cracking of the surface, application of water with an atomizing nozzle as specified in Section 90-7.01A, "Water Method," shall be started immediately and shall be continued until application of the compound is resumed or started; however, the compound shall not be applied over any resulting freestanding water. Should the film of compound be damaged from any cause before the expiration of 7 days after the concrete is placed in the case of structures and 72 hours in the case of pavement, the damaged portion shall be repaired immediately with additional compound.
- At the time of use, compounds containing pigments shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. A paddle shall be used to loosen all settled pigment from the bottom of the container, and a power driven agitator shall be used to disperse the pigment uniformly throughout the vehicle.
- Agitation shall not introduce air or other foreign substance into the curing compound.

- The manufacturer shall include in the curing compound the necessary additives for control of sagging, pigment settling, leveling, de-emulsification, or other requisite qualities of a satisfactory working material. Pigmented curing compounds shall be manufactured so that the pigment does not settle badly, does not cake or thicken in the container, and does not become granular or curdled. Settlement of pigment shall be a thoroughly wetted, soft, mushy mass permitting the complete and easy vertical penetration of a paddle. Settled pigment shall be easily redispersed, with minimum resistance to the sideways manual motion of the paddle across the bottom of the container, to form a smooth uniform product of the proper consistency.
- Curing compounds shall remain sprayable at temperatures above 4°C and shall not be diluted or altered after manufacture.
- The curing compound shall be packaged in clean 1040-L totes, 210-L barrels

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

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

90-7.01C Waterproof Membrane Method

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

90-7.01D Forms-In-Place Method

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

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

90-7.02 CURING PAVEMENT

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

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

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

90-7.03 CURING STRUCTURES

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

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

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

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

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

90-7.04 CURING PRECAST CONCRETE MEMBERS

• Precast concrete members shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing." Curing shall be provided for the minimum time specified for each method or until the concrete reaches its design strength, whichever is less. Steam curing may also be used for precast members and shall conform to the following provisions:

A. After placement of the concrete, members shall be held for a minimum 4-hour presteaming period. If the ambient air temperature is below 10°C, steam shall be applied during the presteaming period to hold the air surrounding the member at a temperature between 10°C and 32°C.
B. To prevent moisture loss on exposed surfaces during the presteaming period, members shall be covered as soon as possible after casting or the exposed surfaces shall be kept wet by fog spray or wet blankets.
C. Enclosures for steam curing shall allow free circulation of steam about the member and shall be constructed to contain the live steam with a minimum moisture loss. The use of tarpaulins or similar flexible covers will be permitted, provided they are kept in good repair and secured in such a manner as to prevent the loss of steam and moisture.
D. Steam at the jets shall be at low pressure and in a saturated condition. Steam jets shall not impinge directly on the concrete, test cylinders, or forms. During application of the steam, the temperature rise within the enclosure shall

not exceed 22°C per hour. The curing temperature throughout the enclosure shall not exceed 65°C and shall be maintained at a constant level for a sufficient time necessary to develop the required transfer strength. Control cylinders shall be covered to prevent moisture loss and shall be placed in a location where temperature is representative of the average temperature of the enclosure.

E. Temperature recording devices that will provide an accurate, continuous, permanent record of the curing temperature shall be provided. A minimum of one temperature recording device per 60 m of continuous bed length will be required for checking temperature.

F. Members in pretension beds shall be detensioned immediately after the termination of steam curing while the concrete and forms are still warm, or the temperature under the enclosure shall be maintained above 15°C until the stress is transferred to the concrete.

G. Curing of precast concrete will be considered completed after termination of the steam curing cycle.

90-7.05 CURING PRECAST PRESTRESSED CONCRETE PILES

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

A. Piles shall be either steam cured or water cured. If water curing is used, the piles shall be kept continuously wet by the application of water in conformance with the provisions in Section 90-7.01A, "Water Method."

B. If steam curing is used, the steam curing provisions in Section 90-7.04, "Curing Precast Concrete Members," shall apply except that the piles shall be kept continuously wet for their entire length for a period of not less than 3 days, including the holding and steam curing periods.

90-7.06 CURING SLOPE PROTECTION

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

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

90-7.07 CURING MISCELLANEOUS CONCRETE WORK

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

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

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

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

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

90-8 PROTECTING CONCRETE

90-8.01 GENERAL

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

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

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

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

90-8.02 PROTECTING CONCRETE STRUCTURES

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

90-8.03 PROTECTING CONCRETE PAVEMENT

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

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

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

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

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

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

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

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

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

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

90-9 COMPRESSIVE STRENGTH

90-9.01 GENERAL

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

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

• When concrete compressive strength is specified as a prerequisite to applying loads or stresses to a concrete structure or member, test cylinders for other than steam cured concrete will be cured in conformance with Method 1 of

California Test 540. The compressive strength of concrete determined for these purposes will be evaluated on the basis of individual tests.

- When concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete strength to be used as a basis for acceptance of other than steam cured concrete will be determined from cylinders cured in conformance with Method 1 of California Test 540. If the result of a single compressive strength test at the maximum age specified or allowed is below the specified strength but is 95 percent or more of the specified strength, the Contractor shall, at the Contractor's expense, make corrective changes, subject to approval of the Engineer, in the mix proportions or in the concrete fabrication procedures, before placing additional concrete, and shall pay to the State $14 for each in-place cubic meter of concrete represented by the deficient test. If the result of a single compressive strength test at the maximum age specified or allowed is below 95 percent of the specified strength, but is 85 percent or more of the specified strength, the Contractor shall make the corrective changes specified above, and shall pay to the State $20 for each in place cubic meter of concrete represented by the deficient test. In addition, such corrective changes shall be made when the compressive strength of concrete tested at 7 days indicates, in the judgment of the Engineer, that the concrete will not attain the required compressive strength at the maximum age specified or allowed. Concrete represented by a single test that indicates a compressive strength of less than 85 percent of the specified 28-day compressive strength will be rejected in conformance with the provisions in Section 6-1.04, "Defective Materials."
- If the test result indicates that the compressive strength at the maximum curing age specified or allowed is below the specified strength, but is 85 percent or more of the specified strength, payments to the State as required above shall be made, unless the Contractor, at the Contractor's expense, obtains and submits evidence acceptable to the Engineer that the strength of the concrete placed in the work meets or exceeds the specified 28-day compressive strength. If the test result indicates a compressive strength at the maximum curing age specified or allowed below 85 percent, the concrete represented by that test will be rejected, unless the Contractor, at the Contractor's expense, obtains and submits evidence acceptable to the Engineer that the strength and quality of the concrete placed in the work are acceptable. If the evidence consists of tests made on cores taken from the work, the cores shall be obtained and tested in conformance with the requirements in ASTM Designation: C 42.
- No single compressive strength test shall represent more than 250 m^3.
- When a precast concrete member is steam cured, the compressive strength of the concrete will be determined from test cylinders that have been handled and stored in conformance with Method 3 of California Test 540. The compressive strength of steam cured concrete will be evaluated on the basis of individual tests representing specific portions of production. When the concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete shall be considered to be acceptable whenever its compressive strength reaches the specified 28-day compressive strength provided that strength is reached in not more than the maximum number of days specified or allowed after the member is cast.
- When concrete is specified by compressive strength, prequalification of materials, mix proportions, mixing equipment, and procedures proposed for use will be required prior to placement of the concrete. Prequalification shall be accomplished by the submission of acceptable certified test data or trial batch reports by the Contractor. Prequalification data shall be based on the use of materials, mix proportions, mixing equipment, procedures, and size of batch proposed for use in the work.
- Certified test data, in order to be acceptable, shall indicate that not less than 90 percent of at least 20 consecutive tests exceed the specified strength at the maximum number of cure days specified or allowed, and none of those tests are less than 95 percent of specified strength. Strength tests included in the data shall be the most recent tests made on concrete of the proposed mix design and all shall have been made within one year of the proposed use of the concrete.
- Trial batch test reports, in order to be acceptable, shall indicate that the average compressive strength of 5 consecutive concrete cylinders, taken from a single batch, at not more than 28 days (or the maximum age allowed) after molding shall be at least 4 MPa greater than the specified 28-day compressive strength, and no individual cylinder shall have a strength less than the specified strength at the maximum age specified or allowed. Data contained in the report shall be from trial batches that were produced within one year of the proposed use of specified strength concrete in the project. Whenever air-entrainment is required, the air content of trial batches shall be equal to or greater than the air content specified for the concrete without reduction due to tolerances.
- Tests shall be performed in conformance with either the appropriate California Test methods or the comparable ASTM test methods. Equipment employed in testing shall be in good condition and shall be properly calibrated. If the tests are performed during the life of the contract, the Engineer shall be notified sufficiently in advance of performing the tests in order to witness the test procedures.
- The certified test data and trial batch test reports shall include the following information:

A. Date of mixing.
B. Mixing equipment and procedures used.
C. The size of batch in cubic meters and the mass, type, and source of all ingredients used.
D. Penetration of the concrete.

E. The air content of the concrete if an air-entraining admixture is used.
F. The age at time of testing and strength of all concrete cylinders tested.

- Certified test data and trial batch test reports shall be signed by an official of the firm that performed the tests.
- When approved by the Engineer, concrete from trial batches may be used in the work at locations where concrete of a lower quality is required and the concrete will be paid for as the type or class of concrete required at that location.
- After materials, mix proportions, mixing equipment, and procedures for concrete have been prequalified for use, additional prequalification by testing of trial batches will be required prior to making changes that, in the judgment of the Engineer, could result in a strength of concrete below that specified.
- The Contractor's attention is directed to the time required to test trial batches and the Contractor shall be responsible for production of trial batches at a sufficiently early date so that the progress of the work is not delayed.
- When precast concrete members are manufactured at the plant of an established manufacturer of precast concrete members, the mix proportions of the concrete shall be determined by the Contractor, and a trial batch and prequalification of the materials, mix proportions, mixing equipment, and procedures will not be required.

90-10 MINOR CONCRETE

90-10.01 GENERAL

- Concrete for minor structures, slope paving, curbs, sidewalks and other concrete work, when designated as minor concrete on the plans, in the specifications, or in the contract item, shall conform to the provisions specified herein.
- The Engineer, at the Engineer's discretion, will inspect and test the facilities, materials and methods for producing the concrete to ensure that minor concrete of the quality suitable for use in the work is obtained.

90-10.02 MATERIALS

- Minor concrete shall conform to the following requirements:

90-10.02A Cementitious Material

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

90-10.02B Aggregate

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

90-10.02C Water

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

90-10.02D Admixtures

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

90-10.03 PRODUCTION

- Cementitious material, water, aggregate, and admixtures shall be stored, proportioned, mixed, transported, and discharged in conformance with recognized standards of good practice that will result in concrete that is thoroughly and uniformly mixed, that is suitable for the use intended, and that conforms to requirements specified herein. Recognized standards of good practice are outlined in various industry publications such as are issued by American Concrete Institute, AASHTO, or the Department.
- The cementitious material content of minor concrete shall conform to the provisions in Section 90-1.01, "Description."

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

90-10.04 CURING MINOR CONCRETE

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

90-10.05 PROTECTING MINOR CONCRETE

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

90-10.06 MEASUREMENT AND PAYMENT

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

90-11 MEASUREMENT AND PAYMENT

90-11.01 MEASUREMENT

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

90-11.02 PAYMENT

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

SECTION 91: PAINT

Issue Date: November 18, 2005

Section 91-3, "Paints for Timber," of the Standard Specifications is amended to read:

91-3 PAINTS FOR TIMBER

91-3.01 WOOD PRIMER, LATEX-BASE

Classification:

- This specification covers a ready-mixed priming paint for use on unpainted wood or exterior woodwork. It shall conform with the requirements in the Detailed Performance Standards of the Master Painters Institute (MPI) for exterior wood primers, and be listed on the Exterior Latex Wood Primer MPI List Number 6.

91-3.02 PAINT; LATEX-BASE FOR EXTERIOR WOOD, WHITE AND TINTS

Classification:

- This specification covers a ready-mixed paint for use on wood surfaces subject to outside exposures. This paint shall conform to the requirements in the Detailed Performance Standards of the Master Painters Institute (MPI) for Paint, Latex, Exterior, and shall be listed on the following MPI Approved Products List:

A. Exterior Latex, Flat MPI Gloss Level 1, MPI List Number 10.
B. Exterior Latex, Semi-Gloss, MPI Gloss Level 5, MPI List Number 11.
C. Exterior Latex, Gloss, MPI Gloss Level 6, MPI List Number 119.

- Unpainted wood shall first be primed with wood primer conforming to the provisions in Section 91-3.01, "Wood Primer, Latex-Base."

Section 91-4, "Miscellaneous Paints," of the Standard Specifications is amended to read:

91-4 MISCELLANEOUS PAINTS

91-4.01 THROUGH 91-4.04 (BLANK)

91-4.05 PAINT; ACRYLIC EMULSION, EXTERIOR WHITE AND LIGHT AND MEDIUM TINTS

Classification:

- This specification covers an acrylic emulsion paint designed for use on exterior masonry. This paint shall conform to the requirements in the Detailed Performance Standards of the Master Painters Institute (MPI) for Paint, Latex, Exterior, and shall be listed on the following MPI Approved Products Lists:

A. Exterior Latex, Flat MPI Gloss Level 1, MPI List Number 10.
B. Exterior Latex, Semi-Gloss, MPI Gloss Level 5, MPI List Number 11.
C. Exterior Latex, Gloss, MPI Gloss Level 6, MPI List Number 119.

- This paint may be tinted by using "universal" or "all purpose" concentrates.

SECTION 92: ASPHALTS

Issue Date: November 3, 2006

Section 92, "Asphalts," of the Standard Specifications is amended to read:

92-1.01 DESCRIPTION

- Asphalt is refined petroleum or a mixture of refined liquid asphalt and refined solid asphalt that are prepared from crude petroleum. Asphalt is:

1. Free from residues caused by the artificial distillation of coal, coal tar, or paraffin
2. Free from water
3. Homogeneous

92-1.02 MATERIALS

GENERAL

- Furnish asphalt under the Department's "Certification Program for Suppliers of Asphalt." The Department maintains the program requirements, procedures, and a list of approved suppliers at:

http://www.dot.ca.gov/hq/esc/Translab/fpmcoc.htm

- Transport, store, use, and dispose of asphalt safely.
- Prevent the formation of carbonized particles caused by overheating asphalt during manufacturing or construction.

GRADES

- Performance graded (PG) asphalt binder is:

Performance Graded Asphalt Binder

Property	AASHTO Test Method	Specification Grade				
		PG 58-22 [a]	PG 64-10	PG 64-16	PG 64-28	PG 70-10
Original Binder						
Flash Point, Minimum °C	T 48	230	230	230	230	230
Solubility, Minimum % [b]	T 44	99	99	99	99	99
Viscosity at 135°C, [c] Maximum, Pa·s	T 316	3.0	3.0	3.0	3.0	3.0
Dynamic Shear, Test Temp. at 10 rad/s, °C Minimum G*/sin(delta), kPa	T 315	58 1.00	64 1.00	64 1.00	64 1.00	70 1.00
RTFO Test, [e] Mass Loss, Maximum, %	T 240	1.00	1.00	1.00	1.00	1.00
RTFO Test Aged Binder						
Dynamic Shear, Test Temp. at 10 rad/s, °C Minimum G*/sin(delta), kPa	T 315	58 2.20	64 2.20	64 2.20	64 2.20	70 2.20
Ductility at 25°C Minimum, cm	T 51	75	75	75	75	75
PAV [f] Aging, Temperature, °C	R 28	100	100	100	100	110
RTFO Test and PAV Aged Binder						
Dynamic Shear, Test Temp. at 10 rad/s, °C Maximum G*/sin(delta), kPa	T 315	22 [d] 5000	31 [d] 5000	28 [d] 5000	22 [d] 5000	34 [d] 5000
Creep Stiffness, Test Temperature, °C Maximum S-value, Mpa Minimum M-value	T 313	-12 300 0.300	0 300 0.300	-6 300 0.300	-18 300 0.300	0 300 0.300

Notes:

a. Use as asphalt rubber base stock for high mountain and high desert area.

b. The Engineer waives this specification if the supplier is a Quality Supplier as defined by the Department's "Certification Program for Suppliers of Asphalt."

c. The Engineer waives this specification if the supplier certifies the asphalt binder can be adequately pumped and mixed at temperatures meeting applicable safety standards.

d. Test the sample at 3°C higher if it fails at the specified test temperature. G*sin(delta) remains 5000 kPa maximum.

e. "RTFO Test" means the asphaltic residue obtained using the Rolling Thin Film Oven Test, AASHTO Test Method T 240 or ASTM Designation: D 2872. The residue from mass change determination may be used for other tests.

f. "PAV" means Pressurized Aging Vessel.

- Performance graded polymer modified asphalt binder (PG Polymer Modified) is:

Performance Graded Polymer Modified Asphalt Binder [a]

Property	AASHTO Test Method	Specification Grade		
		PG 58-34 PM	PG 64-28 PM	PG 76-22 PM
Original Binder				
Flash Point, Minimum °C	T 48	230	230	230
Solubility, Minimum % [b]	T 44[c]	98.5	98.5	98.5
Viscosity at 135°C, [d] Maximum, Pa·s	T 316	3.0	3.0	3.0
Dynamic Shear, Test Temp. at 10 rad/s, °C Minimum G*/sin(delta), kPa	T 315	58 1.00	64 1.00	76 1.00
RTFO Test , Mass Loss, Maximum, %	T 240	0.60	0.60	0.60
RTFO Test Aged Binder				
Dynamic Shear, Test Temp. at 10 rad/s, °C Minimum G*/sin(delta), kPa	T 315	58 2.20	64 2.20	76 2.20
Dynamic Shear, Test Temp. at 10 rad/s, °C Maximum (delta), %	T 315	Note e 80	Note e 80	Note e 80
Elastic Recovery[f], Test Temp., °C Minimum recovery, %	T 301	25 75	25 75	25 65
PAV[g] Aging, Temperature, °C	R 28	100	100	110
RTFO Test and PAV Aged Binder				
Dynamic Shear, Test Temp. at 10 rad/s, °C Maximum G*sin(delta), kPa	T 315	16 5000	22 5000	31 5000
Creep Stiffness, Test Temperature, °C Maximum S-value, MPa Minimum M-value	T 313	-24 300 0.300	-18 300 0.300	-12 300 0.300

Notes:

a. Do not modify PG Polymer Modified using acid modification.

b. The Engineer waives this specification if the supplier is a Quality Supplier as defined by the Department's "Certification Program for Suppliers of Asphalt."

c. The Department allows ASTM D 5546 instead of AASHTO T 44

d. The Engineer waives this specification if the supplier certifies the asphalt binder can be adequately pumped and mixed at temperatures meeting applicable safety standards.

e. Test temperature is the temperature at which G*/sin(delta) is 2.2 kPa. A graph of log G*/sin(delta) plotted against temperature may be used to determine the test temperature when G*/sin(delta) is 2.2 kPa. A graph of (delta) versus temperature may be used to determine delta at the temperature when G*/sin(delta) is 2.2 kPa. The Engineer also accepts direct measurement of (delta) at the temperature when G*/sin(delta) is 2.2 kPa.

f. Tests without a force ductility clamp may be performed.

g. "PAV" means Pressurized Aging Vessel.

SAMPLING

• Provide a sampling device in the asphalt feed line connecting the plant storage tanks to the asphalt weighing system or spray bar. Make the sampling device accessible between 600 and 750 mm above the platform. Provide a receptacle for flushing the sampling device.

• Include with the sampling device a valve:

1. Between 10 and 20 mm in diameter
2. Manufactured in a manner that a one-liter sample may be taken slowly at any time during plant operations
3. Maintained in good condition

• Replace failed valves.

• In the Engineer's presence, take 2 one-liter samples per operating day. Provide round, friction top, one-liter containers for storing samples.

92-1.03 EXECUTION

• If asphalt is applied, you must comply with the heating and application specifications for liquid asphalt in Section 93, "Liquid Asphalts."

92-1.04 MEASUREMENT

• If the contract work item for asphalt is paid by mass, the Department measures asphalt tonnes by complying with the specifications for mass determination of liquid asphalt in Section 93, "Liquid Asphalts."

• The Engineer determines the asphalt mass from volumetric measurements if you:

1. Use a partial asphalt load.
2. Use asphalt at a location other than a mixing plant and no scales within 35 km are available and suitable.
3. Deliver asphalt in either of the following:

   3.1. A calibrated truck with each tank accompanied by its measuring stick and calibration card.

   3.2. A truck equipped with a calibrated thermometer that determines the asphalt temperature at the delivery time and with a vehicle tank meter complying with the specifications for weighing, measuring, and metering devices in Section 9-1.01, "Measurement of Quantities."

• If you furnish asphalt concrete from a mixing plant producing material for only one project, the Engineer determines the asphalt quantity by measuring the volume in the tank at the project's start and end provided the tank is calibrated and equipped with its measuring stick and calibration card.

• The Engineer determines pay quantities from volumetric measurements as follows:

1. Before converting the volume to mass, the Engineer reduces the measured volume to that which the asphalt would occupy at 15°C.
2. The Engineer uses 981 L/tonne and 1020 g/L for the average mass and volume for PG and PG Polymer Modified asphalt grades at 15°C.
3. The Engineer uses the Conversion Table in Section 93, "Liquid Asphalts."

SECTION 93: LIQUID ASPHALTS

Issue Date: November 3, 2006

The ninth paragraph of Section 93-1.04, "Measurement," of the Standard Specifications is amended to read:

• The following Legend and Conversion Table is to be used for converting volumes of liquid asphalt products, Grades 70 to 3000, inclusive, and paving asphalt Grades PG 58-22, PG 64-10, PG 64-16, PG 64-28, and PG 70-10, and Grades PG 58-34 PM, PG 64-28 PM, and PG 76-22 PM.

SECTION 95: EPOXY

Issue Date: June 30, 2006

Section 95, "Epoxy," of the Standard Specifications is amended to read:

95-1 GENERAL

95-1.01 DESCRIPTION

- These specifications are intended to specify epoxy that will meet service requirements for highway construction.
- Epoxy shall be furnished as 2 components, which shall be mixed together at the site of the work.

95-1.02 SAMPLING AND TESTING

- Epoxy shall not be used prior to sampling and testing unless its use is permitted prior to sampling and testing in conformance with the provisions in Section 6-1.07, "Certificates of Compliance."
- Tests will be conducted in conformance with the latest test methods of the American Society for Testing and Materials, and California Test Methods in use by the Transportation Laboratory.
- Epoxy components shall be formulated to maintain the specified properties for a minimum of one year. The Engineer may require additional testing of any epoxy component that has not been used within one year of manufacture.

95-1.03 PACKAGING, LABELING AND STORING

- Each component shall be packaged in containers of size proportional to the amount of that component in the mix so that one container of each component is used in mixing one batch of epoxy. The containers shall be of such design that all of the contents may be readily removed and shall be well sealed to prevent leakage. The containers and labeling shall meet U.S. Department of Transportation Hazardous Material Shipping Regulations, and the containers shall be of a material, or lined with a material, of such character as to resist any action by the components. Each container shall be clearly labeled with the ASTM Designation: C881 Class and Type; designation (Component A or B); manufacturer's name; date of manufacture; batch number (a batch shall consist of a single charge of all components in a mixing chamber); all directions for use (as specified elsewhere) and such warning or precautions concerning the contents as may be required by State or Federal Laws and Regulations. The manufacturer of the finished epoxy components shall furnish a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," and a copy of the label for each material. The certificate shall include a list, by Title and Section, of the State and Federal packaging and labeling laws and regulations that the manufacturer has complied with.
- Attention is directed to the characteristic of some epoxy components to crystallize or thicken excessively prior to use when stored at temperatures below 2ºC. Any material which shows evidence of crystallization or a permanent increase in viscosity or settling of pigments which cannot be readily redispersed with a paddle shall not be used.

95-1.04 DIRECTIONS FOR USE

- At the time of mixing, components A and B shall be at a temperature between 15°C and 30°C, unless otherwise specified. Any heating of the adhesive components shall be done by application of indirect heat. Immediately prior to mixing, each component shall be thoroughly mixed with a paddle. Separate paddles shall be used to stir each component. Immediately prior to use, the 2 components shall be thoroughly mixed together in the specified ratios. No solvent shall be added to any epoxy.
- After mixing, epoxies shall be placed in the work and any overlaying or inserted material which is to be bonded to the work by the epoxy shall also be placed before thickening of the epoxy has begun. Surfaces upon which epoxy is to be placed shall be free of rust, paint, grease, asphalt, and loose and deleterious material. When epoxy is used as a binder to make epoxy concrete or mortar, the 2 components of epoxy shall be thoroughly mixed together before the aggregate is added and, unless otherwise specified, the mix proportions shall consist of one part of binder to approximately 4 parts of aggregate, by volume. Aggregate for use in epoxy concrete and mortar shall be clean and shall have a moisture content of not more than 0.50-percent when tested by California Test 226. Surfaces against which epoxy concrete and mortar are to be placed shall be primed with a coat of the epoxy used just prior to placing the concrete or mortar.

95-2 TYPES OF EPOXIES

95-2.01 BINDER (ADHESIVE), EPOXY RESIN BASE

Classification:

- This specification covers a low viscosity epoxy formulated primarily for use in making high-strength epoxy concrete and epoxy mortar and in pressure grouting of cracks in concrete. For load bearing applications, use ASTM Designation: C 881, Type IV, Grade 1, Class B or C. Class B or C shall be used depending on the substrate and ambient temperatures. Use Grade B for atmospheric and surface temperatures as low as 4°C. Use Class C when temperatures are 15°C or higher. For non-load bearing applications use ASTM Designation: C881, Type I, Grade 1, Class B or C. Apply no thicker than recommended by the manufacturer. Thick sections of this epoxy are not suitable for use in freeze thaw environments. In a freeze-thaw environment, increase the aggregate loading to improve the properties of the epoxy concrete.

Directions for Use:

• Mix in conformance with the manufacturer's written recommendations. No more material shall be mixed than can be used within the pot-life from the time mixing operations are started.

95-2.02 (BLANK)

95-2.03 EPOXY RESIN ADHESIVE FOR BONDING NEW CONCRETE TO OLD CONCRETE

Classification:

• This specification covers a low viscosity paste epoxy formulated primarily for use in bonding new portland cement concrete to hardened portland cement concrete. The epoxy shall meet the specification requirements of ASTM Designation: C 881, Type V, Grade 2. This epoxy is available in 2 Classes: Class C for general use at temperature greater than 15°C and Class B for use when cure temperatures are below 15°C and above 4°C, or when a faster cure is required.

Directions for Use:

• The mixing ratio and use shall be in conformance with the manufacturer's written recommendations. When measuring as individual Components A and B, stir and tap the measuring containers to remove possible air voids. The ingredients in Components A and B shall be thoroughly dispersed such that each component forms a uniform paste. Do not mix more material than can be spread within the pot life from the time mixing operations are started. The spreading rate shall be sufficient to thoroughly coat the surface. Spread the mixed adhesive by brush or roller over blast-cleaned concrete at a rate recommended by the manufacturer. The new concrete shall be placed against the adhesive coating on the old concrete before the adhesive has set. If the adhesive has set and is not tacky prior to placing the new concrete, a new coating of adhesive shall be applied.

95-2.04 RAPID SET EPOXY ADHESIVE FOR PAVEMENT MARKERS

Classification:

• This specification covers a high viscosity paste, rapid set epoxy formulated primarily for use in bonding pavement markers to portland cement concrete and asphalt concrete. The adhesive shall meet ASTM Designation: C 881, Type IV, Grade 3, Class B and C except that the gel time may be shorter than 30 minutes. The adhesive shall conform to these requirements and the following.

Characteristics of Combined Components:

• All tests shall be performed in conformance with the requirements in California Test 434.

Property	Requirement
Gel time, minutes, maximum, at 25°C	30
Bond Strength to Concrete, Time, minutes (maximum) to reach not less than 1.4 MPa	
at 25ºC ±1ºC	35
at 10ºC ±1ºC	45
Slant Shear Strength	
2 days at 25ºC ±1ºC, MPa	7
14 days at 25ºC ±1ºC, plus water soak, MPa	10.5
Tensile Adhesion and Cohesion	
Ceramic marker bottom, MPa	4.8 min.
Ceramic marker bottom, including post cure, MPa	4.8 min.
Retroreflective pavement marker bottom, MPa	3.4 min.
Color of mixed epoxy	gray
Glass transition temperature, Tg, samples conditioned at 25°C for 24 hours, ASTM Designation: D 4065	30ºC min.

Directions for Use:

• Components A and B shall be mixed in conformance with the manufacturer's written recommendations. When an automatic proportioning and mixing machine is used, the temperature of the components shall be maintained by indirect heating or cooling, so that the adhesive will meter, mix and extrude properly. The maximum temperature shall be such that after proper mixing no excess adhesive shall flow from under the marker other than that specified in Section 85-1.06, "Placement."

95-2.05 STANDARD SET EPOXY ADHESIVE FOR PAVEMENT MARKERS

Classification

• This specification covers a high viscosity paste standard set epoxy formulated primarily for use in bonding pavement markers to portland cement concrete and asphalt concrete. The epoxy shall meet ASTM Designation: C 881, Type IV, Viscosity Grade 3, Classes B or C, except that the gel time may be shorter than 30 minutes.

Characteristics of Combined Components

• All tests shall be performed in conformance with the requirements in California Test 434.

Property	Requirement
Gel time, minutes, maximum, at 25ºC	30
Bond Strength to Concrete, Time (maximum) to reach not less than 1.4 MPa	
at 25ºC ±1ºC	3.5 hours
at 13ºC ±1ºC	24 hours
Slant Shear Strength	
2 days at 25ºC ±1ºC, MPa	7 min.
14 days at 25ºC ±1ºC, plus water soak, MPa	10.5 min.
Tensile Adhesion and Cohesion	
Ceramic marker bottom, MPa	4.8 min.
Ceramic marker bottom, including post cure, MPa	4.8 min.
Reflective pavement marker bottom, MPa	3.4 min.
Color of Mixed Components	gray
Glass transition temperature, Tg, samples conditioned at 25ºC for 24 hours, ASTM Designation: D 4065	30ºC min.

Directions for Use

• Components A and B shall be mixed in conformance with the manufacturer's written recommendations. When an automatic proportioning and mixing machine is used, the temperature of the components shall be maintained by indirect heating or cooling, so that the adhesive will meter, mix and extrude properly. The maximum temperature shall be such that after proper mixing no excess adhesive shall flow from under the marker other than that specified in Section 85-1.06, "Placement."

95-2.06 (BLANK)

95-2.07 (BLANK)

95-2.08 (BLANK)

95-2.09 EPOXY SEALANT FOR INDUCTIVE LOOPS

Classification

• This specification covers a high viscosity liquid epoxy formulated primarily for use in sealing inductive wire loops and leads imbedded in asphalt concrete and portland cement concrete for traffic signal controls and vehicle counters. This epoxy is to be used for repair work on existing spalls, cracks and other deformations in and around saw cuts housing inductor loops and leads. The rapid cure allows minimum traffic delay. This sealant is suitable for use in freeze-thaw areas. The epoxy shall meet ASTM Designation: C 881, Type I, Grade 2 and the following requirements.

Characteristics of Combined Components

- All tests shall be performed in conformance with the requirements in California Test 434.

Property	Requirement
Gel time, minutes, maximum	30
On 3-mm cast sheet, cured 18 hours at 25ºC, + 5 hours at 70ºC	
Tensile Strength, MPa	2.7 min.
Elongation, percent	90 min.
Shore D Hardness	45 min.

Directions for Use

- Saw cuts shall be cleaned with compressed air to remove all excess moisture and debris. For repairing damaged saw cuts, all loose spalled material shall be cleaned away from the saw cut, chipping back to sound asphalt concrete or portland cement concrete and all loose material cleaned from loop wires.
- The mixing ratio shall be in conformance with the manufacturer's recommendations. No more material shall be mixed than can be used within the gel time from the time mixing operations are started.
- When automatic mixing equipment is used for mixing the sealant, the provisions in the twelfth paragraph in Section 85-1.06, "Placement," shall apply.

95-2.10 (BLANK)

95-2.11 EPOXY RESIN ADHESIVE FOR INJECTION GROUTING OF PORTLAND CEMENT CONCRETE PAVEMENTS

Directions for Use

- Both components and the mixed material shall contain no solvents. The mixing ratio of the components in terms of volume and mass shall be clearly stated. The material shall be suitable for use in the mixing equipment used by the applicator. Epoxy adhesive samples shall be furnished to the Engineer for testing at least 12 days before the expected time of use.

Characteristics of Adhesive:

Test[a]	California Test	Requirement
Brookfield Viscosity, No. 3 Spindle at 20 rpm, Pa·s at 25ºC	434, Part 4	0.9 max.
Gel time, minutes	434, Part 1	2 to 15
Slant Shear Strength on Dry Concrete, MPa, after 4 days of cure in air at 25ºC ±1ºC	434, Part 5[b]	41.4 min.
Slant Shear Strength on Wet Concrete, MPa, after 4 days of cure in air at 25ºC ±1ºC	434, Part 5[b]	21.1 min.
Tensile Strength, Mpa	434, Part 7, except test after 4 days of cure at 25ºC ±1ºC	31.0 min.
Elongation, %	434, Part 7, except test after 4 days of cure at 25ºC ±1ºC	10 max.

a The mixing ratio used will be that recommended by the manufacturer.

b For slant shear strength on concrete, delete Sections B-1 and B-5 of California Test 434, Part 5. For dry concrete, use Step "2" below only. For wet concrete, use both Steps "1" & "2":

1 Soak blocks in water for 24 hours at 25ºC ±1ºC. Remove and wipe off excess water.

2 Mix epoxy as described in California Test 434, Part 1, and apply a coat approximately 250 µm-inch thick to each diagonal surface. Place four 3-mm square pieces of shim stock 305 µm thick on one block to control final film thickness. Before pressing the coated surfaces together, leave the blocks so that the coated surfaces are horizontal until the epoxy reacts slightly to prevent excessive flow.

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.

The proposal shall set forth in clearly legible figures and in the respective spaces provided:

A. Unit Prices
B. Item Totals
C. TOTAL BID (A)
D. Number of working days bid for completion of the work
E. TOTAL BID (B) - product of the working days bid and the cost per day shown on the Engineer's Estimate
F. TOTAL BASIS FOR COMPARISON OF BIDS (A+B)

The proposal shall be signed by the bidder, who shall fill out the blanks in the proposal form as therein required.

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.

The amount of the bidder's security required in Section 2-1.07, "Proposal Guaranty," of the Standard Specifications shall be based on the "TOTAL BID (A)" set forth on the proposal form.

Submit request for substitution of an "or equal" item, and the data substantiating the request to the Department of Transportation, Submit request for substitution of an "or equal" item, and the data substantiating the request to the Department of Transportation, **-{{address}} -** , 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.

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 title 49, part 26, Code of Federal Regulations (49 CFR 26) entitled "Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs." In order to ensure the Department achieves its federally mandated statewide overall DBE goal, the Department encourages the participation of Disadvantaged Business Enterprises (DBEs), as defined in 49 CFR 26 in the performance of contracts financed in whole or in part with Federal Funds. The Contractor shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of subcontracts.

Bidders shall be fully informed respecting the requirements of the Regulations. The Regulations in their entirety are incorporated herein by this reference 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 joint venture partner must be responsible for specific contract items of work, or clearly defined 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 commensurate with its ownership interest.
D. 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.
E. DBEs must be certified by the California Unified Certification Program (CUCP). Listings of DBEs certified by the CUCP are available from the following sources:

    1. The Department's web site at http://www.dot.ca.gov/hq/bep.
    2. The Department's DBE Directory. 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.

F. When reporting DBE participation, bidders may count the cost of materials or supplies purchased from DBEs as follows:

1. If the materials or supplies are obtained from a DBE manufacturer, count 100 percent of the cost of the materials or supplies. 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, count 60 percent of the cost of the materials or supplies. 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 F.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 F.2.
3. If the DBE is neither a manufacturer nor a regular dealer, count only 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.

G. When reporting DBE participation, bidders may count the participation of DBE trucking companies 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.
2. The DBE must itself own and operate at least one fully licensed, insured, and operational truck used on the contract.
3. The DBE receives credit for the total value of the transportation services it provides on the contract using trucks its owns, insures, and operates using drivers it employs.
4. The DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services the lessee DBE provides on the contract.
5. The DBE may also lease trucks from a non-DBE firm, including an owner-operator. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission it receives as a result of the lease arrangement. The DBE does not receive credit for the total value of the transportation services provided by the lessee, since these services are not provided by a DBE.
6. For the purposes of this paragraph G, 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.

H. Bidders are encouraged to use services offered by financial institutions owned and controlled by DBEs.

SECTION 3. AWARD AND EXECUTION OF CONTRACT

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

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

Bids will be compared on the basis of the Engineer's Estimate of the quantities of work to be done and the number of working days bid for completion of the work. The award of the contract, if it be awarded, will be to the lowest responsible bidder whose proposal complies with all the requirements prescribed. The lowest bid will be determined on the basis of the "Total Basis for Comparison of Bids (A+B)" set forth in the proposal. The contract price for the awarded contract will be the "Total Bid (A)" set forth in the proposal.

Bids in which the number of working days bid for completion of the work exceed 400 will be considered non-responsive and will be rejected.

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

A "CALTRANS BIDDER - DBE INFORMATION" form will be included in the contract documents to be executed by the successful bidder. The purpose of the form is to collect data required under 49 CFR 26. Even if no DBE participation will be reported, the successful bidder must execute and return the form.

The bidder's "CALTRANS BIDDER - DBE INFORMATION" form should include the names, addresses and phone numbers of DBE firms that will participate, with a complete description of work or supplies to be provided by each, and the dollar value of each DBE transaction. When 100 percent of a contract item of work is not to be performed or furnished by a DBE, a description of the exact portion of that work to be performed or furnished by that DBE should be included in the DBE information, including the planned location of that work. A bidder certified as a DBE should describe the work it has committed to performing with its own forces as well as any other work that it has committed to be performed by DBE subcontractors, suppliers and trucking companies.

The bidder is encouraged to provide written confirmation from each DBE that the DBE is participating in the contract. A copy of a DBE's quote will serve as written confirmation that the DBE is participating in the contract. If a DBE is participating as a joint venture partner, the bidder is encouraged to submit a copy of the joint venture agreement.

The "CALTRANS BIDDER - DBE INFORMATION" form should be returned to the Department by the successful bidder with the executed contract, contract bonds and the documents identified in Section 3-1.025, "Insurance Policies," of the Standard Specifications.

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, contract bonds and the documents identified in Section 3-1.025, "Insurance Policies," of the Standard Specifications. For the purposes of the form, payee shall be deemed to mean the successful bidder. The form is not to be completed for subcontractors or suppliers. Failure to complete and return the "Payee Data Record" form to the Department as provided herein will result in the retention of 31 percent of payments due the Contractor and penalties of up to $20,000. This retention of payments for failure to complete the "Payee Data Record" form is in addition to any other retention of payments due the Contractor.

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

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

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

The work shall be diligently prosecuted to completion before the expiration of **the NUMBER OF WORKING DAYS BID** beginning on the fifteenth calendar day after approval of the contract.

The Contractor shall pay to the State of California the sum of $ 12,100 per day, for each and every calendar day's delay in finishing the work after expiration of the number of working days bid, until work requiring closure of lanes or shoulders on State Highway Route 24 is complete.

The Contractor shall pay to the State of California the sum of $ 11,000 per day, for each and every calendar day's delay in finishing the work after expiration of the number of working days bid, if no further lane or shoulder closures are required on State Highway Route 24 to complete the remaining work.

In no case will liquidated damages of more than $ 12,100 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.

5-1.013 LINES AND GRADES

Attention is directed to Section 5-1.07, "Lines and Grades," of the Standard Specifications.

Stakes or marks will be set by the Engineer in conformance with the requirements in Chapter 12, "Construction Surveys," of the Department's Surveys Manual.

5-1.017 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.

5-1.018 GUARANTEE

GENERAL

The Contractor shall guarantee the work is in accordance with contract requirements and remains free from substantial defects in materials and workmanship for a period of one year after contract acceptance. For certain portions of the work where the Director relieves the Contractor of responsibility in accordance with Section 7-1.15, "Relief from Maintenance and Responsibility," of the Standard Specifications, the guarantee period starts on the relief date and ends one year therefrom.

Substantial defects in materials and workmanship means defective work objectively manifested by damaged, displaced, or missing parts or components and workmanship resulting in improper function of materials, components, equipment, or systems, as installed or manufactured by the Contractor, subcontractor, supplier, or manufacturer.

During the guarantee period, the Contractor shall repair or replace contract work and associated work which is not in accordance with contract requirements or has substantial defects in materials and workmanship. The Contractor shall perform the corrective work with no expense to the Department other than State-provided field inspection services.

The guarantee of work excludes damage or displacement that is outside the control of the Contractor and caused by normal wear and tear, improper operation, insufficient maintenance, abuse, unauthorized modification, or natural disaster as described in Section 7-1.165, "Damage by Storm, Flood, Tsunami or Earthquake," of the Standard Specifications.

The Contractor shall have the same insurance coverage during corrective work operations as prior to contract acceptance, in accordance with Section 7-1.12, "Indemnification and Insurance," of the Standard Specifications.

The contract bonds furnished in accordance with Section 3-1.02, "Contract Bonds," of the Standard Specifications must remain in full force and effect during the guarantee period and until all corrective work is complete.

In the case of conflict between this guarantee provision and any warranty provision included in the contract, the warranty provision shall govern for the specific construction product or feature covered.

CORRECTIVE WORK

During the guarantee period, the Department will monitor performance of the highway facilities completed by the Contractor and will perform a thorough review of the contract work at least 60 days before the expiration of the one-year guarantee.

If the Engineer discovers contract work not in compliance with contract requirements or that has substantial defects in materials and workmanship, at any time during the guarantee period, a list of items that require corrective work will be developed and forwarded to the Contractor. Within 15 days of receipt of a list, the Contractor shall submit to the Engineer a detailed plan for performing corrective work. The work plan shall include a start to finish schedule. It shall include a list of labor, equipment, materials, and any special services intended to be used. It shall clearly show related work including traffic control, temporary delineation, and permanent delineation.

The Contractor shall start the corrective and related work within 15 days of receiving notice from the Engineer that the Contractor’s work plan is approved. The corrective work shall be diligently prosecuted and completed within the time allotted in the approved work plan.

If the Engineer determines that corrective work, covered by the guarantee, is urgently needed to prevent injury or property damage, the Engineer will give the Contractor a request to start emergency repair work and a list of items that require repair work. The Contractor shall mobilize within 24 hours and diligently perform emergency repair work on the damaged highway facilities. The Contractor shall submit a work plan within 5 days of starting emergency repair work.

If the Contractor fails to commence and execute, with due diligence, corrective work and related work required under the guarantee in the time allotted, the Engineer may proceed to have the work performed by State forces or other forces at the Contractor's expense. Upon demand, the Contractor shall pay all costs incurred by the Department for work performed by State forces or other forces including labor, equipment, material, and special services.

PAYMENT

Full compensation for performing corrective work; and related work such as traffic control, temporary delineation, and permanent delineation, and to maintain insurance coverage and bonds, shall be considered as included in the contract prices paid for the various contract items of work and no separate payment will be made therefor.

5-1.019 COST REDUCTION INCENTIVE

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

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

If a cost reduction proposal submitted by the Contractor, and subsequently approved by the Engineer, provides for a reduction in contract time, 50 percent of that contract time reduction shall be credited to the State by reducing the contract working days, not including plant establishment. Attention is directed to "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions regarding the working days.

If a cost reduction proposal submitted by the Contractor, and subsequently approved by the Engineer, provides for a reduction in traffic congestion or avoids traffic congestion during construction, 60 percent of the estimated net savings in construction costs attributable to the cost reduction proposal will be paid to the Contractor. In addition to the requirements in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications, the Contractor shall provide detailed comparisons of the traffic handling between the existing contract and the proposed change, and estimates of the traffic volumes and congestion.

5-1.02 LABOR NONDISCRIMINATION

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

NOTICE OF REQUIREMENT FOR NONDISCRIMINATION PROGRAM

(GOV. CODE, SECTION 12990)

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

5-1.022 EXCLUSION OF RETENTION

In conformance with 49 CFR, Part 26, Subpart B, Section 26.29 (b)(1), the retention of proceeds required by Public Contract Code Section 10261 shall not apply. In conformance with Public Contract Code 7200 (b), in subcontracts between the Contractor and a subcontractor and in subcontracts between a subcontractor and any subcontractor thereunder, retention proceeds shall not be withheld, and the exceptions provided in Public Contract Code 7200 (c) shall not apply. At the option of the Contractor, subcontractors may be required to furnish payment and performance bonds issued by an admitted surety insurer.

The third paragraph of Section 9-1.06, "Partial Payments," of the Standard Specifications, and Section 9-1.065, "Payment of Withheld Funds," of the Standard Specifications shall not apply.

5-1.023 UNSATISFACTORY PROGRESS

If the number of working days charged to the contract exceeds 75 percent of the working days in the current time of completion and the percent working days elapsed exceeds the percent work completed by more than 15 percentage points, the Department will withhold 10 percent of the amount due on the current monthly estimate.

The percent working days elapsed will be determined from the number of working days charged to the contract divided by the number of contract working days in the current time of completion, expressed as a percentage. The number of contract working days in the current time of completion shall consist of the original contract working days increased or decreased by time adjustment s approved by the Engineer.

The percent work completed will be determined by the Engineer from the sum of payments made to date plus the amount due on the current monthly estimate, divided by the current total estimated value of the work, expressed as a percentage.

When the percent of working days elapsed minus the percent of work completed is less than or equal to 15 percentage points, the funds withheld shall be returned to the Contractor with the next monthly progress payment.

Funds kept or withheld from payment, due to the failure of the Contractor to comply with the provisions of the contract, will not be subject to the requirements of Public Contract Code 7107 or to the payment of interest pursuant to Public Contract Code Section 10261.5.

5-1.03 INTEREST ON PAYMENTS

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

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

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

5-1.04 PUBLIC SAFETY

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

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

A. Excavations—The near edge of the excavation is 3.6 m or less from the edge of the lane, except:

    1. Excavations covered with sheet steel or concrete covers of adequate thickness to prevent accidental entry by traffic or the public.
    2. Excavations less than 0.3-m deep.
    3. Trenches less than 0.3-m wide for irrigation pipe or electrical conduit, or excavations less than 0.3-m in diameter.
    4. Excavations parallel to the lane for the purpose of pavement widening or reconstruction.
    5. Excavations in side slopes, where the slope is steeper than 1:4 (vertical:horizontal).
    6. Excavations protected by existing barrier or railing.

B. Temporarily Unprotected Permanent Obstacles—The work includes the installation of a fixed obstacle together with a protective system, such as a sign structure together with protective railing, and the Contractor elects to install the obstacle prior to installing the protective system; or the Contractor, for the Contractor's convenience and with permission of the Engineer, removes a portion of an existing protective railing at an obstacle and does not replace such railing complete in place during the same day.
C. Storage Areas—Material or equipment is stored within 3.6 m of the lane and the storage is not otherwise prohibited by the provisions of the Standard Specifications and these special provisions.

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

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

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

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

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

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

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

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

5-1.05 TESTING

Testing of materials and work shall conform to the provisions in Section 6-3, "Testing," of the Standard Specifications and these special provisions.

Whenever the provisions of Section 6-3.01, "General," of the Standard Specifications refer to tests or testing, it shall mean tests to assure the quality and to determine the acceptability of the materials and work.

The Engineer will deduct the costs for testing of materials and work found to be unacceptable, as determined by the tests performed by the Department, and the costs for testing of material sources identified by the Contractor which are not used for the work, from moneys due or to become due to the Contractor. The amount deducted will be determined by the Engineer.

5-1.06 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES

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

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

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

5-1.065 SOLID WASTE DISPOSAL AND RECYCLING REPORT

This work shall consist of reporting disposal and recycling of construction solid waste, as specified in these special provisions. For the purposes of this section, solid waste includes construction and demolition waste debris, but not hazardous waste.

Annually by the fifteenth day of January, the Contractor shall complete and certify Form CEM-2025, "Solid Waste Disposal and Recycling Report," which quantifies solid waste generated by the work performed and disposed of in landfills or recycled during the previous calendar year. The amount and type of solid waste disposed of or recycled shall be reported in either metric tonnes or cubic meters. The Contractor shall also complete and certify Form CEM-2025 within 5 days following contract acceptance.

Form CEM-2025, "Solid Waste Disposal and Recycling Report" can be downloaded from the following website:

http://www.dot.ca.gov/hq/construc/manual2001

If the Contractor has not submitted Form CEM-2025, by the dates specified above, the Department will withhold the amount of $10,000 for each missing or incomplete report. The moneys withheld will be released for payment on the next monthly estimate for partial payment following the date that a complete and acceptable Form CEM-2025 is submitted to the Engineer. Upon completion of all contract work and submittal of the final Form CEM-2025, remaining withheld funds associated with this section, "Solid Waste Disposal and Recycling Report," will be released for payment. Withheld funds in conformance with this section shall be in addition to other moneys withheld provided for in the contract. No interest will be due the Contractor on withheld amounts.

Full compensation for preparing and submitting Form CEM-2025, "Solid Waste Disposal and Recycling Report," shall be considered as included in the contract price for the various items of work involved and no additional compensation will be allowed therefor.

5-1.07 (BLANK)

5-1.075 BUY AMERICA REQUIREMENTS

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

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

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

5-1.08 SUBCONTRACTOR AND DBE RECORDS

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

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

Prior to the fifteenth of each month, the Contractor shall submit documentation to the Engineer showing the amount paid to DBE trucking companies. 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. If the DBE leases trucks from a non-DBE, the Contractor may count only the fee or commission the DBE receives as a result of the lease arrangement.

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. 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 SUBCONTRACTORS

The subcontractors listed by the Contractor in conformance with Section 2-1.054, "Required Listing of Proposed Subcontractors," of the Standard Specifications, 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.

The Contractor should notify the Engineer in writing of any changes to its anticipated DBE participation. This notice should be provided prior to the commencement of that portion of the work.

5-1.09 SUBCONTRACTING

Attention is directed to the provisions in Section 8-1.01, "Subcontracting," of the Standard Specifications, and these special provisions.

The provisions in the third paragraph of Section 8-1.01, "Subcontracting," of the Standard Specifications, that the Contractor shall perform with the Contractor's own organization contract work amounting to not less than 50 percent of the original contract price, is not changed by the Federal Aid requirement specified under "Required Contract Provisions Federal-Aid Construction Contracts" in Section 14 of these special provisions that the Contractor perform not less than 30 percent of the original contract work with the Contractor's own organization.

Each subcontract and lower tier subcontracts that may in turn be made shall include the "Required Contract Provisions Federal-Aid Construction Contracts" in Section 14 of these special provisions. 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.

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.

5-1.10 PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS

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

5-1.103 RECORDS

The Contractor shall maintain cost accounting records for the contract pertaining to, and in such a manner as to provide a clear distinction between, the following six categories of costs of work during the life of the contract:

A. Direct costs of contract item work.
B. Direct costs of changes in character in conformance with Section 4-1.03C, "Changes in Character of Work," of the Standard Specifications.
C. Direct costs of extra work in conformance with Section 4-1.03D, "Extra Work," of the Standard Specifications.
D. Direct costs of work not required by the contract and performed for others.
E. Direct costs of work performed under a notice of potential claim in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications.
F. Indirect costs of overhead.

Cost accounting records shall include the information specified for daily extra work reports in Section 9-1.03C, "Records," of the Standard Specifications. The requirements for furnishing the Engineer completed daily extra work reports shall only apply to work paid for on a force account basis.

The cost accounting records for the contract shall be maintained separately from other contracts, during the life of the contract, and for a period of not less than 3 years after the date of acceptance of the contract. If the Contractor intends to file claims against the Department, the Contractor shall keep the cost accounting records specified above until complete resolution of all claims has been reached.

5-1.104 INTERNET DAILY EXTRA WORK REPORT

When extra work is being paid for on a force account basis, the Contractor shall submit daily extra work reports in conformance with the provisions in Section 9-1.03C, "Records," of the Standard Specifications and these special provisions.

The Contractor shall send daily extra work reports to the Engineer using the Department's Internet extra work billing system. The reports shall conform to the requirements in the "iCAS User's Guide" (Guide). The Guide is available from the Department, and is also found on the Internet at:

http://www.dot.ca.gov/hq/construc/ewb/EWB_INSTRUCTION.pdf

The Department will provide system accounts to the Contractor's authorized representatives when at least one of the representatives has received training. The Department will provide system training to at least one of the Contractor's authorized representatives within 30 days of the Contractor's request for training. The Department will assign an account and user identification to the Contractor's authorized representatives, and each Contractor's authorized representative shall maintain a unique password. A daily extra work report that the Contractor's authorized representative sends to the Department using the Internet extra work billing system will be considered signed by the Contractor. A daily extra work report that the Engineer approves using the Internet extra work billing system will be considered signed by the Engineer.

Daily extra work reports that include billing for materials shall be substantiated by a valid copy of a vendor's invoice in conformance to the requirements in Section 9-1.03C, "Records," of the Standard Specifications. Each materials invoice shall clearly identify the relative daily extra work report and the associated cost of the materials. In addition to postal service and parcel service and if approved by the Engineer, invoices may be sent by facsimile or as an electronic-mail attachment.

The Contractor shall maintain the Contractor's interface with the Department's Internet extra work billing system. If the Contractor is using the file transfer process to submit extra work reports, it shall conform to the file transfer format and process defined in the Guide.

5-1.11 PARTNERING

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

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

A one-day "Training in Partnering Concepts" session will be conducted regardless of whether the Contractor requests the formation of a "Partnering" relationship. The "Training in Partnering Concepts" session will be conducted locally for the Contractor's and the Engineer's project representatives. The Contractor shall be represented by a minimum of 2 representatives, one being the Contractor's authorized representative pursuant to Section 5-1.06, "Superintendence," of the Standard Specifications. Scheduling of the "Training in Partnering Concepts" session and selection of the trainer and training site shall be determined cooperatively by the Contractor and the Engineer. If, upon the Contractor's request, "Partnering" is approved by the Engineer, the "Training in Partnering Concepts" session shall be conducted prior to the initial "Partnering Workshop."

The costs involved in providing the "Training in Partnering Concepts" trainer and training site will be borne entirely by the State. The costs will be determined in conformance with the provisions in Section 9-1.03B, "Work Performed by Special Forces or Other Special Services," of the Standard Specifications, and paying to the Contractor the sum of that cost, except no markups will be allowed.

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

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

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

5-1.114 VALUE ANALYSIS

The Contractor may submit to the Engineer, in writing, a request for a "Value Analysis" workshop. The purpose for having a workshop is to identify value enhancing opportunities and to consider modifications to the plans and specifications that will reduce either the total cost, time of construction or traffic congestion, without impairing, in any manner, the essential functions or characteristics of the project including, but not limited to, service life, economy of operation, ease of maintenance, benefits to the travelling public, desired appearance, or design and safety standards.

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

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

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

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

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

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

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

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

5-1.12 DISPUTE REVIEW BOARD

GENERAL

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

The DRB shall be utilized when dispute or potential claim resolution at the project level is unsuccessful. The DRB shall function as specified herein until the day of acceptance of the contract, at which time the work of the DRB will cease except for completion of unfinished reports. No DRB dispute meetings shall take place later than 30 days prior to acceptance of contract. After acceptance of contract, disputes or potential claims which have followed the dispute resolution processes of the Standard Specifications and these special provisions, but have not been resolved, shall be stated or restated by the Contractor, in response to the Proposed Final Estimate within the time limits provided in Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications. The State will review those claims in conformance with the provisions in Section 9-1.07B of the Standard Specifications. Following the adherence to and completion of the contractual administrative claims procedure, the Contractor may file for arbitration in conformance with the provisions in Section 9-1.10, "Arbitration," of the Standard Specifications and these special provisions.

Disputes, as used in this section, shall include differences of opinion, properly noticed as provided hereinafter, between the State and Contractor on matters related to the work and other subjects considered by the State or Contractor, or by both, to be of concern to the DRB on this project, except matters relating to Contractor, subcontractor or supplier potential claims not actionable against the Department as specified in these special provisions or quantification of disputes for overhead type expenses or costs. Disputes for overhead type expenses or costs shall conform to the requirements of Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications. Whenever the term "dispute" or "disputes" is used herein, it shall be deemed to include potential claims as well as disputes.

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

SELECTION PROCESS, DISCLOSURE AND APPOINTMENTS

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

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

The State and the Contractor shall nominate and approve DRB members in conformance with the terms and conditions of the Dispute Review Board Agreement and these special provisions, within 45 days of the approval of the contract. Each party shall provide written notification to the other of the name of their selected DRB nominee along with the prospective member's complete written disclosure statement.

Disclosure statements shall include a resume of the prospective member's experience and a declaration statement describing past, present, anticipated, and planned relationships, including indirect relationships through the prospective member's primary or full-time employer, to this project and with the parties involved in this construction contract, including but not limited to, relevant subcontractors or suppliers to the parties, parties' principals, or parties' counsel. DRB members shall also include a full disclosure of close professional or personal relationships with all key members of the contract. Objections to nominees must be based on a specific breech or violation of nominee responsibilities or on nominee qualifications under these provisions unless otherwise specified. The Contractor or the State may, on a one-time basis, object to the other's nominee without specifying a reason and this person will not be selected for the DRB. Another person shall then be nominated within 15 days.

The first duty of the State and Contractor selected members of the DRB shall be to select and recommend a prospective third DRB member to the parties for final selection and approval. The first 2 DRB members shall proceed with the selection of the third DRB member immediately upon receiving written notification from the State of their selection, and shall provide their recommendation simultaneously to the parties within 15 days of the notification.

The first 2 DRB members shall select a third DRB member subject to mutual approval of the parties or may mutually concur on a list of potentially acceptable third DRB members and submit the list to the parties for final selection and approval of the third member. The goal in the selection of the third member is to complement the professional experience of the first 2 members and to provide leadership for the DRB's activities.

The third prospective DRB member shall supply a full disclosure statement to the first 2 DRB members and to the parties prior to appointment.

An impasse shall be considered to have been reached if the parties are unable to approve a third member within 15 days of receipt of the recommendation of the first 2 DRB members, or if the first 2 DRB members are unable to agree upon a recommendation within their 15 day time limit. In the event of an impasse in selection of third DRB member the State and the Contractor shall each propose 3 candidates for the third DRB member position. The parties shall select the candidates proposed under this paragraph from the current list of arbitrators certified by the Public Works Contract Arbitration Committee created by Article 7.2 (commencing with Section 10245) of the State Contract Act. The first 2 DRB members shall then select one of the 6 proposed candidates in a blind draw.

No DRB member shall have prior direct involvement in this contract. No member shall have a financial interest in this contract or the parties thereto, within a period of 6 months prior to award of this contract or during the contract, except as follows:

A. Compensation for services on this DRB.
B. Ownership interest in a party or parties, documented by the prospective DRB member, that has been reviewed and determined in writing by the State to be sufficiently insignificant to render the prospective member acceptable to the State.
C. Service as a member of other Dispute Review Boards on other contracts.
D. Retirement payments or pensions received from a party that are not tied to, dependent on or affected by the net worth of the party.
E. The above provisions apply to parties having a financial interest in this contract, including but not limited to contractors, subcontractors, suppliers, consultants, and legal and business services.

The Contractor or the State may reject any of the three DRB members who fail to fully comply at all times with all required employment and financial disclosure conditions of DRB membership as described in the Dispute Review Board Agreement and as specified herein. A copy of the Dispute Review Board Agreement is included in this section.

The Contractor, the State, and the 3 members of the DRB shall complete and adhere to the Dispute Review Board Agreement in administration of this DRB within 15 days of the parties' concurrence in the selection of the third member. No DRB meeting shall take place until the Dispute Review Board Agreement has been signed by all parties. The State authorizes the Engineer to execute and administer the terms of the Agreement. The person(s) designated by the Contractor as authorized to execute contract change orders shall be authorized to execute and administer the terms of this agreement, or to delegate the authority in writing. The operation of the DRB shall be in conformance with the terms of the Dispute Review Board Agreement.

COMPENSATION

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

REPLACEMENT OF DRB MEMBERS

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

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

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

OPERATION

The following procedure shall be used for dispute resolution:

A. If the Contractor objects to any decision, act or order of the Engineer, the Contractor shall give written notice of potential claim in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications and these special provisions, including the provision of applicable cost documentation; or file written protests or notices in conformance with the provisions in the Standard Specifications and these special provisions.

B. The Engineer will respond, in writing, to the Contractor's written supplemental notice of potential claim within 20 days of receipt of the notice.
C. Within 15 days after receipt of the Engineer's written response, the Contractor shall, if the Contractor still objects, file a written reply with the Engineer, stating clearly and in detail the basis of the objection.
D. Following an objection to the Engineer's written response, the Contractor shall refer the dispute to the DRB if the Contractor wishes to further pursue the objection to the Engineer's decision. The Contractor shall make the referral in writing to the DRB, simultaneously copied to the State, within 21 days after receipt of the written response from the Engineer. The written dispute referral shall describe the disputed matter in individual discrete segments so that it will be clear to both parties and the DRB what discrete elements of the dispute have been resolved, and which remain unresolved, and shall include an estimate of the cost of the affected work and impacts, if any, on project completion.
E. By failing to submit the written notice of referral to the DRB, within 21 days after receipt of the Engineer's written response to the supplemental notice of potential claim, the Contractor waives future claims and arbitration on the matter in contention.
F. The Contractor and the State shall each be afforded an opportunity to be present and to be heard by the DRB, and to offer evidence. Either party furnishing written evidence or documentation to the DRB must furnish copies of such information to the other party a minimum of 15 days prior to the date the DRB is scheduled to convene the meeting for the dispute. Either party shall produce such additional evidence as the DRB may deem necessary to reach an understanding and a determination of the dispute. The party furnishing additional evidence shall furnish copies of such additional evidence to the other party at the same time the evidence is provided to the DRB. The DRB shall not consider evidence not furnished in conformance with the terms specified herein.
G. Upon receipt by the DRB of a written referral of a dispute, the DRB shall convene to review and consider the dispute. The dispute meeting shall be held no earlier than 30 days and no later than 60 days after receipt of the written referral unless otherwise agreed to by all parties. The DRB shall determine the time and location of the DRB dispute meeting, with due consideration for the needs and preferences of the parties while recognizing the paramount importance of a timely hearing of the dispute.
H. There shall be no participation of either party's attorneys at DRB dispute meetings.
I. There shall be no participation of persons who are not directly involved in the contract or who do not have direct knowledge of the dispute, including but not limited to consultants, except for expert testimony allowed at the discretion of the DRB and with approval prior to the dispute meeting by both parties.
J. The DRB shall furnish a report, containing findings and recommendations as described in the Dispute Review Board Agreement, in writing to both the State and the Contractor. The DRB may request clarifying information of either party within 10 days after the DRB dispute meeting. Requested information shall be submitted to the DRB within 10 days of the DRB request. The DRB shall complete its report, including minority opinion, if any, and submit it to the parties within 30 days of the DRB dispute meeting, except that time extensions may be granted at the request of the DRB with the written concurrence of both parties. The report shall include the facts and circumstances related to the matters under consideration, pertinent provisions of the contract, applicable laws and regulations, and actual costs and time incurred as shown on the Contractor's cost accounting records. The DRB shall make recommendations on the merit of the dispute and, if appropriate, recommend guidelines for determining compensation.
K. Within 30 days after receiving the DRB's report, both the State and the Contractor shall respond to the DRB in writing signifying that the dispute is either resolved or remains unresolved. Failure to provide the written response within the time specified, or a written rejection of the DRB's recommendation or response to a request for reconsideration presented in the report by either party, shall conclusively indicate that the party(s) failing to respond accepts the DRB recommendation. Immediately after responses have been received from both parties, the DRB shall provide copies of both responses to the parties simultaneously. Either party may request clarification of elements of the DRB's report from the DRB prior to responding to the report. The DRB shall consider any clarification request only if submitted within 10 days of receipt of the DRB's report, and if submitted simultaneously in writing to both the DRB and the other party. Each party may submit only one request for clarification for any individual DRB report. The DRB shall respond, in writing, to requests for clarification within 10 days of receipt of such requests.
L. The DRB's recommendations, stated in the DRB's reports, are not binding on either party. Either party may seek a reconsideration of a recommendation of the DRB. The DRB shall only grant a reconsideration based upon submission of new evidence and if the request is submitted within the 30-day time limit specified for response to the DRB's written report. Each party may submit only one request for reconsideration regarding an individual DRB recommendation.

M. If the State and the Contractor are able to resolve their dispute with the aid of the DRB's report, the State and Contractor shall promptly accept and implement the recommendations of the DRB. If the parties cannot agree on compensation within 60 days of the acceptance by both parties of the DRB's recommendation, either party may request the DRB to make a recommendation regarding compensation.
N. The State or the Contractor shall not call DRB members who served on the DRB for this contract as witnesses in arbitration proceedings which may arise from this contract, and all documents created by the DRB shall be inadmissible as evidence in subsequent arbitration proceedings, except the DRB's final written reports on each issue brought before it.
O. The State and Contractor shall jointly indemnify and hold harmless the DRB members from and against all claims, damages, losses, and expenses, including but not limited to attorney's fees, arising out of and resulting from the findings and recommendations of the DRB.
P. The DRB members shall have no claim against the State or the Contractor, or both, from claimed harm arising out of the parties' evaluations of the DRB's report.

DISPUTES INVOLVING SUBCONTRACTOR POTENTIAL CLAIMS

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

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

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

RETENTION

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

DISPUTE REVIEW BOARD AGREEMENT

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

Form 6202 Rev (09/01/02)

DISPUTE REVIEW BOARD AGREEMENT

_____
(Contract Identification)

Contract No. _____

THIS DISPUTE REVIEW BOARD AGREEMENT, hereinafter called "AGREEMENT", made and entered into this _____ day of _____, _____, between the State of California, acting through the California Department of Transportation and the Director of Transportation, hereinafter called the "STATE," _____ _____ hereinafter called the "CONTRACTOR," and the Dispute Review Board, hereinafter called the "DRB" consisting of the following members:

_____ ,
(Contractor Appointee)

_____ ,
(State Appointee)

and _____
(Third Person)

WITNESSETH, that

WHEREAS, the STATE and the CONTRACTOR, hereinafter called the "parties," are now engaged in the construction on the State Highway project referenced above; and

WHEREAS, the special provisions for the above referenced contract provides for the establishment and operation of the DRB to assist in resolving disputes; and

WHEREAS, the DRB is composed of three members, one selected by the STATE, one selected by the CONTRACTOR, and the third member selected by the other two members and approved by the parties;

NOW THEREFORE, in consideration of the terms, conditions, covenants, and performance contained herein, or attached and incorporated and made a part hereof, the STATE, the CONTRACTOR, and the DRB members hereto agree as follows:

SECTION I DESCRIPTION OF WORK

To assist in the resolution of disputes between the parties, the contract provides for the establishment and the operation of the DRB. The intent of the DRB is to fairly and impartially consider disputes placed before it and provide written recommendations for resolution of these disputes to both parties. The members of this DRB shall perform the services necessary to participate in the DRB's actions as designated in Section II, Scope of Work.

SECTION II SCOPE OF WORK

The scope of work of the DRB includes, but is not limited to, the following:

A. OBJECTIVE

The principal objective of the DRB is to assist in the timely resolution of disputes between the parties arising from performance of this contract. It is not intended for either party to default on their normal responsibility to amicably and fairly settle their differences by indiscriminately assigning them to the DRB. It is intended that the mere existence of the DRB will encourage the parties to resolve disputes without resorting to this review procedure. But when a dispute that is serious enough to warrant the DRB's review does develop, the process for prompt and efficient action will be in place.

B. PROCEDURES

The DRB shall render written reports on disputes between the parties arising from the construction contract. Prior to consideration of a dispute, the DRB shall establish rules and regulations that will govern the conduct of its business and reporting procedures in conformance with the requirements of the contract and the terms of this AGREEMENT. DRB recommendations, resulting from its consideration of a dispute, shall be furnished in writing to both parties. The recommendations shall be based on facts and circumstances involved in the dispute, pertinent contract provisions, applicable laws and regulations. The recommendations shall find one responsible party in a dispute; shared or "jury" determinations shall not be rendered. The DRB shall make recommendations on the merit of the dispute, and if appropriate, recommend guidelines for determining compensation. If the parties cannot agree on compensation within 60 days of the acceptance by both parties of the DRB's recommendation, either party may request the DRB to make a recommendation regarding compensation.

The DRB shall refrain from officially giving advice or consulting services to anyone involved in the contract. The individual members shall act in a completely independent manner and while serving as members of the DRB shall have no consulting business connections with either party or its principals or attorneys or other affiliates (subcontractors, suppliers, etc.) who have a beneficial interest in the contract.

During scheduled meetings of the DRB as well as during dispute meetings, DRB members shall refrain from expressing opinions on the merits of statements on matters under dispute or potential dispute. Opinions of DRB members expressed in private sessions shall be kept strictly confidential. Individual DRB members shall not meet with, or discuss contract issues with individual parties, except as directed by the DRB Chairperson. Such discussions or meetings shall be disclosed to both parties. Other discussions regarding the project between the DRB members and the parties shall be in the presence of all three members and both parties. Individual DRB members shall not undertake independent investigations of any kind pertaining to disputes or potential disputes, except with the knowledge of both parties and as expressly directed by the DRB Chairperson.

C. CONSTRUCTION SITE VISITS, PROGRESS MEETINGS AND FIELD INSPECTIONS

The DRB members shall visit the project site and meet with representatives of the parties to keep abreast of construction activities and to develop familiarity with the work in progress. Scheduled progress meetings shall be held at or near the project site. The DRB shall meet at least once at the start of the project, and at least once every 4 months thereafter. The frequency, exact time, and duration of additional site visits and progress meetings shall be as recommended by the DRB and approved by the parties consistent with the construction activities or matters under consideration and dispute. Each meeting shall consist of a round table discussion and a field inspection of the work being performed on the contract, if necessary. Each meeting shall be attended by representatives of both parties. The agenda shall generally be as follows:

1. Meeting opened by the DRB Chairperson.
2. Remarks by the STATE's representative.
3. A description by the CONTRACTOR's representative of work accomplished since the last meeting; the current schedule status of the work; and a forecast for the coming period.
4. An outline by the CONTRACTOR's representative of potential problems and a description of proposed solutions.
5. An outline by the STATE's representative of the status of the work as the STATE views it.
6. A brief description by the CONTRACTOR's or STATE's representative of potential claims or disputes which have surfaced since the last meeting.
7. A summary by the STATE's representative, the CONTRACTOR's representative, or the DRB of the status of past disputes and potential claims.

The STATE's representative will prepare minutes of all progress meetings and circulate them for revision and approval by all concerned within 10 days of the meeting.

The field inspection shall cover all active segments of the work, the DRB being accompanied by both parties' representatives. The field inspection may be waived upon mutual agreement of the parties.

D. DRB CONSIDERATION AND HANDLING OF DISPUTES

Upon receipt by the DRB of a written referral of a dispute, the DRB shall convene to review and consider the dispute. The dispute meeting shall be held no earlier than 30 days and no later than 60 days after receipt of the written referral, unless otherwise agreed to by all parties. The DRB shall determine the time and location of DRB dispute meetings, with due consideration for the needs and preferences of the parties while recognizing the paramount importance of speedy resolution of issues. No dispute meetings shall take place later than 30 days prior to acceptance of contract.

Normally, dispute meetings shall be conducted at or near the project site. However, any location that would be more convenient and still provide required facilities and access to necessary documentation shall be satisfactory.

Both parties shall be given the opportunity to present their evidence at these dispute meetings. It is expressly understood that the DRB members are to act impartially and independently in the consideration of the contract provisions, applicable laws and regulations, and the facts and conditions surrounding any dispute presented by either party, and that the recommendations concerning any such dispute are advisory and nonbinding on the parties.

The DRB may request that written documentation and arguments from both parties be sent to each DRB member, through the DRB Chairperson, for review before the dispute meeting begins. A party furnishing written documentation to the DRB shall furnish copies of such information to the other party at the same time that such information is supplied to the DRB.

DRB dispute meetings shall be informal. There shall be no testimony under oath or cross-examination. There shall be no reporting of the procedures by a shorthand reporter or by electronic means. Documents and verbal statements shall be received by the DRB in conformance with acceptance standards established by the DRB. These standards need not comply with prescribed legal laws of evidence.

The third DRB member shall act as Chairperson for dispute meetings and all other DRB activities. The parties shall have a representative at all dispute meetings. Failure to attend a duly noticed dispute meeting by either of the parties shall be conclusively considered by the DRB as indication that the non-attending party considers written submittals as their entire and complete argument. The claimant shall discuss the dispute, followed by the other party. Each party shall then be allowed one or more rebuttals until all aspects of the dispute are thoroughly covered. DRB members shall ask questions, seek clarification, and request further data from either of the parties as may be necessary to assist in making a fully informed recommendation. The DRB may request from either party documents or information that would assist the DRB in making its findings and recommendations including, but not limited to, documents used by the CONTRACTOR in preparing the bid for the project. A refusal by a party to provide information requested by the DRB may be considered by the DRB as an indication that the requested material would tend to disprove that party's position. In large or complex cases, additional dispute meetings may be necessary in order to consider all the evidence presented by both parties. All involved parties shall maintain the confidentiality of all documents and information, as provided in this AGREEMENT.

During dispute meetings, no DRB member shall express an opinion concerning the merit of any facet of the case. DRB deliberations shall be conducted in private, with interim individual views kept strictly confidential.

After dispute meetings are concluded, the DRB shall meet in private and reach a conclusion supported by 2 or more members. Private sessions of the DRB may be held at a location other than the job site or by electronic conferencing as deemed appropriate, in order to expedite the process.

The DRB's findings and recommendations, along with discussion of reasons therefor, shall then be submitted as a written report to both parties. Recommendations shall be based on the pertinent contract provisions, applicable laws and regulations, and facts and circumstances related to the dispute. The report shall be thorough in discussing the facts considered, the contract language, law or regulation viewed by the DRB as pertinent to the issues, and the DRB's interpretation and philosophy in arriving at its conclusions and recommendations. The DRB's report shall stand on its own, without attachments or appendices. The DRB Chairperson shall furnish a copy of the written recommendation report to the DRB Coordinator, Division of Construction, MS 44, P.O. Box 942874, Sacramento, CA 94274.

With prior written approval of both parties, the DRB may obtain technical services necessary to adequately review the disputes presented, including audit, geotechnical, schedule analysis and other services. The parties' technical staff may supply those services as appropriate. The cost of technical services, as agreed to by the parties, shall be borne equally by the 2 parties as specified in an approved contract change order. The CONTRACTOR will not be entitled to markups for the payments made for these services.

The DRB shall resist submittal of incremental portions of information by either party, in the interest of making a fully informed decision and recommendation.

The DRB shall make every effort to reach a unanimous decision. If this proves impossible, the dissenting member shall prepare a minority opinion, which shall be included in the DRB's report.

Although both parties should place weight upon the DRB's recommendations, they are not binding. Either party may appeal a recommendation to the DRB for reconsideration. However, reconsideration shall only be allowed when there is new evidence to present, and the DRB shall accept only one appeal from each party pertaining to an individual DRB recommendation. The DRB shall hear appeals in conformance with the terms described in the Section entitled "Dispute Review Board" in the special provisions.

E. DRB MEMBER REPLACEMENT

Should the need arise to appoint a replacement DRB member, the replacement DRB member shall be appointed in the same manner as the original DRB members were appointed. The selection of a replacement DRB member shall begin promptly upon notification of the necessity for a replacement and shall be completed within 15 days. This AGREEMENT shall be amended to indicate change in DRB membership.

SECTION III CONTRACTOR RESPONSIBILITIES

The CONTRACTOR shall furnish to each DRB member one copy of pertinent documents that are or may become necessary for the DRB to perform their function. Pertinent documents are written notices of potential claim, responses to those notices, drawings or sketches, calculations, procedures, schedules, estimates, or other documents which are used in the performance of the work or in justifying or substantiating the CONTRACTOR's position. The CONTRACTOR shall also furnish a copy of such pertinent documents to the STATE, in conformance with the terms outlined in the special provisions.

SECTION IV STATE RESPONSIBILITIES

The STATE will furnish the following services and items:

A. CONTRACT RELATED DOCUMENTS

The STATE will furnish to each DRB member one copy of Notice to Contractors and Special Provisions, Proposal and Contract, Plans, Standard Specifications, and Standard Plans, change orders, written instructions issued by the STATE to the CONTRACTOR, or other documents pertinent to any dispute that has been referred to the DRB and necessary for the DRB to perform its function.

B. COORDINATION AND SERVICES

The STATE, through the Engineer, will, in cooperation with the CONTRACTOR, coordinate the operations of the DRB. The Engineer will arrange or provide conference facilities at or near the project site and provide secretarial and copying services to the DRB without charge to the CONTRACTOR.

SECTION V TIME FOR BEGINNING AND COMPLETION

Once established, the DRB shall be in operation until the day of acceptance of the contract. The DRB members shall not begin work under the terms of this AGREEMENT until authorized in writing by the STATE.

SECTION VI PAYMENT

A. ALL INCLUSIVE RATE PAYMENT

The STATE and the CONTRACTOR shall bear the costs and expenses of the DRB equally. Each DRB member shall be compensated at an agreed rate of $1,200 per day if time spent per meeting, including on-site time plus one hour of travel time, is greater than 4 hours. Each DRB member shall be compensated at an agreed rate of $700 per day if time spent per meeting, including on-site time plus one hour of travel time, is less than or equal to 4 hours. The agreed rates shall be considered full compensation for on-site time, travel expenses, transportation, lodging, time for travel and incidentals for each day, or portion thereof, that the DRB member is at an authorized DRB meeting. No additional compensation will be made for time spent by DRB members in review and research activities outside the official DRB meetings unless that time has been specifically agreed to in advance by the STATE and CONTRACTOR. Time away from the project that has been specifically agreed to in advance by the parties will be compensated at an agreed rate of $125 per hour. The agreed amount of $125 per hour shall include all incidentals including expenses for telephone, fax, and computer services. Members serving on more than one DRB involving the State, regardless of the number of meetings per day, shall not be paid more than the all inclusive rate per day or rate per hour for an individual project. The STATE will provide, at no cost to the CONTRACTOR, administrative services such as conference facilities and secretarial services to the DRB.

B. PAYMENTS

DRB members shall be compensated at the same rate. The CONTRACTOR shall make direct payments to each DRB member for their participation in authorized meetings and approved hourly rate charges from invoices submitted by each DRB member. The STATE will reimburse the CONTRACTOR for its share of the costs of the DRB.

The DRB members may submit invoices to the CONTRACTOR for partial payment for work performed and services rendered for their participation in authorized meetings not more often than once per month during the progress of the work. The invoices shall be in a format approved by the parties and accompanied by a general description of activities performed during that billing period. Payment for hourly fees, at the agreed rate, shall not be paid to a DRB member until the amount and extent of those fees are approved by the STATE and CONTRACTOR.

Invoices shall be accompanied by original supporting documents, which the CONTRACTOR shall include with the extra work billing when submitting for reimbursement of the STATE's share of cost from the STATE. The CONTRACTOR will be reimbursed for one-half of approved costs of the DRB. No markups will be added to the CONTRACTOR's payment.

C. INSPECTION OF COSTS RECORDS

The DRB members and the CONTRACTOR shall keep available for inspection by representatives of the STATE and the United States, for a period of 3 years after final payment, the cost records and accounts pertaining to this AGREEMENT. If any litigation, claim, or audit arising out of, in connection with, or related to this contract is initiated before the expiration of the 3-year period, the cost records and accounts shall be retained until such litigation, claim, or audit involving the records is completed.

SECTION VII ASSIGNMENT OF TASKS OF WORK

The DRB members shall not assign the work of this AGREEMENT.

SECTION VIII TERMINATION OF DRB MEMBERS

DRB members may resign from the DRB by providing not less than 15 days written notice of the resignation to the STATE and CONTRACTOR. DRB members may be terminated by their original appointing power or by either party, for failing to fully comply at all times with all required employment and financial disclosure conditions of DRB membership in conformance with the terms of the contract.

SECTION IX LEGAL RELATIONS

The parties hereto mutually understand and agree that the DRB member in the performance of duties on the DRB, is acting in the capacity of an independent agent and not as an employee of either party.

No party to this AGREEMENT shall bear a greater responsibility for damages or personal injury than is normally provided by Federal or State of California Law.

Notwithstanding the provisions of this contract that require the CONTRACTOR to indemnify and hold harmless the STATE, the parties shall jointly indemnify and hold harmless the DRB members from and against all claims, damages, losses, and expenses, including but not limited to attorney's fees, arising out of and resulting from the findings and recommendations of the DRB.

SECTION X CONFIDENTIALITY

The parties hereto mutually understand and agree that all documents and records provided by the parties in reference to issues brought before the DRB, which documents and records are marked "Confidential - for use by the DRB only," shall be kept in confidence and used only for the purpose of resolution of subject disputes, and for assisting in development of DRB findings and recommendations; that such documents and records will not be utilized or revealed to others, except to officials of the parties who are authorized to act on the subject disputes, for any purposes, during the life of the DRB. Upon termination of this AGREEMENT, said confidential documents and records, and all copies thereof, shall be returned to the parties who furnished them to the DRB. However, the parties understand that such documents shall be subsequently discoverable and admissible in court or arbitration proceedings unless a protective order has been obtained by the party seeking further confidentiality.

SECTION XI DISPUTES

Disputes between the parties hereto, including disputes between the DRB members and either party or both parties, arising out of the work or other terms of this AGREEMENT, which cannot be resolved by negotiation and mutual concurrence between the parties, or through the administrative process provided in the contract, shall be resolved by arbitration as provided in Section 9-1.10, "Arbitration," of the Standard Specifications.

SECTION XII VENUE, APPLICABLE LAW, AND PERSONAL JURISDICTION

In the event that any party, including an individual member of the DRB, deems it necessary to institute arbitration proceedings to enforce any right or obligation under this AGREEMENT, the parties hereto agree that such action shall be initiated in the Office of Administrative Hearings of the State of California. The parties hereto agree that all questions shall be resolved by arbitration by application of California law and that the parties to such arbitration shall have the right of appeal from such decisions to the Superior Court in conformance with the laws of the State of California. Venue for the arbitration shall be Sacramento or any other location as agreed to by the parties.

SECTION XIII FEDERAL REVIEW AND REQUIREMENTS

On Federal-Aid contracts, the Federal Highway Administration shall have the right to review the work of the DRB in progress, except for private meetings or deliberations of the DRB.

Other Federal requirements in this agreement shall only apply to Federal-Aid contracts.

SECTION XIV CERTIFICATION OF THE CONTRACTOR, THE DRB MEMBERS, AND THE STATE

IN WITNESS WHEREOF, the parties hereto have executed this AGREEMENT as of the day and year first above written.

DRB MEMBER

By: _____

Title: _____

DRB MEMBER

By: _____

Title : _____

DRB MEMBER

By : _____

Title : _____

CONTRACTOR

By: _____

Title: _____

CALIFORNIA STATE DEPARTMENT OF TRANSPORTATION

By: _____

Title: _____

5-1.13 FORCE ACCOUNT PAYMENT

Payment for extra work at force account will be determined by either non-subcontracted or subcontracted force account payment unless otherwise specified.

Non-Subcontracted Force Account Payment:

When extra work to be paid for on a force account basis is performed by the Contractor, compensation will be determined in accordance with Section 9-1.03, "Force Account Payment," of the Standard Specifications and these special provisions.

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

Attention is directed to "Time-Related Overhead" of these special provisions.

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

Cost	Percent Markup
Labor	28
Materials	10
Equipment Rental	10

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

The above markups, together with payments made for time-related overhead pursuant to "Time-Related Overhead" of these special provisions, shall constitute full compensation for all overhead costs for work performed on a force account basis. These overhead costs shall be deemed to include all items of expense not specifically designated as cost or equipment rental in conformance with the provisions in Sections 9-1.03A(1), "Labor," 9-1.03A(2), "Materials," and 9-1.03A(3), "Equipment Rental," of the Standard Specifications. The total payment made as provided above and in the first paragraph of Section 9-1.03A, "Work Performed by Contractor," of the Standard Specifications shall be deemed to be the actual cost of the work performed on a force account basis, and shall constitute full compensation therefor.

Full compensation for overhead costs for work performed on a force account basis, and for which no adjustment is made to the lump sum price bid for time-related overhead conforming to the provisions in "Time-Related Overhead" of these special provisions, shall be considered as included in the markups specified above, and no additional compensation will be allowed therefor.

Subcontracted Force Account Payment

When extra work to be paid for on a force account basis is performed by a subcontractor approved in conformance with the provisions in Section 8-1.01, "Subcontracting," of the Standard Specifications, compensation will be determined in accordance with the provisions in Section 9-1.03, "Force Account Payment," of the Standard Specifications.

5-1.14 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.

5-1.15 COMPENSATION ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS

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

ITEM CODE	ITEM
390102	ASPHALT CONCRETE (TYPE A)
390126	Rubberized Asphalt Concrete (Type G)
390127	Rubberized Asphalt Concrete (Type O)
391005	PAVING ASPHALT (BINDER-PAVEMENT REINFORCING FABRIC)
397001	ASPHALTIC EMULSION (Paint Binder)
390095	REPLACE ASPHALT CONCRETE SURFACING

The compensation payable for asphalt concrete, asphaltic emulsion (paint binder) and paving asphalt (binder-pavement reinforcing fabric) 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 quantity of paving asphalt used in asphaltic emulsion (paint binder) will be determined by multiplying the item quantity for asphaltic emulsion (paint binder) included in a monthly estimate by the minimum percent residue specified in Section 94, "Asphaltic Emulsions," of the Standard Specifications. The asphaltic emulsion minimum percent residue will be based on the type of emulsion used by the Contractor.

At the Contractor's option, the Contractor may provide actual daily test results for paving asphalt residue for the asphaltic emulsion (paint binder) used. Test results provided by the Contractor shall be from an independent testing laboratory that participates in the AASHTO Proficiency Sample Program. The Contractor shall take samples of asphaltic emulsion from the distributor truck at mid-load from a sampling tap or thief. Two separate 2-liter samples shall be taken in the presence of the Engineer.

The Contractor shall provide one sample to the Contractor's independent testing laboratory, with 24 hours of sampling. The second sample shall be given to the Engineer. The test results from the Contractor's independent testing laboratory shall be delivered to the Engineer within 10 days from sample date.

The adjustment in compensation will be determined in conformance with the following formulae when the item of asphalt concrete, asphaltic emulsion or paving asphalt (binder-pavement reinforcing fabric) 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:

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

Where:

A = Adjustment in dollars per tonne of paving asphalt used to produce asphalt concrete, asphaltic emulsion residue used as paint binder and used as a binder for pavement reinforcing fabric 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 as a binder for pavement reinforcing fabric plus the quantity 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 plus the quantity in tonnes of paving asphalt that would have been used as residue in the asphaltic emulsion (paint binder) shown under "This Estimate" on the monthly estimate.

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

A. The compensation adjustments provided herein will be shown separately on payment estimates. The Contractor shall be liable to the State for decreased compensation adjustments and the Department may deduct the amount thereof from any 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.

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

http://www.dot.ca.gov/hq/esc/oe/asphalt_index/astable.html

5-1.16 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.

5-1.17 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	$44,000
B	Roadside Clearing	$13,500
C	Progress Schedule (Critical Path Method)	$22,500

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. Lighting standards
B. Joint Seals
C. Luminaires

5-1.18 PROJECT INFORMATION

The information in this section has been compiled specifically for this project and is made available for bidders and Contractors. Other information referenced in the Standard Specifications and these special provisions do not appear in this section. The information is subject to the conditions and limitations set forth in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," and Section 6-2, "Local Materials," of the Standard Specifications. Bidders and Contractors shall be responsible for knowing the procedures for obtaining information.

Cross sections for maintenance vehicle pullouts are available in paper .

The District Office in which the work is situated is located at 111 Grand Avenue, Oakland, CA 94612.

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.

Plans of the existing bridges available to bidders and Contractors are reproductions of the original contract plans, with significant changes noted, and working drawings, and do not necessarily show normal construction tolerances and variances. Where dimensions of new construction required by this contract are dependent on the dimensions of the existing bridges, the Contractor shall verify the controlling field dimensions and shall be responsible for adjusting dimensions of the work to fit existing conditions.

5-1.19 SOUND CONTROL REQUIREMENTS

Sound control shall conform to these special provisions.

The noise level from the Contractor's operations, between the hours of 9:00 p.m. and 6:00 a.m., shall not exceed 86 dBa (Lmax) at a distance of 15 m, except for the following work:

A. Cold Plane AC Pavement from 9:00 PM to 6:00 AM, Monday through Saturday.
B. Grind Existing Concrete Pavement from 9:00PM to 6:00 AM, Monday through Saturday.
C. Crack Existing Concrete Pavement from 9:00 PM to 6:00 AM, Monday through Saturday.
D. Remove Concrete from 9:00 PM to 6:00 AM, Monday through Saturday.
E. Remove Edge Drain-Saw cut existing pavement from 9:00 PM to 6"00 AM, Monday through Saturday.

All above operations shall be completed within a stretch of no more than 1.5 KM in both directions of the freeway (within the same KP). The Contractor shall finish each segment before moving onto the next.

The Contractor shall provide one "Type 1" sound level meter and one acoustic calibrator which will be used by the Department during the life of the contract. The Contractor shall provide training by a person trained in noise monitoring to one Department employee designated by the Engineer. The sound level meter shall be calibrated and certified by the manufacturer or other independent acoustical laboratory prior to delivery to the Department. The Contractor shall provide annual recalibration by the manufacturer or other independent acoustical laboratory. All equipment shall be capable of taking measurements using the A-weighting network and the "slow" response of the sound level meter. The measurement microphone shall be fitted with an appropriate windscreen. All equipment shall be returned to the Contractor at the acceptance of the contract. Equipment damaged by actions of the Department or the public shall be paid for as extra work as provided in Section 4-1.03D for the Standard Specifications.

Each internal combustion engine, used for any purpose on the job or related to the job, shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without the muffler.

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

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

5-1.20 AERIALLY 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" and "Project Information" of these special provisions.

The complete Site Investigation Report is available for inspection at the Department of Transportation, Construction Duty Senior's Desk at 111 Grand Av., Oakland, CA 94612.

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. The Department will not consider the Contractor a generator of such contaminated materials.

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:

A. United States Department of Transportation,
B. United States Environmental Protection Agency,
C. California Environmental Protection Agency,
D. California Department of Health Services,
E. Department of Toxic Substances Control,
F. California Division of Occupational Safety and Health Administration,
G. Integrated Waste Management Board,
H. Regional Water Quality Control Board, Region 2,
I. State Air Resources Control Board, and
J. Bay Area Air Quality Management 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:

A. Health and Safety Code, Division 20, Chapter 6.5 (California Hazardous Waste Control Act),
B. Title 22, California Code of Regulations, Division 4.5 (Environmental Health Standards for the Management of Hazardous Waste), and
C. 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 PLAIN WIRE REINFORCEMENT
ASTM Designation: A 82

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

SUBSTITUTION TABLE FOR BAR REINFORCEMENT

METRIC BAR DESIGNATION NUMBER[1] SHOWN ON THE PLANS	BAR DESIGNATION NUMBER[2] TO BE SUBSTITUTED
10	3
13	4
16	5
19	6
22	7
25	8
29	9
32	10
36	11
43	14
57	18

[1]Bar designation numbers approximate the number of millimeters of the nominal diameter of the bars.
[2]Bar numbers are based on the number of eighths of an inch included in the nominal diameter of the bars.
No adjustment will be required in spacing or total number of reinforcing bars due to a difference in minimum yield strength between metric and non-metric bars.

SUBSTITUTION TABLE FOR SIZES OF:

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

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

METRIC SIZE SHOWN ON THE PLANS mm	SIZE TO BE SUBSTITUTED inch
6 or 6.35	1/4
8 or 7.94	5/16
10 or 9.52	3/8
11 or 11.11	7/16
13, 12.70, or M12	1/2
14 or 14.29	9/16
16, 15.88, or M16	5/8
19, 19.05, or M20	3/4
22, 22.22, or M22	7/8
24, 25, 25.40, or M24	1
29, 28.58, or M27	1-1/8
32, 31.75, or M30	1-1/4
35 or 34.93	1-3/8
38, 38.10, or M36	1-1/2
44 or 44.45	1-3/4
51 or 50.80	2
57 or 57.15	2-1/4
64 or 63.50	2-1/2
70 or 69.85	2-3/4
76 or 76.20	3
83 or 82.55	3-1/4
89 or 88.90	3-1/2
95 or 95.25	3-3/4
102 or 101.60	4

SUBSTITUTION TABLE FOR NOMINAL THICKNESS OF SHEET METAL

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

SUBSTITUTION TABLE FOR WIRE

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

SUBSTITUTION TABLE FOR PIPE PILES

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

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

SUBSTITUTION TABLE FOR CIDH CONCRETE PILING

METRIC SIZE SHOWN ON THE PLANS	ACTUAL AUGER SIZE TO BE SUBSTITUTED inches
350 mm	14
400 mm	16
450 mm	18
600 mm	24
750 mm	30
900 mm	36
1.0 m	42
1.2 m	48
1.5 m	60
1.8 m	72
2.1 m	84
2.4 m	96
2.7 m	108
3.0 m	120
3.3 m	132
3.6 m	144
4.0 m	156

SUBSTITUTION TABLE FOR STRUCTURAL TIMBER AND LUMBER

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

SUBSTITUTION TABLE FOR NAILS AND SPIKES

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

SUBSTITUTION TABLE FOR IRRIGATION COMPONENTS

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

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

8-1.02 PREQUALIFIED AND TESTED SIGNING AND DELINEATION MATERIALS

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

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

For those categories of materials included on the list of Prequalified and Tested Signing and Delineation Materials, only those products shown within the listing may be used in the work. Other categories of products, not included on the list of Prequalified and Tested Signing and Delineation Materials, may be used in the work provided they conform to the requirements of the Standard Specifications.

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

PAVEMENT MARKERS, PERMANENT TYPE

Retroreflective With Abrasion Resistant Surface (ARS)

A. Apex, Model 921AR (100 mm x 100 mm)
B. Avery Dennison, Models C88 (100 mm x 100 mm), 911 (100 mm x 100 mm) and 953 (70 mm x 114 mm)
C. Ray-O-Lite, Model "AA" ARS (100 mm x 100 mm)
D. 3M Series 290 (89 mm x 100 mm)
E. 3M Series 290 PSA, with pressure sensitive adhesive pad (89 mm x 100 mm)

Retroreflective With Abrasion Resistant Surface (ARS)

(for recessed applications only)

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

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

Non-Reflective, 100 mm Round

A. Apex Universal (Ceramic)
B. Apex Universal, Models 929 (ABS) and 929PP (Polypropylene)
C. Glowlite, Inc. (Ceramic)
D. Hi-Way Safety, Inc., Models P20-2000W and 2001Y (ABS)
E. Interstate Sales, "Diamond Back" (Polypropylene)
F. Novabrite Models Cdot (White) Cdot-y (Yellow), Ceramic
G. Novabrite Models Pdot-w (White) Pdot-y (Yellow), Polypropylene
H. Three D Traffic Works TD10000 (ABS), TD10500 (Polypropylene)

PAVEMENT MARKERS, TEMPORARY TYPE

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

A. Vega Molded Products "Temporary Road Marker" (75 mm x 100 mm)

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

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

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

STRIPING AND PAVEMENT MARKING MATERIAL

Permanent Traffic Striping and Pavement Marking Tape

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

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

A. Advanced Traffic Marking, Series 200
B. Brite-Line, Series 100
C. Garlock Rubber Technologies, Series 2000
D. P.B. Laminations, Aztec, Grade 102
E. Swarco Industries, "Director-2"
F. Trelleborg Industries, R140 Series
G. 3M, Series 620 "CR", and Series A750
H. 3M, Series A145, Removable Black Line Mask

(Black Tape: for use only on Asphalt Concrete Surfaces)

I. Advanced Traffic Marking Black "Hide-A-Line"
(Black Tape: for use only on Asphalt Concrete Surfaces)

J. Brite-Line "BTR" Black Removable Tape
(Black Tape: for use only on Asphalt Concrete Surfaces)

K. Trelleborg Industries, RB-140
(Black Tape: for use only on Asphalt Concrete Surfaces)

Preformed Thermoplastic (Heated in place)

A. Avery Dennison, "Hotape"
B. Flint Trading, "Premark," "Premark 20/20 Flex," and "Premark 20/20 Flex Plus"
C. Ennis Paint Inc., "Flametape"

Ceramic Surfacing Laminate, 150 mm x 150 mm

A. Highway Ceramics, Inc.

CLASS 1 DELINEATORS

One Piece Driveable Flexible Type, 1700 mm

A. Bunzl Extrusion, "Flexi-Guide Models 400 and 566"
B. Carsonite, Curve-Flex CFRM-400
C. Carsonite, Roadmarker CRM-375
D. FlexStake, Model 654 TM
E. GreenLine Models HWD1-66 and CGD1-66

Special Use Type, 1700 mm

A. Bunzl Extrusion, Model FG 560 (with 450 mm U-Channel base)
B. Carsonite, "Survivor" (with 450 mm U-Channel base)
C. Carsonite, Roadmarker CRM-375 (with 450 mm U-Channel base)
D. FlexStake, Model 604
E. GreenLine Models HWDU and CGD (with 450 mm U-Channel base)
F. Impact Recovery Model D36, with #105 Driveable Base
G. Safe-Hit with 200 mm pavement anchor (SH248-GP1)
H. Safe-Hit with 380 mm soil anchor (SH248-GP2) and with 450 mm soil anchor (SH248-GP3)

Surface Mount Type, 1200 mm

A. Bent Manufacturing Company, Masterflex Model MF-180EX-48
B. Carsonite, "Super Duck II"
C. FlexStake, Surface Mount, Models 704 and 754 TM
D. Impact Recovery Model D48, with #101 Fixed (Surface-Mount) Base
E. Three D Traffic Works "Channelflex" ID No. 522248W

CHANNELIZERS

Surface Mount Type, 900 mm

A. Bent Manufacturing Company, Masterflex Models MF-360-36 (Round) and MF-180-36 (Flat)
B. Bunzl Extrusion, Flexi-Guide Models FG300PE and FG300UR
C. Carsonite, "Super Duck" (Flat SDF-436, Round SDR-336)
D. Carsonite, "Super Duck II" Model SDCF203601MB "The Channelizer"
E. FlexStake, Surface Mount, Models 703 and 753 TM
F. GreenLine, Model SMD-36
G. Hi-Way Safety, Inc. "Channel Guide Channelizer" Model CGC36
H. Impact Recovery Model D36, with #101 Fixed (Surface-Mount) Base
I. Repo, Models 300 and 400
J. Safe-Hit, Guide Post, Model SH236SMA
K. Three D Traffic Works "Channelflex" ID No. 522053W

Lane Separation System

A. Bunzl "Flexi-Guide (FG) 300 Curb System"
B. Qwick Kurb, "Klemmfix Guide System"
C. Recycled Technology, Inc. "Safe-Lane System"

CONICAL DELINEATORS, 1070 mm

(For 700 mm Traffic Cones, see Standard Specifications)
A. Bent Manufacturing Company "T-Top"
B. Plastic Safety Systems "Navigator-42"
C. Radiator Specialty Company "Enforcer"
D. Roadmaker Company "Stacker"
E. TrafFix Devices "Grabber"
F. Three D Traffic Works "Ringtop" TD7000, ID No. 742143

OBJECT MARKERS

Type "K", 450 mm

A. Bunzl, Model FG318PE
B. Carsonite, Model SMD 615
C. FlexStake, Model 701 KM
D. Repo, Models 300 and 400
E. Safe-Hit, Model SH718SMA

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

A. Bent Manufacturing "Masterflex" Model MF-360-24
B. Bunzl Extrusion, Model FG324PE
C. Carsonite, Super Duck II
D. FlexStake, Model 701KM
E. Repo, Models 300 and 400
F. Safe-Hit, Models SH8 24SMA_WA and SH8 24GP3_WA
G. The Line Connection, Model DP21-4Q
H. Three D Traffic Works "Q" Marker, ID No. 531702W

CONCRETE BARRIER MARKERS AND
TEMPORARY RAILING (TYPE K) REFLECTORS

Impactable Type

A. ARTUK, "FB"
B. Bunzl Extrusion, Models PCBM-12 and PCBM-T12
C. Duraflex Corp., "Flexx 2020" and "Electriflexx"
D. Hi-Way Safety, Inc., Model GMKRM100
E. Plastic Safety Systems "BAM" Models OM-BARR and OM-BWAR
F. Three D Traffic Works "Roadguide" Model TD 9304

Non-Impactable Type

A. ARTUK, JD Series
B. Plastic Safety Systems "BAM" Models OM-BITARW and OM-BITARA
C. Vega Molded Products, Models GBM and JD
D. Plastic Vacuum Forming, “Cap-It C400"

METAL BEAM GUARD RAIL POST MARKERS

(For use to the left of traffic)
A. Bunzl Extrusion, "Mini" (75 mm x 254 mm)
B. Creative Building Products, "Dura-Bull, Model 11201"
C. Duraflex Corp., "Railrider"
D. Plastic Vacuum Forming, “Cap-It C300"

CONCRETE BARRIER DELINEATORS, 400 mm

(For use to the right of traffic)

A. Bunzl Extrusion, Model PCBM T-16
B. Safe-Hit, Model SH216RBM

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

A. Stinson Equipment Company "SaddleMarker"

SOUND WALL DELINEATOR

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

A. Bunzl Extrusion, PCBM S-36

GUARD RAILING DELINEATOR

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

Wood Post Type, 686 mm

A. Bunzl Extrusion, FG 427 and FG 527
B. Carsonite, Model 427
C. FlexStake, Model 102 GR
D. GreenLine GRD 27
E. Safe-Hit, Model SH227GRD
F. Three D Traffic Works "Guardflex" TD9100

Steel Post Type

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

RETROREFLECTIVE SHEETING

Channelizers, Barrier Markers, and Delineators

A. Avery Dennison T-6500 Series (For rigid substrate devices only)
B. Avery Dennison WR-6100 Series
C. Nippon Carbide Industries, Flexible Ultralite Grade (ULG) II
D. Reflexite, PC-1000 Metalized Polycarbonate
E. Reflexite, AC-1000 Acrylic
F. Reflexite, AP-1000 Metalized Polyester
G. Reflexite, Conformalight, AR-1000 Abrasion Resistant Coating
H. 3M, High Intensity

Traffic Cones, 330 mm Sleeves

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

Traffic Cones, 100 mm and 150 mm Sleeves

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

Barrels and Drums

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

Barricades

Type I, Medium-Intensity (Typically Enclosed Lens, Glass-Bead Element)

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

Barricades

Type II, Medium-High-Intensity (Typically Enclosed Lens, Glass-Bead Element)

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

Signs

Type II, Medium-High-Intensity (Typically Enclosed Lens, Glass-Bead Element)

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

Signs

Type III, High-Intensity (Typically Encapsulated Glass-Bead Element)

A. Avery Dennison, T-5500 and T-5500A Series
B. Nippon Carbide Industries, Nikkalite Brand Ultralite Grade II
C. 3M Series 3870

Signs

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

A. Avery Dennison, T-6500 Series
B. Nippon Carbide Industries, Crystal Grade, 94000 Series
C. Nippon Carbide Industries, Model No. 94847 Fluorescent Orange
D. Nippon Carbide Industries, Model No. 94844 Fluorescent Yellow Green

Signs

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

A. Avery Dennison, WU-6014
B. Novabrite LLC, "Econobrite"
C. Reflexite "Vinyl"
D. Reflexite "SuperBright"
E. Reflexite "Marathon"
F. 3M Series RS34 Orange and RS20 Fluorescent Orange

Signs

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

A. 3M LDP Series 3924 Fluorescent Orange
B. 3M LDP Series 3970

Signs

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

A. Avery Dennison, T-7500 Series
B. Avery Dennison, T-7511 Fluorescent Yellow
C. Avery Dennison, T-7513 Fluorescent Yellow Green
D. Avery Dennison, W-7514 Fluorescent Orange
E. Nippon Carbide Industries, Nikkalite Crystal Grade Series 92800
F. Nippon Carbide Industries, Nikkalite Crystal Grade Model 92844 Fluorescent Yellow/Green
G. Nippon Carbide Industries, Nikkalite Crystal Grade Model 92847 Fluorescent Orange

Sign

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

A. 3M VIP Series 3981 Diamond Grade Fluorescent Yellow
B. 3M VIP Series 3983 Diamond Grade Fluorescent Yellow/Green
C. 3M VIP Series 3990 Diamond Grade

SPECIALTY SIGNS

A. Hallmark Technologies, Inc., All Sign STOP Sign (All Plastic), 750 mm
B. Reflexite "Endurance" Work Zone Sign (with Semi-Rigid Plastic Substrate)

SIGN SUBSTRATE

Fiberglass Reinforced Plastic (FRP)

A. Fiber-Brite
B. Sequentia, "Polyplate"
C. Inteplast Group "InteCel" (13 mm for Post-Mounted CZ Signs, 1200 mm or less)

Aluminum Composite

A. Alcan Composites "Dibond Material, 2 mm" (for temporary construction signs only)
B. Mitsubishi Chemical America, Alpolic 350 (for temporary construction signs only)

8-1.03 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. Model 170 controller assemblies, including completely wired controller cabinet and inductive loop detector sensor units.
B. Highway advisory radio antenna and lightning arrestor.

Completely wired controller cabinets, with auxiliary equipment but without controller unit, will be furnished to the Contractor at the Caltrans Maintenance Station, 30 Rickard Street, San Francisco, CA 94134.

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. The number, type, and size of the sign panels, and the contract number shall also be provided to the District Warehouse Manager.

8-1.04 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.

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 welding for this project.

Wherever reference is made to the following AWS welding codes in the Standard Specifications, on the plans, or in these special provisions, the year of adoption for these codes shall be as listed:

AWS Code	Year of Adoption
D1.1	2002
D1.4	1998
D1.5	2002
D1.6	1999

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

Section 6.1.1.1 of AWS D1.5 is replaced with the following:

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

Sections 6.1.3 through 6.1.4.3 of AWS D1.1, Section 7.1.2 of AWS D1.4, and Sections 6.1.1.2 through 6.1.3.3 of AWS D1.5 are replaced with the following:

The QC Inspector shall be the duly designated person who acts for and on behalf of the Contractor for inspection, testing, and quality related matters for all welding.

Quality Assurance (QA) is the prerogative of the Engineer. The QA Inspector is the duly designated person who acts for and on behalf of the Engineer.

The QC Inspector shall be responsible for quality control acceptance or rejection of materials and workmanship, and shall be currently certified as an AWS Certified Welding Inspector (CWI) in conformance with the requirements in AWS QC1, " Standard for AWS Certification of Welding Inspectors."

The QC Inspector may be assisted by an Assistant QC Inspector provided that this individual is currently certified as an AWS Certified Associate Welding Inspector (CAWI) in conformance with the requirements in AWS QC1, "Standard for AWS Certification of Welding Inspectors." The Assistant QC Inspector may perform inspection under the direct supervision of the QC Inspector provided the Assistant is always within visible and audible range of the QC Inspector. The QC Inspector shall be responsible for signing all reports and for determining if welded materials conform to workmanship and acceptance criteria. The ratio of QC Assistants to QC Inspectors shall not exceed 5 to 1.

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

Section 6.14.6, "Personnel Qualification," of AWS D1.1, Section 7.8, "Personnel Qualification," of AWS D1.4, and Section 6.1.3.4, "Personnel Qualification," of AWS D1.5 are replaced with the following:

Personnel performing nondestructive testing (NDT) shall be qualified and certified in conformance with the requirements of the American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A and the Written Practice of the NDT firm. The Written Practice of the NDT firm shall meet or exceed the guidelines of the ASNT Recommended Practice No. SNT-TC-1A. Individuals who perform NDT, review the results, and prepare the written reports shall be either:

A. Certified NDT Level II technicians, or;
B. Level III technicians who hold a current ASNT Level III certificate in that discipline and are authorized and certified to perform the work of Level II technicians.

Section 6.5.4 of AWS D1.5 is replaced with the following:

The QC Inspector shall inspect and approve each joint preparation, assembly practice, welding technique, joint fit-up, and the performance of each welder, welding operator, and tack welder to make certain that the applicable requirements of this code and the approved Welding Procedure Specification (WPS) are met. The QC Inspector shall examine the work to make certain that it meets the requirements of Sections 3 and 6.26. The size and contour of all welds shall be measured using suitable gages. Visual inspection for cracks in welds and base metal, and for other discontinuities should be aided by strong light magnifiers, or such other devices as may be helpful. Acceptance criteria different from those specified in this code may be used when approved by the Engineer.

Section 6.6.5, "Nonspecified NDT Other than Visual," of AWS D1.1, Section 6.6.5 of AWS D1.4 and Section 6.6.5 of AWS D1.5 shall not apply.

For any welding, the Engineer may direct the Contractor to perform NDT that is in addition to the visual inspection or NDT specified in the AWS or other specified welding codes, in the Standard Specifications, or in these special provisions. Additional NDT required by the Engineer will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications. Should any welding deficiencies be discovered by this additional NDT, all costs associated with the repair of the deficient area, including NDT of the weld and of the weld repair, and any delays caused by the repair, shall be at the Contractor's expense.

Repair work to correct welding deficiencies discovered by visual inspection or NDT, or by additional NDT directed or performed by the Engineer, and any associated delays or expenses caused to the Contractor by performing these repairs, shall be at the Contractor's expense.

The Engineer shall have the authority to verify the qualifications or certifications of any welder, QC Inspector, or NDT personnel to specified levels by retests or other means approved by the Engineer.

Continuous inspection shall be provided when any welding is being performed. Continuous inspection, as a minimum, shall include having a QC Inspector within such close proximity of all welders or welding operators so that inspections by the QC Inspector of each welding operation at each welding location shall not lapse for a period exceeding 30 minutes.

Inspection and approval of all joint preparations, assembly practices, joint fit-ups, welding techniques, and the performance of each welder, welding operator, and tack welder shall be documented by the QC Inspector on a daily basis for each day welding is performed. For each inspection, including fit-up, Welding Procedure Specification (WPS) verification, and final weld inspection, the QC Inspector shall confirm and document compliance with the requirements of the AWS or other specified code criteria and the requirements of these special provisions on all welded joints before welding, during welding, and after the completion of each weld.

When joint weld details that are not prequalified to the details of Section 3 of AWS D1.1 or to the details of Figure 2.4 or 2.5 of AWS D1.5 are proposed for use in the work, the joint details, their intended locations, and the proposed welding parameters and essential variables, will be approved by the Engineer. The Engineer shall have 2 weeks to complete the review of the proposed joint detail locations. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications. Upon approval of the proposed joint detail locations and qualification of the proposed joint details, welders and welding operators using these details shall perform a qualification test plate using the WPS variables and the joint detail to be used in production. The test plate shall have the maximum thickness to be used in production and a minimum length of 180 mm and minimum finish welded width 460 mm. The test plate shall be mechanically and radiographically tested. Mechanical and radiographic testing and acceptance criteria shall be as specified in the applicable AWS codes.

In addition to the requirements specified in the applicable code, the period of effectiveness for a welder's or welding operator's qualification shall be a maximum of 3 years for the same weld process, welding position, and weld type. If production welding will be performed without gas shielding, then qualification shall also be without gas shielding. Excluding welding of fracture critical members, a valid qualification at the beginning of work on a contract will be acceptable for the entire period of the contract, as long as the welder's or welding operator's work remains satisfactory.

The Engineer will witness all qualification tests for WPSs that were not previously approved by the Department. An approved independent third party will witness the qualification tests for welders or welding operators. The independent third party shall be a current CWI and shall not be employed by the Contractor performing the welding. The Engineer shall have 2 weeks to review the qualifications and copy of the current certification of the independent third party. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications. The Contractor shall notify the Engineer one week prior to performing any qualification tests. Witnessing of qualification tests by the Engineer shall not constitute approval of the intended joint locations, welding parameters, or essential variables.

In addition to the requirements of AWS D1.5 Section 5.12 or 5.13, welding procedures qualification, for work welded in conformance with that code, shall conform to the following requirements:

A. Unless considered prequalified, fillet welds, including reinforcing fillet welds, shall be qualified in each position. The fillet weld soundness test shall be conducted using the essential variables of the WPS as established by the Procedure Qualification Record (PQR).
B. For qualification of joints that do not conform to Figures 2.4 and 2.5 of AWS D1.5, two WPS qualification tests are required. The tests conforming to AWS D1.5 Section 5.13 shall be conducted using both Figure 5.1 and Figure 5.3. The test conforming to Figure 5.3 shall be conducted using the same welding electrical parameters that were established for the test conducted conforming to Figure 5.1.
C. The travel speed, current, and voltage values that are used for tests conducted per AWS D1.5 Section 5.12 or 5.13 shall be consistent for each weld joint, and shall in no case vary by more than 10 percent for travel speed, 10 percent for current, and 7 percent for voltage.
D. For a WPS qualified in conformance with AWS D1.5 Section 5.13, the values to be used for calculating ranges for current and voltage shall be based on the average of all weld passes made in the test. Heat input shall be calculated using the average of current and voltage of all weld passes made in the test for a WPS qualified in conformance with Section 5.12 or 5.13.
E. To qualify for unlimited material thickness, two qualification tests are required for WPSs utilized for welding material thicknesses greater than 38 mm. One test shall be conducted using 20-mm thick test plates, and one test shall be conducted using test plates with a thickness between 38 mm and 50 mm. Two maximum heat input tests may be conducted for unlimited thickness qualification.
F. Macroetch tests are required for WPS qualification tests, and acceptance shall be per AWS D1.5 Section 5.19.3.
G. When a weld joint is to be made using a combination of qualified WPSs, each process shall be qualified separately.
H. When a weld joint is to be made using a combination of qualified and prequalified processes, the WPS shall reflect both processes and the limitations of essential variables, including weld bead placement, for both processes.
I. Prior to preparing mechanical test specimens, the PQR welds shall be inspected by visual and radiographic tests. Backing bar shall be 75 mm in width and shall remain in place during NDT testing. Results of the visual and radiographic tests shall comply with AWS D1.5 Section 6.26.2, excluding Section 6.26.2.2. Test plates that do not comply with both tests shall not be used.

WELDING QUALITY CONTROL

Welding quality control shall conform to the requirements in the AWS or other specified welding codes, the Standard Specifications, and these special provisions.

Unless otherwise specified, welding quality control shall apply when any work is welded in conformance with the provisions in Section 49, "Piling," Section 52, "Reinforcement," Section 55, "Steel Structures,"—of the Standard Specifications.

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

A. Grate and frame of adjust drainage inlets.

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

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

The QCM shall be the sole individual responsible to the Contractor for submitting, receiving, reviewing, and approving all correspondence, required submittals, and reports to and from the Engineer. The QCM shall be a registered professional engineer or shall be currently certified as a CWI or a CAWI.

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

Welding inspection personnel or NDT firms to be used in the work shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project, except for the following conditions:

A. The work is welded in conformance with AWS D1.5 and is performed at a permanent fabrication or manufacturing facility which is certified under the AISC Quality Certification Program, Category Cbr, Major Steel Bridges and Fracture Critical endorsement F.
B. The welding is performed on pipe pile material at a permanent pipe manufacturing facility authorized to apply the American Petroleum Institute (API) monogram for API 5L pipe.

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

Prior to submitting the Welding Quality Control Plan (WQCP) required herein, a pre-welding meeting between the Engineer, the Contractor's QCM, and a representative from each entity performing welding or inspection for this project, shall be held to discuss the requirements for-the WQCP.

The Contractor shall submit to the Engineer, in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, 2 copies of a separate WQCP for each subcontractor or supplier for each item of work for which welding is to be performed.

The Contractor shall allow the Engineer 2 weeks to review the WQCP submittal after a complete plan has been received. No welding shall be performed until the WQCP is approved in writing by the Engineer. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

An amended WQCP or any addendum to the approved WQCP shall be submitted to, and approved in writing by the Engineer, for proposed revisions to the approved WQCP. An amended WQCP or addendum will be required for revisions to the WQCP, including but not limited to a revised WPS; additional welders; changes in NDT firms, QC, or NDT personnel or procedures; or updated systems for tracking and identifying welds. The Engineer shall have 1 week to complete the review of the amended WQCP or addendum. Work affected by the proposed revisions shall not be performed until the amended WQCP or addendum has been approved. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Information regarding the contents, format, and organization of a WQCP, is available at the Transportation Laboratory or the following website:

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

After final approval of the WQCP, amended WQCP, or addendum, the Contractor shall submit 7 copies to the Engineer of the approved documents. A copy of the Engineer approved document shall be available at each location where welding is to be performed.

A daily production log for welding shall be kept for each day that welding is performed. The log shall clearly indicate the locations of all welding. The log shall include the welders' names, amount of welding performed, any problems or deficiencies discovered, and any testing or repair work performed, at each location. The daily report from each QC Inspector shall also be included in the log.

The following items shall be included in a Welding Report that is to be submitted to the Engineer within 10 days following the performance of any welding:

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

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

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

The Engineer will review the Welding Report to determine if the Contractor is in conformance with the WQCP. Unless otherwise specified, the Engineer shall be allowed 10 days to review the report and respond in writing after a complete Welding Report has been received. Prior to receiving notification from the Engineer of the Contractor's conformance with the WQCP, the Contractor may encase in concrete or cover welds for which a Welding Report has been submitted. However, should the Contractor elect to encase or cover those welds prior to receiving notification from the Engineer, it is expressly understood that the Contractor shall not be relieved of the responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase or cover welds pending notification by the Engineer, and in the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The QC Inspector shall provide reports to the QCM on a daily basis for each day that welding is performed.

Except for noncritical weld repairs, the Engineer shall be notified immediately in writing when welding problems, deficiencies, base metal repairs, or any other type of repairs not submitted in the WQCP are discovered, and also of the proposed repair procedures to correct them. The Contractor shall allow the Engineer one week to review these procedures. No remedial work shall begin until the repair procedures are approved in writing by the Engineer. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The QCM shall sign and furnish to the Engineer, a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each item of work for which welding was performed. The certificate shall state that all of the materials and workmanship incorporated in the work, and all required tests and inspections of this work, have been performed in conformance with the details shown on the plans, the Standard Specifications, and these special provisions.

WELDING FOR OVERHEAD SIGN AND POLE STRUCTURES

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

Welding inspection personnel or NDT firms to be used in the work shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project, except for when the welding is performed at a permanent fabrication or manufacturing facility which is certified under the AISC Quality Certification Program, Category Sbd, Conventional Steel Building Structures.

Welding Qualification Audit

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

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

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

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

Welding Report

For work welded in conformance with the provisions in Section 56-1, "Overhead Sign Structures," or Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, a Welding Report shall be submitted in conformance with the provisions in "Welding Quality Control," of these special provisions.

PAYMENT

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

SECTION 9. DESCRIPTION OF BRIDGE WORK

This work shall consists, in general, of replacing approach slabs and joint seals as shown on the plans for:

CAMINO PABLO UNDERCROSSING
(Bridge No. 28-0103L)

CAMINO PABLO UNDERCROSSING
(Bridge No. 28-0103R)

ST. STEPHENS DRIVE OVERCROSSING
(Bridge No. 28-0111)

ACALANES ROAD UNDERCROSSING
(Bridge No. 28-0110L)

ACALANES ROAD UNDERCROSSING
(Bridge No. 28-0110R)

LAFAYETTE UNDERCROSSING
(Bridge No. 28-0137L)

DOLORES DRIVE UNDERCROSSING
(Bridge No. 28-0134L)

HAPPY VALLEY ROAD UNDERCROSSING
(Bridge No. 28-0132L)

HAPPY VALLEY ROAD UNDERCROSSING
(Bridge No. 28-0132R)

OAK HILL ROAD UNDERCROSSING
(Bridge No. 28-0230L)

OAK HILL ROAD UNDERCROSSING
(Bridge No. 28-0230R)

FIRST STREET UNDERCROSSING
(Bridge No. 28-0228R)

EBMUD AQUEDUCT UNDERCROSSING
(Bridge No. 28-0145L)

EBMUD AQUEDUCT UNDERCROSSING
(Bridge No. 28-0145R)

BROWN AVENUE UNDERCROSSING
(Bridge No. 28-0131R)

SECTION 10. CONSTRUCTION DETAILS

SECTION 10-1. GENERAL

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.

During construction at the vicinity of, but not limited to, Pleasant Hill Road and Route 24 Interchange when suspected any archaeological materials encountered, Contractor shall stop work immediately and inform the Engineer. Work may be resumed as directed by the Engineer.

Prior to adjust each drainage inlet to grade or adjust drainage inlet frame and grate to grade Contractor shall clean the inlets as directed by the Engineer. Debris from clean out drainage inlets shall be disposed in accordance with Section 7-1.13 of the Standard Specifications. All work required clean drainage inlets will be paid for as extra work as provided in Section 4-1.3D of the Standard Specifications.

Attention is directed to "Sound Control Requirements" of these special provisions in regarding to all work operations shall be completed within a stretch of no more than 1.5 KM in both directions of the freeway (within the same KP) before moving onto the next segment.

Attention is directed to "Cold Plane Asphalt Concrete Pavement" of these special provisions.

Prior to the start of the operation for cold plane asphalt concrete pavement, the contractor shall have a certified asphalt concrete plant and an approved mix design for the initial asphalt concrete paving layer.

Any area that is cold planed in a work period shall be paved with the first layer of asphalt concrete within the same work period before the area is opened to public traffic. Following spreading and compacting of the first layer of asphalt concrete, a drop-off of more than 45 mm will not be allowed between adjacent lanes open to public traffic.

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.

Attention is directed to "Replace Concrete Pavement (Rapid Strength Concrete)" of these special provisions in regards to providing Pre-Operation Conference and the Just-In-Time Training prior to commencing pavement replacement operations.

Attention is directed to "Water Pollution Control" of these special provisions regarding the submittal and approval of the Storm Water Pollution Prevention Plan prior to performing work having potential to cause water pollution.

Attention is directed to "Grind Existing Concrete Pavement" of these special provisions. The contractor shall schedule his operations such that the amount of grinding residue generated does not exceed available temporary storage capacity .

The Replace Concrete Pavement (Rapid Strength Concrete) operation shall be done prior to the Grind Existing Concrete Pavement operation.

Attention is directed to "Grind Existing Concrete Pavement" of these special provisions.

Existing pavement markers at grinding locations shall be removed prior to Grind Existing Concrete Pavement operation.

Attention is directed to "Rubberized Asphalt Concrete (Type G)" of these special provisions.

Fog Seal shall be applied on asphalt concrete shoulders after the Grind Existing Concrete Pavement operation is done.

The first order of work shall be to verify the location of the loop detectors to be replaced prior to repaving.

The uppermost layer of new pavement shall not be placed until all underlying conduits and loop detectors have been installed.

All loop detectors at each location shall be replaced and tested within the time allotted for traffic signal system shutdown at that location.

No above ground electrical work shall be performed on any system within the project site until all Contractor-furnished electrical materials for that individual system have been tested and delivered to Contractor.

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

Attention is directed to "Progress Schedule (Critical Path Method)" of these special provisions regarding the submittal of a general time-scaled logic diagram within 10 days after approval of the contract. The diagram shall be submitted prior to performing any work that may be affected by any proposed deviations to the construction staging of the project.

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 Asphaltic Emulsion (paint binder), 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 Rubberized Asphalt Concrete has been placed. After completion of the Rubberized Asphalt Concrete (Types O & G) Surfacing 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 Tonn for Rubberized Asphalt Concrete (Type O & Type G) , and no additional compensation will be allowed therefor.

At those locations exposed to public traffic where metal beam guard railings, single or double thrie beam barrier or concrete barriers are to be constructed, reconstructed, or removed and replaced, the Contractor shall schedule operations so that at the end of each working day there shall be no post holes open nor shall there be any railing or barrier posts installed without the blocks and rail elements assembled and mounted thereon.

Attention is directed to "Maintaining Traffic" of these special provisions concerning scheduling ramp closures.

10-1.02 WATER POLLUTION CONTROL

Water pollution control work shall conform to the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications and these special provisions.

This project lies within the boundaries of the San Francisco Bay Regional Water Quality Control Board (RWQCB).

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

The Department's Permit references and incorporates by reference the current Statewide General Permit issued by the SWRCB entitled "Order No. 99-08-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Associated with Construction Activity," which regulates discharges of storm water and non-storm water from construction activities disturbing 0.4-hectare or more of soil in a common plan of development. Sampling and analysis requirements as specified in SWRCB Resolution No. 2001-46 are added to the Statewide General Permit. Copies of the Statewide General Permit and modifications thereto are available for review from the SWRCB, Storm Water Permit Unit, 1001 "I" Street, P.O. Box 1977, Sacramento, California 95812-1977, Telephone: (916) 341-5254 and may also be obtained from the SWRCB Internet website at:

http://www.swrcb.ca.gov/stormwtr/construction.html.

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

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

The Permits require the preparation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP shall be prepared in conformance with the requirements of the Permits, the Department's "Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual," and the Department's "Construction Site Best Management Practices (BMPs) Manual," including addenda to those permits and manuals issued up to and including the date of advertisement of the project. These manuals are hereinafter referred to, respectively, as the "Preparation Manual" and the "Construction Site BMPs Manual," and collectively, as the "Manuals." Copies of the Manuals may be obtained from the Department of Transportation, Material Operations Branch, Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, California 95815, Telephone: (916) 445-3520, and may also be obtained from the Department's Internet website at:

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

The Contractor shall know and fully comply with applicable provisions of the Permits and all modifications thereto, the Manuals, and Federal, State, and local regulations and requirements that govern the Contractor's operations and storm water and non-storm water discharges from both the project site and areas of disturbance outside the project limits during

construction. Attention is directed to Sections 7-1.01, "Laws to be Observed," and 7-1.12, "Indemnification and Insurance," of the Standard Specifications.

The Permits shall apply to storm water and certain permitted non-storm water discharges from areas outside the project site which are directly related to construction activities for this contract including, but not limited to, asphalt batch plants, material borrow areas, concrete plants, staging areas, storage yards and access roads. The Contractor shall comply with the Permits and the Manuals for those areas and shall implement, inspect and maintain the required water pollution control practices. The Engineer shall be allowed full access to these areas during construction to assure Contractor's proper implementation of water pollution control practices. Installing, inspecting and maintaining water pollution control practices on areas outside the highway right of way not specifically arranged and provided for by the Department for the execution of this contract, will not be paid for.

The Contractor shall be responsible for penalties assessed or levied on the Contractor or the Department as a result of the Contractor's failure to comply with the provisions in this section "Water Pollution Control" including, but not limited to, compliance with the applicable provisions of the Permits, the Manuals, and Federal, State and local regulations and requirements as set forth therein.

Penalties as used in this section, "Water Pollution Control," shall include fines, penalties and damages, whether proposed, assessed, or levied against the Department or the Contractor, including those levied under the Federal Clean Water Act and the State Porter-Cologne Water Quality Control Act, by governmental agencies or as a result of citizen suits. Penalties shall also include payments made or costs incurred in settlement for alleged violations of the Permits, the Manuals, or applicable laws, regulations, or requirements. Costs incurred could include sums spent instead of penalties, in mitigation or to remediate or correct violations.

RETENTION OF FUNDS

Notwithstanding any other remedies authorized by law, the Department may retain money due the Contractor under the contract, in an amount determined by the Department, up to and including the entire amount of Penalties proposed, assessed, or levied as a result of the Contractor's violation of the Permits, the Manuals, or Federal or State law, regulations or requirements. Funds may be retained by the Department until final disposition has been made as to the Penalties. The Contractor shall remain liable for the full amount of Penalties until such time as they are finally resolved with the entity seeking the Penalties.

Retention of funds for failure to conform to the provisions in this section, "Water Pollution Control," shall be in addition to the other retention amounts required by the contract. The amounts retained for the Contractor's failure to conform to provisions in this section will be released for payment on the next monthly estimate for partial payment following the date when an approved SWPPP has been implemented and maintained, and when water pollution has been adequately controlled, as determined by the Engineer.

When a regulatory agency identifies a failure to comply with the Permits and modifications thereto, the Manuals, or other Federal, State or local requirements, the Department may retain money due the Contractor, subject to the following:

A. The Department will give the Contractor 30 days notice of the Department's intention to retain funds from partial payments which may become due to the Contractor prior to acceptance of the contract. Retention of funds from payments made after acceptance of the contract may be made without prior notice to the Contractor.
B. No retention of additional amounts out of partial payments will be made if the amount to be retained does not exceed the amount being withheld from partial payments pursuant to Section 9-1.06, "Partial Payments," of the Standard Specifications.
C. If the Department has retained funds, and it is subsequently determined that the State is not subject to the entire amount of the Costs and Liabilities assessed or proposed in connection with the matter for which the retention was made, the Department shall be liable for interest on the amount retained for the period of the retention. The interest rate payable shall be 6 percent per annum.

During the first estimate period that the Contractor fails to conform to the provisions in this section, "Water Pollution Control," the Department may retain an amount equal to 25 percent of the estimated value of the contract work performed.

The Contractor shall notify the Engineer immediately upon request from the regulatory agencies to enter, inspect, sample, monitor, or otherwise access the project site or the Contractor's records pertaining to water pollution control work. The Contractor and the Department shall provide copies of correspondence, notices of violation, enforcement actions or proposed fines by regulatory agencies to the requesting regulatory agency.

STORM WATER POLLUTION PREVENTION PLAN PREPARATION, APPROVAL AND AMENDMENTS

As part of the water pollution control work, a Storm Water Pollution Prevention Plan (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 shall be performed until the SWPPP has been approved by the Engineer. Approval shall not constitute a finding that the SWPPP complies with applicable requirements of the Permits, the Manuals and applicable Federal, State and local laws, regulations, and requirements.

The Contractor shall designate a Water Pollution Control Manager. The Water Pollution Control Manager shall be responsible for the preparation of the SWPPP and required modifications or amendments, and shall be responsible for the implementation and adequate functioning of the various water pollution control practices employed. The Contractor may designate different Water Pollution Control Managers to prepare the SWPPP and to implement the water pollution control practices. The Water Pollution Control Managers shall serve as the primary contact for 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 Water Pollution Control Manager shall have a minimum of 24 hours of formal storm water management training or certification as a Certified Professional in Erosion and Sediment Control (CPESC). The Engineer will reject the Contractor's submission of a Water Pollution Control Manager if the submitted qualifications are deemed to be inadequate.

The SWPPP shall apply to the areas within and those outside of the highway right of way that are directly related to construction operations including, but not limited to, asphalt batch plants, material borrow areas, concrete plants, staging areas, storage yards, and access roads.

The SWPPP shall incorporate water pollution control practices in the following categories:

A. Soil stabilization.
B. Sediment control.
C. Wind erosion control.
D. Tracking control.
E. Non-storm water management.
F. Waste management and materials pollution control.

The following contract items of work shall be incorporated into the SWPPP as "Temporary Water Pollution Control Practices": Temporary Concrete Washout (portable) and Temporary Cover,. The Contractor's attention is directed to the special provisions provided for Temporary Water Pollution Control Practices The following contract items of work, as shown on the project plans or as specified elsewhere in these special provisions, shall be identified in the SWPPP as permanent water pollution control practices: Erosion Control (Mulch), Fiber Rolls. These permanent water pollution control practices shall be constructed as specified in "Order of Work" of these special provisions, and utilized during the construction period. The Contractor shall maintain and protect the permanent water pollution control practices throughout the duration of the project and shall restore these controls to the lines, grades and condition shown on the plans prior to acceptance of the contract.

The SWPPP shall include, but not be limited to, the items described in the Manuals, Permits and related information contained in the contract documents. The Contractor shall develop a Water Pollution Control Schedule that describes the timing of grading or other work activities that could affect water pollution. The Water Pollution Control Schedule shall be updated by the Contractor to reflect changes in the Contractor's operations that would affect the necessary implementation of water pollution control practices.

The Contractor shall complete the "Construction Site BMPs Consideration Checklist" presented in the Preparation Manual and shall incorporate water pollution control practices into the SWPPP. Water pollution control practices include the "Minimum Requirements" and other Contractor-selected water pollution control practices from the "Construction Site BMPs Consideration Checklist" and the "Project-Specific Minimum Requirements" identified in the Water Pollution Control Cost Break-Down of this section.

Within 20 working days after the approval of the contract, the Contractor shall submit 3 copies of the draft SWPPP to the Engineer. The Engineer will have 10 working days to review the SWPPP. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the SWPPP within 10 working days of receipt of the Engineer's comments. The Engineer will have 5 working days to review the revisions. Upon the Engineer's approval of the SWPPP, 4 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. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for resulting losses, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The 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 a condition of the Permits, or when directed by the Engineer. Amendments shall

identify additional water pollution control practices or revised operations, including those areas or operations not identified in the initially approved SWPPP. Amendments to the SWPPP shall be prepared and submitted for review and approval within a time approved by the Engineer, but in no case longer than the time specified for the initial submittal and review of the SWPPP. 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 by a representative of the Regional Water Quality Control Board, State Water Resources Control Board, United States Environmental Protection Agency, or the local storm water management agency. Requests by the public shall be directed to the Engineer.

COST BREAK-DOWN

The Contractor shall include a Water Pollution Control Cost Break-Down in the SWPPP which itemizes the contract lump sum for water pollution control work. The Contractor shall use the Water Pollution Control Cost Break-Down provided in this section as the basis for the cost break-down submitted with the SWPPP. The Contractor shall use the Water Pollution Control Cost Break-Down to identify items, quantities and values for water pollution control work, excluding Temporary Water Pollution Control Practices for which there are separate bid items. The Contractor shall be responsible for the accuracy of the quantities and values used in the cost break-down submitted with the SWPPP. Partial payment for the item of water pollution control will not be made until the Water Pollution Control Cost Break-Down is approved by the Engineer.

Attention is directed to "Time-Related Overhead" of these special provisions regarding compensation for time-related overhead.

Line items indicated in the Water Pollution Control Cost Break-Down in this section with a specified Estimated Quantity shall be considered "Project-Specific Minimum Requirements." The Contractor shall incorporate Project-Specific Minimum Requirements with Contractor-designated quantities and values into the Water Pollution Control Cost Break-Down submitted with the SWPPP.

Line items indicated in the Water Pollution Control Cost Break-Down in this section without a specified Estimated Quantity shall be considered by the Contractor for selection to meet the applicable "Minimum Requirements" as defined in the Manuals, or for other water pollution control work as identified in the "Construction Site BMPs Consideration Checklist" presented in the Preparation Manual. In the Water Pollution Control Cost Break-Down submitted with the SWPPP, the Contractor shall list only those water pollution control practices selected for the project, including quantities and values required to complete the work for those items.

The sum of the amounts for the items of work listed in the Water Pollution Control Cost Break-Down shall be equal to the contract lump sum price bid for water pollution control. Overhead and profit, except for time-related overhead, shall be included in the individual items listed in the cost break-down.

WATER POLLUTION CONTROL COST BREAK-DOWN

Contract No. 269604

ITEM	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	VALUE	AMOUNT
SC-4	Check Dam	EA	1		
SC-10	Storm Drain Inlet Protection	EA	240		
WE-1	Wind Erosion Control	LS	Lump Sum		
TC-1	Stabilized Construction Entrance/Exit	EA	1		
NS-3	Paving and Grinding Operations	LS	Lump Sum		
NS-6	Illicit Connection/Illegal Discharge Detection and Reporting	LS	Lump Sum		
NS-8	Vehicle and Equipment Cleaning	LS	Lump Sum		
NS-9	Vehicle and Equipment Fueling	LS	Lump Sum		
NS-10	Vehicle and Equipment Maintenance	LS	Lump Sum		
WM-1	Material Delivery and Storage	LS	Lump Sum		
WM-2	Material Use	LS	Lump Sum		
WM-3	Stockpile Management	LS	Lump Sum		
WM-4	Spill Prevention and Control	LS	Lump Sum		
WM-5	Solid Waste Management	LS	Lump Sum		
WM-6	Hazardous Waste Management	LS	Lump Sum		
WM-8	Concrete Waste Management	LS	Lump Sum		
WM-9	Sanitary/Septic Waste Management	LS	Lump Sum		
WM-10	Liquid Waste Management	LS	Lump Sum		

TOTAL _____

Adjustments in the items of work and quantities listed in the approved cost break-down shall be made when required to address amendments to the SWPPP, except when the adjusted items are paid for as extra work.

No adjustment in compensation will be made to the contract lump sum price paid for water pollution control due to differences between the quantities shown in the approved cost break-down and the quantities required to complete the work as shown on the approved 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 which is not on the approved cost break-down, the adjustment in compensation will be determined in the same manner specified for extra work in conformance with Section 4-1.03D, "Extra Work," of the Standard Specifications.

If requested by the Contractor and approved by the Engineer, changes to the water pollution control practices listed in the approved cost break-down, including addition of new water pollution control practices, will be allowed. Changes shall be included in the approved amendment of the SWPPP. If the requested changes result in a net cost increase to the lump sum price for water pollution control, an adjustment in compensation will be made without change to the water pollution control item. The net cost increase to the water pollution control item will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

SWPPP IMPLEMENTATION

Unless otherwise specified, 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 specified in the SWPPP and in the amendments. Unless otherwise directed by the Engineer, the Contractor's responsibility for SWPPP implementation shall continue throughout temporary suspensions of work ordered in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications. Requirements for installation, construction, inspection, maintenance, removal, and disposal of water pollution control practices shall conform to the requirements in the Manuals and these special provisions.

If the Contractor or the Engineer identifies a deficiency in the implementation of the approved SWPPP or amendments, the deficiency shall be corrected immediately unless requested by the Contractor and approved by the Engineer in writing, but shall be corrected prior to the onset of precipitation. If the Contractor fails to correct the identified deficiency by the date agreed or prior to the onset of precipitation, the project shall be in nonconformance with this section, "Water Pollution Control." Attention is directed to Section 5-1.01, "Authority of Engineer," of the Standard Specifications, and to "Retention of Funds" of this section for possible nonconformance penalties.

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

Implementation of water pollution control practices may vary by season. The Construction Site BMPs Manual and these special provisions shall be followed for control practice selection of year-round, rainy season and non-rainy season water pollution control practices.

Year-Round Implementation Requirements

The Contractor shall have a year-round program for implementing, inspecting and maintaining water pollution control practices for wind erosion control, tracking control, non-storm water management, and waste management and materials pollution control.

The National Weather Service weather forecast shall be monitored and used by the Contractor on a daily basis. An alternative weather forecast proposed by the Contractor may be used if approved by the Engineer. If precipitation is predicted, the necessary water pollution control practices shall be deployed prior to the onset of the precipitation.

Disturbed soil areas shall be considered active whenever the soil disturbing activities have occurred, continue to occur or will occur during the ensuing 21 days. Non-active areas shall be protected as prescribed in the Construction Site BMPs Manual within 14 days of cessation of soil disturbing activities or prior to the onset of precipitation, whichever occurs first.

The Contractor shall implement, maintain and inspect the following temporary sediment control practices on a year-round basis. The listed practices shall remain in place until their use is no longer needed, as determined by the Engineer.

YEAR-ROUND SEDIMENT CONTROL PRACTICES	LOCATION USED
Temporary Cover	Location to be determined

Rainy Season Implementation Requirements

Soil stabilization and sediment control practices shall be provided throughout the rainy season, defined as between October 15 and April 15.

An implementation schedule of required soil stabilization and sediment control practices for disturbed soil areas shall be completed no later than 20 days prior to the beginning of each rainy season. The implementation schedule shall identify the soil stabilization and sediment control practices and the dates when the implementation will be 25 percent, 50 percent and 100 percent complete, respectively. For construction activities beginning during the rainy season, the Contractor shall implement applicable soil stabilization and sediment control practices. The Contractor shall implement soil stabilization and sediment control practices a minimum of 10 days prior to the start of the rainy season.

Throughout the defined rainy season, the active disturbed soil area of the project site shall be not more than 0.925 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 disturbed soil areas. A detailed plan for the mobilization of sufficient labor and equipment shall be maintained to deploy the water pollution control practices required to protect disturbed soil areas prior to the onset of precipitation.

Non-Rainy Season Implementation Requirements

The non-rainy season shall be defined as days outside the defined rainy season. The Contractor's attention is directed to the Construction Site BMPs Manual for soil stabilization and sediment control implementation requirements on disturbed soil areas during the non-rainy season. Disturbed soil areas within the project shall be protected in conformance with the requirements in the Construction Site BMPs Manual with an effective combination of soil stabilization and sediment control.

MAINTENANCE

To ensure the proper implementation and functioning of water pollution control practices, the Contractor shall regularly inspect and maintain the construction site for the water pollution control practices identified in the 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 two weeks outside of the defined rainy season.
E. Routinely, a minimum of once every week during the defined rainy season.

The Contractor shall use the Storm Water Quality Construction Site Inspection Checklist provided in the Preparation Manual or an alternative inspection checklist provided by the Engineer. One copy of each site inspection record shall be submitted to the Engineer within 24 hours of completing the inspection.

REPORTING REQUIREMENTS

Report of Discharges, Notices or Orders

If the Contractor identifies discharges into surface waters or drainage systems in a manner causing, or potentially causing, a condition of pollution, or if the project receives a written notice or order from a regulatory agency, the Contractor shall immediately inform the Engineer. The Contractor shall submit a written report to the Engineer within 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 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 first-time non-storm water discharge events, excluding exempted discharges. The Contractor shall notify the Engineer of the operations causing non-storm water discharges and shall obtain field approval for first-time non-storm water discharges. Non-storm water discharges shall be monitored at first-time occurrences and routinely thereafter.

Annual Certifications

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

SAMPLING AND ANALYTICAL REQUIREMENTS

The Contractor is required to implement specific sampling and analytical procedures to determine whether BMPs implemented on the construction site are:

A. preventing pollutants that are known or should be known by permittees to occur on construction sites that are not visually detectable in storm water discharges, to cause or contribute to exceedances of water quality objectives

.**Non-Visible Pollutants**

The project has the potential to discharge non-visible pollutants in storm water from the construction site. The project SWPPP shall contain a Sampling and Analysis Plan (SAP) that describes the sampling and analysis strategy and schedule to be implemented on the project for monitoring non-visible pollutants in conformance with this section.

The SAP shall identify potential non-visible pollutants that are known or should be known to occur on the construction site associated with the following: (1) construction materials, wastes or operations; (2) known existing contamination due to historical site usage; or (3) application of soil amendments, including soil stabilization products, with the potential to alter pH or contribute toxic pollutants to storm water. Planned material and waste storage areas, locations of known existing contamination, and areas planned for application of soil amendments shall be shown on the SWPPP Water Pollution Control Drawings.

The SAP shall identify a sampling schedule for collecting a sample down gradient from the applicable non-visible pollutant source and a sufficiently large uncontaminated control sample during the first two hours of discharge from rain events during daylight hours which result in a sufficient discharge for sample collection. If run-on occurs onto the non-visible pollutant source, a run-on sample that is immediately down gradient of the run-on to the Department's right of way shall be collected. A minimum of 72 hours of dry weather shall occur between rain events to distinguish separate rain events.

The SAP shall state that water quality sampling will be triggered when any of the following conditions are observed during the required storm water inspections conducted before or during a rain event:

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

The SAP shall identify sampling locations for collecting down gradient and control samples, and the rationale for their selection. The control sampling location shall be selected where the sample does not come into contact with materials, wastes or areas associated with potential non-visible pollutants or disturbed soil areas. Sampling locations shall be shown on the SWPPP Water Pollution Control Drawings. Only trained personnel shall collect water quality samples and be identified in the SAP. Qualifications of designated sampling personnel shall describe training and experience, and shall be included in the SWPPP. The SAP shall state monitoring preparation, sample collection procedures, quality assurance/quality control, sample labeling procedures, sample collection documentation, sample shipping and chain of custody procedures, sample numbering system, and reference the construction site health and safety plan.

The SAP shall identify the analytical method to be used for analyzing down gradient and control samples for potential non-visible pollutants on the project. For samples analyzed in the field by sampling personnel, collection, analysis, and equipment calibration shall be in conformance with the Manufacturer's specifications. For samples that will be analyzed by a laboratory, sampling, preservation, and analysis shall be performed by a State-certified laboratory in conformance with 40 CFR 136. The SAP shall identify the specific State-certified laboratory, sample containers, preservation requirements, holding times, and analysis method to be used. A list of State-certified laboratories that are approved by the Department is available at the following internet site:

http://www.dhs.ca.gov/ps/ls/elap/html/lablist_county.htm.

Analytical Results and Evaluation

The Contractor shall submit a hard copy and electronic copy of water quality analytical results and quality assurance/quality control data to the Engineer within 5 days of sampling for field analyses and within 30 days for laboratory analyses. Analytical results shall be accompanied by an evaluation from the Contractor to determine if down gradient samples show elevated levels of the tested parameter relative to levels in the control sample. If down gradient or downstream samples, as applicable, show increased levels, the Contractor will assess the BMPs, site conditions, and surrounding influences to determine the probable cause for the increase. As determined by the assessment, the Contractor will repair or modify BMPs to address increases and amend the SWPPP as necessary. Electronic results (in one of the following file formats: .xls, .txt, .csv, .dbs, or .mdb) shall have at a minimum the following information: sample identification number, contract number, constituent, reported value, method reference, method detection limit, and reported detection limit. The Contractor shall document sample collection during rain events.

Water quality sampling documentation and analytical results shall be maintained with the SWPPP on the project site until a Notice of Completion has been submitted and approved.

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

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, 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.
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 management, and waste management and materials pollution water pollution control practices, except those for which there is a contract item of work as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Storm water sampling and analysis will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications. No payment will be made for the preparation, collection, analysis, and reporting of storm water samples required where appropriate BMPs are not implemented prior to a rain event, or if a failure of a BMP is not corrected prior to a rain event.

Soil Stabilization

Temporary water pollution control practices except:

SS-1 Scheduling
SS-2 Preservation of Existing Vegetation

Wind Erosion Control

No sharing of maintenance costs will be allowed.

Tracking Control

TC-1 Stabilized Construction Entrance/Exit.

Non-Storm Water Management

No sharing of maintenance costs will be allowed.

Waste Management & Materials Pollution Control

No sharing of maintenance costs will be allowed.

The division of cost will be made by determining the cost of maintaining 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. Cleanup, repair, removal, disposal, improper installation, and replacement of water pollution control practices damaged by the Contractor's negligence, shall not be considered as included in the cost for performing maintenance.

The provisions for sharing maintenance costs shall not relieve the Contractor from the responsibility for providing appropriate maintenance on items with no shared maintenance costs.

Full compensation for non-shared maintenance costs of water pollution control practices, as specified in this section, "Water Pollution Control," shall be considered as included in the contract lump sum price paid for water pollution control and no additional compensation will be allowed therefor.

Water pollution control practices for which there is a contract item of work, will be measured and paid for as that contract item of work.

10-1.03 STREET SWEEPING

Street sweeping shall be conducted where sediment is tracked from the project site onto paved roads, as described in the approved Storm Water Pollution Prevention Plan in accordance with "Water Pollution Control" of these special provisions, and as directed by the Engineer.

Street sweeping shall be one of the water pollution control practices for sediment control. The Storm Water Pollution Prevention Plan shall include the use of street sweeping. Street sweeping shall be performed in accordance with Section 4, SC—7 in the Construction Site Best Management Practices Manual of the Caltrans Storm Water Quality Handbooks.

The number of street sweepers shall be as designated in the approved Storm Water Pollution Prevention Plan. The Contractor shall maintain at least 1 sweeper on the project site at all times during the period that sweeping work is required. Sweepers shall be self-loading, motorized, and shall have spray nozzles. Sweepers may include a vacuum apparatus.

Street sweeping shall commence at the beginning of clearing and grubbing and shall continue until completion of the project, or as directed by the Engineer. Street sweeping shall be performed immediately after soil disturbing activities occur or offsite tracking of material is observed. Street sweeping shall be performed so that dust is minimized. If dust generation is excessive or sediment pickup is ineffective as determined by the Engineer, the use of water or a vacuum will be required.

At the option of the Contractor, collected material may be temporarily stockpiled in accordance with the approved Storm Water Pollution Prevention Plan. Collected material shall be disposed of at least once per week.

Material collected during street sweeping operations shall be disposed of in conformance with Section 7—1.13, "Disposal of Material Outside The Highway Right Of Way," of the Standard Specifications.

MEASUREMENT AND PAYMENT

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

The costs involved in providing street sweeping in addition to that required in the approved Storm Water Pollution Protection Plan and this section will be borne equally by the State and the Contractor. The division of cost will be made by determining the cost of providing street sweeping 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

10-1.04 TEMPORARY COVER

Temporary cover shall be furnished, installed, maintained, and later removed at the locations shown on the approved Storm Water Pollution Prevention Plan in conformance with "Water Pollution Control" of these special provisions, and in conformance with details shown on the plans and these special provisions.

Temporary cover shall be one of the water pollution control practices for soil stabilization. The Storm Water Pollution Prevention Plan shall include the use of temporary cover.

MATERIALS

Temporary Cover Fabric

Temporary cover fabric shall be either a geotextile (engineering fabric) or a geomembrane (plastic sheeting) conforming to the following requirements:

A. Geotextile shall be a woven, slit film fabric which is also known as woven tape. The fabric shall be nonbiodegradable, resistant to deterioration by sunlight, and inert to most soil chemicals. Edges of the film fabric shall be selvage or serge to prevent unraveling. The film fabric shall also conform to the following requirements:

Specification	Requirements
Grab tensile strength (25-mm grip), kilonewtons, min. ASTM Designation: D4632*	0.89
Elongation at break, percent min. ASTM Designation: D4632*	15
Toughness, kilonewtons, min. (percent elongation x grab tensile strength)	13.3
Permittivity, 1/sec, max. (liters per minute per square meter) ASTM Designation: D 4491	0.08 (244)
Ultraviolet light stability, percent tensile strength retained after 500 hours, min. ASTM Designation: D 4355 (xenon arc lamp method)	70

* or appropriate test method for specific polymer

B. The geomembrane shall consist of 0.25-mm thick, single-ply material in conformance with the requirements in ASTM Designation: D 5199.

Temporary cover fabric shall be manufactured from polyethylene, polypropylene, or comparable polymers. The polymer materials may be virgin, recycled, or a combination of virgin and recycled materials. The polymer materials shall not contain biodegradable filler materials that can degrade the physical or chemical characteristics of the finished fabric. The Engineer may order tests to confirm the absence of biodegradable filler materials in conformance with the requirements in ASTM Designation: E 204 (Fourier Transformed Infrared Spectroscopy-FTIR).

Restrainers

Restrainers for securing the temporary cover fabric on slopes and stockpiles shall consist of one or a combination of the following:

A. Gravel-filled bags used as restrainers shall be knotted, roped, and placed at a maximum of 2 m apart on the temporary cover fabric as shown on the plans. Gravel-filled bags shall be between 13 kg and 22 kg in mass, between 600 mm and 800 mm in length, and between 400 mm and 500 mm in width. Gravel bag fabric shall be nonwoven polypropylene geotextile with a minimum unit weight of 270 g/m^2. The fabric shall have a minimum grab tensile strength (25-mm grip) of 0.89-kN in conformance with the requirements in ASTM Designation: D 4632, and an ultraviolet (UV) stability of 70 percent tensile strength retained after 500 hours in conformance with the requirements in ASTM Designation: D 4355, xenon arc lamp method. Gravel shall consist of noncohesive material between 10 mm and 20 mm in diameter, free of clay balls, organic matter, and other deleterious material. The openings of gravel-filled bags shall be secured to prevent escape of gravel.
B. Restrainers consisting of a steel anchor with a wooden lath shall be fabricated and placed as shown on the plans. Wooden lath shall conform to the provisions in Section 20-2.12, "Lumber," of the Standard Specifications and shall be fir or pine, 38 mm x 89 mm in size, and 2.4 m in length. The wooden lath shall be secured to the temporary cover with steel anchors placed 1.2 m apart along the lath.

The Contractor may use an alternative restrainer if approved by the Engineer in writing. The Contractor shall submit details for an alternative restrainer to the Engineer prior to installation. The alternative restrainer shall be installed and maintained in conformance with these special provisions.

INSTALLATION

Temporary cover shall be installed as follows:

A. Temporary cover fabric shall be placed and anchored as shown on the plans.
B. Abutting edges of the temporary cover fabric shall overlap a minimum of 600 mm. Nonabutting edges shall be embedded in the soil a minimum of 150 mm.
C. Restrainers shall be placed at the overlap area and along the toe of the slope. Restrainers outside the overlap areas shall be placed at a maximum spacing of 2.4 m.
D. Steel anchors shall be installed to allow the leg of the steel anchor to pierce through the temporary cover fabric into the slope with the crown section securing the wooden lath firmly against the slope.
E. Earthen berm, a linear sediment barrier, shall be constructed adjacent to the toe of the slope with a minimum height of 200 mm and a minimum width of 940 mm. The earthen berm shall be hand or mechanically compacted. Alternative linear sediment barrier may be used at the Contractor's expense if approved by the Engineer in writing.

If the Contractor removes the temporary cover in order to facilitate other work, the temporary cover shall be replaced and secured at the Contractor's expense.

When no longer required as determined by the Engineer, temporary cover shall become the property of the Contractor and 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.

Ground disturbances, including holes and depressions, caused by the installation and removal of the temporary cover shall be backfilled and repaired in conformance with the provisions in Section 15-1.02, "Preservation of Property," of the Standard Specifications.

MAINTENANCE

The Contractor shall maintain the temporary cover throughout the contract to prevent displacement or migration of the material on the slope or stockpiled.

Temporary cover shall be maintained to minimize exposure of the protected area. Restrainers shall be relocated and secured as needed to restrain the temporary cover fabric in place. Temporary cover that breaks free shall be immediately secured. Holes, tears, and voids in the temporary cover fabric shall be patched, repaired, or replaced. When patches or repairs are unacceptable as determined by the Engineer, the temporary cover shall be replaced.

Temporary cover shall be repaired or replaced on the same day when the damage occurs. Damage to the temporary cover resulting from the Contractor's vehicles, equipment, or operations shall be repaired at the Contractor’s expense.

MEASUREMENT AND PAYMENT

The quantity of temporary cover to be paid for will be measured by the square meter for the actual area covered.

The contract price paid per square meter for temporary cover shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing temporary cover, complete in place, including trench excavation and backfill, maintenance, and removal of temporary cover, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.05 NON-STORM WATER DISCHARGE CONTROL

Non-Storm water discharges shall conform to the requirements in Section 7-1.01 G, "Water Pollution Control" of the Standard Specifications, the requirements for water pollution control elsewhere in these special provisions, and these special provisions.

Conformance with the requirements of this section shall in no way relieve the Contractor from the contractor’s responsibilities, as provided in Section 7-1.11, "Preservation of Property", and Section 7-1.12, “Responsibility for Damage”, of the Standard Specifications.

Spill Contingency

The Contractor shall prepare and submit to the Engineer a contingency plan for the management of spills or leaks of any materials or wastes that may impact the water quality of the receiving water body.

The spill contingency plan shall be incorporated within the Storm Water Pollution Prevention Plan (SWPPP), as specified in "Water Pollution Control" of these special provisions.

The contingency plan shall include instructions and procedures for preventing spills, reporting spills, and a list of spill containment and collection materials and equipment to be maintained onsite. The contingency plan shall be reviewed and updated as directed by the Engineer.

Liquids, Residues, And Debris

The control and disposal of the liquids, residues, and debris shall be described within the SWPPP, as specified in "Water Pollution Control" of these special provisions. The SWPPP shall, at a minimum, depict and describe the procedural and structural methods of detaining, collecting, and disposing of all slurries, liquids, residues, and debris associated with the operations. Sufficient redundancy shall be incorporated into the procedural and structural methods such that the liquids, residues, and debris are not conveyed into or become present in receiving waters, drainage systems, or other water bodies.

The runoff from the grinding residue shall be considered a prohibited non-storm water discharge. Conditions for temporarily storing grinding residue outside the highway right of way shall include the following:

A narrative and plans that illustrate details of the site and the proposed deployment of temporary water pollution control and permanent erosion control measures shall be included and submitted as part of the initial Water Pollution Control document submittal and shall address all necessary construction site best management practices including, but not limited to: WM-3, Covered Soil Stockpiles, WM-5 Solid Waste Management, WM-8 Concrete Waste Management, TC-1 Stabilized Construction Entrances/Exits, TC-2 Stabilized Construction Roadways, SC-10 Drain Inlet Protection, and NS-3 Paving and Grinding Operations. Proposed permanent erosion control recommendations shall be consistent with proposed treatments specified elsewhere in the special provisions.

B. Provide the Engineer two copies of the Contractor's Water Pollution Control drawings for the "Temporary Grinding Residue Storage Facility" as described elsewhere in these special provisions. If a Temporary Grinding Residue Storage Facility is constructed outside of the Right of Way, drawings shall be supplied and at a minimum shall contain and/or address the following:

a. A site map showing the proposed circulation patterns, existing drainage facilities, drainage patterns, and adjacent water bodies or water courses.
b. Water Pollution Control drawing showing all necessary BMPs to prevent Water Pollution including impacts to groundwater in conformance with "Water Pollution Control" of these special provisions. Containment facilities may be either constructed on site or be prefabricated units capable of preventing infiltration, spills and discharges. All containment facilities shall include adequate freeboard.
c. An estimate of the volume of the PCC liquid residue to be generated and corresponding calculations for sizing adequate containment facilities to prevent the delay of work.

A contingency plan to address the immediate repair of the Contractor's facilities in case of breech or malfunction including procedures for spill containment and recovery.

The State will not be liable to the Contractor for failure to accept all or any portion of the water pollution control practices for the grinding residue containment system, nor for any delays to the work due to the Contractor's failure to submit acceptable water pollution control and permanent erosion control practices. The Contractor shall not begin installation or use of the "Temporary Grinding Residue Storage Facility" described elsewhere in these special provisions, until handling and disposal protocols have been established regarding immediate removal of temporary on-site storage.

This spec has been approved to use by Gary Garofalo on 1/27/06

TEMPORARY GRINDING RESIDUE STORAGE FACILITY

Attention is directed to "Order of Work", "Preservation of Property", "Grind Existing Concrete Pavement", "Disposal of Portland Cement Concrete (PCC) Pavement Grooving and Grinding Residues", "Non-Storm Water Discharge Control" and "Water Pollution Control" of these special provisions.

Temporary grinding storage facilities shall be used as one of the various measures to prevent water pollution. The Storm Water Pollution Prevention Plan shall include the use of temporary grinding storage facilities.

MATERIALS

Plastic Liner

Plastic liner shall be single ply, new polyethylene sheeting, a minimum of 0.5-mm thick and shall be free of holes, punctures, tears or other defects that compromise the impermeability of the material. No seams or overlapping joints will be allowed except as indicated in these special provisions.

Gravel-filled Bags

Gravel-filled bag fabric shall be non-woven polypropylene geotextile (or comparable polymer), with a minimum unit weight of 235 g/m^2. The fabric shall have a minimum grab tensile strength of 0.89-kilonewtons in conformance to the requirements in ASTM Designation: D 4632, 25-mm grip, and an ultraviolet (UV) stability of 70 percent tensile strength retained after 500 hours in conformance to the requirements in ASTM Designation: D 4355, xenon arc lamp method.

Gravel-filled bags shall be between 600 mm and 800 mm in length, and between 400 mm and 500 mm in width.

Gravel shall be between 5 mm and 75 mm in diameter, and shall be clean and free from clay balls, organic matter, and other deleterious materials. The opening of gravel-filled bags shall be secured such that gravel does not escape. Gravel-filled bags shall be between 13 kg and 22 kg in mass.

Straw Bales

Straw for straw bales shall conform to the provisions in Section 20-2.06, "Straw," of the Standard Specifications.

Straw bales shall be a minimum of 360 mm in width, 450 mm in height, 900 mm in length and shall have a minimum mass of 23 kg. The straw bale shall be composed entirely of vegetative matter, except for binding material.

Straw bales shall be bound by either wire, nylon or polypropylene string. Jute or cotton binding shall not be used. Wire shall be a minimum 1.57 mm (16-gage) baling wire. Nylon or polypropylene string shall be approximately 2 mm in diameter with 360 N of breaking strength.

Stakes

Stakes used for securing straw bales shall be 50 mm x 50 mm wood posts. Metal stakes may be used as an alternative, and shall be a minimum 13 mm in diameter. Stakes shall be a minimum 1200 mm in length. The tops of the metal stakes shall be bent at a 90-degree angle or capped with an orange or red plastic safety cap that fits snugly to the metal stake. The Contractor shall submit a sample of the metal stake and plastic cap, if used, to the Engineer prior to installation.

Staples

Staples shall be as shown on the plans.

Signs

Signs shall be constructed as shown on the plans. Wood posts shall conform to the provisions in Section 56-2.02B, "Wood Posts," of the Standard Specifications. Lag screws shall conform to the provisions in Section 56-2.02D, "Sign Panel Fastening Hardware," of the Standard Specifications.

Plywood shall be freshly painted for each installation with not less than 2 applications of flat white paint. Sign letters shown on the plans shall be stenciled with commercial quality exterior black paint. Testing of paint will not be required.

INSTALLATION

Temporary grinding storage facilities shall either be constructed as shown on the plans or a pre-manufactured, water-tight above grade containment system. Drying basins shall conform with items A to *L* below.

A. Be appropriately sized to contain all PCC residue and liquids generated so work is not delayed. Temporary grinding storage facilities shall be constructed in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations for all concrete wastes. These facilities shall be constructed to contain all liquid and concrete waste without seepage, spillage or overflow. The length and width of a temporary grinding storage facility may be increased from the minimum dimensions shown on the plans, at the Contractor's expense and upon approval of the Engineer.

B Be designed to facilitate recycling of wastewater to reduce the total amount of water used.

C Be designed to prevent infiltration and be lined with a minimum 0.25mm thick plastic with all seams taped. If seaming is required, methods recommended by the manufacturer to form a waterproof seam shall be followed.

D Be located at least 15 m away from water bodies, storm water conveyance systems, ESAs, or any areas under the jurisdiction of the US Army Corps of Engineers or the California Department of Fish and Game.

E The Contractor shall not begin construction of the storage facility nor utilize any locations until proper authorization to proceed is obtained from the local Regional Water Quality Control Board having jurisdiction of the site.

F Grinding residue shall be treated as a prohibited non-storm water discharge and all necessary precautions shall be undertaken to prevent spills and discharges. Any and all spills or discharges shall be immediately contained, reported to the Engineer, cleaned and properly disposed.

G A sign shall be installed adjacent to each storage facilitydetermined by the Contractor and approved by the Engineer. Signs shall be installed in conformance with the provisions in Section 56-2.03, "Construction," and Section 56-2.04, "Sign Panel Installation," of the Standard Specifications and as shown on the plans.

H. The liner must be able to withstand alkaline liquids.

I The liner must be placed and anchored in accordance with the manufacturer's requirements.

J Storm water run-off and irrigation run-off should not be allowed to drain to the storage facility during the life of the temporary storage facility.

K If larger than 100 m^3, interior side slopes shall be constructed at 1V: 3H or flatter.

L Security fencing and locked access to the temporary storage facility should be required (to prevent intrusion and to prevent illicit discharge of PCC residue, washout material and other wastes).

Contractor shall submit details for an alternative temporary grinding storage facility to the Engineer at least 7 days prior to installation. The alternative temporary grinding storage facility shall be installed and maintained in conformance with these special provisions.

When temporary grinding storage facilities are no longer required for the work, as determined by the Engineer, the hardened concrete and liquid residue shall be removed and disposed of in conformance with the provisions in Section 15-3.02, "Removal Methods," of the Standard Specifications. Material used to construct temporary grinding storage facilities shall become the property of the Contractor, shall be removed from the site of the work, and shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The temporary storage sites shall be restored to their original condition, line and grade to the Engineer's satisfaction. Holes, depressions or other ground disturbance caused by the installation and removal of the temporary grinding storage facilities shall be back filled and repaired in conformance with the provisions in Section 15-1.02, "Preservation of Property," of the Standard Specifications. Site restoration shall include the application of permanent erosion controls.

MAINTENANCE

Temporary grinding storage facilities shall be maintained to provide adequate holding and freeboard capacity. Maintaining temporary grinding storage facilities shall include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials shall be removed and disposed of in conformance with the provisions in Section 15-3.02, "Removal Methods," of the Standard Specifications. Holes, rips, and voids in the plastic liner shall be patched and repaired by taping or the plastic liner shall be replaced. Plastic liner shall be replaced when patches or repairs compromise the impermeability of the material as determined by the Engineer.

MEASUREMENT AND PAYMENT

Full compensation for conforming to the Non-storm Water Discharge Control, and for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing the Temporary Grinding Residue Storage Facility, disposing of concrete waste, removing, complete in place, maintenance, and removal of Temporary Grinding Residue Storage Facility, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer, shall be considered as included in the price paid for the contract item of work involving PCC pavement grooving or grinding residues and no additional compensation will be allowed therefore.

10-1.06 TEMPORARY CONCRETE WASHOUT (PORTABLE)

A portable temporary concrete washout shall be furnished, maintained, and removed as specified in the approved Storm Water Pollution Prevention Plan in conformance with "Water Pollution Control" of these special provisions and as directed by the Engineer.

A portable temporary concrete washout shall consist of a commercially available drum at a minimum size of 208-liter or alternate container upon written approval from the Engineer. The drum shall be stenciled "Concrete Waste Material." The letters shall be black and 100 mm in height on a white background. The top of the stenciling shall be 300 mm from the top of the barrel.

PLACEMENT

A portable temporary concrete washout shall be as follows:

A. A portable temporary concrete washout shall be in place prior to placement of concrete and shall be located in the immediate area of the concrete work as approved by the Engineer. The temporary concrete washout shall be located away from construction traffic or public access areas. After initial placement, temporary concrete washout shall be moved as needed for concrete construction work. When the temporary concrete washout is no longer required, as determined by the Engineer, it 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.
B. A sign shall be installed adjacent to each washout at a location determined by the Contractor and approved by the Engineer. Signs shall be installed in conformance with the provisions in Section 12-3.06B, "Portable Signs" of the Standard Specifications. Each portable sign shall consist of a base, framework and a sign panel. The sign panel shall be made out of plywood and shall have a minimum size of 610 mm by 1200 mm. The sign panel shall read "Concrete Washout" with black letters, 150 mm in height, on a white background.
C. The Contractor shall provide sufficient temporary concrete washout capacity to contain liquid and concrete waste generated by washout operations without seepage or spills.

Maintaining the portable temporary concrete washout shall include removing and disposing of concrete waste. Concrete waste material generated shall be removed each day 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.

The Contractor shall provide the name and location of the disposal facility to the Engineer before disposal of solid and liquid concrete waste. The Contractor shall provide verification that the off-site commercial or noncommercial disposal site has a permit issued by the California Regional Water Quality Control Board (RWQCB). If the disposal site is located outside of the State of California, the Contractor shall provide a copy of the permit issued by the state or local agency having jurisdiction over the disposal site.

When relocating or transporting a portable temporary concrete washout, the portable washout shall be properly secured to prevent spilling of concrete waste material.

PAYMENT

The contract lump sum price paid for temporary concrete washout (portable) shall include full compensation for furnishing all labor, materials, tools, equipment, including the sign, and incidentals, and for doing all the work involved in furnishing, placing, maintaining, repairing, replacing, transporting, disposing of concrete waste, and removing the washout, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

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 other contractors (Contract No EA 04-0A8004) to Replace gore signs in Alameda on Route 24, at PM R5.65 (9.1KP), (Contract No. EA 04-2S2201) construct soil nail wall at Fish Ranch Road in CC country on Rte 24, at 0.3 PM, and (Contract No. EA 04-3S5404) Insert pipe liner on existing 36-inch RCP beneath the westbound lanes of Rte 24, in CC County, PM 5.6 Westbound. may be in progress adjacent to or within the limits of this project during progress of the work on this contract.

10-1.08 PROGRESS SCHEDULE (CRITICAL PATH METHOD)

The Contractor shall submit to the Engineer practicable critical path method (CPM) progress schedules in conformance with these special provisions. Whenever the term "schedule" is used in this section it shall mean CPM progress schedule.

Attention is directed to "Payments" of Section 5 of these special provisions.

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

DEFINITIONS

The following definitions shall apply to this section:

A. ACTIVITY.—A task, event or other project element on a schedule that contributes to completing the project. Activities have a description, start date, finish date, duration and one or more logic ties.
B. BASELINE SCHEDULE.—The initial schedule representing the Contractor's work plan on the first working day of the project.
C. CONTRACT COMPLETION DATE.—The current extended date for completion of the contract shown on the weekly statement of working days furnished by the Engineer in conformance with the provisions in Section 8-1.06, "Time of Completion," of the Standard Specifications.
D. CRITICAL PATH.—The longest continuous chain of activities for the project that has the least amount of total float of all chains. In general, a delay on the critical path will extend the scheduled completion date.

E. CRITICAL PATH METHOD (CPM).—A network based planning technique using activity durations and the relationships between activities to mathematically calculate a schedule for the entire project.
F. DATA DATE.—The day after the date through which a schedule is current. Everything occurring earlier than the data date is "as-built" and everything on or after the data date is "planned."
G. EARLY COMPLETION TIME.—The difference in time between an early scheduled completion date and the contract completion date.
H. FLOAT.—The difference between the earliest and latest allowable start or finish times for an activity.
I. MILESTONE.—An event activity that has zero duration and is typically used to represent the beginning or end of a certain stage of the project.
J. NARRATIVE REPORT.—A document submitted with each schedule that discusses topics related to project progress and scheduling.
K. NEAR CRITICAL PATH.—A chain of activities with total float exceeding that of the critical path but having no more than 10 working days of total float.
L. SCHEDULED COMPLETION DATE.—The planned project finish date shown on the current accepted schedule.
M. STATE OWNED FLOAT ACTIVITY.—The activity documenting time saved on the critical path by actions of the State. It is the last activity prior to the scheduled completion date.
N. TIME IMPACT ANALYSIS.—A schedule and narrative report developed specifically to demonstrate what effect a proposed change or delay has on the current scheduled completion date.
O. TOTAL FLOAT.—The amount of time that an activity or chain of activities can be delayed before extending the scheduled completion date.
P. UPDATE SCHEDULE.—A current schedule developed from the baseline or subsequent schedule through regular monthly review to incorporate as-built progress and any planned changes.

GENERAL REQUIREMENTS

The Contractor shall submit to the Engineer baseline, monthly update and final update schedules, each consistent in all respects with the time and order of work requirements of the contract. The project work shall be executed in the sequence indicated on the current accepted schedule.

Schedules shall show the order in which the Contractor proposes to carry out the work with logical links between time-scaled work activities, and calculations made using the critical path method to determine the controlling operation or operations. The Contractor is responsible for assuring that all activity sequences are logical and that each schedule shows a coordinated plan for complete performance of the work.

The Contractor shall produce schedules using computer software and shall furnish compatible software for the Engineer's exclusive possession and use. The Contractor shall furnish network diagrams, narrative reports, tabular reports and schedule data as parts of each schedule submittal.

Schedules shall include, but not be limited to, activities that show the following that are applicable to the project:

A. Project characteristics, salient features, or interfaces, including those with outside entities, that could affect time of completion.
B. Project start date, scheduled completion date and other milestones.
C. Work performed by the Contractor, subcontractors and suppliers.
D. Submittal development, delivery, review and approval, including those from the Contractor, subcontractors and suppliers.
E. Procurement, delivery, installation and testing of materials, plants and equipment.
F. Testing and settlement periods.
G. Utility notification and relocation.
H. Erection and removal of falsework and shoring.
I. Major traffic stage switches.
J. Finishing roadway and final cleanup.
K. State-owned float as the predecessor activity to the scheduled completion date.

Schedules shall have not less than 50 and not more than 500 activities, unless otherwise authorized by the Engineer. The number of activities shall be sufficient to assure adequate planning of the project, to permit monitoring and evaluation of progress, and to do an analysis of time impacts.

Schedule activities shall include the following:

A. A clear and legible description.
B. Start and finish dates.

C. A duration of not less than one working day, except for event activities, and not more than 20 working days, unless otherwise authorized by the Engineer.
D. At least one predecessor and one successor activity, except for project start and finish milestones.
E. Required constraints.
F. Codes for responsibility, stage, work shifts, location and contract pay item numbers.

The Contractor may show early completion time on any schedule provided that the requirements of the contract are met. Early completion time shall be considered a resource for the exclusive use of the Contractor. The Contractor may increase early completion time by improving production, reallocating resources to be more efficient, performing sequential activities concurrently or by completing activities earlier than planned. The Contractor may also submit for approval a cost reduction incentive proposal in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications that will reduce time of construction.

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

State-owned float shall be considered a resource for the exclusive use of the State. The Engineer may accrue State-owned float by the early completion of review of any type of required submittal when it saves time on the critical path. The Contractor shall prepare a time impact analysis, when requested by the Engineer, to determine the effect of the action in conformance with the provisions in "Time Impact Analysis" specified herein. The Engineer will document State-owned float by directing the Contractor to update the State-owned float activity on the next update schedule. The Contractor shall include a log of the action on the State-owned float activity and include a discussion of the action in the narrative report. The Engineer may use State-owned float to mitigate past, present or future State delays by offsetting potential time extensions for contract change orders.

The Engineer may adjust contract working days for ordered changes that affect the scheduled completion date, in conformance with the provisions in Section 4-1.03, "Changes," of the Standard Specifications. The Contractor shall prepare a time impact analysis to determine the effect of the change in conformance with the provisions in "Time Impact Analysis" specified herein, and shall include the impacts acceptable to the Engineer in the next update schedule. Changes that do not affect the controlling operation on the critical path will not be considered as the basis for a time adjustment. Changes that do affect the controlling operation on the critical path will be considered by the Engineer in decreasing time or granting an extension of time for completion of the contract. Time extensions will only be granted if the total float is absorbed and the scheduled completion date is delayed one or more working days because of the ordered change.

The Engineer's review and acceptance of schedules shall not waive any contract requirements and shall not relieve the Contractor of any obligation thereunder or responsibility for submitting complete and accurate information. Schedules that are rejected shall be corrected by the Contractor and resubmitted to the Engineer within 5 working days of notification by the Engineer, at which time a new review period of one week will begin.

Errors or omissions on schedules shall not relieve the Contractor from finishing all work within the time limit specified for completion of the contract. If, after a schedule has been accepted by the Engineer, either the Contractor or the Engineer discover that any aspect of the schedule has an error or omission, it shall be corrected by the Contractor on the next update schedule.

COMPUTER SOFTWARE

The Contractor shall submit to the Engineer for approval a description of proposed software before delivery. The software shall be the current version of Primavera SureTrak Project Manager for Windows, or equal, and shall be compatible with Windows NT (version 4.0) operating system. If software other than SureTrak is proposed, it shall be capable of generating files that can be imported into SureTrak.

The Contractor shall furnish schedule software and all original software instruction manuals to the Engineer with submittal of the baseline schedule. The furnished schedule software shall become the property of the State and will not be returned to the Contractor. The State will compensate the Contractor in conformance with the provisions in Section 4-1.03, "Extra Work," of the Standard Specifications for replacement of software which is damaged, lost or stolen after delivery to the Engineer.

The Contractor shall instruct the Engineer in the use of the software and provide software support until the contract is accepted. Within 20 working days of contract approval, the Contractor shall provide a commercial 8-hour training session for 2 Department employees in the use of the software at a location acceptable to the Engineer. It is recommended that the Contractor also send at least 2 employees to the same training session to facilitate development of similar knowledge and skills in the use of the software. If software other than SureTrak is furnished, then the training session shall be a total of 16-hours for each Department employee.

NETWORK DIAGRAMS, REPORTS AND DATA

The Contractor shall include the following for each schedule submittal:

A. Two sets of originally plotted, time-scaled network diagrams.
B. Two copies of a narrative report.
C. Two copies of each of 3 sorts of the CPM software-generated tabular reports.
D. One 1.44-megabyte 90 mm (3.5 inch) floppy diskette containing the schedule data.

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

A. Show a continuous flow of information from left to right.
B. Be based on early start and early finish dates of activities.
C. Clearly show the primary paths of criticality using graphical presentation.
D. Be prepared on E-size sheets, 860 mm x 1120 mm (34 inch x 44 inch).
E. Include a title block and a timeline on each page.

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

A. Contractor's transmittal letter.
B. Work completed during the period.
C. Identification of unusual conditions or restrictions regarding labor, equipment or material; including multiple shifts, 6-day work weeks, specified overtime or work at times other than regular days or hours.
D. Description of the current critical path.
E. Changes to the critical path and scheduled completion date since the last schedule submittal.
F. Description of problem areas.
G. Current and anticipated delays:

    1. Cause of delay.
    2. Impact of delay on other activities, milestones and completion dates.
    3. Corrective action and schedule adjustments to correct the delay.

H. Pending items and status thereof:

    1. Permits
    2. Change orders
    3. Time adjustments
    4. Non-compliance notices

I. Reasons for an early or late scheduled completion date in comparison to the contract completion date.

Tabular reports shall be software-generated and provide information for each activity included in the project schedule. Three different reports shall be sorted by (1) activity number, (2) early start and (3) total float. Tabular reports shall be 215 mm x 280 mm (8 1/2 inch x 11 inch) in size and shall include, as a minimum, the following applicable information:

A. Data date
B. Activity number and description
C. Predecessor and successor activity numbers and descriptions
D. Activity codes
E. Scheduled, or actual and remaining durations (work days) for each activity
F. Earliest start (calendar) date
G. Earliest finish (calendar) date
H. Actual start (calendar) date
I. Actual finish (calendar) date
J. Latest start (calendar) date

K. Latest finish (calendar) date
L. Free float (work days)
M. Total float (work days)
N. Percentage of activity complete and remaining duration for incomplete activities.
O. Lags
P. Required constraints

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

PRE-CONSTRUCTION SCHEDULING CONFERENCE

The Contractor shall schedule and the Engineer will conduct a pre-construction scheduling conference with the Contractor's project manager and construction scheduler within 10 working days of the approval of the contract. At this meeting the Engineer will review the requirements of this section of the special provisions with the Contractor.

The Contractor shall submit a general time-scaled logic diagram displaying the major activities and sequence of planned operations and shall be prepared to discuss the proposed work plan and schedule methodology that comply with the requirements of these special provisions. If the Contractor proposes deviations to the construction staging of the project, then the general time-scaled logic diagram shall also display the deviations and resulting time impacts. The Contractor shall be prepared to discuss the proposal.

At this meeting, the Contractor shall additionally submit the alphanumeric coding structure and the activity identification system for labeling the work activities. To easily identify relationships, each activity description shall indicate its associated scope or location of work by including such terms as quantity of material, type of work, bridge number, station to station location, side of highway (such as left, right, northbound, southbound), lane number, shoulder, ramp name, ramp line descriptor or mainline.

The Engineer will review the logic diagram, coding structure, and activity identification system, and provide any required baseline schedule changes to the Contractor for implementation.

BASELINE SCHEDULE

Beginning the week following the pre-construction scheduling conference, the Contractor shall meet with the Engineer weekly until the baseline schedule is accepted by the Engineer to discuss schedule development and resolve schedule issues.

The Contractor shall submit to the Engineer a baseline schedule within 20 working days of approval of the contract. The Contractor shall allow 3 weeks for the Engineer's review after the baseline schedule and all support data are submitted. In addition, the baseline schedule submittal will not be considered complete until the computer software is delivered and installed for use in review of the schedule.

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

The baseline schedule shall not extend beyond the number of working days specified in these special provisions. The baseline schedule shall have a data date of the first working day of the contract and not include any completed work to date. The baseline schedule shall not attribute negative float or negative lag to any activity.

If the Contractor submits an early completion baseline schedule that shows contract completion in less than 85 percent of the working days specified in these special provisions, the baseline schedule shall be supplemented with resource allocations for every task activity and include time-scaled resource histograms. The resource allocations shall be shown to a level of detail that facilitates report generation based on labor crafts and equipment classes for the Contractor and subcontractors. The Contractor shall use average composite crews to display the labor loading of on-site construction activities. The Contractor shall optimize and level labor to reflect a reasonable plan for accomplishing the work of the contract and to assure that resources are not duplicated in concurrent activities. The time-scaled resource histograms shall show labor crafts and equipment classes to be utilized on the contract. The Engineer may review the baseline schedule activity resource allocations using Means Productivity Standards or equivalent to determine if the schedule is practicable.

UPDATE SCHEDULE

The Contractor shall submit an update schedule and meet with the Engineer to review contract progress, on or before the first day of each month, beginning one month after the baseline schedule is accepted. The Contractor shall allow 2 weeks for the Engineer's review after the update schedule and all support data are submitted, except that the review period shall not start until the previous month's required schedule is accepted. Update schedules that are not accepted or rejected within the review period will be considered accepted by the Engineer.

The update schedule shall have a data date of the twenty-first day of the month or other date established by the Engineer. The update schedule shall show the status of work actually completed to date and the work yet to be performed as planned. Actual activity start dates, percent complete and finish dates shall be shown as applicable. Durations for work that has been completed shall be shown on the update schedule as the work actually occurred, including Engineer submittal review and Contractor resubmittal times.

The Contractor may include modifications such as adding or deleting activities or changing activity constraints, durations or logic that do not (1) alter the critical path(s) or near critical path(s) or (2) extend the scheduled completion date compared to that shown on the current accepted schedule. The Contractor shall state in writing the reasons for any changes to planned work. If any proposed changes in planned work will result in (1) or (2) above, then the Contractor shall submit a time impact analysis as described herein.

TIME IMPACT ANALYSIS

The Contractor shall submit a written time impact analysis (TIA) to the Engineer with each request for adjustment of contract time, or when the Contractor or Engineer consider that an approved or anticipated change may impact the critical path or contract progress.

The TIA shall illustrate the impacts of each change or delay on the current scheduled completion date or internal milestone, as appropriate. The analysis shall use the accepted schedule that has a data date closest to and prior to the event. If the Engineer determines that the accepted schedule used does not appropriately represent the conditions prior to the event, the accepted schedule shall be updated to the day before the event being analyzed. The TIA shall include an impact schedule developed from incorporating the event into the accepted schedule by adding or deleting activities, or by changing durations or logic of existing activities. If the impact schedule shows that incorporating the event modifies the critical path and scheduled completion date of the accepted schedule, the difference between scheduled completion dates of the two schedules shall be equal to the adjustment of contract time. The Engineer may construct and utilize an appropriate project schedule or other recognized method to determine adjustments in contract time until the Contractor provides the TIA.

The Contractor shall submit a TIA in duplicate within 15 working days of receiving a written request for a TIA from the Engineer. The Contractor shall allow the Engineer 2 weeks after receipt to approve or reject the submitted TIA. All approved TIA schedule changes shall be shown on the next update schedule.

If a TIA submitted by the Contractor is rejected by the Engineer, the Contractor shall meet with the Engineer to discuss and resolve issues related to the TIA. If agreement is not reached, the Contractor will be allowed 15 days from the meeting with the Engineer to give notice in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications. The Contractor shall only show actual as-built work, not unapproved changes related to the TIA, in subsequent update schedules. If agreement is reached at a later date, approved TIA schedule changes shall be shown on the next update schedule. The Engineer will withhold remaining payment on the schedule contract item if a TIA is requested by the Engineer and not submitted by the Contractor within 15 working days. The schedule item payment will resume on the next estimate after the requested TIA is submitted. No other contract payment will be retained regarding TIA submittals.

FINAL UPDATE SCHEDULE

The Contractor shall submit a final update, as-built schedule with actual start and finish dates for the activities, within 30 days after completion of contract work. The Contractor shall provide a written certificate with this submittal signed by the Contractor's project manager and an officer of the company stating, "To my knowledge and belief, the enclosed final update schedule reflects the actual start and finish dates of the actual activities for the project contained herein." An officer of the company may delegate in writing the authority to sign the certificate to a responsible manager.

RETENTION

The Department will retain an amount equal to 25 percent of the estimated value of the work performed during each estimate period in which the Contractor fails to submit an acceptable schedule conforming to the requirements of these special provisions as determined by the Engineer. Schedule retentions will be released for payment on the next monthly estimate for partial payment following the date that acceptable schedules are submitted to the Engineer or as otherwise specified herein. Upon completion of all contract work and submittal of the final update schedule and certification, any remaining retained funds associated with this section, "Progress Schedule (Critical Path Method)", will be released for payment. Retentions held in conformance with this section shall be in addition to other retentions provided for in the contract. No interest will be due the Contractor on retention amounts.

PAYMENT

Progress schedule (critical path method) will be paid for at a lump sum price. The contract lump sum price paid for progress schedule (critical path method) shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, including computer software, and for doing all the work involved in preparing, furnishing, and updating schedules, and instructing and assisting the Engineer in the use of computer software, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Payments for the progress schedule (critical path method) contract item will be made progressively as follows:

A. A total of 25 percent of the item amount or a total of 25 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon achieving all of the following:

   1. Completion of 5 percent of all contract item work.
   2. Acceptance of all schedules and TIAs required to the time when 5 percent of all contract item work is complete.
   3. Delivery of schedule software to the Engineer.
   4. Completion of required schedule software training.

B. A total of 50 percent of the item amount or a total of 50 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon completion of 25 percent of all contract item work and acceptance of all schedules and TIAs required to the time when 25 percent of all contract item work is complete.

C. A total of 75 percent of the item amount or a total of 75 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon completion of 50 percent of all contract item work and acceptance of all schedules and TIAs required to the time when 50 percent of all contract item work is complete.

D. A total of 100 percent of the item amount or a total of 100 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon completion of all contract item work, acceptance of all schedules and TIAs required to the time when all contract item work is complete, and submittal of the certified final update schedule.

If the Contractor fails to complete any of the work or provide any of the schedules required by this section, the Engineer shall make an adjustment in compensation in conformance with the provisions in Section 4-1.03C, "Changes in Character of Work," of the Standard Specifications for the work not performed. Adjustments in compensation for schedules will not be made for any increased or decreased work ordered by the Engineer in furnishing schedules.

10-1.09 TIME-RELATED OVERHEAD

The Contractor will be compensated for time-related overhead as described below and in conformance with "Force Account Payment" of these special provisions. The Contractor will not be compensated for time-related overhead for delays to the controlling operations caused by the Engineer that occur prior to the first working day, but will be compensated for actual overhead costs incurred, as determined by an independent Certified Public Accountant audit examination and report.

Attention is directed to "Beginning of Work, Time of Completion and Liquidated Damages," "Force Account Payment," and "Progress Schedule (Critical Path Method)" of these special provisions.

The provisions in Section 9-1.08, "Adjustment of Overhead Costs," of the Standard Specifications shall not apply.

Time-related overhead shall consist of those overhead costs, including field and home office overhead, that are in proportion to the time required to complete the work. Time-related overhead shall not include costs that are not related to time, including but not limited to, mobilization, licenses, permits, and other charges incurred only once during the contract. Time-related overhead shall not apply to subcontractors of any tier, suppliers, fabricators, manufacturers, or other parties associated with the Contractor.

Field office overhead expenses include time-related costs associated with the normal and recurring operations of the construction project, and shall not include costs directly attributable to the work of the contract. Time-related costs of field office overhead include, but are not limited to, salaries, benefits, and equipment costs of project managers, general superintendents, field office managers and other field office staff assigned to the project, and rent, utilities, maintenance, security, supplies, and equipment costs of the project field office.

Home office overhead or general and administrative expenses refer to the fixed costs of operating the Contractor's business. These costs include, but are not limited to, general administration, insurance, personnel and subcontract administration, purchasing, accounting, and project engineering and estimating. Home office overhead costs shall exclude expenses specifically related to other contracts or other businesses of the Contractor, equipment coordination, material deliveries, and consultant and legal fees.

The amount of time-related overhead associated with a reduction in contract time for cost reduction incentive proposals accepted and executed in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications shall be considered a construction cost attributable to the resultant estimated net savings due to the cost reduction incentive.

If the final increased amount of time-related overhead exceeds 149 percent of the contract lump sum price bid, the Contractor shall, within 60 days of the Engineer's written request, submit to the Engineer an audit examination and report performed by an independent Certified Public Accountant of the Contractor's actual overhead costs. The audit examination and report shall depict the Contractor's project and company-wide financial records and shall specify the actual overall average daily rates for both field and home office overhead for the entire duration of the project, and whether the costs have been properly allocated. The rates of field and home office overhead shall exclude unallowable costs as determined in the Federal Acquisition Regulations, 48 CFR, Chapter 1, Part 31.

Independent Certified Public Accountant's audit examinations shall be performed in conformance with the requirements of the American Institute of Certified Public Accountants Attestation Standards. Audit examinations and reports shall determine if the rates of field office overhead and home office overhead are:

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

Within 20 days of receipt of the Engineer's written request, the Contractor shall make its financial records available for audit by the State for the purpose of verifying the actual rate of time-related overhead specified in the audit submitted by the Contractor. The actual rate of time-related overhead specified in the audit, submitted by the Contractor, will be subject to approval by the Engineer.

If the Engineer requests the independent Certified Public Accountant audit, or if it is requested in writing by the Contractor, the contract lump sum payment for time-related overhead, in excess of 149 percent of the lump sum price bid, will be adjusted to reflect the actual rate.

The cost of performing an independent Certified Public Accountant audit examination and submitting the report, requested by the Engineer, will be borne equally by the State and the Contractor. The division of the cost will be made by determining the cost of providing an audit examination and report in conformance with the provisions of Section 9-1.03B, "Work Performed by Special Forces or Other Special Services" of the Standard Specifications, and paying to the Contractor one-half of that cost. The cost of performing an audit examination and submitting the independent Certified Public Accountant audit report for overhead claims other than for the purpose of verifying the actual rate of time-related overhead shall be entirely borne by the Contractor. The cost of performing an audit examination and submitting the independent Certified Public Accountant audit report to verify actual overhead costs incurred prior to the first working day shall be entirely borne by the Contractor.

Time-related overhead will be paid for at a lump sum price. The contract lump sum price bid for time-related overhead will be increased or decreased only as a result of suspensions or adjustments of contract time which revise the current contract completion date and which satisfy any of the following criteria:

A. Suspensions of work ordered in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications, except:

    1. Suspensions ordered due to weather conditions being unfavorable for the suitable prosecution of the controlling operation or operations.
    2. Suspensions ordered due to the failure on the part of the Contractor to carry out orders given, or to perform the provisions of the contract.
    3. Suspensions ordered due to factors beyond the control of and not caused by the State or the Contractor, for which the Contractor is granted extensions of time in conformance with the provisions of the third paragraph of Section 8-1.07, "Liquidated Damages," of the Standard Specifications.
    4. Other suspensions that mutually benefit the State and the Contractor.

B. Extensions of contract time granted by the State in conformance with the provisions in the fifth paragraph in Section 8-1.07, "Liquidated Damages," of the Standard Specifications and set forth in approved contract change orders, in conformance with the provisions in Section 4-1.03, "Changes," of the Standard Specifications.
C. Reductions in contract time set forth in approved contract change orders, in conformance with the provisions in Section 4-1.03, "Changes," of the Standard Specifications.

For each day the number of working days bid to complete the contract, in conformance with the provisions in "Beginning Of Work, Time Of Completion And Liquidated Damages," of these special provisions, is increased or decreased due to suspensions or adjustments of contract time as specified above, the lump sum price for time-related overhead will be increased or decreased by an amount equal to the contract lump sum price bid for time-related overhead divided by the number of working days bid to complete the contract.

In the event an early completion progress schedule, as defined in "Progress Schedule (Critical Path Method)" of these special provisions, is submitted by the Contractor and approved by the Engineer, the amount of time-related overhead eligible for payment will be based on the total number of working days for the project, in conformance with the provisions in "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions, rather than the Contractor's early completion progress schedule.

The contract lump sum price paid for time-related overhead shall include full compensation for time-related overhead, including the Contractor's share of costs of an independent Certified Public Accountant audit of overhead costs requested by the Engineer, as specified in these special provisions, and as directed by the Engineer.

The provisions in Sections 4-1.03B, "Increased or Decreased Quantities," and 4-1.03C, "Changes in Character of the Work," of the Standard Specifications shall not apply to the contract item of time-related overhead.

Full compensation for additional overhead costs incurred during days of inclement weather when the contract work is extended into additional construction seasons due to delays caused by the State shall be considered as included in the time-related overhead paid during the contract working days, and no additional compensation will be allowed therefor.

Full compensation for additional overhead costs involved in performing additional contract item work that is not a controlling operation shall be considered as included in the contract items of work involved, and no additional compensation will be allowed therefor.

Full compensation for overhead, other than time-related overhead measured and paid for as specified above, and other than overhead costs included in the markups specified in "Force Account Payment" of these special provisions, shall be considered as included in the various items of work and no additional compensation will be allowed therefor.

Overhead costs incurred by subcontractors of any tier, suppliers, fabricators, manufacturers, and other parties associated with the Contractor shall be considered as included in the various items of work and as specified in Section 9-1.03, “Force Account Payment,” of the Standard Specifications.

For the purpose of making partial payments pursuant to the provisions in Section 9-1.06, "Partial Payments," of the Standard Specifications, the amount of time-related overhead in each monthly partial payment will be based on the number of working days that occurred during that monthly estimate period, including compensable suspensions and right of way delays. Working days granted by contract change order due to extra work or changes in character of work, will be compensated upon completion of the contract. The amount earned per working day for time-related overhead shall be the lesser of the following amounts:

A. The contract lump sum price for time-related overhead, divided by the number of working days bid to complete the contract, in conformance with the provisions in "Beginning Of Work, Time Of Completion And Liquidated Damages," of these special provisions.
B. Twenty percent of the original total contract amount, divided by the number of working days bid to complete the contract, in conformance with the provisions in "Beginning Of Work, Time Of Completion And Liquidated Damages," of these special provisions.

After acceptance of the contract in conformance with the provisions in Section 7-1.17, "Acceptance of Contract," of the Standard Specifications, the amount of the contract lump sum price for time-related overhead not yet paid, will be included for payment in the first estimate made after acceptance of the contract in conformance with the provisions in Section 9-1.07, "Payment After Acceptance," of the Standard Specifications.

10-1.10 OBSTRUCTIONS

Attention is directed to Section 8-1.10, "Utility and Non-Highway Facilities," and Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

Attention is directed to the existence of certain underground facilities that may require special precautions be taken by the Contractor to protect the health, safety and welfare of workers and of the public. Facilities requiring special precautions include, but are not limited to: conductors of petroleum products, oxygen, chlorine, and toxic or flammable gases; natural gas in pipelines greater than 150 mm in diameter or pipelines operating at pressures greater than 415 kPa (gage); underground electric supply system conductors or cables, with potential to ground of more than 300 V, either directly buried or in a duct or conduit which do not have concentric grounded or other effectively grounded metal shields or sheaths.

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

10-1.11 MOBILIZATION

Mobilization shall conform to the provisions in Section 11, "Mobilization," of the Standard Specifications.

10-1.12 CONSTRUCTION AREA TRAFFIC CONTROL DEVICES

Flagging, signs, and temporary traffic control devices furnished, installed, maintained, and removed when no longer required shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Category 1 temporary traffic control devices are defined as small and lightweight (less than 45 kg) devices. These devices shall be certified as crashworthy by crash testing, crash testing of similar devices, or years of demonstrable safe performance. Category 1 temporary traffic control devices include traffic cones, plastic drums, portable delineators, and channelizers.

If requested by the Engineer, the Contractor shall provide written self-certification for crashworthiness of Category 1 temporary traffic control devices at least 5 days before beginning any work using the devices or within 2 days after the request if the devices are already in use. Self-certification shall be provided by the manufacturer or Contractor and shall include the following:

A. Date,
B. Federal Aid number (if applicable),
C. Contract number, district, county, route and kilometer post of project limits,
D. Company name of certifying vendor, street address, city, state and zip code,
E. Printed name, signature and title of certifying person; and
F. Category 1 temporary traffic control devices that will be used on the project.

The Contractor may obtain a standard form for self-certification from the Engineer.

Category 2 temporary traffic control devices are defined as small and lightweight (less than 45 kg) devices that are not expected to produce significant vehicular velocity change, but may cause potential harm to impacting vehicles. Category 2 temporary traffic control devices include barricades and portable sign supports.

Category 2 temporary traffic control devices shall be on the Federal Highway Administration's (FHWA) list of Acceptable Crashworthy Category 2 Hardware for Work Zones. This list is maintained by FHWA and can be located at:

http://safety.fhwa.dot.gov/roadway_dept/road_hardware/listing.cfm?code=workzone

The Department also maintains this list at:

http://www.dot.ca.gov/hq/traffops/signtech/signdel/pdf/Category2.pdf

Category 2 temporary traffic control devices that have not received FHWA acceptance shall not be used. Category 2 temporary traffic control devices in use that have received FHWA acceptance shall be labeled with the FHWA acceptance letter number and the name of the manufacturer. The label shall be readable and permanently affixed by the manufacturer. Category 2 temporary traffic control devices without a label shall not be used.

If requested by the Engineer, the Contractor shall provide a written list of Category 2 temporary traffic control devices to be used on the project at least 5 days before beginning any work using the devices or within 2 days after the request if the devices are already in use.

Category 3 temporary traffic control devices consist of temporary traffic-handling equipment and devices that weigh 45 kg or more and are expected to produce significant vehicular velocity change to impacting vehicles. Temporary traffic-handling equipment and devices include crash cushions, truck-mounted attenuators, temporary railing, temporary barrier, and end treatments for temporary railing and barrier.

Type III barricades may be used as sign supports if the barricades have been successfully crash tested, meeting the NCHRP Report 350 criteria, as one unit with a construction area sign attached.

Category 3 temporary traffic control devices shall be shown on the plans or on the Department's Highway Safety Features list. This list is maintained by the Division of Engineering Services and can be found at:

http://www.dot.ca.gov/hq/esc/approved_products_list/HighwaySafe.htm

Category 3 temporary traffic control devices that are not shown on the plans or not listed on the Department's Highway Safety Features list shall not be used.

Full compensation for providing self-certification for crashworthiness of Category 1 temporary traffic control devices and for providing a list of Category 2 temporary traffic control devices used on the project shall be considered as included in the prices paid for the various items of work requiring the use of the Category 1 or Category 2 temporary traffic control devices and no additional compensation will be allowed therefor.

10-1.13 CONSTRUCTION AREA SIGNS

Construction area signs for temporary traffic control shall be furnished, installed, maintained, and removed when no longer required in conformance with the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to "Furnish Sign" of these special provisions.

Attention is directed to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. Type II retroreflective sheeting shall not be used on construction area sign panels. Type III, IV, VII, VIII, or IX retroreflective sheeting shall be used for stationary mounted construction area sign panels.

Unless otherwise shown on the plans or specified in these special provisions, the color of construction area warning and guide signs shall have black legend and border on orange background, except W10-1 or W47(CA) (Highway-Rail Grade Crossing Advance Warning) sign shall have black legend and border on yellow background.

Repair to construction area sign panels will not be allowed, except when approved by the Engineer. At nighttime under vehicular headlight illumination, sign panels that exhibit irregular luminance, shadowing or dark blotches shall be immediately replaced at the Contractor's expense.

The Contractor shall notify the appropriate regional notification center for operators of subsurface installations at least 2 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)	(800) 642-2444 (800) 227-2600
Underground Service Alert-Southern California (USA)	(800) 422-4133

Excavations required to install construction area signs shall be performed by hand methods without the use of power equipment, except that power equipment may be used if it is determined there are no utility facilities in the area of the proposed post holes. The post hole diameter, if backfilled with portland cement concrete, shall be at least 100 mm greater than the longer dimension of the post cross-section.

Construction area signs placed within 4.6 m from the edge of the travel way shall be mounted on stationary mounted sign supports as specified in "Construction Area Traffic Control Devices" of these special provisions.

The Contractor shall maintain accurate information on construction area signs. Signs that are no longer required shall be immediately covered or removed. Signs that convey inaccurate information shall be immediately replaced or the information shall be corrected. Covers shall be replaced when they no longer cover the signs properly. The Contractor shall immediately restore to the original position and location any sign that is displaced or overturned, from any cause, during the progress of work.

10-1.14 MAINTAINING TRAFFIC

Attention is directed to Sections 7-1.08, "Public Convenience," 7-1.09, "Public Safety," and 12, "Construction Area Traffic Control Devices," of the Standard Specifications and to the provisions in "Public Safety" 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.

A portable changeable message sign shall be placed in advance of each traffic control system at locations as directed by the Engineer. The sign shall be in place and in operation before any other component of the traffic control system is placed and shall remain in operation until all other components of the traffic control system are removed. Portable changeable message signs shall conform to the provisions in "Portable Changeable Message Signs," of these special provisions.

RAMP CLOSED signs [SC6-4(CA)] shall be used to inform motorists of the temporary closing of a freeway or expressway entrance or exit ramp for more than one day.

The SC6-4(CA) signs shall be installed at least 7 calendar days prior to closing the ramp, but not more than 14 days in advance of the ramp closure. The Contractor shall notify the Engineer not less than 2 calendar days prior to installing the SC6-4(CA) signs. The SC6-4(CA) signs shall be stationary mounted at locations shown on the plans and shall remain in place and visible to motorists during ramp closures.

The Contractor shall be responsible for maintaining accurate and timely information on the SC6-4(CA) signs. The SC6-4(CA) signs, when no longer required or when the information becomes outdated, shall be immediately covered or removed, or the sign message shall be updated.

Lane or ramp closures shall conform to the provisions in section "Traffic Control System for Laneand ramp Closure" of these special provisions.

Personal vehicles of the Contractor's employees shall not be parked within the State 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 work vehicles or equipment are parked on the shoulder within 1.8 m of a traffic lane, the shoulder area shall be closed as shown on the plans.

Ramps shall be closed only during the hours shown on the charts 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.

No 2 consecutive entrance ramps or 2 consecutive exit ramps in the same direction of travel shall be closed concurrently.

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.

Chart No. 1
Multilane Lane Requirements

Location: Westbound — On Route 24 – From Caldecott Tunnel to El Curtola Overcrossing

	a.m.												p.m.												
FROM HOUR TO HOUR	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	2	3																3	2	2	2
Fridays	1	1	1	1	2	3																3	3	2	
Saturdays	2	1	1	1	1	2	2	3														3	3	2	
Sundays	2	1	1	1	1	1	2	2	2	3											3	3	3	2	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

1	One lane open in direction of travel
2	Two adjacent lanes open in direction of travel
3	Three adjacent lanes open in direction of travel
	No lane closure allowed

REMARKS: Coordinate with Caldecott Tunnel Maintenance Crew when closing at or close to Caldecott Tunnel

Chart No. 2
Multilane Lane Requirements

Location: Eastbound — On Route 24 - From Caldecott Tunnel to El Curtola Overcrossing

	a.m.												p.m.												
FROM HOUR TO HOUR	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	2	1	1	1	1	2	2															3	3	2	
Fridays	2	1	1	1	1	2	2															3	3	3	
Saturdays	2	1	1	1	1	1	2	2	3												3	3	3	3	
Sundays	2	1	1	1	1	1	1	2	2	3	3										3	3	2	2	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

1	One lane open in direction of travel
2	Two adjacent lanes open in direction of travel
3	Three adjacent lanes open in direction of travel
	No lane closure allowed

REMARKS: Coordinate with Caldecott Tunnel Maintenance Crew when closing at or close to Caldecott Tunnel.

Chart No. 3
Ramp Lane Requirements

Location: Westbound — Route 24 - On the Fish Ranch on-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																	X	X	X	
Fridays	X	X	X	X	X																	X	X	X	
Saturdays	X	X	X	X	X	X	X	X	X	X	X										X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X	X	X									X	X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: SEE DETOUR NO. 1

Chart No. 4
Ramp Lane Requirements

Location: Westbound — Route 24 - On the Gateway Blvd. on-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																	X	X	X	
Fridays	X	X	X	X	X																	X	X	X	
Saturdays	X	X	X	X	X	X	X	X	X	X										X	X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X	X	X								X	X	X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: SEE DETOUR NO. 2

Chart No. 5
Ramp Lane Requirements

Location: Westbound — Route 24 - On the Orinda/Camino Pablo collector on-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																		X	X	
Fridays	X	X	X	X	X																		X	X	
Saturdays	X	X	X	X	X	X	X	X															X	X	
Sundays	X	X	X	X	X	X	X	X	X														X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

- SEE DETOUR NO. 3
- Keep collector on-ramp open to give way to traffic from NB Camino Pablo

Chart No. 6
Ramp Lane Requirements

Location: Westbound — Route 24 - On the SB Camino Pablo on-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																X	X	X	X	
Fridays	X	X	X	X	X																X	X	X	X	
Saturdays	X	X	X	X	X	X	X	X	X	X										X	X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X	X	X							X	X	X	X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

- SEE DETOUR NO. 3
- Keep collector on-ramp open to give way to traffic from NB Camino Pablo

Chart No. 7
Ramp Lane Requirements

Location: Westbound Route 24 - On the "loop" on-ramp from NB Camino Pablo & on the "loop" off-ramp to SB Camino Pablo

	a.m.												p.m.												
FROM HOUR TO HOUR	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	X	X	X	X	X																	X	X	X	
Fridays	X	X	X	X	X																	X	X	X	
Saturdays	X	X	X	X	X	X	X	X													X	X	X	X	X
Sundays	X	X	X	X	X	X	X	X	X												X	X	X	X	X
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

- SEE DETOUR NO. 3 for closure of NB Camino Pablo on-ramp.
- Keep on-ramp and off-ramp collectors open giving way to traffic from SB Camino Pablo and traffic to NB Camino Pablo.
- Advance signing to notify traffic to SB Camino Pablo to use the next off-ramp.

Chart No. 8
Ramp Lane Requirements

Location: Westbound Route 24 - On the St. Stephens Dr./Hidden Valley Rd. on-ramp

	a.m.												p.m.												
FROM HOUR TO HOUR	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	X	X	X	X	X																	X	X	X	X
Fridays	X	X	X	X	X																	X	X	X	X
Saturdays	X	X	X	X	X	X	X	X	X											X	X	X	X	X	X
Sundays	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: SEE DETOUR NO. 4

Chart No. 9
Ramp Lane Requirements

Location: Westbound — Route 24 - On the Acalanes Rd/Upper Happy Valley Rd. collector on-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																X	X	X	X	
Fridays	X	X	X	X	X																X	X	X	X	
Saturdays	X	X	X	X	X	X	X	X	X	X									X	X	X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X	X									X	X	X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X — Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: SEE DETOUR NO. 5

Chart No. 10
Ramp Lane Requirements

Location: Westbound — Route 24 - On the on-ramp from NB Acalanes Road

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																X	X	X	X	
Fridays	X	X	X	X	X																X	X	X	X	
Saturdays	X	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X	X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X — Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

- SEE DETOUR NO. 5
- Coordinate this chart with Chart No. 14

Chart No. 11
Ramp Lane Requirements

Location: Westbound — Route 24 - On the on-ramp from El Nido Ranch Rd

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X	X					X	X	X	X					X	X	X	X	X	X	
Fridays	X	X	X	X	X	X					X	X	X	X					X	X	X	X	X	X	
Saturdays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X	Ramp may be closed
	No work that interferes with public traffic will be allowed

REMARKS:

- SEE DETOUR NO. 5
- Keep collector on-ramp open for traffic from NB Acalanes Rd

Chart No. 12
Ramp Lane Requirements

Location: Westbound — Route 24 - On the Central Lafayette/Moraga Rd. on-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																	X	X	X	
Fridays	X	X	X	X	X																	X	X	X	
Saturdays	X	X	X	X	X	X	X	X													X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X											X	X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X — Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: SEE DETOUR NO. 6

Chart No. 13
Ramp Lane Requirements

Location: Westbound — Route 24 - On the Pleasant Hill Rd./Mt Diablo Blvd. collector on-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																	X	X	X	
Fridays	X	X	X	X	X																	X	X	X	
Saturdays	X	X	X	X	X	X	X	X														X	X	X	
Sundays	X	X	X	X	X	X	X	X	X													X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X — Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: SEE DETOUR NO. 7

Chart No. 14
Ramp Lane Requirements

Location: Westbound — Route 24 - On the on-ramp from SB Pleasant Hill Rd.

	a.m.												p.m.												
FROM HOUR TO HOUR	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	X	X	X	X	X																X	X	X	X	
Fridays	X	X	X	X	X																X	X	X	X	
Saturdays	X	X	X	X	X	X	X	X	X											X	X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X	X									X	X	X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X	Ramp may be closed
	No work that interferes with public traffic will be allowed

REMARKS:
- SEE DETOUR NO. 7
- Keep collector on-ramp open to give way to traffic from NB Pleasant Hill Rd

Chart No. 15
Ramp Lane Requirements

Location: Westbound — Route 24 - On the "loop" on-ramp from NB Pleasant Hill Rd & on the "loop" off-ramp to SB Pleasant Hill Rd/Mt. Diablo Blvd.

	a.m.												p.m.												
FROM HOUR TO HOUR	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	X	X	X	X	X																	X	X	X	
Fridays	X	X	X	X	X																		X	X	
Saturdays	X	X	X	X	X	X																X	X	X	
Sundays	X	X	X	X	X	X	X	X													X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X	Ramp may be closed
	No work that interferes with public traffic will be allowed

REMARKS:
- SEE DETOUR NO. 7 for the NB Pleasant Rd on-ramp traffic
- Keep collector on-ramp and off-ramp open to give way to traffic from SB Pleasant Hill Rd and traffic to NB Pleasant Hill Road.
- Advance signing upstream to notify traffic of closure of off-ramp to SB Pleasant Hill/Mt Diablo Blvd and to use the next off-ramp.

Chart No. 16
Ramp Lane Requirements

Location: Westbound — Route 24 - On the Fish Ranch Road off-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																	X	X	X	
Fridays	X	X	X	X	X																	X	X	X	
Saturdays	X	X	X	X	X	X	X	X	X												X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X	X											X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: SEE DETOUR NO. 8

Chart No. 17
Ramp Lane Requirements

Location: Westbound — Route 24 - On the Gateway Blvd. off-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																	X	X	X	
Fridays	X	X	X	X	X																	X	X	X	
Saturdays	X	X	X	X	X	X	X	X	X	X	X									X	X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X	X	X								X	X	X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

Chart No. 18
Ramp Lane Requirements

Location: Westbound — Route 24 - On the off-ramp to NB Camino Pablo

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X	X																	X	X	
Fridays	X	X	X	X	X	X																	X	X	
Saturdays	X	X	X	X	X	X	X	X													X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X	X											X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X — Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: Keep collector off-ramp open to give way to traffic going to SB Camino Pablo

Chart No. 19
Ramp Lane Requirements

Location: Westbound — Route 24 - On the off-ramp to NB Camino Pablo

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																		X	X	
Fridays	X	X	X	X	X																		X	X	
Saturdays	X	X	X	X	X	X	X	X													X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X	X											X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X — Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

Chart No. 20
Ramp Lane Requirements

Location: Westbound — Route 24 - On St. Stephens/Hidden Valley Road off-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																X	X	X	X	
Fridays	X	X	X	X	X																X	X	X	X	
Saturdays	X	X	X	X	X	X	X	X	X	X	X								X	X	X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: Advance advisory signing for traffic to use the upstream off-ramp.

Chart No. 21
Ramp Lane Requirements

Location: Westbound — Route 24 - On the Acalanes Road/Upper Happy Valley Road off-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																X	X	X	X	
Fridays	X	X	X	X	X																X	X	X	X	
Saturdays	X	X	X	X	X	X	X	X	X	X										X	X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X	X										X	X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: Coordinate this chart with Chart No. 7-A

Chart No. 22
Ramp Lane Requirements

Location: Westbound — Route 24 - On the Central Lafayette/Moraga off-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																X	X	X	X	
Fridays	X	X	X	X	X																X	X	X	X	
Saturdays	X	X	X	X	X	X	X	X												X	X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X	X									X	X	X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X — Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: Advance advisory signing for the motorists to use upstream off-ramp

Chart No. 23
Ramp Lane Requirements

Location: Westbound — Route 24 - On the Pleasant Hill Road collector off-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																	X	X	X	
Fridays	X	X	X	X	X																	X	X	X	
Saturdays	X	X	X	X	X	X	X	X													X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X	X										X	X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X — Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

Chart No. 24
Ramp Lane Requirements

Location: Westbound — Route 24 - On the off-ramp to NB Pleasant Hill Road

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X	X															X	X	X	X	
Fridays	X	X	X	X	X	X															X	X	X	X	
Saturdays	X	X	X	X	X	X	X	X	X										X	X	X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X	X	X								X	X	X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X — Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: Keep collector off-ramp open to give way to traffic going to SB Pleasant Hill/Mt Diablo Blvd.

Chart No. 25
Ramp Lane Requirements

Location: Eastbound — Route 24 - On the Fish Ranch Rd. on-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																	X	X	X	
Fridays	X	X	X	X	X																		X	X	
Saturdays	X	X	X	X	X	X	X	X															X	X	
Sundays	X	X	X	X	X	X	X	X	X													X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X — Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: SEE DETOUR NO. 9

Chart No. 26
Ramp Lane Requirements

Location: Eastbound — Route 24 - On the Gateway Blvd. on-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X	X	X															X	X	X	
Fridays	X	X	X	X	X	X	X															X	X	X	
Saturdays	X	X	X	X	X	X	X	X															X	X	
Sundays	X	X	X	X	X	X	X	X	X													X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X — Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: SEE DETOUR NO. 10

Chart No. 27
Ramp Lane Requirements

Location: Eastbound — Route 24 - On the SB Camino Pablo on-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																	X	X	X	
Fridays	X	X	X	X	X																		X	X	
Saturdays	X	X	X	X	X	X	X																X	X	
Sundays	X	X	X	X	X	X	X	X														X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X — Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: SEE DETOUR NO. 11

Chart No. 28
Ramp Lane Requirements

Location: Eastbound — Route 24 - On the Bryant on-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X																		X	X	
Fridays	X	X	X	X	X																		X	X	
Saturdays	X	X	X	X	X	X	X	X															X	X	
Sundays	X	X	X	X	X	X	X	X														X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X — Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: SEE DETOUR NO. 12

Chart No. 29
Ramp Lane Requirements

Location: Eastbound — Route 24 - On the St. Stephens Drive on-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X	X																X	X	X	
Fridays	X	X	X	X	X	X																X	X	X	
Saturdays	X	X	X	X	X	X	X															X	X	X	
Sundays	X	X	X	X	X	X	X	X															X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X — Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: SEE DETOUR NO. 13

Chart No. 30
Ramp Lane Requirements

Location: Eastbound Route 24 - On the NB Acalanes Road on-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X	X																	X	X	
Fridays	X	X	X	X	X	X																	X	X	
Saturdays	X	X	X	X	X	X	X																X	X	
Sundays	X	X	X	X	X	X	X	X															X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: SEE DETOUR NO. 14

Chart No. 31
Ramp Lane Requirements

Location: Eastbound Route 24 - On the "loop" on-ramp from SB Acalanes Rd & on the "loop" off-ramp to NB Acalanes Rd/Upper Happy Valley Rd.

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X	X																X	X	X	
Fridays	X	X	X	X	X	X																X	X	X	
Saturdays	X	X	X	X	X	X	X														X	X	X	X	
Sundays	X	X	X	X	X	X	X	X													X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

- SEE DETOUR NO. 15 for closure of SB Acalanes Rd. on-ramp.
- Keep on-ramp and off-ramp collectors open giving way to traffic from NB Acalanes Rd. on -ramp and SB Acalanes Rd. off-ramp.
- Advance signing to notify traffic to NB Acalanes Rd to use the next off-ramp.

Chart No. 32
Ramp Lane Requirements

Location: Eastbound Route 24 - On the Acalanes Rd/Upper Happy Valley Rd. collector on-ramp

	a.m.												p.m.											
FROM HOUR TO HOUR	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	X	X	X	X	X	X																		X	X
Fridays	X	X	X	X	X	X																		X	X
Saturdays	X	X	X	X	X	X	X																	X	X
Sundays	X	X	X	X	X	X	X	X																X	X
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: SEE DETOUR NO. 16

Chart No. 33
Ramp Lane Requirements

Location: Eastbound Route 24 - On the First St. on-ramp

	a.m.												p.m.											
FROM HOUR TO HOUR	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	X	X	X	X	X	X																			X
Fridays	X	X	X	X	X	X																			X
Saturdays	X	X	X	X	X	X	X																	X	X
Sundays	X	X	X	X	X	X	X															X	X	X	X
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: SEE DETOUR NO. 17

Chart No. 34
Ramp Lane Requirements

Location: Eastbound Route 24 - On the "loop" on-ramp from SB Pleasant Hill Rd & on the "loop" off-ramp to NB Pleasant Hill Rd.

	a.m.												p.m.											
FROM HOUR TO HOUR	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	X	X	X	X	X	X																	X	X	
Fridays	X	X	X	X	X	X																	X	X	
Saturdays	X	X	X	X	X	X	X															X	X	X	
Sundays	X	X	X	X	X	X	X	X														X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

- SEE DETOUR NO. 18 for closure of SB Pleasant Hill Rd. on-ramp.
- Keep on-ramp and off-ramp collectors open giving way to traffic from NB Pleasant Hill Rd. on -ramp and SB Pleasant Hill Rd. off-ramp.
- Advance signing to notify traffic to NB Pleasant Hill Rd to use the next off-ramp.

Chart No. 35
Ramp Lane Requirements

Location: Eastbound Route 24 - On the on-ramp from NB Pleasant Hill Rd.

	a.m.												p.m.											
FROM HOUR TO HOUR	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	X	X	X	X	X	X																	X	X	
Fridays	X	X	X	X	X	X																		X	
Saturdays	X	X	X	X	X	X	X															X	X	X	
Sundays	X	X	X	X	X	X	X	X														X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: SEE DETOUR NO. 19

Chart No. 36
Ramp Lane Requirements

Location: Eastbound — Route 24 - On the Pleasant Hill Rd collector on-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X	X																			X
Fridays	X	X	X	X	X	X																			X
Saturdays	X	X	X	X	X	X	X																	X	X
Sundays	X	X	X	X	X	X	X																X	X	X
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: SEE DETOUR NO. 20

Chart No. 37
Ramp Lane Requirements

Location: Eastbound — Route 24 - On the Fish Ranch Rd. off-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X	X																X	X	X	
Fridays	X	X	X	X	X	X																X	X	X	
Saturdays	X	X	X	X	X	X	X																X	X	
Sundays	X	X	X	X	X	X	X	X													X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

Chart No. 38
Ramp Lane Requirements

Location: Eastbound — Route 24 - On the Gateway Blvd. off-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X	X	X														X	X	X	X	
Fridays	X	X	X	X	X	X	X														X	X	X	X	
Saturdays	X	X	X	X	X	X	X	X													X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X												X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X — Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

Chart No. 39
Ramp Lane Requirements

Location: Eastbound — Route 24 - On the Orinda/Camino Pablo off-ramp

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X	X	X																	X	
Fridays	X	X	X	X	X	X	X																	X	
Saturdays	X	X	X	X	X	X	X	X																X	
Sundays	X	X	X	X	X	X	X	X	X														X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X — Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

Chart No. 40
Ramp Lane Requirements

Location: Eastbound Route 24 - On the St. Stephens Dr/Hidden Valley Rd. off-ramp

	a.m.												p.m.											
FROM HOUR TO HOUR	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	X	X	X	X	X	X	X														X	X	X	X	
Fridays	X	X	X	X	X	X	X														X	X	X	X	
Saturdays	X	X	X	X	X	X	X	X	X												X	X	X	X	
Sundays	X	X	X	X	X	X	X	X	X											X	X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

Chart No. 41
Ramp Lane Requirements

Location: Eastbound Route 24 - On the Acalanes Road/Upper Happy Valley Road collector. off-ramp

	a.m.												p.m.											
FROM HOUR TO HOUR	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	X	X	X	X	X	X	X																X	X	
Fridays	X	X	X	X	X	X	X																X	X	
Saturdays	X	X	X	X	X	X	X	X														X	X	X	
Sundays	X	X	X	X	X	X	X	X													X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

Chart No. 42
Ramp Lane Requirements

Location: Eastbound Route 24 - On the SB Acalanes Rd. off-ramp

	a.m.												p.m.											
FROM HOUR TO HOUR	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	X	X	X	X	X	X	X															X	X	X	
Fridays	X	X	X	X	X	X	X															X	X	X	
Saturdays	X	X	X	X	X	X	X	X													X	X	X	X	
Sundays	X	X	X	X	X	X	X	X													X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

Chart No. 43
Ramp Lane Requirements

Location: Eastbound Route 24 - On the Oak Hill Rd. off-ramp

	a.m.												p.m.											
FROM HOUR TO HOUR	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	X	X	X	X	X	X	X																	X	
Fridays	X	X	X	X	X	X	X																	X	
Saturdays	X	X	X	X	X	X	X	X																X	
Sundays	X	X	X	X	X	X	X	X	X														X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

Chart No. 44
Ramp Lane Requirements

Location: Eastbound Route 24 - On the Pleasant Hill Rd./Mt. Diablo Blvd. collector off-ramp

	a.m.												p.m.											
FROM HOUR TO HOUR	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	X	X	X	X	X																				X
Fridays	X	X	X	X	X																				X
Saturdays	X	X	X	X	X	X	X	X																	X
Sundays	X	X	X	X	X	X	X	X	X															X	X
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: Advance signing to notify traffic to use upstream off-ramp.

Chart No. 45
Ramp Lane Requirements

Location: Eastbound Route 24 - On the off-ramp to SB Pleasant Hill Rd./Mt. Diablo Blvd.

	a.m.												p.m.											
FROM HOUR TO HOUR	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	X	X	X	X	X	X																X	X	X	
Fridays	X	X	X	X	X	X																X	X	X	
Saturdays	X	X	X	X	X	X	X	X														X	X	X	
Sundays	X	X	X	X	X	X	X	X	X												X	X	X	X	
Day before designated legal holiday																									
Designated legal holidays																									

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: Advance signing to notify traffic to use upstream off-ramp.

10-1.15 CLOSURE REQUIREMENTS AND CONDITIONS

Lane closures shall conform to the provisions in "Maintaining Traffic" of these special provisions and these special provisions.

The term closure, as used herein, is defined as the closure of a traffic lane or lanes, including ramp or connector lanes, within a single traffic control system.

CLOSURE SCHEDULE

By noon Monday, the Contractor shall submit a written schedule of planned closures for the following week period, defined as Friday noon through the following Friday noon. Closures involving work (temporary barrier placement and paving operations) that will reduce horizontal clearances, traveled way inclusive of shoulders, to 2 lanes or less shall be submitted not less than 18 working days and no more than 90 working days before the anticipated start of operation. Closures involving work (pavement overlay, overhead sign installation, falsework and girder erection) that will reduce the vertical clearances available to the public, shall be submitted not less than 18 working days and no more than 90 working days before the anticipated start of operation.

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, 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 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 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 $3,400 per interval from moneys due or that may become due the Contractor under the contract.

COMPENSATION

The Contractor shall notify the Engineer of 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 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, delay to the Contractor's schedule due to removal of the closure will be considered a right of way delay within the meaning of Section 8-1.09, "Right of Way Delays," and compensation for the delay will be determined in conformance with the provisions in Section 8-1.09.

10-1.16 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE

A traffic control system shall consist of closing traffic lanes and ramps in conformance with the details shown on the plans, the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications, the provisions under "Maintaining Traffic" and "Construction Area Signs" of these special provisions, and these special provisions.

The provisions in this section will not relieve the Contractor of responsibility for providing additional devices or taking measures as may be necessary to comply with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications.

During traffic stripe operations and pavement marker placement operations using bituminous adhesive, traffic shall be controlled, at the option of the Contractor, with either stationary or moving lane closures. During other operations, traffic shall be controlled with stationary lane closures. Attention is directed to the provisions in Section 84-1.04, "Protection From Damage," and Section 85-1.06, "Placement," of the Standard Specifications.

If components in the traffic control system are displaced or cease to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair the components to the original condition or replace the components and shall restore the components to the original location.

STATIONARY LANE CLOSURE

When lane and ramp closures are made for work periods only, at the end of each work period, components of the traffic control system, except portable delineators placed along open trenches or excavation adjacent to the traveled way, shall be removed from the traveled way and shoulder. If the Contractor so elects, the components may be stored at selected central locations, designated by the Engineer within the limits of the highway right of way.

Each vehicle used to place, maintain and remove components of a traffic control system on multilane highways shall be equipped with a Type II flashing arrow sign which shall be in operation when the vehicle is being used for placing, maintaining or removing the components. Vehicles equipped with Type II flashing arrow sign not involved in placing, maintaining or removing the components when operated within a stationary type lane closure shall only display the caution display mode. The sign shall be controllable by the operator of the vehicle while the vehicle is in motion. The flashing arrow sign shown on the plans shall not be used on the vehicles which are doing the placing, maintaining and removing of components of a traffic control system and shall be in place before a lane closure requiring the sign's use is completed.

MOVING LANE CLOSURE

Flashing arrow signs used in moving lane closures shall be truck-mounted. Changeable message signs used in moving lane closure operations shall conform to the provisions in Section 12-3.12, "Portable Changeable Message Signs," of the Standard Specifications, except the signs shall be truck-mounted and the full operation height of the bottom of the sign may be less than 2.1 m above the ground, but should be as high as practicable.

Truck-mounted attenuators (TMA) for use in moving lane closures shall be any of the following approved models, or equal:

A. Hexfoam TMA Series 3000, Alpha 1000 TMA Series 1000 and Alpha 2001 TMA Series 2001, manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601–2076, Telephone (312) 467–6750.

   1. Distributor (northern): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, Telephone (800) 884–8274, FAX (916) 387–9734.
   2. Distributor (southern): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805, Telephone (800) 222–8274.

B. Cal T–001 Model 2 or Model 3, manufacturer and distributor: Hexcel Corporation, 11711 Dublin Boulevard, P.O. Box 2312, Dublin, CA 94568, Telephone (925) 551–4900.

C. Renco Rengard Model Nos. CAM 8–815 and RAM 8–815, manufacturer and distributor: Renco Inc., 1582 Pflugerville Loop Road, P.O. Box 730, Pflugerville, TX 78660–0730, Telephone (800) 654–8182.

Each TMA shall be individually identified with the manufacturer's name, address, TMA model number, and a specific serial number. The names and numbers shall each be a minimum 13 mm high and located on the left (street) side at the lower front corner. The TMA shall have a message next to the name and model number in 13 mm high letters which states, "The bottom of this TMA shall be _____ mm ± _____ mm above the ground at all points for proper impact performance." Any TMA which is damaged or appears to be in poor condition shall not be used unless recertified by the manufacturer. The Engineer shall be the sole judge as to whether used TMAs supplied under this contract need recertification. Each unit shall be certified by the manufacturer to meet the requirements for TMA in conformance with the standards established by the Transportation Laboratory.

Approvals for new TMA designs proposed as equal to the above approved models shall be in conformance with the procedures (including crash testing) established by the Transportation Laboratory. For information regarding submittal of new designs for evaluation contact: Transportation Laboratory, 5900 Folsom Boulevard, Sacramento, California 95819.

New TMAs proposed as equal to approved TMAs or approved TMAs determined by the Engineer to need recertification shall not be used until approved or recertified by the Transportation Laboratory.

PAYMENT

The contract lump sum price paid for traffic control system shall include full compensation for furnishing all labor, materials (including signs), tools, equipment, and incidentals, and for doing all the work involved in placing, removing, storing, maintaining, moving to new locations, replacing and disposing of the components of the traffic control system shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The adjustment provisions in Section 4-1.03, "Changes," of the Standard Specifications shall not apply to the item of traffic control system. Adjustments in compensation for traffic control system will be made only for increased or decreased traffic control system required by changes ordered by the Engineer and will be made on the basis of the cost of the increased or decreased traffic control necessary. The adjustment will be made on a force account basis as provided in Section 9-1.03, "Force Account Payment," of the Standard Specifications for increased work and estimated on the same basis in the case of decreased work.

Traffic control system required by work which is classed as extra work, as provided in Section 4-1.03D of the Standard Specifications, will be paid for as a part of the extra work.

10-1.17 PORTABLE CHANGEABLE MESSAGE SIGN

Portable changeable message signs shall be furnished, placed, operated, and maintained at those locations shown on the plans or where designated by the Engineer in conformance with the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to "Maintaining Traffic" of these special provisions regarding the use of the portable changeable message signs.

10-1.18 TEMPORARY RAILING

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.

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.

10-1.19 CHANNELIZER

Channelizers shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Channelizers shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

When no longer required for the work as determined by the Engineer, channelizers and underlying adhesive used to cement the channelizer bases to the pavement shall be removed. Removed channelizers and adhesive shall become the property of the Contractor and shall be removed from the site of work.

10-1.20 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.

10-1.21 EXISTING HIGHWAY FACILITIES

The work performed in connection with various existing highway facilities shall conform to the provisions in Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

Except as otherwise provided for damaged materials in Section 15-2.04, "Salvage," of the Standard Specifications, the materials to be salvaged shall remain the property of the State, and shall be cleaned, packaged, bundled, tagged, and hauled to the District Regional Recycle Center at the San Francisco-Oakland Bay Bridge warehouse supply area adjacent to the San Francisco-Oakland Bay Bridge Toll Plaza and stockpiled.

The Contractor shall notify the Engineer and the District Regional Recycle Coordinator, telephone (510) 286-6111 a minimum of 48 hours prior to hauling salvaged material to the Recycle Center.

The recycle center is open from 8:00 AM to Noon and from 1:00 PM to 2:30 PM Mondays through Fridays except legal holidays.

REPLACE PULL BOX

Electrical Contractor shall locate and tag all affected existing pull boxes prior to paving within the project limits. Existing pull boxes shall be replaced with No. 5 (T) or No. 6 (T) in paved areas and No. 5 or No. 6 in all other areas. Top of pull boxes shall be flush with finished grade.

Full compensation for locating, tagging, replacing existing pull boxes will be paid for as extra work as provided in Section 4-1.03D of the standard Specifications.

SALVAGE DOUBLE THRIE BEAM BARRIER

Existing double thrie beam barrier, where shown on the plans to be salvaged, shall be salvaged and haul it to the station as indicated in the special provisions. Salvage existing double thrie beam barrier shall conform to Sections 15-2.04, "Salvage," 15-2.06, "Measurement," and 15-2.07, "Payment" of the Standard Specifications.

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 METAL BEAM GUARD RAILING AND DOUBLE METAL BEAM GUARD RAILING

Existing metal beam guard railing and double 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 double 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 double metal beam guard railing and no separate payment will be made therefor.

REMOVE PAVEMENT MARKER

Existing pavement markers, including underlying adhesive, when no longer required for traffic lane delineation as determined by the Engineer, shall be removed and disposed of.

REMOVE YELLOW AND WHITE THERMOPLASTIC TRAFFIC STRIPE AND YELLOW AND WHITE THERMOPLASTIC PAVEMENT MARKING

Thermoplastic traffic stripe and thermoplastic pavement marking shall be removed at the locations shown on the plans and as directed by the Engineer.

Attention is directed to "Water Pollution Control" of these special provisions.

Waste from removal of yellow thermoplastic traffic stripe and yellow thermoplastic 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 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 30 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 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 5 days prior to the start of removal of yellow thermoplastic traffic stripe and yellow thermoplastic 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 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.

Prior to removing yellow thermoplastic traffic stripe and yellow thermoplastic 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 3.

Where grinding or other methods approved by the Engineer are used to remove yellow thermoplastic traffic stripe and yellow thermoplastic 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 traffic stripe and yellow thermoplastic pavement markingto the Engineer for approval not less than 7 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 traffic stripe and yellow thermoplastic 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), 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 traffic stripe and yellow thermoplastic 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.

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.

Full compensation for providing a written work plan for the removal, storage, and disposal of yellow thermoplastic traffic stripe and yellow thermoplastic pavement marking shall be considered as included in the contract prices paid per meter for remove yellow thermoplastic traffic stripe and remove yellow thermoplastic pavement marking-and no separate payment will be made therefor.

REMOVE DRAINAGE FACILITY

Existing edge drains and asphalt concrete lined ditch where shown on the plans to be removed, shall be completely removed and disposed of.

REMOVE ASPHALT CONCRETE DIKE

Existing asphalt concrete dike, where shown on the plans to be removed, shall be removed.

Prior to removing the dike, the outside edge of the asphalt concrete to remain in place shall be cut on a neat line to a minimum depth of 50 mm.

The dike shall be removed in such a manner that the surfacing which is to remain in place is not damaged.

The dike shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.

ADJUST INLET AND MANHOLE COVER TO GRADE

Existing concrete drainage inlets and existing manhole covers shall be adjusted as shown on the plans and as directed by the Engineer.

Portland cement concrete shall be minor concrete or may be produced from commercial quality concrete containing not less than 590 pounds of cement per cubic yard.

Adjustment of inlets and manhole cover 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 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 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.

Adjust inlets and manhole covers will be measured by the unit as determined from the actual count of the adjust inlets and manhole covers.

The contract unit price paid for adjust inlet and manhole cover shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in adjusting inlets and manhole cover, including removing portions of inlets, bar reinforcing steel, concrete 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.

ADJUST UTILITY COVER TO GRADE

Covers of existing utility , junction structures or other facilities shall be adjusted to grade in conformance with the provisions in Section 15-2.05, "Reconstruction," of the Standard Specifications.

ADJUST FRAME AND GRATE TO GRADE

Frames and grates of existing drainage inlets or other facilities shall be adjusted to grade in conformance with the provisions in Section 15-2.05, "Reconstruction," of the Standard Specifications.

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REMOVE CRASH CUSHION (SAND FILLED) Existing crash cushion (sand filled) , at locations shown on the plans to be removed, shall be removed and disposed of.

Removing sand filled crash cushion, regardless of the number of modules in each sand filled crash cushion, will be measured and paid for by the unit as remove crash cushion (sand filled). The quantity to be paid for will be determined from actual count of the units in place.

ADJUST METAL BEAM GUARD RAILING

Existing metal beam guard railing, at the locations shown on the plans, shall be adjusted to grade to conform to the height requirements for new railing in conformance with the details shown on the plans and these special provisions.

The metal beam guard railing shall be raised to grade and then supported by nailing treated wood blocks to the front and the back of the wood posts.

The wood blocks shall be 38 mm x 140 mm in size, 300 mm long, rough or S4S construction grade or better pressure treated Douglas fir or Southern yellow pine. Pressure treating shall conform to the provisions for treating wood posts and blocks in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications and these special provisions.

Each block shall be secured to the post with two 16d hot-dip galvanized nails. The 38 mm x 300 mm edge of the block shall rest firmly on the pavement. Pavement displaced while raising the posts shall be firmly recompacted prior to installing the blocks.

At the option of the Contractor, where the change in rail element height is 50 mm or less, the element and block may be raised by drilling a new bolt hole in the post. The new hole shall be treated in conformance with the provisions for treating field bored holes in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications. The new hole shall be offset approximately 25 mm towards the leading edge of the post (towards approaching traffic) from the vertical plane of the original hole.

Adjust metal beam guard railing will be measured by the meter from end to end along the face of the adjusted railing, including along and around the face of return, end, and terminal sections.

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. 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 shall conform to the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions 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 disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications. Removal operations of cold planed material shall be concurrent with planing operations and follow within 15 m of the planer, unless otherwise directed by the Engineer.

Cold plane asphalt concrete pavement will be measured by the square meter. The quantity to be paid for will be the actual area of surface cold planed irrespective of the number of passes required to obtain the depth shown on the plans.

The contract price paid per square meter for cold plane asphalt concrete pavement shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in cold planing asphalt concrete surfacing and disposing of planed material, including furnishing the asphalt concrete for and constructing, maintaining, removing, and disposing of temporary asphalt concrete tapers, as specified in the Standard Specifications and these special provisions and as directed by the Engineer.

EXISTING 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.

REMOVE CONCRETE

Concrete, where shown on the plans to be removed, shall be removed.

Removing concrete curb, and concrete barrierwill be measured by the meter, measured along the curb, or barrier 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.

10-1.22 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.

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

Vegetation shall be cleared and grubbed only within the excavation lines.

At locations where there is no grading adjacent to a bridge or other structure, clearing and grubbing of vegetation shall be limited to 1.5 m outside the physical limits of the bridge or structure.

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.

10-1.23 EARTHWORK

Earthwork shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

10-1.24 SHOULDER BACKING

This work shall consist of constructing shoulder backing adjacent to the edge of new pavement surfacing in conformance with the details shown on the plans and these special provisions.

Material for shoulder backing shall be imported material or material processed from reclaimed portland cement concrete, lean concrete base, cement treated base, or a combination of any of these materials, conforming to the following grading and quality requirements:

Grading Requirements		Quality Requirements		
Sieve Sizes	Percentage Passing	Specification	California Test	Requirement
50 mm	100	Sand Equivalent	217	10 minimum-30 maximum
25 mm	75 - 100	Resistance (R-value)	301	50 minimum
4.75 mm	40 - 60	Percentage Crushed Particles	205	75% minimum
600 µm	12 - 35	Durability Index	229	20 minimum
75 µm	5 - 20			

At the option of the Contractor, aggregate for shoulder backing may consist of material processed from reclaimed asphalt concrete conforming to the following grading and quality requirements:

Grading Requirements		Quality Requirements		
Sieve Sizes	Percentage Passing	Specification	California Test	Requirement
50 mm	100	Resistance (R-value)	301	50 minimum
19 mm	70 - 100	Percentage Crushed Particles	205	75% minimum
4.75 mm	30 - 80	Durability Index	229	20 minimum

Coarse aggregate consisting of material retained on the 4.75-mm sieve, shall consist of material of which at least 75 percent by mass shall be crushed particles with a minimum of two fractured faces, as determined in conformance with California Test 205.

Shoulder backing material shall have a minimum unit weight of 2160 kg/m^3 as determined in conformance with California Test 212.

Shoulder backing material shall not be treated with lime, cement or other chemical mixtures.

A Class 2 plant may be used for batch mixing material that is specified to be plant-mixed.

Shoulder backing material consisting of reclaimed asphalt concrete, shall not be placed within 30 m measured horizontally of any culvert, watercourse, or bridge within the project limits.

The areas where shoulder backing is to be constructed shall be cleared of weeds, grass, and debris. Removed weeds grass and debris 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.

Prior to placement of shoulder backing material, basement material shall be scarified to a minimum depth of 75 mm. Immediately prior to placement of shoulder backing material, scarified material shall be watered. Shoulder backing material shall be placed, watered, and rolled a minimum of two passes with a steel tired roller weighing not less than 7.2 tonne to form a smooth, compacted surface. Watering shall conform to the provisions in Section 17, "Watering," of the Standard Specifications.

Shoulder backing material shall not be deposited on new pavement surfacing prior to placing the material in the final position, nor shall the material be deposited onto new pavement surfacing during mixing, watering, and blading operations.

Shoulder backing construction shall be completed along the edges of any portion of new pavement surfacing within 5 days after completion of that portion of the new surfacing. Prior to opening a lane adjacent to uncompleted shoulder backing to uncontrolled public traffic, the Contractor shall furnish, place, and maintain portable delineators and W8-9 (LOW SHOULDER) signs off of and adjacent to the new pavement surfacing. Portable delineators shall be placed at the beginning and along the drop-off of the edge of pavement, in the direction of travel, at successive maximum intervals of 150 m on tangents and 60 m on curves. W8-9 (LOW SHOULDER) signs shall be placed at the beginning and along the drop-off at successive maximum intervals of 600 m. The portable delineators and W8-9 (LOW SHOULDER) signs shall be maintained in place at each location until the shoulder backing is completed at that location. Portable delineators and signs shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications, except the signs may be set on temporary portable supports or on barricades.

Quantities of imported material (shoulder backing) will be measured by the tonne in conformance with the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications.

The contract price paid per tonne for imported material (shoulder backing) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing shoulder backing, complete in place, including furnishing, placing, maintaining, and removing portable delineators, W8-9 (LOW SHOULDER) signs, and temporary supports or barricades for the signs, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.25 MATERIAL CONTAINING AERIALLY DEPOSITED LEAD

Earthwork involving material containing aerially deposited lead shall conform to the provisions in Section 19, "Earthwork" of the Standard Specifications and these special provisions. The levels of lead found near the project limits are considered non-hazardous with the exception of material designated as Type Z-2.

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

Type Z-2 material contains aerially deposited lead in average concentrations (using the 95 percent Upper Confidence Limit) greater than or equal to 1000 mg/kg total lead; greater than or equal to 5.0 mg/L soluble lead (as tested using the California Waste Extraction Test) and the material is surplus; or greater than 3397 mg/kg total lead. Type Z-2 material exists in the unpaved areas, from a depth of 0.00 m to the depth of 0.3 m below existing grade - at the following locations:

Gore Paving Locations:

1) From "W" 46+72 to "W" 47+18
2) From "BL7" 75+59 to "BL7" 57+70
3) From "S2" 65+68 to "S2" 65+76
4) From "D" 48+40 to "D" 98+93
5) From "VL"1 9+00 to "VL"1 9+08
6) From "RL1" 160+92 to "RL1" 161+05
7) From "RL1" 161+77 to "RL1" 161+85

Motor Vehicle Pullout (MVP) Locations:

1) MVP1
2) MVP2
3) MVP3
4) MVP6
5) MVP7
6) MVP9
7) MVP16
8) MVP22
9) MVP24
10) MVP26
11) MVP33

This material is hazardous waste regulated by the State of California and shall be transported to and disposed of at a Class I Disposal Site. Material excavated from these areas shall be transported by a hazardous waste transporter registered with the DTSC using the required procedures for creating a manifest for the material. The vehicles used to transport the hazardous material shall conform to the current certifications of compliance of the DTSC.

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 California Department of Industrial Relations, Division of Occupational Safety and Health (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 Department 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 Department personnel by the Contractor. The number of Department personnel will be 3.

The Engineer will notify the Contractor of acceptance or rejection of the submitted or revised Lead Compliance Plan not more than 10 days after submittal of the plan.

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 an Excavation and Transportation Plan to the Engineer. The Engineer will have 7 days to review the plan. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the plan within 7 days of receipt of the Engineer's comments. The Engineer will have 7 days to review the revisions. Upon the Engineer's approval of the plan, 3 additional copies incorporating the required changes shall be submitted to the Engineer. Minor changes to or clarifications of 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 plan while minor revisions or amendments are being completed.

DUST CONTROL

Excavation, transportation, placement, and handling of material 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.

STOCKPILING

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 the hazardous material, and the Contractor will not be obligated for further cleanup, removal, or remedial action for such material 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 material for which the lead content is not known shall be analyzed for aerially deposited lead by the Contractor prior to removing the material 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^3 of surplus material and tested for lead using EPA Method 6010 or 7000 series.

Materials containing aerially deposited lead shall be disposed of within California. The disposal site shall be operating under a permit issued by the appropriate California Environmental Protection Agency board or department.

The Engineer will obtain the State of California Board of Equalization Identification Number for hazardous waste disposal. The Engineer will sign all hazardous waste manifests. The Contractor shall notify the Engineer 5 days before the manifests are to be signed.

MEASUREMENT AND PAYMENT

Quantities of roadway 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, 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) of the types 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.

Sampling, analyses, and reporting of results for surplus material not previously sampled will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

10-1.26 FIBER ROLLS

Fiber rolls shall conform to the details shown on the plans and these special provisions.

MATERIALS

Fiber rolls shall consist of one of the following:

A. Fiber rolls shall be constructed on the project site with manufactured blankets consisting of one or a combination of wood excelsior, rice, wheat or coconut fibers. The blanket shall measure approximately 3.5 m wide by 26 m to 29 m in length. Wood excelsior material shall have individual fibers, 80 percent of which shall be 150 mm or longer in fiber length. The blanket shall have a photodegradable plastic netting. The blanket shall be rolled on the blanket's width and secured with jute twine spaced 2 m apart along the roll for the full length and 150 mm from each end of the individual rolls. The blanket shall be rolled so that the netting is on the outside of the finished roll. The finished roll diameter shall be a minimum of 175 mm and a maximum of 225 mm and shall weigh not less than 1.3 kg/m.
B. Fiber rolls shall be pre-manufactured rice or wheat straw, wood excelsior or coconut fiber rolls encapsulated within a photodegradable plastic netting. Each roll shall be a minimum of 175 mm and a maximum of 225 mm in diameter and 7 m to 9 m in length and shall weigh not less than 1.3 kg/m. The netting shall be ultraviolet (UV) degradable plastic. The netting shall have a minimum durability of one year after installation. The netting shall be secured tightly at each end of the individual rolls.
C. Stakes shall be fir or pine and shall be a minimum of 25 mm x 25 mm x 600 mm in length. Metal stakes may be used as an alternative. The Contractor shall submit a sample of the metal stake to the Engineer prior to installation. The tops of the metal stakes shall be bent over at a 90-degree angle. No additional compensation will be allowed for the use of a metal stake.

INSTALLATION

Fiber rolls shall be joined tightly together to form a single linear roll that is installed approximately parallel to the slope contour. Fiber rolls shall be installed prior to the application of other erosion control materials.

Furrows shall be constructed at a slight angle to the slope contour to a depth of 50 mm to 100 mm, and at a sufficient width to hold the fiber rolls.

Stakes shall be installed 1.2 m apart along the total length of the rolls and 125 mm from the end of each individual roll. Stakes shall be driven flush or a maximum of 50 mm above the roll.

MEASUREMENT AND PAYMENT

Fiber rolls will be measured by the meter from end to end along the centerline of the installed rolls.

The contract price paid per meter for fiber rolls shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing fiber rolls, complete in place, including stakes, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.27 EROSION CONTROL (MULCH)

Erosion control (mulch) work shall consist of spreading mulch on all embankment slopes, excavation slopes, and areas shown on the plans. Erosion control (mulch) shall conform to the provisions in Section 20-3, "Erosion Control," of the Standard Specifications and these special provisions.

If the slope on which the mulch is to be placed is finished during the rainy season as specified in "Water Pollution Control" of these special provisions, the mulch shall be applied immediately to the slope.

MATERIALS

Mulch shall conform to the requirements in Section 20-2.08, "Mulch," of the Standard Specifications and these special provisions. Mulch shall consist of either wood chips or tree bark or a combination of both.

APPLICATION

Mulch shall be spread to a uniform thickness of 75 mm. Mulch shall extend to the edge of retaining walls, dikes, paving, fiber rolls and to within 1.2 meters from the flow line of paved and unpaved drainage ditches.

MEASUREMENT AND PAYMENT

Quantities of erosion control (mulch) will be measured by the cubic meter in conformance with the provisions in Section 9-1.01, "Measurement of Quantities," and will be measured in the vehicle at the point of delivery.

Full compensation for Erosion Control (Mulch) shall be considered as included in the contract price paid per Tonn for Imported Material (Shoulder Backing) and no separate payment will be made.

10-1.28 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 installed under existing paving by jacking or drilling methods in conformance with the provisions in Section 20-5.03B, "Conduit for Irrigation Crossovers," of the Standard Specifications.

ROADSIDE CLEARING

Existing trees and shrubs shown on plans to be removed, shall be removed. Tree and shrub removal shall conform to Section 20-4.025 of the Standard Specifications.

Weed Control

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.

10-1.29 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 and quality requirements shown in the following tables for the Class specified:

Grading Requirements (Percentage Passing)

Sieve Sizes	Operating Range	Contract Compliance
_____	_____	_____
_____	_____	_____
63-mm	100	100
4.75-mm	30-65	25-70
75-µm	0-15	0-18

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 1 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 1 aggregate subbase not exceed 50 percent of the total volume of the aggregate used shall not apply. Aggregate for Class 1 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.

10-1.30 AGGREGATE BASE (CLASS 3)

Aggregate base shall be 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 3 aggregate base not exceed 50 percent of the total volume of the aggregate used shall not apply. Aggregate for 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.

Aggregate for Class 3 aggregate base shall conform to the following requirements:

Grading Requirements (Percentage Passing)

Sieve Sizes	_19_ Maximum	
	Operating Range	Contract Compliance
50-mm		
37.5-mm		
25-mm	100	100
19-mm	90-100	87-100
4.75-mm	35-60	30-65
600-µm	10-30	5-35
75-µm	2-11	0-14

Except for the grading requirements all requirements pertaining to Class 2 aggregate base as given in Section 26-1.02A "Class 2 Aggregate Base," of the Standard Specifications shall apply to Class 3 aggregate base.

The aggregate shall not be treated with lime, cement or other chemical material before the Durability Index test is performed. Untreated reclaimed asphalt concrete and portland cement concrete will not be considered to be treated with lime, cement or other chemical material for purposes of performing the Durability Index test.

10-1.31 FOG SEAL COAT

Fog seal coat shall conform to the provisions in Section 37-1, "Seal Coats," of the Standard Specifications and these special provisions.

Attention is directed to "Order of Work" in these special provisions regarding application of asphalt emulsion.

Asphaltic emulsion shall be either SS1h or CSS1h grade

10-1.32 SEAL RANDOM CRACKS IN EXISTING SURFACING

Cracks in existing asphalt concrete surfacing of traffic lanes and shoulders shall be prepared and filled with crack sealant and covered with sand and aggregate as shown on the plans and in conformance with these special provisions.

Cracks 6 mm wide and wider in existing asphalt concrete surfacing and shoulders shall be prepared and sealed. Limits of lanes and shoulders to be prepared and sealed shall be as designated on the plans or directed by the Engineer.

The Contractor shall provide the Engineer with a Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificate of Compliance," of the Standard Specifications for each shipment of crack sealant. The certificate shall certify that the sealant conforms to the specifications, and shall be accompanied with storage and heating instructions and cautions for the material.

MATERIALS

Low modulus asphalt crack sealant shall be a mixture of paving asphalt and polymer.

Low modulus asphalt crack sealant shall conform to the following requirements:

Test	Test Method	Requirements
Softening Point	ASTM Designation: D 36	82°C min.
Ductility @ 4°C, 10 mm/min	ASTM Designation: D 113	300 mm min.
Force Ductility @ 4°C	Utah DOT Test Method (1)	18 N max.
Flow	ASTM Designation: D 3407	3 mm max.

Note:
(1) The Utah DOT Test Method is available for review at the Transportation Laboratory.

Low modulus asphalt crack sealant shall be furnished premixed in containers with an inside liner of polyethylene. Packaged material shall not exceed 30 kg in mass.

The sealant shall be capable of being melted and applied to cracks at temperatures below 204°C. When heated, it shall readily penetrate cracks 6 mm wide or wider.

PREPARATION

Cracks to be filled and adjacent asphalt concrete surfacing shall be cleaned and shall be free of dirt, vegetation, debris and loose sealant. Cleaning shall be done by air blasting. Old sealant which protrudes above the asphalt concrete surfacing shall be completely removed. Routing will not be required.

Hot compressed air or other means, approved by the Engineer, shall be used to clean and dry the crack immediately prior to application of crack sealant.

APPLICATION

Crack sealant shall be applied only after the cracks and adjacent asphalt concrete surfacing have been cleaned and dried.

Crack sealant material shall be spread with a nozzle or device approved for use by the Engineer and be placed within the specified temperature range and to the dimensions shown on the plans.

Cracks shall be squeegeed as necessary after application of the crack sealant material.

Within 2 days after application of sealant, sealed cracks that reopen or in which the sealant material sags below the surrounding asphalt concrete surfacing and shoulders shall be resealed.

MEASUREMENT AND PAYMENT

Seal random cracks will be measured by lane-kilometer, from actual measurement along the edge of each paved lane, parallel with the gradient of the pavement, or by lane length calculated using kilometer-post designations, as determined by the Engineer.

The contract price paid per lane-kilometer for seal random cracks shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in sealing random cracks, complete in place, including furnishing and applying sand and for brooming excessive sand as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for cleaning and sealing random cracks in adjacent paved shoulders shall be considered as included in the contract price paid per lane-kilometer for seal random cracks and no additional compensation will be allowed therefor.

Immediately prior to placing binder, pavement reinforcing fabric, and asphalt concrete surfacing, the pavement shall be cleaned of loose and extraneous materials such as, but not limited to, vegetation, sand, dirt, gravel and water.

Before placing the pavement reinforcing fabric, a binder of paving asphalt Grade PG 70-10 shall be applied uniformly to the surface to receive the pavement reinforcing fabric at a rate of not less than 1.15 L per square meter of surface covered. When pavement reinforcing fabric is placed in areas of conform tapers, the binder shall be spread at the approximate rate of 1.4 L per square meter of surface covered. The exact rate of application of asphalt binder will be determined by the Engineer.

Pavement reinforcing fabric shall not be placed in areas of conform tapers when the thickness of the overlying asphalt concrete will be less than 40 mm.

Asphalt concrete surfacing shall be placed over the pavement reinforcing fabric in the same work shift that the fabric is placed.

Pavement reinforcing fabric shall not be exposed to public traffic, Contractor's equipment or elements that will damage the fabric prior to placement of asphalt concrete surfacing.

Asphaltic emulsion shall not be substituted for paving asphalt binder for pavement reinforcing fabric.

Full compensation for cleaning pavement immediately in advance of placing binder, pavement reinforcing fabric, and asphalt concrete surfacing shall be considered as included in the contract price paid per square meter for pavement reinforcing fabric and no separate payment will be made therefor.

10-1.33 ASPHALT CONCRETE

Asphalt concrete shall be Type A and shall conform to the provisions in Section 11-1, "Quality Control / Quality Assurance" of these special provisions.

Surfacing of miscellaneous areas with asphalt concrete shall conform to the provisions in "Asphalt Concrete (Miscellaneous Areas)" of these special provisions.

The grade of asphalt binder to be mixed with aggregate for Type A asphalt concrete shall be Grade PG 64-10 and shall conform to the provisions in Section 92, "Asphalts" of the Standard Specifications.

A prime coat of liquid asphalt, Grade SC-70, shall be applied.

Paint binder (tack coat) shall be applied to existing surfaces to be surfaced and between layers of asphalt concrete, except when eliminated by the Engineer.

Paint binder (tack coat) shall be, at the option of the Contractor, either slow-setting asphaltic emulsion, rapid-setting asphaltic emulsion, or paving asphalt. Slow-setting asphaltic emulsion and rapid-setting asphaltic emulsion shall conform to the provisions in Section 39-8.02 of Section 11-1, "Quality Control / Quality Assurance," of these special provisions, and the provisions in Section 94, "Asphaltic Emulsions," of the Standard Specifications. When paving asphalt is used for paint binder; the grade will be determined by the Engineer. Paving asphalt shall be applied at a temperature of not less than 140°C or more than 175°C. Paving asphalt shall conform to the provisions in Section 39-8.02 of Section 11-1, "Quality Control / Quality Assurance," of these special provisions, and the provisions in Section 92, "Asphalts," of the Standard Specifications.

Paint binder (tack coat) shall be applied in the liter per square meter range limits specified for the surfaces to receive asphalt concrete in the tables below. The exact application rate within the range will be determined by the Engineer.

Application Rates for Asphaltic Emulsion Paint Binder (Tack Coat) on Asphalt Concrete (except Open Graded) and on Portland Cement Concrete Pavement (PCCP)		
Type of surface to receive Paint binder (tack coat)	Slow-Setting Asphaltic Emulsion L/m^2 (Note A)	Rapid-Setting Asphaltic Emulsion L/m^2 (Note B)
Dense, compact surfaces, between layers, and on PCCP	0.20 – 0.35	0.10 – 0.20
Open, textured or dry, Aged surfaces	0.35 – 0.90	0.20 – 0.40

Note A: Slow-setting asphaltic emulsion is asphaltic emulsion diluted with additional water. Water shall be added and mixed with the asphaltic emulsion (containing up to 43 percent water) so the resulting mixture contains one part asphaltic emulsion and not more than one part added water. The water shall be added by the emulsion producer or at a facility that has the capability to mix or agitate the combined blend.

Note B: Undiluted rapid-setting asphaltic emulsion

Application Rates for Paint Binder (Tack Coat) on Asphalt Concrete (except Open Graded) and on Portland Cement Concrete Pavement (PCCP)	
Type of surface to receive paint binder (tack coat)	Paving Asphalt L/m^2
Dense, compact surfaces, between layers, and on PCCP	0.05 – 0.10
Open, textured or dry, aged surfaces	0.10 – 0.25

The Contractor may obtain a copy of the Department's "Quality Control / Quality Assurance Manual for Asphalt Concrete Production and Placement" and the statistical evaluation program "PACRS" at:

http://www.dot.ca.gov/hq/construc

The aggregate for Type A asphalt concrete shall conform to the 19 mm Maximum medium grading specified in Section 39-2.02, "Aggregate," in Section 11-1, "Quality Control / Quality Assurance," of these special provisions.

In addition to the provisions in Section 39-9.01, "Spreading Equipment," in Section 11-1, "Quality Control / Quality Assurance," of these special provisions, asphalt paving equipment shall be equipped with automatic screed controls and a sensing device or devices.

When placing asphalt concrete to lines and grades established by the Engineer, the automatic controls shall control the longitudinal grade and transverse slope of the screed. Grade and slope references shall be furnished, installed, and maintained by the Contractor. Should the Contractor elect to use a ski device, the minimum length of the ski device shall be 9 m. The ski device shall be a rigid one piece unit and the entire length shall be utilized in activating the sensor.

When placing the initial mat of asphalt concrete on existing pavement, the end of the screed nearest the centerline shall be controlled by a sensor activated by a ski device not less than 9 m long. The end of the screed farthest from centerline shall be controlled by an automatic transverse slope device set to reproduce the cross slope designated by the Engineer.

When paving contiguously with previously placed mats, the end of the screed adjacent to the previously placed mat shall be controlled by a sensor that responds to the grade of the previously placed mat and will reproduce the grade in the new mat within a 3 mm tolerance. The end of the screed farthest from the previously placed mat shall be controlled in the same manner the screed was controlled when placing the initial mat.

If the methods and equipment furnished by the Contractor fail to produce a layer of asphalt concrete conforming to the provisions, including straightedge tolerance, in Section 39-10.04, "Compacting," in Section 11-1, "Quality Control / Quality Assurance," of these special provisions, the paving operations shall be discontinued and the Contractor shall modify the equipment or methods, or furnish substitute equipment.

If the automatic screed controls fail to operate properly during a day's work, the Contractor may use manual control of the spreading equipment for the remainder of that day. However, the equipment shall be corrected or replaced with alternative automatically controlled equipment conforming to the requirements in this section before starting another day's work.

If the finished surface of the asphalt concrete on Route 24 traffic lanes does not meet the specified surface tolerances, the finished surface shall be brought within tolerance by either (1) removal and replacement, or (2) placing an overlay of asphalt concrete. The method will be selected by the Engineer. The corrective work shall be at the Contractor's expense.

The area to which paint binder has been applied shall be closed to public traffic. Care shall be taken to avoid tracking binder material onto existing pavement surfaces beyond the limits of construction.

A vertical longitudinal joint of more than 45 mm will not be allowed between adjacent lanes open to public traffic.

Shoulders or median borders adjacent to a lane being paved shall be surfaced before opening the lane to public traffic.

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.

Additional asphalt concrete surfacing material shall be placed along the edge of the surfacing at road connections and private drives, hand raked, if necessary, and compacted to form smooth tapered conforms. Full compensation for furnishing all labor and tools and doing all the work necessary to hand rake said conforms shall be considered as included in the contract prices paid per tonne for the various contract items of asphalt concrete surfacing involved and no additional compensation will be allowed therefor.

10-1.34 REPLACE ASPHALT CONCRETE SURFACING

This work shall consist of removing existing asphalt concrete surfacing and underlying base and replacing the removed surfacing and base with new asphalt concrete as shown on the plans and in conformance with these special provisions.

The exact limits of asphalt concrete surfacing to be removed and replaced will be determined by the Engineer.

Existing asphalt concrete surfacing and underlying base material removed during a work period shall be replaced before the time the lane is to be opened to public traffic as designated in "Maintaining Traffic" of these special provisions.

The outline of the asphalt concrete surfacing to be removed shall be cut with a power-driven saw to a depth of not less than 46 mm before removing the surfacing. Surfacing and base shall be removed without damage to surfacing that is to remain in place. Damage to pavement which is to remain in place shall be repaired to a condition satisfactory to the Engineer or the damaged pavement shall be removed and replaced with new asphalt concrete if ordered by the Engineer. Repairing or removing and replacing pavement damaged outside the limits of pavement to be replaced shall be at the Contractor's expense and will not be measured or paid for.

Removed materials 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 remaining in place, after removing asphalt concrete surfacing and base to the required depth, shall be graded to a plane, watered, and compacted. The finished surface of the remaining material shall not extend above the grade established by the Engineer.

Areas of the base material which are low as a result of over excavation shall be filled, at the Contractor's expense, with asphalt concrete.

Asphalt concrete used for replace asphalt concrete surfacing shall conform to the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications.

At the Contractor's option, asphalt concrete used for replace asphalt concrete surfacing may be produced in conformance with the provisions for asphalt concrete placed on the traveled way in Section 11-1, "Quality Control / Quality Assurance," of these special provisions.

The quantity of replace asphalt concrete surfacing to be paid for will be measured by the cubic meter. The volume to be paid for will be calculated on the basis of the dimensions shown on the plans adjusted by the amount of any change ordered by the Engineer.

The contract price paid per cubic meter for replace asphalt concrete surfacing shall include full compensation for furnishing all labor, materials (including asphalt concrete), tools, equipment, and incidentals, and for doing all the work involved in replacing asphalt concrete surfacing, 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 miscellaneous areas to be paid for at the contract price per square meter for place asphalt concrete (miscellaneous area), in addition to the prices paid for the materials involved, shall be limited to the areas listed on the plans.

Aggregate for asphalt concrete dikes shall be in conformance with the provisions for 9.5-mm Maximum grading in Section 39-2.02, "Aggregate," of the Standard Specifications.

If the Contractor selects the batch mixing method, asphalt concrete shall be produced by the automatic batch mixing method in conformance with the provisions in Section 39-3.03A(2), "Automatic Proportioning," of the Standard Specifications.

The area to which paint binder has been applied shall be closed to public traffic. Care shall be taken to avoid tracking binder material onto existing pavement surfaces beyond the limits of construction.

A vertical longitudinal joint of more than 45 mm will not be allowed at any time between adjacent lanes open to public traffic.

Where the existing pavement is to be widened by constructing a new structural section adjacent to the existing pavement, the new structural section, on both sides of the existing pavement, shall be completed to match the elevation of the edge of the existing pavement at each location prior to spreading and compacting asphalt concrete over the adjacent existing pavement.

Shoulders or median borders adjacent to a lane being paved shall be surfaced prior to opening the lane to public traffic.

Asphalt concrete surfacing shall be placed on existing surfacing, including curve widening, chain control lanes, turnouts, left turn lanes, and public and private road connections shown on the plans, unless otherwise directed by the Engineer.

Additional asphalt concrete surfacing material shall be placed along the edge of the surfacing at road connections and private drives, hand raked, if necessary, and compacted to form smooth tapered conforms. Full compensation for furnishing all labor and tools and for doing all the work necessary to hand rake these conforms shall be considered as included in the contract prices paid per tonne for the various items of asphalt concrete surfacing involved and no additional compensation will be allowed therefor.

10-1.35 RUBBERIZED ASPHALT CONCRETE (TYPE G)

Rubberized asphalt concrete (Type G) shall consist of furnishing and mixing gap graded aggregate and asphalt-rubber binder and spreading and compacting the mixture. Type G rubberized asphalt concrete shall conform, except as otherwise provided, to the provisions for Type A asphalt concrete in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions.

GENERAL

The Contractor shall furnish samples of aggregate to the Engineer in conformance with the provisions in Section 39-3.03, "Proportioning," of the Standard Specifications.

Aggregate for Type G rubberized asphalt concrete shall be of such quality that the optimum amount of asphalt-rubber binder to be mixed with the aggregate, as determined by the Engineer in conformance with the requirements in California Test 367 (as amended below), shall be a minimum of 7.0 percent by mass of dry aggregate and a maximum of 9.0 percent by mass of dry aggregate. Aggregates which result in an optimum asphalt-rubber binder content of less than 7.0 percent or more than 9.0 percent by mass of dry aggregate shall not be used. The Engineer will determine the exact amount of asphalt-rubber binder to be mixed with the aggregate in conformance with the requirements in California Test 367, except as follows:

A. The specific gravity used in California Test 367, Section "B. Voids Content of Specimen," will be determined using California Test 308, Method A.
B. California Test 367, Section "C. Optimum Bitumen Content," is revised as follows:

    1. Plot asphalt-rubber binder content versus void content for each specimen on Form TL-306 (Figure 3), and connect adjacent points with straight lines.
    2. From Figure 3 select the theoretical asphalt-rubber binder content that has ___ percent voids.
    3. Record the asphalt-rubber binder content in Step 2 as the Optimum Bitumen Content (OBC).
    4. To establish a recommended range, use the Optimum Bitumen Content (OBC) as the high value and 0.3 percent less as the low value. Notwithstanding, the recommended range shall not extend below 7.0 percent nor shall the high value to establish the recommended range be above 9.0 percent. If the OBC is 7.0 percent, then there shall be no recommended range, and 7.0 percent shall be the recommended value.

C. Laboratory mixing and compaction shall be in conformance with the requirements of California Test 304, except that the mixing temperature of the aggregate shall be between 149°C and 163°C. The compaction temperature of the combined mixture shall be between 143°C and 149°C.

The rubberized asphalt concrete mixture, composed of the aggregate proposed for use and the optimum amount of asphalt-rubber binder as determined in conformance with the requirements in California Test 367 modified above, shall conform to the following quality requirements:

RUBBERIZED ASPHALT CONCRETE MIXTURE

Test Parameter	California Test	Requirement
Stabilometer Value, Minimum	304 and 366	23
Voids in Mineral Aggregate, Percent, Minimum	See Note	18

Note: Voids in mineral aggregate test shall be determined as described in Asphalt Institute Mix Design Methods for Asphalt Concrete (MS-2).

The asphalt-rubber binder content of the rubberized asphalt concrete (Type G) will be determined by extraction tests in conformance with the requirements in California Test 362, or will be determined in conformance with the requirements in California Test 379.

The Contractor shall furnish a Certificate of Compliance to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each material used in asphalt-rubber binder and the asphalt-rubber binder mixture. The Certificate of Compliance shall certify that the material conforms to the provisions in these special provisions. When requested by the Engineer, the Contractor shall submit samples with the Certificate of Compliance. The Contractor shall provide the Engineer a Material Safety Data Sheet (MSDS) for each of the constituent components of the asphalt-rubber binder, for the completed mixture of asphalt-rubber binder and for the Type G rubberized asphalt concrete.

The Contractor shall provide a Certificate of Compliance for each truck load of crumb rubber modifier (CRM), paving asphalt, and asphalt modifier delivered to the project. The Quality Control Program used by the manufacturer of each ingredient shall include a sampling and testing frequency as shown below:

A. CRM shall be tested, except for the grading requirement, at least once for every 225 tonnes of production, with a minimum of once for each project. CRM shall be tested for grading for every truck load delivered to the project.
B. Paving asphalt shall be tested at least once for every 180 tonnes of production with a minimum of once for each project.
C. Asphalt modifier shall be tested at least once for every 23 tonnes of production with a minimum of once for each project.
D. A copy of the laboratory test results for the test parameters specified in these special provisions for CRM, paving asphalt, and asphalt modifier shall be submitted to the Engineer with the Certificate of Compliance for each truck load of individual material delivered to the project.

Certified volume or weight slips shall be delivered to the Engineer for the materials supplied.

PAVING ASPHALT

The grade of paving asphalt to be used in the asphalt-rubber binder shall be Grade 64-16 conforming to the provisions in Section 92, "Asphalts," of the Standard Specifications and these special provisions.

The paving asphalt for use in asphalt-rubber binder shall be modified with an asphalt modifier.

ASPHALT MODIFIER

The asphalt modifier shall be a resinous, high flash point, aromatic hydrocarbon compound and shall conform to the following requirements:

ASPHALT MODIFIER

Test Parameter	ASTM Designation	Requirement
Viscosity, m^2/s ($x10^{-6}$) at 100°C	D 445	X ± 3*
Flash Point, CL.O.C., °C	D 92	207 min.
Molecular Analysis:		
Asphaltenes, percent by mass	D 2007	0.1 max.
Aromatics, percent by mass	D 2007	55 min.

* The symbol "X" is the viscosity of the asphalt modifier the Contractor proposes to furnish. The value "X" which the Contractor proposes shall be between the limits 19 and 36 and shall be submitted in writing to the Engineer. A proposed change, requested by the Contractor, in the value "X" shall require a new asphalt-rubber binder design.

The asphalt modifier shall be proportionately added to the paving asphalt at the production site where the asphalt-rubber binder is blended and reacted. Asphalt modifier shall be added in an amount of 2.5 percent to 6.0 percent by mass of the paving asphalt based on the recommendation of the asphalt-rubber binder supplier. The paving asphalt shall be at a temperature of not less than 190°C or more than 226°C when the asphalt modifier is added. If the asphalt modifier is combined with the paving asphalt, before being blended with the CRM, the combined paving asphalt and asphalt modifier shall be mixed by circulation for a period of not less than 20 minutes. Premixing of asphalt modifier and paving asphalt will not be required when the ingredients of the asphalt-rubber binder are proportioned and mixed simultaneously. Asphalt modifier and paving asphalt shall be measured for proportioning with meters conforming to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications.

CRUMB RUBBER MODIFIER (CRM)

Crumb rubber modifier (CRM) shall consist of a combination of scrap tire CRM and high natural CRM. The scrap tire CRM shall consist of ground or granulated rubber derived from a combination of automobile tires, truck tires or tire buffings. The high natural CRM shall consist of ground or granulated rubber derived from materials that utilize high natural rubber sources.

Steel and fiber separation may be accomplished by any method. Cryogenic separation, if utilized, shall be performed separately from and prior to grinding or granulating.

CRM shall be ground or granulated at ambient temperature. Cryogenically produced CRM particles which can pass through the grinder or granulator without being ground or granulated respectively shall not be used.

CRM shall not contain more than 0.01-percent wire (by mass of CRM) and shall be free of other contaminants, except fabric. Fabric shall not exceed 0.05-percent by mass of CRM. The test and method for determining the percent by mass of wire and fabric is available at the Transportation Laboratory, Pavement Branch, Telephone 916-227-7300, and will be furnished to interested persons upon request. A Certificate of Compliance certifying these percentages shall be furnished to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

The length of an individual CRM particle shall not exceed 4.75 mm.

The CRM shall be sufficiently dry so that the CRM will be free flowing and not produce foaming when combined with the blended paving asphalt and asphalt modifier mixture. Calcium carbonate or talc may be added at a maximum amount of 3 percent by mass of CRM to prevent CRM particles from sticking together. The CRM shall have a specific gravity between 1.1 and 1.2 as determined by California Test 208. Scrap tire CRM and high natural CRM shall be delivered to the production site in separate bags and shall be sampled and tested separately. CRM material shall conform to the following requirements of ASTM Designation: D 297:

SCRAP TIRE CRUMB RUBBER MODIFIER

Test Parameter	Percent	
	Min.	Max.
Acetone Extract	6.0	16.0
Ash Content	—	8.0
Carbon Black Content	28.0	38.0
Rubber Hydrocarbon	42.0	65.0
Natural Rubber Content	22.0	39.0

HIGH NATURAL CRUMB RUBBER MODIFIER

Test Parameter	Percent	
	Min.	Max.
Acetone Extract	4.0	16.0
Rubber Hydrocarbon	50.0	—
Natural Rubber Content	40.0	48.0

The CRM for asphalt-rubber binder shall conform to the gradations specified below when tested in conformance with the requirements in ASTM Designation: C 136, except as follows:

A. Split or quarter 100 g ± 5 g from the CRM sample and dry to a constant mass at a temperature of not less than 57°C or more than 63°C and record the dry sample mass. Place the CRM sample and 5.0 g of talc in a 0.5-L jar. Seal the jar, then shake it by hand for a minimum of one minute to mix the CRM and the talc. Continue shaking or open the jar and stir until particle agglomerates and clumps are broken and the talc is uniformly mixed.
B. Place one rubber ball on each sieve. Each ball shall have a mass of 8.5 g ± 0.5 g, have a diameter of 24.5 mm ± 0.5 mm, and shall have a Shore Durometer "A" hardness of 50 ± 5 in conformance with the requirements in ASTM Designation: D 2240. After sieving the combined material for 10 minutes ± 1 minute, disassemble the sieves. Material adhering to the bottom of a sieve shall be brushed into the next finer sieve. Weigh and record the mass of the material retained on the 2.36-mm sieve and leave this material (do not discard) on the scale or balance. Observed fabric balls shall remain on the scale or balance and shall be placed together on the side of the scale or balance to prevent the fabric balls from being covered or disturbed when placing the material from finer sieves onto the scale or balance. The material retained on the next finer sieve (2.00-mm sieve) shall be added to the scale or balance. Weigh and record that mass as the accumulative mass retained on that sieve (2.00-mm sieve). Continue weighing and recording the accumulated masses retained on the remaining sieves until the accumulated mass retained in the pan has been determined. Prior to discarding the CRM sample, separately weigh and record the total mass of fabric balls in the sample.
C. Determine the mass of material passing the 75-µm sieve (or mass retained in the pan) by subtracting the accumulated mass retained on the 75-µm sieve from the accumulated mass retained in the pan. If the material passing the 75-µm sieve (or mass retained in the pan) has a mass of 5 g or less, cross out the recorded number for the accumulated mass retained in the pan and copy the number recorded for the accumulated mass retained on the 75-µm sieve and record that number (next to the crossed out number) as the accumulated mass retained in the pan. If the material passing the 75-µm sieve (or mass retained in the pan) has a mass greater than 5 g, cross out the recorded number for the accumulated mass retained in the pan, subtract 5 g from that number and record the difference next to the crossed out number. The adjustment to the accumulated mass retained in the pan is made to account for the 5 g of talc added to the sample. For calculation purposes, the adjusted total sample mass is the same as the adjusted accumulated mass retained in the pan. Determine the percent passing based on the adjusted total sample mass and record to the nearest 0.1 percent.

CRM GRADATIONS

Sieve Size	Scrap Tire CRM Percent Passing	High Natural CRM Percent Passing
2.36-mm	100	100
2.00-mm	98-100	100
1.18-mm	45-75	95-100
600-µm	2-20	35-85
300-µm	0-6	10-30
150-µm	0-2	0-4
75-µm	0	0-1

ASPHALT-RUBBER BINDER

Asphalt-rubber binder shall consist of a mixture of paving asphalt, asphalt modifier, and crumb rubber modifier.

At least 2 weeks before the binder's intended use, the Contractor shall furnish the Engineer 4 one-liter cans filled with the asphalt-rubber binder proposed for use on the project. The Contractor shall supply the Engineer, for approval, a binder formulation and samples of the materials to be used in the asphalt-rubber binder at least 2 weeks before construction is scheduled to begin. The binder formulations shall consist of the following information:

A. Paving Asphalt and Modifiers:

1. Source and grade of paving asphalt.
2. Source and identification (or type) of modifiers used.
3. Percentage of asphalt modifier by mass of paving asphalt.
4. Percentage of the combined blend of paving asphalt and asphalt modifier by total mass of asphalt-rubber binder to be used.
5. Laboratory test results for test parameters shown in these special provisions.

B Crumb Rubber Modifier (CRM):

1. Source and identification (or type) of scrap tire and high natural CRM.
2. Percentage of scrap tire and high natural CRM by total mass of the asphalt-rubber blend.
3. If CRM from more than one source is used, the above information will be required for each CRM source used.
4. Laboratory test results for test parameters shown in these special provisions.

C. Asphalt-Rubber Binder:

1. Laboratory test results of the proposed blend for test parameters shown in these special provisions.
2. The minimum reaction time and temperature.

The method and equipment for combining paving asphalt, asphalt modifier, and CRM shall be so designed and accessible that the Engineer can readily determine the percentages by mass for each material being incorporated into the mixture.

The proportions of the materials, by total mass of asphalt-rubber binder, shall be 80 percent ± 2 percent combined paving asphalt and asphalt modifier, and 20 percent ± 2 percent CRM. However, the minimum amount of CRM shall not be less than 18.0 percent. Lower values which are rounded up shall not be allowed. The CRM shall be combined at the production site and shall contain 75 percent ± 2 percent scrap tire CRM and 25 percent ± 2 percent high natural CRM, by mass.

The paving asphalt and asphalt modifier shall be combined into a blended mixture that is chemically compatible with the crumb rubber modifier to be used. The blended mixture is considered to be chemically compatible when it meets the provisions for asphalt-rubber binder (after reacting) found in these special provisions.

The blended paving asphalt and asphalt modifier mixture, and the CRM shall be combined and mixed together at the production site in a blender unit to produce a homogeneous mixture.

The temperature of the blended paving asphalt and asphalt modifier mixture shall be not less than 190°C nor more than 226°C when the CRM is added. The combined materials shall be reacted for a minimum of 45 minutes after incorporation of the CRM at a temperature of not less than 190°C nor more than 218°C. The temperature shall not be higher than 6°C below the actual flash point of the asphalt-rubber binder.

After reacting, the asphalt-rubber binder shall conform to the following requirements:

ASPHALT-RUBBER BINDER

Test Parameter	ASTM Test Method	Requirement	
		Min.	Max.
Cone Penetration @ 25°C, 1/10 mm	D 217	25	70
Resilience @ 25°C, Percent rebound	D 3407	18	—
Field Softening Point, °C	D 36	52	74
Viscosity @ 190°C, Pa • s ($x10^{-3}$)	See Note	1500	4000

NOTE: The viscosity test shall be conducted using a hand held Haake Viscometer Model VT-02 with Rotor 1, 24 mm in depth x 53 mm in height, or equivalent, as determined by the Engineer. The accuracy of the viscometer shall be verified by comparing the viscosity results obtained with the hand held viscometer to 3 separate calibration fluids of known viscosities ranging from 1000 to 5000 Pa • s ($x10^{-3}$). The viscometer will be considered accurate if the values obtained are within 300 Pa • s ($x10^{-3}$) of the known viscosity. The known viscosity value shall be based on the fluid manufacturers standard test temperature or the test temperature versus viscosity correlation table provided by the fluid manufacturer. Viscometers used on the project shall be verified to be accurate. The test method for determining the viscosity of asphalt-rubber binder using a hand held viscometer is available at the Transportation Laboratory, Pavement Branch, Telephone (916) 227-7300. The accuracy verification results shall be provided to the Engineer and shall be certified by a Certificate of Compliance. The Certificate of Compliance shall be furnished to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

The Contractor shall provide a Haake Viscometer, or equivalent, at the production site during combining of asphalt-rubber binder materials. The Contractor shall take viscosity readings of asphalt-rubber binder from samples taken from the feed line connecting the storage and reaction tank to the asphalt concrete plant. Readings shall be taken at least every hour with not less than one reading for each batch of asphalt-rubber binder. The Contractor shall log these results, including time and asphalt-rubber binder temperature, and a copy of the log shall be submitted to the Engineer on a daily basis. As determined by the Engineer, the Contractor shall either notify the Engineer at least 15 minutes prior to each test or provide the Engineer a schedule of testing times.

The reacted asphalt-rubber binder shall be maintained at a temperature of not less than 190°C nor more than 218°C.

If any of the material in a batch of asphalt-rubber binder is not used within 4 hours after the 45-minute reaction period, heating of the material shall be discontinued. Any time the asphalt-rubber binder cools below 190°C and is reheated shall be considered a reheat cycle. The total number of reheat cycles shall not exceed 2. The material shall be uniformly reheated to a temperature of not less than 190°C nor more than 218°C prior to use. Additional scrap tire CRM may be added to the reheated binder and reacted for a minimum of 45 minutes. The cumulative amount of additional scrap tire CRM shall not exceed 10 percent of the total binder mass. Reheated asphalt-rubber binder shall conform to the provisions for asphalt-rubber binder.

EQUIPMENT FOR PRODUCTION OF ASPHALT-RUBBER BINDER

The Contractor shall utilize the following equipment for production of asphalt-rubber binder:

A. An asphalt heating tank equipped to heat and maintain the blended paving asphalt and asphalt modifier mixture at the necessary temperature before blending with the CRM. This unit shall be equipped with a thermostatic heat control device and a temperature reading device and shall be accurate to within ± 3°C and shall be of the recording type.

B. A mechanical mixer for the complete, homogeneous blending of paving asphalt, asphalt modifier, and CRM. Paving asphalt and asphalt modifier shall be introduced into the mixer through meters conforming to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications. The blending system shall be capable of varying the rate of delivery of paving asphalt and asphalt modifier proportionate with the delivery of CRM. During the proportioning and blending of the liquid ingredients, the temperature of paving asphalt and the asphalt modifier shall not vary more than ± 14°C. The paving asphalt feed, the asphalt modifier feed, and CRM feed shall be equipped with devices by which the rate of feed can be determined during the proportioning operation. Meters used for proportioning individual ingredients shall be equipped with rate-of-flow indicators to show the rates of delivery and resettable totalizers so that the total amounts of liquid ingredients introduced into the mixture can be determined. The liquid and dry ingredients shall be fed directly into the mixer at a uniform and controlled rate. The rate of feed to the mixer shall not exceed that which will permit complete mixing of the materials. 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. Mixing shall continue until a homogeneous mixture of uniformly distributed and properly blended asphalt-rubber binder of unchanging appearance and consistency is produced. The

Contractor shall provide a safe sampling device capable of delivering a representative sample of the completed asphalt-rubber binder of sufficient size to permit the required tests.

C. An asphalt-rubber binder storage tank equipped with a heating system furnished with a temperature reading device to maintain the proper temperature of the asphalt-rubber binder and an internal mixing unit capable of maintaining a homogeneous mixture of paving asphalt, asphalt modifier, and CRM.

The equipment shall be approved by the Engineer prior to use.

AGGREGATE

The aggregate for Type G rubberized asphalt concrete shall conform to the following grading and shall meet the quality provisions specified for Type A asphalt concrete in Section 39-2.02, "Aggregate," of the Standard Specifications, except as follows:

A. California Test 211, Los Angeles Rattler loss at 500 revolutions shall be 40 percent maximum.
B. California Test 205, Section D, definition of a crushed particle is revised as follows: "A particle having 2 or more fresh mechanically fractured faces shall be considered a crushed particle."
C. The swell and moisture vapor susceptibility requirements shall not apply.

The symbol "X" in the following table is the gradation which the Contractor proposes to furnish for the specific sieve.

Aggregate Grading Requirements
Percentage Passing
12.5-mm maximum

Sieve Size	Limits of Proposed Gradation	Operating Range	Contract Compliance
19-mm	—	100	100
12.5-mm	—	90-100	90-100
9.5-mm	83-87	X±5	X±7
4.75-mm	33-37	X±5	X±7
2.36-mm	18-22	X±4	X±5
600-µm	8-12	X±4	X±5
75-µm	—	2-7	0-8

PROPORTIONING, SPREADING AND COMPACTING

When batch type asphalt concrete plants are used to produce Type G rubberized asphalt concrete, the asphalt-rubber binder and mineral aggregate shall be proportioned by mass.

When continuous mixing type asphalt concrete plants are used to produce Type G rubberized asphalt concrete, the asphalt-rubber binder shall be proportioned by an asphalt meter of the mass flow, Coriolis effect type. The meter shall have been Type-approved by the Division of Measurement Standards prior to the start of production. The meter shall be calibrated in conformance with the requirements in California Test 109. The meter shall be interfaced with the existing continuous mixing plant controller in use on the asphalt concrete plant.

Type G rubberized asphalt concrete shall be placed only when the atmospheric and pavement surface temperatures are 13°C or above.

When the atmospheric and pavement surface temperature is 18°C or higher, the following shall apply:

A. The temperature of the aggregate shall not be greater than 163°C at the time the asphalt-rubber binder is added to the aggregate.
B. Type G rubberized asphalt concrete shall be spread at a temperature of not less than 138°C or more than 163°C, measured in the mat directly behind the paving machine.
C. The first coverage of initial or breakdown compaction shall be performed when the temperature of the Type G rubberized asphalt concrete is not less than 135°C. Breakdown compaction shall be completed before the temperature of the Type G rubberized asphalt concrete drops below 121°C.

When the atmospheric or pavement surface temperature is below 18°C, the following shall apply:

A The temperature of the aggregate shall not be less than 149°C nor more than 163°C at the time the asphalt-rubber binder is added to the aggregate.

B. The Contractor shall cover the loads of Type G rubberized asphalt concrete with tarpaulins. The tarpaulins shall completely cover the exposed Type G rubberized asphalt concrete until the Type G rubberized asphalt concrete has been completely transferred into the asphalt concrete paver hopper or deposited on the roadbed.
C. Type G rubberized asphalt concrete shall be spread at a temperature of not less than 143°C nor more than 163°C, measured in the mat directly behind the paving machine.
D. The first coverage of initial or breakdown compaction shall be performed when the temperature of the Type G rubberized asphalt concrete is not less than 138°C. Breakdown compaction shall be completed before the temperature of the Type G rubberized asphalt concrete drops below 127°C.

Pneumatic tired rollers shall not be used to compact Type G rubberized asphalt concrete.

Alternative compacting equipment conforming to the provisions in Section 39-6.03, "Compacting," of the Standard Specifications shall be used to compact the Type G rubberized asphalt concrete.

Traffic shall not be allowed on the Type G rubberized asphalt concrete until final rolling operations have been completed and sand has been applied to the surface.

Sand shall be spread on the surface of Type G rubberized asphalt concrete at a rate of 0.5 kg/m^2 to 1.0 kg/m^2. The exact rate will be determined by the Engineer. When ordered by the Engineer excess sand shall be removed from the pavement surface by sweeping. Sand shall be free from clay or organic material. Sand shall conform to the fine aggregate grading provisions in Section 90-3.03, "Fine Aggregate Grading," of the Standard Specifications.

MEASUREMENT AND PAYMENT

Rubberized asphalt concrete (Type G) will be measured and paid for by the tonne in the same manner specified for asphalt concrete in Section 39-8, "Measurement and Payment," of the Standard Specifications.

Full compensation for furnishing and spreading sand on the rubberized asphalt concrete surface and for sweeping and removing excess sand from the pavement surface shall be considered as included in the contract price paid per tonne for rubberized asphalt concrete (Type G) and no separate payment will be made therefor.

10-1.36 RUBBERIZED ASPHALT CONCRETE (TYPE O)

Rubberized asphalt concrete (Type O) shall consist of furnishing and mixing Open Graded aggregate and asphalt-rubber binder and spreading and compacting the mixture. Type O rubberized asphalt concrete shall conform, except as otherwise provided, to the provisions for Open Graded asphalt concrete in Section 39, "Asphalt Concrete," of the Standard Specifications and to these special provisions.

GENERAL

The Contractor shall furnish samples of aggregate to the Engineer in conformance with the provisions in Section 39-3.03, "Proportioning," of the Standard Specifications.

The amount of asphalt-rubber binder to be mixed with the aggregate for Type O rubberized asphalt concrete will be determined by the Engineer using the samples of aggregates furnished by the Contractor in conformance with the provisions in Section 39-3.03, "Proportioning," of the Standard Specifications. The Engineer will determine the exact amount of asphalt-rubber binder to be mixed with the aggregate in conformance with the provisions in California Test 368 with the following exceptions. The aggregate shall be mixed with Grade PG 64-16 paving asphalt and the optimum bitumen content shall be determined in conformance with the test procedure. The optimum binder content for rubberized asphalt concrete Type O shall then be determined using the following formula:

A. $OBC_2 = (OBC_1) \times 1.20$
B. OBC_1 = Optimum bitumen content using Grade PG 64-16 paving asphalt
C. OBC_2 = Optimum bitumen content using asphalt-rubber binder

The asphalt-rubber binder content of the Type O rubberized asphalt concrete will be determined by extraction tests in conformance with the provisions in California Test 362, or will be determined in conformance with the provisions in California Test 379.

The Contractor shall 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 material used in asphalt-rubber binder and the asphalt-rubber binder mixture. The Certificate of Compliance shall certify that the material conforms to the provisions in these special provisions. When requested by the Engineer, the Contractor shall also submit samples with the Certificate of Compliance. The Contractor shall provide the Engineer a Material Safety Data Sheet (MSDS) for each of the constituent components of the asphalt-rubber binder, for the completed mixture of asphalt-rubber binder and for the Type O rubberized asphalt concrete.

The Contractor shall provide a Certificate of Compliance for each truck load of crumb rubber modifier (CRM), paving asphalt, and asphalt modifier delivered to the project. The Quality Control Program used by the manufacturer of each ingredient shall include a sampling and testing frequency as follows:

A. CRM shall be tested, except for the grading requirement, at least once for every 225 tonnes of production, with a minimum of once for each project. CRM shall be tested for grading for every truck load delivered to the project.
B. Paving asphalt shall be tested at least once for every 180 tonnes of production with a minimum of once for each project.
C. Asphalt modifier shall be tested at least once for every 23 tonnes of production with a minimum of once for each project.
D. A copy of the laboratory test results for the test parameters specified in these special provisions for CRM, paving asphalt, and asphalt modifier shall be submitted to the Engineer with the Certificate of Compliance for each truck load of individual material delivered to the project.

PAVING ASPHALT

The grade of paving asphalt to be used in the asphalt-rubber binder shall be Grade PG 64-16 and shall conform to the provisions in Section 92, "Asphalts," of the Standard Specifications and these special provisions.

The paving asphalt for use in asphalt-rubber binder shall be modified with an asphalt modifier.

ASPHALT MODIFIER

The asphalt modifier will be a resinous, high flash point, aromatic hydrocarbon compound and shall conform to the following requirements:

ASPHALT MODIFIER

Test Parameter	ASTM Designation	Requirement
Viscosity, m^2/s ($x10^{-6}$) at 100°C	D 445	X ± 3*
Flash Point, CL.O.C., °C	D 92	207 min.
Molecular Analysis:		
Asphaltenes, percent by mass	D 2007	0.1 max.
Aromatics, percent by mass	D 2007	55 min.

* The symbol "X" is the viscosity of the asphalt modifier the Contractor proposes to furnish. The value "X" which the Contractor proposes shall be between the limits 19 and 36 and shall be submitted in writing to the Engineer. A proposed change, requested by the Contractor, in the value "X" shall require a new asphalt-rubber binder design.

The asphalt modifier shall be proportionately added at the production site where the asphalt-rubber binder is blended and reacted. Asphalt modifier shall be added to the paving asphalt at an amount of 2.5 percent to 6.0 percent by mass of the paving asphalt based on the recommendation of the asphalt-rubber binder supplier. The exact amount will be determined by the Engineer. The paving asphalt shall be at a temperature of not less than 190°C or more than 226°C when the asphalt modifier is added. If the asphalt modifier is combined with the paving asphalt, before being blended with the CRM, the combined paving asphalt and asphalt modifier shall be mixed by circulation for a period of not less than 20 minutes. This premixing of asphalt modifier and the paving asphalt will not be required when the ingredients of the asphalt-rubber binder are proportioned and mixed simultaneously. Asphalt modifier and paving asphalt shall be measured for proportioning with meters conforming to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications.

CRUMB RUBBER MODIFIER (CRM)

Crumb rubber modifier (CRM) shall consist of a combination of scrap tire CRM and high natural CRM. The scrap tire CRM shall consist of ground or granulated rubber derived from a combination of automobile tires, truck tires or tire buffings. The high natural CRM shall consist of ground or granulated rubber derived from materials that utilize high natural rubber sources.

Steel and fiber separation may be accomplished by any method. Cryogenic separation, if utilized, shall be performed separately from and prior to grinding or granulating.

CRM shall be ground or granulated at ambient temperature. Cryogenically produced CRM particles that can pass through the grinder or granulator without being ground or granulated respectively shall not be used.

CRM shall not contain more than 0.01-percent wire (by mass of CRM) and shall be free of other contaminants, except fabric. Fabric shall not exceed 0.05-percent by mass of CRM. The test and method for determining the percent by mass of wire and fabric is available at the Transportation Laboratory, Pavement Branch, Telephone 916-227-7300, and will be furnished to interested persons upon request. A Certificate of Compliance certifying these percentages shall be furnished to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

The length of an individual CRM particle shall not exceed 4.75 mm.

The CRM shall be sufficiently dry so as to be free flowing and not produce foaming when combined with the blended paving asphalt and asphalt modifier mixture. Calcium carbonate or talc may be added at a maximum amount of 3 percent by weight of CRM to prevent CRM particles from sticking together. The CRM shall have a specific gravity between 1.1 and 1.2 as determined in conformance with the requirements in California Test 208. Scrap tire CRM and high natural CRM shall be delivered to the production site in separate bags and shall be sampled and tested separately. CRM material shall conform to the following requirements in conformance with the requirements in ASTM Designation: D 297:

SCRAP TIRE CRUMB RUBBER MODIFIER

Test Parameter	Percent	
	Min.	Max.
Acetone Extract	6.0	16.0
Ash Content	—	8.0
Carbon Black Content	28.0	38.0
Rubber Hydrocarbon	42.0	65.0
Natural Rubber Content	22.0	39.0

HIGH NATURAL CRUMB RUBBER MODIFIER

Test Parameter	Percent	
	Min.	Max.
Acetone Extract	4.0	16.0
Rubber Hydrocarbon	50.0	—
Natural Rubber Content	40.0	48.0

The CRM for asphalt-rubber binder shall conform to the gradations specified below when tested in conformance with the requirements in ASTM Designation: C 136, except as follows:

A. Split or quarter 100 g ± 5 g from the CRM sample and dry to a constant mass at a temperature of not less than 57°C or more than 63°C and record the dry sample mass. Place the CRM sample and 5.0 g of talc in a 0.5-L jar. Seal the jar, then shake it by hand for a minimum of one minute to mix the CRM and the talc. Continue shaking or open the jar and stir until particle agglomerates and clumps are broken and the talc is uniformly mixed.

B. Place one rubber ball on each sieve. Each ball shall have a mass of 8.5 g ± 0.5 g, have a diameter of 24.5 mm ± 0.5 mm, and shall have a Shore Durometer "A" hardness of 50 ± 5 in conformance with the requirements in ASTM Designation: D 2240. After sieving the combined material for 10 minutes ± 1 minute, disassemble the sieves. Material adhering to the bottom of a sieve shall be brushed into the next finer sieve. Weigh and record the mass of the material retained on the 2.36-mm sieve and leave this material (do not discard) on the scale or balance. Observed fabric balls shall remain on the scale or balance and shall be placed together on the side of the scale or balance to prevent the fabric balls from being covered or disturbed when placing the material from finer sieves onto the scale or balance. The material retained on the next finer sieve (2.00-mm sieve) shall be added to the scale or balance. Weigh and record that mass as the accumulative mass retained on that sieve (2.00-mm sieve). Continue weighing and recording the accumulated masses retained on the remaining sieves until the accumulated mass retained in the pan has been determined. Prior to discarding the CRM sample, separately weigh and record the total mass of fabric balls in the sample.

C. Determine the mass of material passing the 75-µm sieve (or mass retained in the pan) by subtracting the accumulated mass retained on the 75-µm sieve from the accumulated mass retained in the pan. If the material passing the 75-µm sieve (or mass retained in the pan) has a mass of 5 g or less, cross out the recorded number for the accumulated mass retained in the pan and copy the number recorded for the accumulated mass retained on the 75-µm sieve and record that number (next to the crossed out number) as the accumulated mass retained in the pan. If the material passing the 75-µm sieve (or mass retained in the pan) has a mass greater than 5 g, cross out the recorded number for the accumulated mass retained in the pan, subtract 5 g from that number and record the

difference next to the crossed out number. The adjustment to the accumulated mass retained in the pan is made to account for the 5 g of talc added to the sample. For calculation purposes, the adjusted total sample mass is the same as the adjusted accumulated mass retained in the pan. Determine the percent passing based on the adjusted total sample mass and record to the nearest 0.1 percent.

CRM GRADATIONS

Sieve Size	Scrap Tire CRM Percent Passing	High Natural CRM Percent Passing
2.36-mm	100	100
2.00-mm	98-100	100
1.18-mm	45-75	95-100
600-µm	2-20	35-85
300-µm	0-6	10-30
150-µm	0-2	0-4
75-µm	0	0-1

ASPHALT-RUBBER BINDER

Asphalt-rubber binder shall consist of a mixture of paving asphalt, asphalt modifier, and crumb rubber modifier.

At least 2 weeks before the binder's intended use, the Contractor shall furnish the Engineer 4 one liter cans filled with the asphalt-rubber binder proposed for use on the project. The Contractor shall supply the Engineer, for approval, a binder formulation and samples of the materials to be used in the asphalt-rubber binder at least 2 weeks before construction is scheduled to begin. The binder formulations shall consist of the following information:

A. Paving Asphalt and Modifiers:

1. Source and grade of paving asphalt.
2. Source and identification (or type) of modifiers used.
3. Percentage of asphalt modifier by mass of paving asphalt.
4. Percentage of the combined blend of paving asphalt and asphalt modifier by total mass of asphalt-rubber binder to be used.
5. Laboratory test results for test parameters shown in these special provisions.

B. Crumb Rubber Modifier (CRM):

1. Source and identification (or type) of scrap tire and high natural CRM.
2. Percentage of scrap tire and high natural CRM by total mass of the asphalt-rubber blend.
3. If CRM from more than one source is used, the above information will be required for each CRM source used.
4. Laboratory test results for test parameters shown in these special provisions.

C. Asphalt-Rubber Binder:

1. Laboratory test results of the proposed blend for test parameters shown in these special provisions.
2. The minimum reaction time and temperature.

The method and equipment for combining paving asphalt, asphalt modifier, and CRM shall be so designed and accessible that the Engineer can readily determine the percentages by mass for each material being incorporated into the mixture.

The proportions of the materials, by total mass of asphalt-rubber binder, shall be 80 percent ± 2 percent combined paving asphalt and asphalt modifier, and 20 percent ± 2 percent CRM. However, the minimum amount of CRM shall not be less than 18.0 percent. Lower values which are rounded up shall not be allowed. The CRM shall be combined at the production site and shall contain 75 percent ± 2 percent scrap tire CRM and 25 percent ± 2 percent high natural CRM, by mass.

The paving asphalt and asphalt modifier shall be combined into a blended mixture that is chemically compatible with the crumb rubber modifier to be used. The blended mixture is considered to be chemically compatible when the mixture meets the provisions for asphalt-rubber binder (after reacting) of these special provisions.

The blended paving asphalt and asphalt modifier mixture and the CRM shall be combined and mixed together at the production site in a blender unit to produce a homogeneous mixture.

The temperature of the blended paving asphalt and asphalt modifier mixture shall be not less than 190°C or more than 226°C when the CRM is added. The combined materials shall be reacted for a minimum of 45 minutes after incorporation of

the CRM at a temperature of not less than 190°C or more than 218°C. The temperature shall not be higher than 6°C below the actual flash point of the asphalt-rubber binder.

After reacting, the blended asphalt-rubber binder shall conform to the following requirements:

ASPHALT-RUBBER BINDER

Test Parameter	ASTM Test Method	Requirement	
		Min.	Max.
Cone Penetration @ 25°C, 1/10 mm	D 217	25	70
Resilience @ 25°C, Percent rebound	D 3407	18	—
Field Softening Point, °C	D 36	52	74
Viscosity @ 190°C, Pa • s ($x10^{-3}$)	See Note	1500	4000

Note: The viscosity test shall be conducted using a hand held Haake Viscometer Model VT-02 with Rotor 1, 24 mm in depth x 53 mm in height, or equivalent, as determined by the Engineer. The accuracy of the viscometer shall be verified by comparing the viscosity results obtained with the hand held viscometer to 3 separate calibration fluids of known viscosities ranging from 1000 to 5000 Pa • s ($x10^{-3}$). The viscometer will be considered accurate if the values obtained are within 300 Pa • s ($x10^{-3}$) of the known viscosity. The known viscosity value shall be based on the fluid manufacturers standard test temperature or the test temperature versus viscosity correlation table provided by the fluid manufacturer. Viscometers used on the project shall be verified to be accurate. The test method for determining the viscosity of asphalt-rubber binder using a hand held viscometer is available at the Transportation Laboratory, Pavement Branch, Telephone 916-227-7300. The accuracy verification results shall be provided to the Engineer and shall be certified by a Certificate of Compliance. The Certificate of Compliance shall be furnished to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

The Contractor shall provide a Haake Viscometer, or equivalent, at the production site during the combining of asphalt-rubber binder materials. The Contractor shall take viscosity readings of asphalt-rubber binder from samples taken from the feed line connecting the storage and reaction tank and the asphalt concrete plant. Readings shall be taken at least every hour with no less than one reading for each batch of asphalt-rubber binder. The Contractor shall log these results including time and asphalt-rubber binder temperature, and a copy of the log shall be submitted to the Engineer on a daily basis. As determined by the Engineer, the Contractor shall either notify the Engineer at least 15 minutes prior to each test or provide the Engineer a schedule of testing times.

The reacted asphalt-rubber binder shall be maintained at a temperature of not less than 190°C nor more than 218°C.

If material in a batch of asphalt-rubber binder is not used within 4 hours after the 45-minute reaction period, heating of the material shall be discontinued. Any time the asphalt-rubber binder cools below 190°C and is reheated shall be considered a reheat cycle. The total number of reheat cycles shall not exceed 2. The material shall be uniformly reheated to a temperature of not less than 190°C nor more than 218°C prior to use. Additional scrap tire CRM may be added to the reheated binder and reacted for a minimum of 45 minutes. The cumulative amount of additional scrap tire CRM shall not exceed 10 percent of the total binder mass. Reheated asphalt-rubber binder shall conform to the provisions for blended asphalt-rubber binder.

EQUIPMENT FOR PRODUCTION OF ASPHALT-RUBBER BINDER

The Contractor shall utilize the following equipment for production of asphalt-rubber binder:

A. An asphalt heating tank equipped to heat and maintain the blended paving asphalt and asphalt modifier mixture at the necessary temperature before blending with the CRM. This unit shall be equipped with a thermostatic heat control device and a temperature reading device and shall be accurate to within ±3°C and shall be of the recording type.

B. A mechanical mixer for the complete, homogeneous blending of paving asphalt, asphalt modifier and CRM. Paving asphalt and asphalt modifier shall be introduced into the mixer through meters conforming to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications. The blending system shall be capable of varying the rate of delivery of paving asphalt and asphalt modifier proportionate with the delivery of CRM. During the proportioning and blending of the liquid ingredients, the temperature of paving asphalt and the asphalt modifier shall not vary more than ±14°C. The paving asphalt feed, the asphalt modifier feed, and CRM feed shall be equipped with devices by which the rate of feed can be determined during the proportioning operation. Meters used for proportioning individual ingredients shall be equipped with rate-of-flow indicators to show the rates of delivery and resettable totalizers so that the total amounts of liquid ingredients introduced into the mixture can be determined. The liquid and dry ingredients shall be fed directly into the mixer at a uniform and controlled rate. The rate of feed to the mixer shall not exceed that which will permit complete mixing of the materials. 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. Mixing shall continue until a homogeneous mixture of uniformly distributed and properly blended asphalt-rubber binder of unchanging appearance and consistency is produced. The Contractor shall provide a safe sampling device capable of delivering a representative sample of the completed asphalt-rubber binder of sufficient size to permit the required tests.
C. An asphalt-rubber binder storage tank equipped with a heating system furnished with a temperature reading device to maintain the proper temperature of the asphalt-rubber binder and an internal mixing unit capable of maintaining a homogeneous mixture of blended paving asphalt, asphalt modifier and CRM.

The equipment shall be approved by the Engineer prior to use.

AGGREGATE

The aggregate for Type O rubberized asphalt concrete shall conform to the 12.5-mm maximum grading conforming to the provisions in Section 39-2.02, "Aggregate," of the Standard Specifications. California Test 205, Section D, definition of a crushed particle is revised as follows: "A particle having 2 or more fresh mechanically fractured faces shall be considered a crushed particle".

PROPORTIONING, SPREADING AND COMPACTING.

When batch type asphalt concrete plants are used to produce Type O rubberized asphalt concrete, the asphalt-rubber binder and mineral aggregate shall be proportioned by mass.

When continuous mixing type asphalt concrete plants are used to produce Type O rubberized asphalt concrete, the asphalt-rubber binder shall be proportioned by an asphalt meter of the mass flow, Coriolis effect type. The meter shall have been Type-approved by the Division of Measurement Standards prior to the start of production. The meter shall be calibrated in conformance with the provisions in California Test 109. The meter shall be interfaced with the existing continuous mixing plant controller in use on the asphalt concrete plant.

Type O rubberized asphalt concrete shall be placed only when the atmospheric and pavement surface temperatures are 13°C and above.

When the atmospheric and pavement surface temperature is 18°C or higher, the following shall apply:

A. The temperature of the aggregate shall not be greater than 163°C at the time the asphalt-rubber binder is added to the aggregate.
B. Type O rubberized asphalt concrete shall be spread at a temperature of not less than 138°C nor more than 163°C, measured in the mat directly behind the paving machine.
C. The first coverage of initial or breakdown compaction shall be performed when the temperature of the Type O rubberized asphalt concrete is not less than 135°C. Breakdown compaction shall be completed before the temperature of the Type O rubberized asphalt concrete drops below 121°C.

When the atmospheric or pavement surface temperature is below 18°C, the following shall apply:

A. The temperature of the aggregate shall be not less than 149°C nor more than 163°C at the time the asphalt-rubber binder is added to the aggregate.
B. The Contractor shall cover loads of Type O rubberized asphalt concrete with tarpaulins. The tarpaulins shall completely cover exposed Type O rubberized asphalt concrete until the Type O rubberized asphalt concrete has been completely transferred into the asphalt concrete paver hopper or deposited on the roadbed.
C. Type O rubberized asphalt concrete shall be spread at a temperature of not less than 143°C nor more than 163°C, measured in the mat directly behind the paving machine.

D. The first coverage of initial or breakdown compaction shall be performed when the temperature of the Type O rubberized asphalt concrete is not less than 138°C. Breakdown compaction shall be completed before the temperature of the Type O rubberized asphalt concrete drops below 127°C.

Pneumatic tired rollers shall not be used to compact Type O rubberized asphalt concrete.

Traffic shall not be allowed on Type O rubberized asphalt concrete until final rolling operations have been completed and sand has been applied to the surface.

Sand shall be spread on the surface of Type O rubberized asphalt concrete at a rate of 0.5 kg/m^2 to 1.0 kg/m^2. The exact rate will be determined by the Engineer. When ordered by the Engineer excess sand shall be removed from the pavement surface by sweeping. Sand shall be free from clay or organic material. Sand shall conform to the fine aggregate grading requirements in conformance with the provisions in Section 90-3.03, "Fine Aggregate Grading," of the Standard Specifications.

MEASUREMENT AND PAYMENT

Rubberized asphalt concrete (Type O) will be measured and paid for by the tonne in the same manner specified for asphalt concrete in Section 39-8, "Measurement and Payment," of the Standard Specifications.

Full compensation for furnishing and spreading sand on the rubberized asphalt concrete surfacing and for sweeping and removing excess sand from the pavement surface shall be considered as included in the contract price paid per tonne for rubberized asphalt concrete (Type O) and no separate payment will be made therefor.

10-1.37 RECYCLED ASPHALT CONCRETE (CONTRACTOR OPTION)

At the option of the Contractor, the asphalt concrete mixture in "Asphalt Concrete" of these special provisions may consist of recycled asphalt concrete.

Recycled asphalt concrete shall conform to the provisions for asphalt concrete in "Asphalt Concrete" of these special provisions except that reclaimed asphalt pavement may be substituted for virgin aggregate at a rate of up to 15 percent by dry mass of the aggregate in the asphalt concrete.

Asphalt binder used in recycled asphalt concrete shall be the same specified for asphalt concrete in "Asphalt Concrete" of these special provisions.

Virgin aggregate to be combined with reclaimed asphalt pavement shall conform to the provisions of "Quality Control/Quality Assurance" of these special provisions.

Reclaimed asphalt pavement shall be from stockpiles, from single or multiple sources, located on surfaces that are smooth and free of debris and organic material. Stockpiles shall consist of only reclaimed asphalt pavement. The material in each reclaimed asphalt pavement stockpile shall be uniformly blended and homogeneous. Stockpiling and processing of reclaimed asphalt pavement will be permitted throughout the life of the project. Stockpiling and processing of reclaimed asphalt pavement shall be performed in a manner that will prevent contamination and segregation of the material. The Engineer shall be given unrestricted access to stockpiles for inspection and testing.

The amount of asphalt binder to be mixed with the combined virgin aggregate and reclaimed asphalt pavement will be determined by the Contractor in conformance with California Test 367 and will be reviewed by the Engineer in conformance with "Quality Control/Quality Assurance" of these special provisions. The asphalt content of the recycled asphalt concrete mixture shall conform to the specification limits of Table 39-9, "Minimum Quality Control Requirements" of "Quality Control/Quality Assurance" of these special provisions.

The substitution rate of reclaimed asphalt pavement for virgin aggregate shall be designated at the time of the asphalt mix design proposal. Changes in the substitution rate of reclaimed asphalt pavement will be permitted to adjust the final grade of the asphalt binder when supported by blending chart results, and with the approval of the Engineer.

Changes in the target values for aggregate gradings and asphalt content shall be considered a change in mix design in conformance with "Quality Control/Quality Assurance" of these special provisions. Changes in cold feed or hot bin proportions of the virgin aggregate to conform to the aggregate gradation requirements shall not be considered a change in the mix design.

When submitting the mix design for review in conformance with the provisions in "Quality Control/Quality Assurance" of these special provisions, the Contractor shall provide the Engineer with the following additional information:

A. Locations of processed reclaimed asphalt pavement stockpiles.
B. A 30-kg sample of processed reclaimed asphalt pavement representing the processed reclaimed asphalt pavement to be used. The sample shall be from a split sample used by the Contractor to determine the mix design for the recycled asphalt concrete produced.
C. The asphalt content of the processed reclaimed asphalt pavement sample, in conformance with the requirements in California Test 380.

D. A grading chart representing the gradation of the recycled asphalt concrete mixture. This chart will be the mathematical combination of the aggregate in reclaimed asphalt pavement and the proposed gradation of the virgin aggregate.
E. The results of gradation tests on the aggregate recovered from the reclaimed asphalt pavement sample, in conformance with the requirements in California Test 202.
F. The results of gradation tests on the combined aggregate recovered from the recycled asphalt concrete mixture proposed, in conformance with the requirements in California Test 202.

Representative samples of reclaimed asphalt pavement to be used in the mix design review shall be obtained from the processed reclaimed asphalt pavement stockpiles. The Contractor shall sample and split the processed reclaimed asphalt pavement sample submitted for the mix design review from the stockpile in conformance with the provisions in California Test 125.

The provisions in "Quality Control/Quality Assurance" of these special provisions for storing and drying aggregate shall not apply to the reclaimed asphalt pavement. The virgin aggregate may be heated to a temperature of 175°C if, in the opinion of the Engineer, the higher temperature does not damage the new binder or the binder in the reclaimed asphalt pavement when the materials are combined.

The grading of the combined virgin aggregate and the processed reclaimed asphalt pavement in the recycled asphalt concrete shall conform to the specification limits of Table 39-9, "Minimum Quality Control Requirements" of "Quality Control/Quality Assurance" of these special provisions. The combined gradation shall be determined based on the mathematical combination of the virgin aggregate material gradation during production and the average reclaimed asphalt pavement gradation accepted for the mix analysis.

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 virgin aggregate and processed reclaimed asphalt pavement being incorporated into the recycled asphalt concrete. Sampling shall conform to the provisions in "Quality Control/Quality Assurance" of these special provisions.

When recycled asphalt concrete is produced by batch mixing, the reclaimed asphalt pavement shall be kept separate from the virgin aggregate until both ingredients enter the weigh hopper or pugmill or other process as approved by the Engineer. The time of mixing after the reclaimed asphalt pavement has been added to the mix shall not be less than 35 seconds.

When recycled asphalt concrete is produced by continuous mixing, the reclaimed asphalt pavement shall be protected from direct contact with the burner flame by means of a shield, separator, second drum or other method approved by the Engineer. The binder shall be introduced into the mixer after the virgin aggregate and reclaimed asphalt pavement have been combined.

In addition to the Contractor process control requirements in "Quality Control/Quality Assurance" of these special provisions, the following tests shall be performed and test results shall be submitted to the Engineer. These tests are for information only.

Quality Characteristic	Test	Minimum Sampling and Testing Frequency	Point of Sampling	Reporting Time Allowance
Absolute viscosity of binder recovered from recycled asphalt concrete	AASHTO T202 or CT 380	10 000 tonnes 5 samples per project	Mat behind paver	5 days
Gradation of combined aggregate from recycled asphalt concrete	CT 202 (after extraction of binder)	5000 tonnes Not less than 1 sample per day	Mat behind paver	5 days

The Contractor shall take 30-kg samples of the recycled asphalt concrete for every 5000 tonnes placed and send them the Office of Materials Engineering and Testing Services (Attention: Asphalt Concrete Testing Lab) located at 5900 Folsom Boulevard, Sacramento, California 95819. Samples will be accompanied by a Form T101 designating the project stationing where the recycled asphalt concrete has been placed in addition to the information required to complete the form.

The provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications shall not apply to recycled asphalt concrete.

Full compensation for reclaimed asphalt concrete shall be considered as included in the contract price paid per tonne for Type A asphalt concrete and no separate payment will be made therefor.

10-1.38 REPLACE CONCRETE PAVEMENT (RAPID STRENGTH CONCRETE)

Replace concrete pavement (Rapid Strength Concrete) shall consist of removing existing portland cement concrete pavement and underlying cement treated base and constructing rapid strength concrete (RSC) pavement as shown on the plans and in conformance with Section 40, "Portland Cement Concrete Pavement," of the Standard Specifications and these special provisions.

DEFINITIONS

The following definitions shall apply to this section:

A. EARLY AGE. – A time less than 10 times the final set time of the concrete.
B. FINAL SET TIME. – The elapsed time after initial contact of cement and water, or accelerator, if used, at which a specific penetration resistance of 27.6 MPa is achieved in conformance with the requirements in ASTM Designation: C 403.
C. OPENING AGE. – The age at which the concrete will achieve the specified strength for opening to public or Contractor traffic.

PRE-OPERATION CONFERENCE

The Contractor and subcontractors involved in construction operations of RSC shall meet with the Engineer at a pre-operation conference, at a mutually agreed time, to discuss methods of accomplishing all phases of the construction operation, contingency planning, and standards of workmanship for the completed item of work.

The Contractor shall provide the facility for the pre-operation conference. The Contractor's superintendent, foremen, subcontractors, field staff, plant personnel including plant supervisors, manager, and operator involved with RSC shall attend the pre-operation conference. The Contractor shall submit a list of participants to the Engineer for approval. The complete listing shall identify each participant's name, employer, title and role in construction of RSC. The pre-operation conference shall be held for no less than 2 hours. Construction operations of RSC shall not begin until the specified personnel have completed the mandatory pre-operation conference.

JUST-IN-TIME TRAINING

Just-In-Time Training (JITT) shall be mandatory, and consist of a formal joint training class on rapid strength concrete. Construction operations for rapid strength concrete shall not begin until the Contractor's and the Engineer's personnel have completed the mandatory JITT. The Contractor's personnel included in the list of participants for the Pre-Operation Conference along with the Engineer's representatives shall attend JITT.

The JITT session will be conducted for not less than 4 hours on rapid strength concrete. The training class may be an extension of the Pre-Operation Conference and shall be conducted at the project field location convenient for both the Contractor's and the Engineer's project staffs. Scheduling and completion of the JITT session shall be completed at least 5 working days prior to the start of construction of rapid strength concrete. The class shall be held during normal working hours.

The JITT instructor shall be experienced in the construction methods, materials, and test methods associated with rapid strength concrete. The instructor shall not be an employee of the Contractor or a member of the Engineer's field staff. A copy of the syllabus, handouts, and presentation material shall be submitted to the Engineer at least 7 days before the day of the training. Selection of the course instructor, the course content and training site shall be as mutually agreed to by the Contractor and the Engineer. The instructor shall issue a certificate of completion to the participants upon the completion of the class. The certificate shall include the course title, date and location of the class, the name of the participant, instructor's name, location and phone number.

The Contractor's or Engineer's personnel involved with rapid strength concrete operations will not be required to attend JITT if they have completed similar training within the previous 12 months of the date of the JITT for this project. The Contractor shall provide a certificate of class completion as described above for each staff member to be excluded from the JITT session. The final determination for exclusion of any staff member's participation will be as determined by the Engineer. All attendees of the JITT shall complete, and submit to the Engineer, an evaluation of the training. The course evaluation form will be provided by the Engineer.

It is expressly understood that Just-In-Time Training shall not relieve the Contractor of any responsibility under the contract for the successful completion of the work in conformity with the requirements of the plans and specifications.

REMOVING EXISTING PAVEMENT AND BASE MATERIALS

Exact limits of concrete pavement to be replaced will be determined by the Engineer.

Existing concrete pavement and underlying base material shall be removed and replaced with base material and RSC pavement within the same work period. In the event existing pavement or base materials are removed and the Contractor is unable to construct, finish, and cure RSC pavement prior to the specified traffic opening time, a temporary roadway structural section shall be constructed.

The outline of concrete pavement to be removed shall be sawed full depth with a power-driven saw except where the pavement is located adjacent to an asphalt concrete shoulder. Saw cuts within concrete pavement slabs shall be cut no more than 2 days prior to concrete pavement slab removal. Saw cuts made in work shifts prior to the actual removal work shift shall not be made parallel or diagonal to the traveled way and shall be cut so that traffic will not dislodge any pieces or segments.

Equipment used to remove concrete pavement within the sawed outline, shall not impact the surface of the concrete to be removed within 0.5-m of pavement to remain in place. Pavement and base removal shall be performed without damage to pavement or base to remain in place. Damage to pavement or base to remain in place, shall be repaired or removed and replaced. Repair, or removal and replacement of the damaged pavement and base shall be at the Contractor’s expense and will not be measured nor paid for.

Removed materials shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The material remaining in place, after removing pavement and base to the required depth, shall be graded to a uniform plane, moisture conditioned, and compacted by methods that will produce a firm and stable base. The finished surface of the remaining material shall not extend above the grade established by the Engineer. Areas that are low as a result of over excavation during base removal shall be filled, at the Contractor's expense, with base replacement material at the time and in the same operation that the base replacement layer is placed.

TEMPORARY ROADWAY STRUCTURAL SECTION

Asphalt concrete and aggregate base, equal to the quantity of pavement removed during the work shift, shall be provided on site for construction of a temporary roadway structural section where existing pavement is to be replaced. The quantity and location of standby material shall be included in the Contractor's contingency plan in conformance with the requirements of these special provisions. Temporary roadway structural section shall be maintained and later removed as the first order of work when replace concrete pavement (Rapid Strength Concrete) operations resume. The temporary roadway structural section shall consist of 90-mm thick asphalt concrete over aggregate base. RSC not conforming to these special provisions for RSC may be used for temporary roadway structural section with the Engineer's approval.

The asphalt concrete shall conform to the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions.

Aggregate base for temporary roadway structural section shall be produced from commercial quality aggregates consisting of broken stone, crushed gravel, natural rough-surfaced gravel, reclaimed concrete and sand, or any combination thereof. Grading of aggregate base shall conform to the 19-mm maximum grading specified in Section 26-1.02A, "Class 2 Aggregate Base," of the Standard Specifications.

Asphalt concrete for temporary roadway structural section shall be produced from commercial quality aggregates and asphalt binder. Grading of aggregate shall conform to the 19-mm maximum, medium grading in Section 39-2.02, "Aggregate," of the Standard Specifications and asphalt binder shall conform to requirements for liquid asphalt SC-800 in Section 93, "Liquid Asphalts," of the Standard Specifications. Amount of asphalt binder to be mixed with the aggregate shall be approximately 0.3 percent less than the optimum bitumen content determined in conformance with the requirements in California Test 367.

Aggregate base and asphalt concrete for the temporary roadway structural section shall be spread and compacted by methods that will produce a well-compacted, uniform base, with a surface of uniform smoothness, texture and density. Surfaces shall be free from pockets of coarse or fine material. Aggregate base may be spread and compacted in one layer. Asphalt concrete may be spread and compacted in one layer. Finished surface of asphalt concrete shall not vary more than 15 mm from the lower edge of a 3.6-m ±0.06 m long straightedge placed parallel with the centerline and shall match the elevation of existing concrete pavement along the joints between the existing pavement and temporary surfacing.

Removed temporary roadway structural section materials shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications, except that removed aggregate base may be stockpiled at the project site and reused for construction of temporary roadway structural sections. When no longer required, standby material or stockpiled material for construction of temporary roadway structural sections shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

RAPID STRENGTH CONCRETE

General

Rapid Strength Concrete (RSC) shall be a concrete made with hydraulic cement that develops opening age and 7-day specified modulus of rupture strengths.

Requirements of Sections 40-1.015, "Cement Content," 40-1.05, "Proportioning," and 90-1.01, "Description," of the Standard Specifications shall not apply.

Combined aggregate grading used in RSC shall be either the 37.5-mm, maximum grading, or 25-mm, maximum grading, at the option of the Contractor.

Cement for RSC shall be hydraulic cement as defined in ASTM Designation: C 219 and shall conform to the following requirements:

Test Description	Test Method	Requirement
Contraction in Air	California Test 527,W/C Ratio = 0.39 ± 0.010	0.053 %, max.
Mortar Expansion in Water	ASTM Designation: C 1038	0.04 %, max.
Soluble Chloride*	California Test 422	0.05 %, max.
Soluble Sulfates*	California Test 417	0.30 %, max.
Thermal Stability	California Test 553	60 %, min.
Compressive Strength @ 3 days	ASTM Designation: C 109	17 MPa

*Test is to be done on a cube specimen, fabricated in conformance with the requirements in ASTM Designation: C 109, cured at least 14 days and then pulverized to 100% passing the 300-µm sieve

At least 45 days prior to intended use, the Contractor shall furnish a sample of cement from each lot proposed for use and all admixtures proposed for use in the quantities ordered by the Engineer.

The Contractor shall submit uniformity reports for cement used in RSC to the Engineer. Uniformity reports shall conform to the requirements in ASTM Designation: C 917, except that testing age and water content may be modified to suit the particular material. Uniformity reports shall be submitted at least every 30 days during RSC pavement operations.

Type C accelerating chemical admixtures conforming to the provisions in Section 90-4, "Admixtures," of the Standard Specifications may be used. In addition to the admixtures listed on the Department's current list of approved admixtures, citric acid or borax may be used if requested in writing by the cement manufacturer and a sample is submitted to the Engineer. Chemical admixtures, if used, shall be included in the testing for requirements listed in the table above.

At least 10 days prior to use in the trial slab, the Contractor shall submit a mix design for RSC that shall include the following:

A. Opening age
B. Proposed aggregate gradings
C. Mix proportions of hydraulic cement and aggregate
D. Types and amounts of chemical admixtures
E. Maximum time allowed between batching RSC and placing roadway pavement
F. Range of ambient temperatures over which the mix design is effective (10˚C maximum range)
G. Final set time of the concrete
H. Any special instructions or conditions, including but not limited to, water temperature requirements when appropriate

The Contractor shall submit more than one mix design to plan for ambient temperature variations anticipated during placement of the roadway pavement. Each mix shall be designed for a maximum ambient temperature range of 10°C. The Contractor shall develop and furnish modulus of rupture development data for each proposed mix design. Modulus of rupture development data for up to 7 days shall be provided to the Engineer prior to beginning paving operations. Modulus of rupture development data may be developed from laboratory prepared samples. The testing ages for modulus of rupture development data shall include one hour before opening age, opening age, one hour after opening age, 24 hours, 7 days and 28 days.

Concrete pavement penetration requirements in Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications shall not apply to RSC.

RSC pavement shall develop a minimum modulus of rupture of as specified in "Pay Factor Adjustment for Low Modulus of Rupture" of these special provisions before opening to public or Contractor traffic. In addition, RSC pavement shall develop a minimum modulus of rupture of 4.2 MPa in 7 days after placement. RSC pavement that attains a modulus of rupture of less than specified may be accepted in conformance with "Pay Factor Adjustment for Low Modulus of Rupture" specified herein. Modulus of rupture shall be determined by averaging results from 3 beam specimens tested in conformance with the requirements in California Test 523. Beam specimens may be fabricated using an internal vibrator in conformance

with the requirements in ASTM Designation: C 31. No single test shall represent more than the production of that day or 100 cubic meters, whichever is less.

Modulus of rupture at early age may be estimated using the correlation established during trial slab placement or by using results from beam specimens cured under atmospheric conditions and at a temperature within 3°C of the pavement. Modulus of rupture at other ages will be determined using beams cured and tested in conformance with California Test 523 except beams will be placed into sand between 5 and 10 times final set time or 24 hours, whichever is earlier. The Engineer will perform the testing to determine modulus of rupture values of the RSC pavement. The modulus of rupture, as determined above, will be the basis for accepting or rejecting the RSC pavement for modulus of rupture requirements.

Pay Factor Adjustment for Low Modulus of Rupture

Where planned replacement pavement nominal thickness is less than 255 mm, payment for replace concrete pavement (Rapid Strength Concrete) will be adjusted for low modulus of rupture tests as follows:

A. Replace concrete pavement (Rapid Strength Concrete) with modulus of rupture of 2.8 MPa or greater before the lane is opened to the traffic and 7-day modulus of rupture of 4.2 MPa or greater will be paid for at the contract price per cubic meter for replace concrete pavement (Rapid Strength Concrete).
B. Replace concrete pavement (Rapid Strength Concrete) with a 7-day modulus of rupture of less than 3.4 MPa will not be paid for, and shall be removed and replaced, at the Contractor's expense with replace concrete pavement (Rapid Strength Concrete) conforming to the requirements of these special provisions.
C. Replace concrete pavement (Rapid Strength Concrete) with modulus of rupture of 2.1 MPa or greater before the lane is opened to traffic and a 7-day modulus of rupture of equal to or greater than 3.4 MPa will be paid for at a percentage of the contract price per cubic meter for replace concrete pavement (Rapid Strength Concrete) in conformance with the percentages in the pay table below.
D. Replace concrete pavement (Rapid Strength Concrete) with modulus of rupture of less than 2.1 MPa when the lane is opened to traffic will be rejected and shall be removed and replaced at the Contractor's expense with replace concrete pavement (Rapid Strength Concrete) conforming to the requirements of these special provisions.

Percentage Pay Table

Modulus of Rupture (MPa) at opening to traffic	7-Day Modulus of Rupture (MPa)		
	Greater than or equal to 4.2	Less than 4.2 and greater than or equal to 3.8	Less than 3.8 and greater than or equal to 3.4
Greater than or equal to 2.8	100%	95%	90%
Less than 2.8 and greater than or equal to 2.4	95%	95%	90%
Less than 2.4 and greater than or equal to 2.1	80%*	80%*	80%*

*Any replacement panels that develops one or more transverse cracks within 21 days after placement shall be removed and replaced at the Contractor's expense with replace concrete pavement (Rapid Strength Concrete) conforming to the requirements of these special provisions. A transverse crack is defined as a crack running from one longitudinal edge of the panel to the other.

Where planned replacement pavement nominal thickness is 255 mm or greater, payment for replace concrete pavement (Rapid Strength Concrete) will be adjusted for low modulus of rupture tests as follows:

A. Replace concrete pavement (Rapid Strength Concrete) with modulus of rupture of 2.3 MPa or greater before the lane is opened to the traffic and 7-day modulus of rupture of 4.2 MPa or greater will be paid for at the contract price per cubic meter for replace concrete pavement (Rapid Strength Concrete).
B. Replace concrete pavement (Rapid Strength Concrete) with a 7-day modulus of rupture of less than 3.4 MPa will not be paid for, and shall be removed and replaced, at the Contractor's expense with replace concrete pavement (Rapid Strength Concrete) conforming to the requirements of these special provisions.
C. Replace concrete pavement (Rapid Strength Concrete) with modulus of rupture of 1.8 MPa or greater before the lane is opened to traffic and a 7-day modulus of rupture of equal to or greater than 3.4 MPa will be paid for at a percentage of the contract price per cubic meter for replace concrete pavement (Rapid Strength Concrete) in conformance with the percentages in the pay table below.
D. Replace concrete pavement (Rapid Strength Concrete) with modulus of rupture of less than 1.8 MPa when the lane is opened to traffic will be rejected and shall be removed and replaced at the Contractor's expense with replace concrete pavement (Rapid Strength Concrete) conforming to the requirements of these special provisions.

Percentage Pay Table

Modulus of Rupture (MPa) at opening to traffic	7-Day Modulus of Rupture (MPa)		
	Greater than or equal to 4.2	Less than 4.2 and greater than or equal to 3.8	Less than 3.8 and greater than or equal to 3.4
Greater than or equal to 2.3	100%	95%	90%
Less than 2.3 and greater than or equal to 2.0	95%	95%	90%
Less than 2.0 and greater than or equal to 1.8	80%*	80%*	80%*

*Any replacement panels that develops one or more transverse cracks within 21 days after placement shall be removed and replaced at the Contractor's expense with replace concrete pavement (Rapid Strength Concrete) conforming to the requirements of these special provisions. A transverse crack is defined as a crack running from one longitudinal edge of the panel to the other.

The Contractor shall pay to the State adjustments in payment for low modulus of rupture tests in conformance with the requirements specified in the tables in this section. The Department will deduct the amount of the adjustments from moneys due or that may become due, the Contractor under the contract.

Proportioning

Weighing, measuring and metering devices used for proportioning materials shall conform to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications and these special provisions.

Over and under dials, and other indicators for weighing and measuring systems used in proportioning materials shall be grouped so that the smallest increment for each indicator can be accurately read from the point at which the proportioning operation is controlled for ingredients batched at a central batch plant. In addition, indicators for weighing and measuring cement batched from a remote weighing system shall also be placed so that each indicator can be accurately read from the point at which the proportioning operation is controlled.

Aggregates shall be handled and stored in conformance with the provisions in Section 90-5.01, "Storage of Aggregates," of the Standard Specifications. Liquid admixtures shall be proportioned in conformance with the provisions in Section 90-4.10, "Proportioning and Dispensing Liquid Admixtures," of the Standard Specifications. Mineral admixtures shall be protected from exposure to moisture until used. Adequate facilities shall be provided to assure that mineral admixtures meeting the specified requirements are kept separate from other mineral admixtures to easily track the materials that are entering the work. Safe and suitable facilities for sampling mineral admixtures shall be provided at the weigh hopper or in the feed line immediately in advance of the hopper.

Weighing equipment shall be insulated against vibration or movement of other operating equipment. When the plant is in operation, the mass of each draft of material shall not vary from the designated mass by more than the tolerances specified herein. Each scale graduation shall be 0.001 of the usable scale capacity.

Aggregate shall be weighed cumulatively and equipment for the weighing of aggregate shall have a zero tolerance of ±0.5 percent of the designated total batch mass of the aggregate. Equipment for the separate weighing of the cement or mineral admixture shall have a zero tolerance of ±0.5 percent of their designated individual batch drafts. Equipment for measuring water shall have a zero tolerance of ±0.5 percent of its designated mass or volume.

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

Material	Tolerance
Aggregate	± 1.0 percent of designated batch mass
Cement	± 0.5 percent of designated batch mass
Mineral Admixture	± 1.0 percent of designated batch mass
Water	± 1.5 percent of designated batch mass or volume

Proportioning shall consist of dividing the aggregates into the specified sizes, each stored in a separate bin, and combining them with cement, mineral admixture and water as provided in these special provisions. Dry ingredients shall be proportioned by mass. Liquid ingredients shall be proportioned by mass or volume.

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

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

Cement shall be kept separate from the aggregates until released for discharge into the mixer. Cement shall be free of lumps and clods when discharged into the mixer. Fabric containers used for transportation or proportioning of cement shall be clean and free of residue before reuse.

Weigh systems for proportioning aggregate, cement, and mineral admixture shall be individual and distinct from all other weigh systems. Each weigh system shall be equipped with a hopper, a lever system, and an indicator to constitute an individual and distinct material-weighing device.

For batches with a volume of one cubic meter or more, proportioning equipment shall conform to one of the following methods:

A. All ingredients shall be batched at a central batch plant and charged into a mixer truck for transportation to the pour site. Ingredient proportioning shall meet the requirements of Section 90-5, "Proportioning," of the Standard Specifications.
B. All ingredients except the cement shall be batched at a central batch plant and charged into a mixer truck for transportation to a remote located silo and weigh system for the proportioning of the cement. The remote system shall proportion cement for charging the mixer truck.
C. All ingredients except the cement shall be batched at a central batch plant and charged into a mixer truck for transportation to a remote location where pre-weighed, containerized cement shall be added to the mixer truck. The cement pre-weighing operation shall utilize a platform scale. The platform scale shall have a maximum capacity of 2.5 tonnes with a maximum graduation size of 0.5 kilograms. Cement shall be pre-weighed into a fabric container. The minimum amount of cement to be proportioned into any single container shall be one half of the total amount required for the load of RSC being produced.
D. Cement, water, and aggregate shall be proportioned volumetrically in conformance with these special provisions.

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

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

No additional mixing water shall be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer. If the Engineer authorizes additional water to be incorporated into the concrete, the drum shall be revolved not less than 30 revolutions at mixing speed after the water is added and before discharge is commenced. Water added to the truck mixer at the job site shall be measured through a meter that conforms to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications.

Aggregate discharged from several bins shall be controlled by gates or by mechanical conveyors. The means of discharge from the bins and from the weigh hopper shall be interlocked so that no more than one bin can discharge at a time, and so that the weigh hopper can not be discharged until the required quantity from each of the bins has been deposited in the weigh hopper.

Weighmaster Certificates

Weighmaster certificates for RSC, regardless of the proportioning method used, shall include all information necessary to trace the manufacturer, and manufacturer's lot number for the cement being used. When proportioned into fabric containers the weighmaster certificates for the cement shall contain date of proportioning, location of proportioning and actual net draft mass of the cement. When proportioned at the pour site from a storage silo the weighmaster certificates shall contain date of proportioning, location of proportioning and the net draft mass of the cement used in the load.

Volumetric Proportioning

When RSC is proportioned by volume, the method shall conform to requirements specified herein.

Aggregates shall be handled and stored in conformance with the provisions in Section 90-5.01, "Storage of Aggregates," of the Standard Specifications. Liquid admixtures shall be proportioned in conformance with the provisions in Section 90-4.10, "Proportioning and Dispensing Liquid Admixtures," of the Standard Specifications. Mineral admixtures shall be protected from exposure to moisture until used. Adequate facilities shall be provided to assure that mineral admixtures meeting the specified requirements are kept separate from other mineral admixtures 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 batch-mixer storage hopper or in the feed line.

Batch-mixer trucks shall be equipped to proportion cement, water, aggregate and additives by volume. Aggregate feeders shall be connected directly to the drive on the cement vane feeder. The cement feed rate shall be tied directly to the feed rate for the aggregate and other ingredients. Any change in the ratio of cement to aggregate shall be accomplished by

changing the gate opening for the aggregate feed. The drive shaft of the aggregate feeder shall be equipped with a revolution counter reading to the nearest full or partial revolution of the aggregate delivery belt.

Aggregate shall be proportioned using a belt feeder operated with an adjustable cutoff gate delineated to the nearest quarter increment. Height of the gate opening shall be readily determinable. Cement shall be proportioned by a method that conforms to the accuracy requirements of these special provisions. Water shall be proportioned by a meter conforming to the provisions in Section 9-1.01, "Measurement and Payment," of the Standard Specifications and these special provisions.

Delivery rate of aggregate and cement per revolution of the aggregate feeder shall be calibrated at appropriate gate settings for each batch-mixer truck used on the project and for each aggregate source. Batch-mixer trucks shall be calibrated at 3 different aggregate gate settings that are commensurate with production needs. Two or more calibration runs shall be required at each of the different aggregate gate openings. The actual mass of material delivered for aggregate proportioning device calibrations shall be determined by a platform scale as specified in these special provisions.

Aggregate belt feeder shall deliver aggregate to the mixer with volumetric consistency so that deviation for any individual aggregate delivery rate check-run shall not exceed 1.0 percent of the mathematical average of all runs for the same gate opening and aggregate type. Each test run shall be at least 500 kg. Fine aggregate used for calibration shall not be reused for device calibration.

At the time of batching, aggregates shall be dried or drained sufficiently to result in stable moisture content, so that no visible separation of water from aggregate takes place during the proportioning process. In no event shall the free moisture content of the fine aggregate at the time of batching exceed 8 percent of its saturated, surface-dry mass.

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

Rotating and reciprocating equipment on batch-mixer trucks shall be covered with metal guards.

The cement proportioning system shall deliver cement to the mixer with a volumetric consistency so that the deviation for any individual delivery rate check-run shall not exceed 1.0 percent of the mathematical average of 3 runs of at least 500 kg each. Cement used for calibration shall not be reused for device calibration.

Water meter accuracy shall be such that, when operating between 50 percent and 100 percent of production capacity, the difference between the indicated mass of water delivered and the actual mass delivered shall not exceed 1.5 percent of the actual mass for each of two individual runs of 1200 liters. The water meter shall be calibrated in conformance with the requirements of California Test 109 and shall be equipped with a resettable totalizer and display the operating rate.

Calibration tests for aggregate, cement and water proportioning devices shall be conducted with a platform scale located at the calibration site. Weighing of test run calibration material shall be performed on a platform scale having a maximum capacity not exceeding 2.5 tonnes with maximum graduations of 0.5-kg. The platform scale shall be error tested within 8 hours of calibration of batch-mixer truck proportioning devices. Error testing shall be performed with test masses conforming to California Test 109 and shall produce a witness scale that is within 2 graduations of the test mass load. The scale shall be available for use at the production site throughout the production period. Equipment needed for the calibration of proportioning systems shall remain available at the production site throughout the production period. A Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," shall be furnished with each delivery of aggregate, cement, and admixtures used for calibration tests and shall be submitted to the Engineer with a certified copies of the mass of each delivery. The Certificate of Compliance shall state that the source of materials used for the calibration tests is from the same source as to be used for the planned work. The Certificate of Compliance shall state that the material supplied conforms to the Standard Specifications and these Special Provisions and shall be signed by an authorized representative who shall have the authority to represent and act for the Contractor.

The batch-mixer truck shall be equipped so that an accuracy check can be made prior to the first operation for the project and at any other time as directed by the Engineer. Further calibration of proportioning devices shall be required every 30 days after production begins or when the source or type of any ingredient is changed. A spot calibration shall consist of calibration of the cement proportioning system only. A two run spot re-calibration of the cement proportioning system shall be performed each time 50 tonnes of cement has passed through the batch-mixer truck. Should the spot re-calibration of the cement proportioning system fall outside the limitations specified herein, a full calibration of the cement proportioning system shall be completed before the resumption of production.

Liquid admixtures shall be proportioned by a meter.

Cement storage shall be located immediately before the cement feeder and shall be equipped with a device that will automatically shut down the power to the cement feeder and aggregate belt feeder when the cement storage level is lowered to a point where less than 20 percent of the total volume is left in storage.

The Contractor shall furnish aggregate moisture determinations, made in conformance with the requirements of California Test 223, at least every 2 hours during proportioning and mixing operations. Moisture determinations shall be recorded and presented to the Engineer at the end of the production shift.

Each aggregate bin shall be equipped with a device that will automatically shut down the power to the cement feeder and the aggregate belt feeder when the aggregate discharge rate is less than 95 percent of the scheduled discharge rate of any bin.

Indicators specified herein shall be in working order prior to commencing proportioning and mixing operations and shall be visible when standing near the batch-mixer truck.

Identifying numbers of batch-mixer trucks shall be at least 75 mm in height, and be located on the front and rear of the vehicles.

Volumetric proportioned RSC shall be mixed in a mechanically operated mixer of adequate size and power for the type of RSC to be placed. Mixers may be of the auger type and shall be operated uniformly at the mixing speed recommended by the manufacturer. Mixers that have an accumulation of hard concrete or mortar shall be removed from service until cleaned. Other types of mixers may be used provided mixing quality will meet the requirements of these special provisions.

Charge or rate of feed to the mixer shall not exceed that which will permit complete mixing of the materials. Dead areas in the mixer, where material does not move or is not sufficiently agitated, shall be corrected by a reduction in the volume of material or by other adjustments. The mixer shall be designed to provide sufficient mixing action and movement to produce properly mixed RSC. Mixing shall continue until a homogeneous mixture is produced at discharge from the mixer. There shall be no lumps or evidence of non-dispersed cement at discharge from the mixer. No water shall be added to the RSC after discharge from the mixer.

Equipment having components made of aluminum or magnesium alloys, which may have contact with plastic concrete during mixing or transporting of RSC, shall not be used.

Uniformity of concrete mixtures will be determined by differences in penetration measurement made in conformance with the requirements in California Test 533. Difference in penetration, determined by comparing penetration tests on 2 samples of mixed concrete from the same batch or truck mixer load, shall not exceed 15 mm. The Contractor shall furnish samples of freshly mixed concrete and provide facilities for obtaining the samples. Sampling facilities shall be safe, accessible, clean and produce a sample which is representative of production. Sample devices and sampling methods shall also conform to the requirements of California Test 125.

Ice shall not be used to cool RSC directly. When ice is used to cool water used in the mix, all of the ice shall be melted before entering the mixer.

Cement shall be proportioned and charged into the mixer by means that will result in no losses of cement due to wind, or due to accumulation on equipment, or other conditions which will vary the required quantity of cement.

Each mixer shall have a metal plate or plates, prominently attached, on which the following information is provided:

A. Uses for which the equipment is designed.
B. Manufacturer's guaranteed capacity of the mixer in terms of the volume of mixed concrete.
C. Speed of rotation of the mixer.

Consistency and workability of mixed concrete when discharged at the delivery point shall be suitable for placement and consolidation.

Information generated by volumetric devices will not be used for payment calculations.

The device that controls the proportioning of cement, aggregate and water shall produce a log of production data. The log of production data shall consist of a series of snapshots captured at 15-minute intervals throughout the period of daily production. Each snapshot of production data shall be a register of production activity at that time and not a summation of the data over the preceding 15 minutes. The amount of material represented by each snapshot shall be the amount produced in the period of time from 7.5 minutes before to 7.5 minutes after the capture time. The daily log shall be submitted to the Engineer, in electronic or printed media, at the end of each production shift or as requested by the Engineer, and shall include the following:

A. Mass of cement per revolution count.
B. Mass of each aggregate size per revolution count.
C. Gate openings for each aggregate size being used.
D. Mass of water added to the concrete per revolution count.
E. Moisture content of each aggregate size being used.
F. Individual volume of all other admixtures per revolution count.
G. Time of day.
H. Day of week.
I. Production start and stop times.
J. Batch-mixer truck identification.
K. Name of supplier.
L. Specific type, size, or designation of concrete being produced.
M. Source of the individual aggregate sizes being used.
N. Source, brand and type of cement being used.
O. Source, brand and type of individual admixtures being used.
P. Name and signature of operator.

Required report items may be input by hand into a pre-printed form or captured and printed by the proportioning device. Electronic media containing recorded production data shall be presented in a tab delimited format on a 90-mm diskette with a capacity of at least 1.4 megabytes. Each snapshot of the continuous production shall be followed by a line-feed carriage-return with allowances for sufficient fields to satisfy the amount of data required by these specifications. The reported data shall be in the above order and shall include data titles at least once per report.

Replacement Base Layer

Base materials removed shall be replaced with replacement base layer. Replacement base layer shall consist of rapid strength concrete and shall be placed in a separate and distinct operation from that of replacing concrete pavement.

Replacement base layer shall be finished to the grade of the original base layer. The surface shall not be textured and shall be finished to a smooth surface, free of mortar ridges and other projections. The finished surface shall be free from voids and porous areas.

Bond Breaker

Bond breaker shall be placed between replacement pavement and existing lean concrete base, cement treated base or new base replacement layer. Bond breaker shall be one of the following:

A. Curing paper conforming to the requirements in ASTM Designation: C 171, white.
B. Polyethylene film conforming to the requirements in ASTM Designation: C 171, except that the minimum thickness shall be 0.15 mm, white opaque.
C. Paving asphalt, Grade PG 64-10, conforming to the provisions in Section 92, "Asphalts," of the Standard Specifications.
D. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class A, containing a minimum of 22 percent nonvolatile vehicles consisting of at least 50 percent paraffin wax.

When curing paper or polyethylene film is used, material shall be placed in a wrinkle free manner. Adjacent sheets shall be overlapped a minimum of 150 mm.

When curing compound or paving asphalt is used, all foreign and loose materials remaining from slab removal shall be removed prior to application.

When paving asphalt is used, no water shall be added before applying asphalt to the surface of the base. The paving asphalt shall be applied in one even application at a rate of 0.10 to 0.45-L/m^2 over the entire base surface area. Concrete pavement shall not be placed until the paving asphalt has cured.

When curing compound is used, the curing compound shall be applied in two separate applications. Each application shall be applied evenly at a rate of 0.3 to 0.5-L/m^2 over the entire base surface area.

Spreading, Compacting and Shaping

Metal or wood side forms may be used. Wood side forms shall not be less than 38-mm thick. Side forms shall be of sufficient rigidity, both in the form and in the connection with adjoining forms, that movement will not occur under the force from subgrading and paving equipment or from the pressure of concrete.

Side forms shall remain in place until the pavement edge no longer requires the protection of forms. Side forms shall be thoroughly cleaned and oiled prior to each use.

Consolidation of RSC shall be by means of high-frequency internal vibrators after the RSC is deposited on the subgrade. Vibrating shall be done in a manner to assure uniform consolidation adjacent to forms and across the full paving width. RSC shall be placed as nearly as possible in its final position and use of vibrators for extensive shifting of the mass of RSC will not be permitted.

RSC shall be spread and shaped by suitable powered finishing machines and supplemented by hand finishing as necessary. Methods of spreading, shaping and consolidating that result in segregation, voids or rock pockets shall be discontinued. The Contractor shall use methods that will produce dense homogeneous pavement conforming to the required cross section.

After the RSC has been mixed and placed, no additional water shall be added to the surface to facilitate finishing. Surface finishing additives, when used, shall be as recommended by the manufacturer of the cement and shall be approved by the Engineer prior to use.

Joints

Prior to placing concrete against existing concrete, a 6-mm thick commercial quality polyethylene flexible foam expansion joint filler shall be placed across the original transverse and longitudinal joint faces and extend the full depth of the excavation. The top of the joint filler shall be placed flush with the top of pavement. Joint filler shall be secured to the joint face of the existing pavement by a method that will hold the joint filler in place during the placement of concrete.

Transverse weakened plane joints in pavement widenings shall be constructed to match the spacing and skew of the weakened plane joints in the adjacent existing pavement. Where the existing transverse weakened plane joint spacing in an adjacent lane exceeds 4.6 m, an additional transverse weakened plane joint shall be constructed midway between the existing joints. The provisions in the second and third paragraphs in Section 40-1.08B, "Weakened Plane Joints," and the third paragraph in Section 40-1.08B(1), "Sawing Method," of the Standard Specifications shall not apply. Sawing of weakened plane joints shall be completed within 2 hours of completion of final finishing. Minimum depth of cut for weakened plane joints shall be 70 mm.

Final Finishing

Tests to determine coefficient of friction of the final textured surface will be made only if the Engineer determines by visual inspection that the final texturing may not have produced a surface having the specified coefficient of friction. Any tests to determine the coefficient of friction will be made after the pavement is opened to public traffic, but not later than 5 days after concrete placement. Pavement areas having a coefficient of friction as determined in conformance with the requirements in California Test 342 of less than 0.30 shall be grooved in conformance with the provisions in Section 42-1.02, "Construction," of the Standard Specifications. Grooving shall be performed prior to the installation of any required edge drains adjacent to the areas to be grooved.

Transverse straightedge and longitudinal straightedge requirements will not apply to the pavement surface within 300 mm of the existing concrete pavement except as required in these special provisions. Longitudinal straightedge requirements in Section 40-1.10, "Final Finishing," of the Standard Specifications, shall be applied at transverse contact joints with existing concrete pavement where the straightedge is to be placed with the midpoint coincident with the joints. Pavement not meeting this straightedge requirement shall be corrected within 48 hours by grinding or other methods as approved by the Engineer.

Profiles of the completed pavement surface specified in Section 40-1.10, "Final Finishing," of the Standard Specifications will not be required. The Profile Index requirements in Section 40-1.10, "Final Finishing," of the Standard Specifications shall not apply.

Curing Method

The curing method for replacement pavement shall be as recommended by the manufacturer of the cement and as approved by the Engineer.

QUALITY CONTROL PROGRAM

General

The Contractor shall establish, provide and maintain a quality control program that will provide assurance to the Engineer that all materials and completed construction conform to the contract requirements specified herein.

At least 21 days prior to the placement of the trial slab the Contractor shall submit to the Engineer for approval a written Quality Control Plan (QCP) that shall be used to ensure the quality of the product and the work. At the request of the Engineer or Contractor, the Contractor and Quality Control Managers (QCMs) shall meet with the Engineer to discuss the QCP. The Engineer will have 14 days to approve the Quality Control Plan (QCP). Should the Engineer fail to complete the review of the Quality Control Plan (QCP) within the time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the Quality Control Plan (QCP), the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

If in the judgement of the Engineer, the Contractor has not implemented or is not complying with the approved QCP, production and placement shall be suspended. Production and placement shall not resume until approved by the Engineer.

Quality Control Plan

The Contractor shall provide a QCP that describes the procedures that the Contractor will use to control the production process, to determine when changes to the production process are needed, and to propose procedures for implementing changes for replacement pavement operations. The QCP shall also include an outline for the placement and testing of the trial slab.

Replacement pavement production and placement shall not begin until the QCP has been approved by the Engineer. Approval of the QCP will be based on the inclusion of all required information. Approval of the QCP does not imply any warranty by the Engineer that adherence to the QCP will result in replacement pavement that complies with these specifications. It shall remain the responsibility of the Contractor to demonstrate this compliance.

The QCP shall include the names and qualifications of the lead QCM and the assistant QCM. The lead QCM shall be responsible for the administration of the QCP. The lead QCM shall have current American Concrete Institute (ACI) certification as "Concrete Field Testing Technician-Grade I" and "Concrete Laboratory Testing Technician-Grade II." The assistant QCM shall have current ACI certification as "Concrete Field Testing Technician-Grade I" and either "Concrete Laboratory Testing Technician-Grade I" or "Concrete Laboratory Testing Technician-Grade II." All sampling, inspection and test reports shall be reviewed and signed by the QCM responsible for the production period involved prior to submittal to the Engineer. At least one QCM shall be present for each stage of mix design, trial slab construction, during production and construction of replacement pavement and for all meetings between the Contractor and Engineer relating to production, placement or testing of replacement pavement. The QCMs shall not be members of production or paving crews, inspectors or testers on the project during production or placement of replacement pavement. QCMs shall have no duties other than those referenced in these special provisions during the production and placement of replacement pavement.

The QCP shall include an outline of the production, transportation and placement of the replacement pavement. The QCP shall include a contingency plan for correcting situations if there is a problem in production, transportation or placement. The Contractor shall have equipment and personnel present to meet the requirements of the contingency plan. The QCP shall contain provisions for determining when placement of the replacement pavement will be suspended and temporary roadway will be substituted.

The QCP shall include the names of quality control personnel to be used and an outline of sampling, testing to be performed during and after construction of replacement pavement. At the time of submission of the QCP, quality control samplers and testers must be Caltrans qualified by the Department through the Independent Assurance Program (IAP) for the sampling and testing for which they will be responsible.

Before production and placement begins, the Contractor, QCMs and Engineer shall have a meeting with all production, transportation, placement, inspection, sampling and testing personnel to familiarize them with the requirements of the project. Items to be discussed include the production, transportation and placement processes for replacement pavement; contingency plan; and sampling and testing. The Contractor shall provide the facility for this meeting. The meeting date and location will be approved by the Engineer. Attendance at this meeting is mandatory for key personnel including the project manager, QCMs, production plant manager, plant inspector, all concrete delivery truck drivers, paving superintendent, paving foreman, paving machine operator, and all inspectors, samplers and testers. All meeting attendees shall sign in at the meeting. Production and placement operations shall not begin unless the above key personnel have attended the mandatory meeting.

Quality Control Inspection, Sampling and Testing

The Contractor shall perform quality control inspection, sampling and testing to ensure that replacement pavement production and placement conform to the provisions specified herein.

The Contractor shall provide the required sampling, testing and inspection during all phases of replacement pavement production and placement. The Contractor shall provide a minimum of two working days notice to the Engineer, so the Engineer can witness all sampling and testing. The Engineer shall be given unrestricted access to the Contractor's quality control inspectors, samplers, testers and laboratories. During the production and placement period, the Contractor shall provide results of all testing to the Engineer within 15 minutes of completion of testing. The Contractor shall record all inspection, sampling and testing on forms approved by the Engineer. The Contractor shall provide written results of all inspection and testing to the Engineer within 48 hours of completion of each shift of paving and within 24 hours for all 7-day strength tests.

The Contractor shall provide a testing laboratory with adequate equipment and personnel for the performance of the quality control tests. This laboratory shall be located at a location approved by the Engineer and so that prompt testing requirements will be achieved. All sampling and testing equipment shall be maintained in proper working condition. Sampling shall be performed in conformance with the requirements of California Test 125. The QCP shall include a list the equipment to be used including date of last calibration, the names and certifications of sampling and testing personnel, and the location of the laboratory and testing equipment during and after paving operations.

Testing laboratories, testing equipment, and sampling and testing personnel shall conform to the requirements of the Department's IAP.

Trial Slab and Process Control Testing

Prior to construction of RSC pavement, the Contractor shall construct one or more trial slabs under conditions similar to those that will exist during pavement replacement, for each mix design, to show that personnel, equipment, and mixing, placing, curing, and sawing techniques will produce a concrete pavement conforming to these special provisions in the anticipated time period under similar atmospheric and temperature conditions as pavement construction and to establish the correlation described below. During production and placement, the Contractor shall conform to the requirements of these special provisions and to the procedure outlined in the QCP to ensure that mixing, transporting, placing, finishing, curing and sawing techniques and that personnel and equipment to be used will produce replacement pavement conforming to these special provisions.

A trial slab shall be constructed using the approved mix design, admixtures and conditions for batching. During construction of trial slab, the Contractor shall demonstrate placement at the minimum and maximum times allowed from batching to placement. RSC pavement within the roadway shall not proceed until a trial slab meeting the requirements of these special provisions has been constructed.

The minimum trial slab dimensions shall be 3 m by 6 m and shall be 225 mm thick where planned replacement pavement nominal thickness is less than 255 mm. The trial slab thickness shall be 260 mm where planned replacement pavement nominal thickness is 255 mm or greater. Where there are planned slab replacements with greater and less than 255 mm thickness then two trial slabs shall be required one at 225 mm thick and one at 255 mm thick. Trial slabs shall be placed near the project site at a location mutually acceptable to the Engineer and the Contractor except slabs shall not be placed on the roadway or within the project limits.

During trial slab construction, the Contractor shall sample and split the aggregate for gradings, cleanness value, and sand equivalent testing with the Engineer, at the Contractor's cost. Both sets of test results of these samples shall conform to the provisions in Section 90-2.02, "Aggregates," of the Standard Specifications. If test results do not conform to the requirements, the trial slab will be rejected.

During trial slab construction and within 20 minutes of RSC delivery, beams shall be fabricated in conformance with the requirements in California Test 523. Beams shall be used to determine early age and 7-day modulus of rupture values. Beams fabricated for early age testing shall be cured so that the monitored temperature in the beams and the trial slab are within 3°C at all times. Internal temperatures of the trial slab and early age beams shall be monitored and recorded at minimum time intervals of 5 minutes by installing thermocouples and or thermistors connected to strip-chart recorders or digital data loggers. Temperature recording devices shall be accurate to within ±1ºC. Internal temperature readings shall be measured at 25 mm from the top and 25 mm from the bottom, no closer than 75 mm from any edge of the concrete elements, until the early age testing is completed. Beams fabricated for 7-day testing shall be cured in conformance with the requirements in California Test 523, except beams shall be placed into sand at between 5 and 10 times the final set time or 24 hours, whichever is earlier. Testing shall be performed by the Contractor and witnessed by the Engineer. At the Engineer's request, the Contractor shall produce samples for the Engineer to test. Strength results from beams shall be the basis for determining whether RSC pavement operations may proceed. Trial slabs 225 mm thick shall have an early age modulus of rupture of not less than 2.8 MPa and a 7-day modulus of rupture of not less than 4.2 MPa. Trial slabs 260 mm thick shall have an early age modulus of rupture of not less than 2.3 MPa and a 7-day modulus of rupture of not less than 4.2 MPa. Beams failing early age or 7-day modulus of rupture requirements shall be cause for the rejection of the trial slab.

When proposed by the Contractor, in writing, and approved by the Engineer, ASTM Designation: C 805 or C 900 shall be used to estimate the modulus of rupture of the pavement at early ages. The selected test method shall be used to determine modulus of rupture until 7 days after the Contractor notifies the Engineer of withdrawal of the proposal or 7 days after the Engineer notifies the Contractor of withdrawal of approval, in writing. During trial slab curing, correlation testing shall be performed to determine the relation between the modulus of rupture and ASTM Designation: C 805 or C 900 performed on the trial slab. The correlation shall be established by testing at 4 or more time intervals. At a minimum, tests shall be performed one hour before and one hour after the opening age and two others within 15 minutes of the opening age. Modulus of rupture estimates shall be calculated with either a linear, exponential or logarithmic, least squares best-fit equation, whichever provides the best correlation coefficient.

The Contractor shall state in detail the intended location and time; procedure for production, placement and finishing of RSC pavement; sampling, sample curing and sample transportation; testing and reporting of test results for the trial slab in the QCP.

Process Control and Quality Control Testing

The Contractor shall provide continuous process control and quality control sampling and testing throughout production and placement of replacement pavement.

During production of RSC for replacement pavement operations, the Contractor shall sample and test aggregates at least once every 500 cubic meters of RSC produced but not less than once per placement shift. Aggregates shall be tested for conformance with gradations, cleanness value and sand equivalent requirements.

During placement of RSC pavement, the Contractor shall fabricate specimens and test for modulus of rupture within the first 25 cubic meters, within the final truckload and at least once every 100 cubic meters.

During placement of RSC, the Contractor shall sample and test for yield, penetration, air content and unit weight at least once in every 500 cubic meters RSC produced but not less than twice per placement shift.

At the Engineer's request, the Contractor shall provide split samples and fabricate beams for the Engineer to test. The cost of sampling, fabricating and transporting extra samples will be paid for as extra work in conformance with the provisions in Section 4-1.03D, "Extra Work," of the Standard Specifications. When, in the opinion of the Engineer, RSC fails to conform to the mix design requirements or the requirements of these special provisions, the Contractor shall provide samples and testing at the direction of the Engineer. If the material fails to meet requirements of these special provisions, cost of sampling and testing shall be at the Contractor's expense. If the material meets the requirements of these special provisions, the cost of sampling and testing will be paid for as extra work in conformance with the provisions in Section 4-1.03D, "Extra Work," of the Standard Specifications.

Beams used for determining early age modulus of rupture shall be cured under the same conditions as the pavement until one hour prior to testing. Beams fabricated for the 7-day test shall be cured in conformance with California Test 523 as modified in these special provisions. Modulus of rupture test results will be used for accepting or rejecting the replacement pavement and pay factor adjustment for low modulus of rupture.

Materials resulting from the construction of the trial slab, test specimens, temporary roadway structural section, and all rejected replacement pavement shall become the property of the Contractor and shall be removed and disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

REPLACE EXISTING PAVEMENT DELINEATION

Whenever existing pavement delineation is removed, obliterated or damaged due to the work involved in replacing concrete pavement, the Contractor shall replace the delineation in conformance with the requirements of these special provisions.

MEASUREMENT AND PAYMENT

Replace concrete pavement (Rapid Strength Concrete) will be measured and paid for in the same manner specified for concrete pavement in Sections 40-1.13, "Measurement," and 40-1.14, "Payment," of the Standard Specifications, and these special provisions.

Replace concrete pavement (Rapid Strength Concrete) payments will be subject to the pay factor values listed in "Pay Factor Adjustment for Low Modulus of Rupture" of these special provisions.

Full compensation for the pre-operation conference, including furnishing the facility to hold the pre-operation conference in, shall be considered as included in the contract prices paid for the item involving RSC and no additional compensation will be made therefor.

Costs for providing JITT will be made in conformance with the provisions in Section 9-1.03, "Force Account Payment," of the Standard Specifications, except no markups shall be added, and the Contractor will be paid for one half of the JITT cost. Costs for providing JITT shall include training materials, class site, and the JITT instructor including the JITT instructor's travel, lodging, meals and presentation materials. All costs incurred by the Contractor or Engineer for attending JITT shall be borne by the party incurring the costs.

The provisions in Section 40-1.135, "Pavement Thickness," of the Standard Specifications shall not apply.

Full compensation for removing and disposing of existing concrete pavement and underlying base, constructing trial slabs, furnishing and placing bond breaker, furnishing and disposing of standby materials for temporary roadway structural section, constructing, maintaining, removing, and disposing of temporary roadway structural section, shall be considered as included in the contract price paid per cubic meter for replace concrete pavement (Rapid Strength Concrete), and no additional compensation will be allowed therefor.

If calibration of volumetric batch-trucks is performed more than 160 km from the project limits, additional inspection expenses will be sustained by the State. Whereas it is and will be impracticable and extremely difficult to ascertain and determine the actual increase in these expenses, it is agreed that payment to the Contractor for Replace Concrete Pavement (Rapid Setting Concrete) will be reduced $1000.

10-1.39 CRACK EXISTING CONCRETE PAVEMENT

Existing concrete pavement at the locations shown on the plans as areas to be cracked shall be cracked to form discrete segments of pavement as specified in these special provisions.

Attention is directed to Section 7-1.09, "Public Safety," of the Standard Specifications. Positive provision shall be provided to contain flying debris during cracking operations.

Existing concrete pavement shall be cracked into segments nominally measuring 1.8 m transversely by 1.2 m longitudinally. In the event existing panels are already cracked into segments, these segments shall be cracked further into nominally equal-sized square or rectangular pieces having a transverse dimension of not more than 1.8 m and a longitudinal dimension of from 0.9 m to 1.5 m, wherever feasible. The pavement cracking tool shall not impact the pavement within 0.3 m of another break line, pavement joint or edge of pavement.

Concrete pavement shall be cracked such that vertical cracks are formed completely through the pavement. The vertical cracks shall not deviate from vertical by more than 150 mm between the surface and bottom of the pavement. The cracks shall be continuous without extensive surface spalling along the crack and without excessive shattering of the pavement or base. Spalling over 30 mm in depth will be considered as extensive surface spalling.

Equipment for cracking concrete pavement shall impact the pavement with a variable force which can be controlled in force and point of impact. Equipment and procedures that utilize unguided free-falling weights such as "headache balls" shall not be used.

Prior to starting cracking operations, the Engineer will select and mark, as a test section, not less than 3 nor more than 5 existing slabs within the limits of pavement to be cracked. The Contractor shall demonstrate, to the satisfaction of the Engineer, the ability of the selected equipment and procedure to produce cracks in the concrete pavement as specified in these special provisions. Immediately prior to cracking the test section slabs, water shall be applied to the surface of the slabs in sufficient quantity that cracking can readily be determined. After the application of water, the test section pavement shall be cracked with the equipment proposed for use on the project using varying impact energy and striking patterns until a proper procedure is established. To verify that the procedure is producing cracked pavement as specified in these special provisions, the Contractor shall take at least 2 core drilled pavement cores, 150 mm or more in diameter, in the cracked pavement test section. The exact location where cores are to be taken will be designated by the Engineer. Cores shall be obtained in conformance with the requirements in ASTM Designation: C 42. Core holes in the existing pavement shall be filled with a concrete mix containing a fast setting premixed magnesium phosphate cement or a fast setting premixed modified high alumina cement approved by the Engineer.

Once the equipment and the procedure for cracking pavement have been approved by the Engineer, that equipment and procedure shall be utilized to crack the concrete pavement for the project. Cores of the cracked concrete pavement shall be taken by the Contractor in the same manner specified for coring test sections, at intervals of not less than one core per lane kilometer for each machine used to crack the lane. In the event that cores indicate that cracking is unsatisfactory, as determined by the Engineer, or the equipment or procedures are changed, an additional test section will be selected and marked by the Engineer. The Contractor shall crack the additional test sections until the equipment and procedure produce cracked pavement conforming to these special provisions.

Prior to opening cracked concrete pavement to public traffic, the pavement shall be swept so that loose debris is removed from the pavement.

Neither the newly cracked pavement nor the first layer of the asphalt concrete shall be exposed to public traffic for more than 15 days.

Cracked pavement segments shall be seated not more than 24 hours prior to receiving the asphalt concrete overlay.

Cracked concrete shall be seated by making not less than 5 passes over the cracked concrete with either an oscillating pneumatic-tired roller conforming to the provisions in the fourth paragraph in Section 39-5.02, "Compacting Equipment," of the Standard Specifications, weighing not less than 13.6 tonnes, or a vibratory sheepsfoot roller exerting a dynamic centrifugal force of at least 89 kN. A pass shall be one movement of a roller in either direction. Roller speed shall not exceed 8 km/h.

After all segments have been seated to the satisfaction of the Engineer, loose debris shall be cleaned from all joints and cracks by suitable compressed-air equipment.

Prior to opening the cracked pavement to public traffic and prior to applying an asphaltic emulsion paint binder (tack coat) for the first layer of asphalt concrete, joints, cracks, and spalls, which are greater than 18 mm in width and greater than 25 mm in depth, shall be repaired by applying paint binder (tack coat), filling with asphalt concrete, and compacting the asphalt concrete. Asphalt concrete shall conform to the provisions for Type B asphalt concrete, 4.75-mm, Maximum grading in Section 39, "Asphalt Concrete," of the Standard Specifications.

Crack existing concrete pavement will be measured by the square meter determined from the full width and length of the pavement cracked. No deduction will be made for existing cracked segments.

The contract price paid per square meter for crack existing concrete pavement shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in cracking existing concrete pavement, testing, seating cracked pavement, cleaning the pavement, filling joints, cracks and spalls, including coring cracked pavement and filling core holes, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.40 GRIND EXISTING CONCRETE PAVEMENT

This work shall consist of grinding existing portland cement concrete as shown on the plans, as specified in Section 42-2, "Grinding," of the Standard Specifications and these special provisions, and as directed by the Engineer.

Grinding equipment for grinding concrete pavements shall use diamond blades mounted on a self-propelled machine designed for grinding and texturing concrete pavements. Grinding equipment that causes raveling, aggregate fracturing, or spalling, or that damages the transverse or longitudinal joints shall not be used.

Grinding shall be performed in the longitudinal direction of the traveled way and shall be done full lane width so that the grinding begins and ends at lines perpendicular to the pavement centerline.

Grinding concrete pavement shall result in a parallel corduroy texture consisting of grooves 2 mm to 3 mm wide with 183 to 193 grooves per meter width of grinding. Tops of ridges shall be between 1.5 mm and 2.0 mm from the bottom of the blade grooves.

The ground surface at transverse joints or cracks will be tested with a 3.6 m ± 0.06-m long straightedge laid on the pavement parallel with the centerline with its midpoint at the joint or crack. The surface shall not vary by more than 2 mm from the lower edge of the straightedge.

Cross-slope uniformity and positive drainage shall be maintained across the entire traveled way and shoulder. The cross-slope shall be uniform so that when tested with a 3.6 m ± 0.06-m long straightedge placed perpendicular to the centerline, the ground pavement surface shall not vary more than 6 mm from the lower edge of the straightedge.

After grinding has been completed, the pavement surface shall be profiled in conformance with the requirements of Section 40-1.10, "Final Finishing," of the Standard Specifications. Two profiles shall be obtained in each lane approximately one meter from the lane lines. The average profile index shall be determined by averaging the two profiles in each lane. Additional grinding shall be performed, where necessary, to bring the ground pavement surface within the Profile Index requirements specified in Section 40-1.10, "Final Finishing," of the Standard Specifications.

Full compensation for profiling the ground pavement surface with a California profilograph or equivalent and any necessary additional grinding to bring the finished surface within the specified tolerances and for furnishing final profilograms to the Engineer shall be considered as included in the contract price paid per square meter for grind existing concrete pavement and no additional compensation will be allowed therefor.

10-1.41 DISPOSAL OF PORTLAND CEMENT CONCRETE (PCC) PAVEMENT GROOVING AND GRINDING RESIDUES

Disposal of portland cement concrete (PCC) pavement grooving and grinding residues shall be in conformance with the provisions in Section 42, "Groove and Grind Pavement," of the Standard Specifications and these special provisions.

The Contractor shall include water pollution control measures to address the handling of the grinding pavement residue within the Storm Water Pollution Prevention Plan or Water Pollution Control Program, as specified in "Water Pollution Control," of these special provisions.

Temporary storage of PCC pavement grooving and grinding residues shall not be allowed within the highway right of way. The Contractor may transport liquid PCC pavement grooving and grinding residues to an offsite drying location if the Engineer provides written approval. The offsite drying location shall be identified and protected in conformance with "Water Pollution Control," of these special provisions.

A Materials Information Handout is not available for disposal of PCC pavement grooving or grinding residues. The Contractor shall dispose of PCC pavement grooving and grinding residues in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside of the Right of Way," of the Standard Specifications. The facilities listed below were permitted by Regional Water Quality Control Board (RWQCB) or other agencies that may accept PCC pavement grinding and grooving residues as of July 1, 2004. If the Contractor is planning to use one of these sites, the Contractor shall determine if the facility has a current permit to accept PCC pavement grooving and grinding residues and if the facility can accept the waste at the time of generation.

SITE NAME	LOCATION	TELEPHONE	WASTE TYPES / RESTRICTIONS
Clean Harbors Environmental Services Buttonwillow	2500 West Lokern Road Buttonwillow, CA	(562) 432-5445	Hazardous Solids and Non-Hazardous Liquids and Solids
Clean Harbors Environmental Services San Jose	1021 Berryessa San Jose, CA	(408) 451-5000	Hazardous and Non-Hazardous Liquids
Crosby & Overton, Inc.	1610 W. 17th Street Long Beach, CA	(562) 432-5445	Hazardous and Non-Hazardous Liquids
D/K Environmental	3650 East 26th Street Vernon, CA	(323) 268-5056	Hazardous and Non-Hazardous Liquids and Solids
DeMenno-Kerdoon	200 N. Alameda Street Compton, CA	(323) 268-5057 (310) 537-7100	Hazardous and Non-Hazardous Liquids and Solids
Filter Recycling Services, Inc.	180 West Monte Avenue Rialto, CA	(909) 424-1630	Hazardous and Non-Hazardous Liquids
K-Pure Water Works	8910 Rochester Ave Rancho Cucamonga, CA	(909) 476-2308	Non-Hazardous Liquids
Liquid Waste Management McKittrick	56533 Highway 58 McKittrick, CA	(559) 386 - 6104	Non-Hazardous Liquids and Solids
Onyx Environmental Services LLC	1704 W. First Street Azusa, CA	(626) 334-5117	Hazardous and Non-Hazardous Liquids and Solids
Phibro-Tech, Inc.	8851 Dice Road Santa Fe Springs, CA	(562) 698-8036	Hazardous and Non-Hazardous Liquids and Solids
Romic Environmental Technologies Corporation	2081 Bay Road East Palo Alto, CA	(650) 324-1638	Hazardous and Non-Hazardous Liquids
Seaport Environmental	700 Seaport Boulevard Redwood City, CA	(650) 364-8154	Non-Hazardous Liquids
Southwest Treatment Systems, Inc.	4120 Bandini Boulevard Los Angeles, CA	(800) 900-3366	Non-Hazardous Liquids
US Filter Recovery Services, Inc.	5375 S. Boyle Avenue Vernon, CA	(323) 277-1495	Hazardous and Non-Hazardous Liquids and Solids
Waste Management Kettleman City	35251 Old Skyline Road Kettleman City, CA	(559) 386 - 6104	Hazardous and Non-Hazardous Liquids and Solids

If the Contractor disposes of PCC pavement grooving and grinding residues at locations not listed above, the disposal shall be in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications, and the following:

1. If the disposal facility is located within the State of California, the facility must be permitted by the RWQCB or other applicable agency, or the Contractor must obtain written approval from the RWQCB or other applicable agency.
2. If located outside of the State of California, the facility must be permitted by the applicable local, state, or federal agencies, or the Contractor must obtain written approval from the applicable local, state, or federal agencies.

The following shall be delivered to the Engineer at least 5 days before disposal of PCC pavement grooving and grinding residues:

1. The name, address, and telephone number of the disposal facility.
2. If the facility is not listed above:
   A. Copy of the facility's RWQCB or other applicable agency permit, or
   B. RWQCB's or other applicable agency's approval, or
   C. Copy of the applicable agency permit if the final disposal location is located outside of the State of California.

The Contractor shall deliver landfill receipts and weight ticket of disposal of residues from PCC pavement grooving and grinding to the Engineer within 5 days of completing of PCC pavement grooving and grinding activities.

The Contractor shall make all arrangements and agreements for the disposal at the time of bidding. Costs related to obtaining approval for disposal within the State of California from the RWQCB or other applicable agency, or the applicable agency if the disposal location is located outside of the State of California, shall be borne by the Contractor and no additional payment shall be made therefore. Full compensation for all costs involved in disposing of PCC pavement grooving or grinding residues as specified in this section, including all costs of handling, temporary storage, hauling and disposal fees, shall be considered as included in the price paid for the contract item of work involving PCC pavement grooving or grinding residues and no additional compensation will be allowed therefore.

10-1.42 PILING

GENERAL

Piling shall conform to the provisions in Section 49, "Piling," of the Standard Specifications, and these special provisions.

Unless otherwise specified, welding of any work performed in conformance with the provisions in Section 49, "Piling," of the Standard Specifications, shall be in conformance with the requirements in AWS D1.1.

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

CAST-IN-DRILLED-HOLE CONCRETE PILES

Cast-in-drilled-hole concrete piling shall conform to the provisions in Section 49-4, "Cast-In-Place Concrete Piles," of the Standard Specifications and these special provisions.

The provisions of "Welding" of these special provisions shall not apply to temporary steel casings.

Cast-in-drilled-hole concrete piles 600 mm in diameter or larger may be constructed by excavation and depositing concrete under slurry.

Materials

Concrete deposited under slurry shall have a nominal penetration equal to or greater than 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.

Portions of cast-in-drilled-hole concrete piles shown on the plans to be formed shall be formed and finished in conformance with the provisions for concrete structures in Section 51, "Concrete Structures," of the Standard Specifications.

Mineral Slurry

Mineral slurry shall be mixed and thoroughly hydrated in slurry tanks, and slurry shall be sampled from the slurry tanks and tested before placement in the drilled hole.

Slurry shall be recirculated or continuously agitated in the drilled hole to maintain the specified properties.

Recirculation shall include removal of drill cuttings from the slurry before discharging the slurry back into the drilled hole. When recirculation is used, the slurry shall be sampled and tested at least every 2 hours after beginning its use until tests show that the samples taken from the slurry tank and from near the bottom of the hole have consistent specified properties. Subsequently, slurry shall be sampled at least twice per shift as long as the specified properties remain consistent.

Slurry that is not recirculated in the drilled hole shall be sampled and tested at least every 2 hours after beginning its use. The slurry shall be sampled mid-height and near the bottom of the hole. Slurry shall be recirculated when tests show that the samples taken from mid-height and near the bottom of the hole do not have consistent specified properties.

Slurry shall also be sampled and tested prior to final cleaning of the bottom of the hole and again just prior to placing concrete. Samples shall be taken from mid-height and near the bottom of the hole. Cleaning of the bottom of the hole and placement of the concrete shall not start until tests show that the samples taken from mid-height and near the bottom of the hole have consistent specified properties.

Mineral slurry shall be tested for conformance to the requirements shown in the following table:

MINERAL SLURRY		
PROPERTY	REQUIREMENT	TEST
Density (kg/m^3) - before placement in the drilled hole - during drilling - prior to final cleaning - immediately prior to placing concrete	1030* to 1110* 1030* to 1200*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/liter) bentonite attapulgite	29 to 53 29 to 42	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	8 to 10.5	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning - immediately prior to placing concrete	less than or equal to 4.0	Sand API 13B-1 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^3. Slurry temperature shall be at least 4°C 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. 3648 FM 1960 West Suite 107 Houston, TX 77068 (800) 525-5237
Super Mud	PDS Company c/o Champion Equipment Company 8140 East Rosecrans Ave. Paramount, CA 90723 (562) 634-8180
Shore Pac GCV	CETCO Drilling Products Group 1350 West Shure Drive Arlington Heights, IL 60004 (847) 392-5800
Novagel Polymer	Geo-Tech Drilling Fluids 220 N. Zapata Hwy, Suite 11A Laredo, TX 78043 (210) 587-4758

Inclusion of a synthetic slurry on the above list may be obtained by meeting the Department's requirements for synthetic slurries. The requirements can be obtained from the 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 and immediately prior to placing concrete.

SlurryPro CDP synthetic slurries shall be tested for conformance to the requirements shown in the following table:

SLURRYPRO CDP KB Technologies Ltd.		
PROPERTY	REQUIREMENT	TEST
Density (kg/m^3) - during drilling - prior to final cleaning - just prior to placing concrete	 less than or equal to 1075* less than or equal to 1025*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/liter) - during drilling -prior to final cleaning - just prior to placing concrete	 53 to 127 less than or equal to 74	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	6 to 11.5	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning - just prior to placing concrete	 less than or equal to 0.5	Sand API 13B-1 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^3. Slurry temperature shall be at least 4°C when tested.		

Super Mud synthetic slurries shall be tested for conformance to the requirements shown in the following table:

SUPER MUD PDS Company		
PROPERTY	REQUIREMENT	TEST
Density (kg/m^3) - prior to final cleaning - just prior to placing concrete	less than or equal to 1025*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/liter) - during drilling - prior to final cleaning - just prior to placing concrete	34 to 64 less than or equal to 64	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	8 to 10.0	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning -just prior to placing concrete	less than or equal to 0.5	Sand API 13B-1 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^3. Slurry temperature shall be at least 4°C when tested.		

Shore Pac GCV synthetic slurries shall be tested for conformance to the requirements shown in the following table:

Shore Pac GCV CETCO Drilling Products Group		
PROPERTY	REQUIREMENT	TEST
Density (kg/m^3) - prior to final cleaning - just prior to placing concrete	less than or equal to 1025*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/liter) - during drilling - prior to final cleaning - just prior to placing concrete	35 to 78 less than or equal to 60	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	8.0 to 11.0	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning -just prior to placing concrete	less than or equal to 0.5	Sand API 13B-1 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^3. Slurry temperature shall be at least 4°C when tested.		

Novagel Polymer synthetic slurries shall be tested for conformance to the requirements shown in the following table:

NOVAGEL POLYMER Geo-Tech Drilling Fluids		
PROPERTY	REQUIREMENT	TEST
Density (kg/m^3) - during drilling - prior to final cleaning - just prior to placing concrete	 less than or equal to 1075* less than or equal to 1025*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/liter) - during drilling - prior to final cleaning - just prior to placing concrete	 48 to 110 less than or equal to 110	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	6.0 to 11.5	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning -just prior to placing concrete	 less than or equal to 0.5	Sand API 13B-1 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^3. Slurry temperature shall be at least 4°C 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 (kg/m^3) - prior to final cleaning - just prior to placing concrete	1017 *	Mud Weight (Density) API 13B-1 Section 1
Sand Content (percent) - prior to final cleaning -just prior to placing concrete	less than or equal to 0.5	Sand API 13B-1 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^3.		

Construction

The Contractor shall submit a placing plan to the Engineer for approval prior to producing the test batch for cast-in-drilled-hole concrete piling and at least 10 working days prior to constructing piling. The plan shall include complete descriptions, details, and supporting calculations as listed below:

A. Requirements for all cast-in-drilled hole concrete piling:

1. Concrete mix design, certified test data, and trial batch reports.
2. Drilling or coring methods and equipment.
3. Proposed method for casing installation and removal when necessary.
4. Plan view drawing of pile showing reinforcement 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. Methods of removal and disposal of excavation, slurry, and contaminated concrete, including removal rates.
6. Methods and equipment for slurry agitating, recirculating, and cleaning.

In addition to compressive strength requirements, the consistency of the concrete to be deposited under slurry shall be verified before use by producing a test batch. The test batch shall be produced and delivered to the project under conditions and in time periods similar to those expected during the placement of concrete in the piles. Concrete for the test batch shall be placed in an excavated hole or suitable container of adequate size to allow for testing as specified herein. Depositing of test batch concrete under slurry will not be required. In addition to meeting the specified nominal penetration, the test batch shall meet the following requirements:

A. For piles where the time required for each concrete placing operation, as submitted in the placing plan, will be 2 hours or less, the test batch shall demonstrate that the proposed concrete mix design achieves either a penetration of at least 50 mm or a slump of at least 125 mm after twice that time has elapsed.
B. For piles where the time required for each concrete placing operation, as submitted in the placing plan, will be more than 2 hours, the test batch shall demonstrate that the proposed concrete mix design achieves either a penetration of at least 50 mm or a slump of at least 125 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. Penetration tests shall be performed in conformance with the requirements in California Test 533. Slump tests shall be performed in conformance with the requirements in ASTM Designation: C 143. Upon completion of testing, the concrete shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The concrete deposited under slurry shall be carefully placed in a compact, monolithic mass and by a method that will prevent washing of the concrete. Concrete deposited under slurry need not be vibrated. Placing concrete shall be a continuous operation lasting not more than the time required for each concrete placing operation at each pile, as submitted in the placing plan, unless otherwise approved in writing by the Engineer. The concrete shall be placed with concrete pumps and delivery tube system of adequate number and size to complete the placing of concrete in the time specified. The delivery tube system shall consist of one of the following:

A. A tremie tube or tubes, each of which are at least 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 watertight cap, or plugged above the slurry level with a good quality, tight fitting, moving plug that will expel the slurry from the tube as the tube is charged with concrete. The cap or plug shall be designed to be released as the tube is charged. The pump discharge or tremie tube shall extend to the bottom of the hole before charging the tube with concrete. After charging the delivery tube system with concrete, the flow of concrete through a tube shall be induced by slightly raising the discharge end. During concrete placement, the tip of the delivery tube shall be maintained as follows to prevent reentry of the slurry into the tube. Until at least 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 the slurry, the bottom of the drilled hole shall be cleaned. The Contractor shall verify that the bottom of the drilled hole is clean.

If temporary casing is used, concrete placed under slurry shall be maintained at a level at least 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.

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 ground water.

Inspection pipes shall be Schedule 40 polyvinyl chloride pipes 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 and shall be no more than 150 mm inside the reinforcement. Coring shall not damage the pile reinforcement. Cored holes shall be made with a double wall core barrel system utilizing a split tube type inner barrel. Coring with a solid type inner barrel will not be allowed. Coring methods and equipment shall provide intact cores for the entire length of the pile concrete. The coring operation shall be logged by an Engineering Geologist or Civil Engineer licensed in the State of California and experienced in core logging. Coring logs shall include complete descriptions of inclusions and voids encountered during coring, and shall be delivered to the Engineer upon completion. Concrete cores shall be preserved, identified with the exact location the core was recovered from within the pile, and made available for inspection by the Engineer.

Acceptance tests of the concrete will be made by the Engineer, without cost to the Contractor. Acceptance tests will evaluate the homogeneity of the placed concrete. Tests will include gamma-gamma logging. Tests may also include crosshole sonic logging and other means of inspection selected by the Engineer. The Contractor shall not conduct operations within 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 Contractor’s expense. Grout shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. The inspection pipes and holes shall be filled using grout tubes that extend to the bottom of the pipe or hole or into the grout already placed.

If acceptance testing performed by the Engineer determines that a pile does not meet the requirements of the specifications, then that pile will be rejected and all depositing of concrete under slurry or concrete placed using temporary casing for the purpose of controlling groundwater shall be suspended until written changes to the methods of pile construction are approved in writing by the Engineer.

The Contractor shall submit to the Engineer for approval a mitigation plan for repair, supplementation, or replacement for each rejected cast-in-drilled-hole concrete pile, and this plan shall conform to the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. Prior to submitting this mitigation plan, the Engineer will hold a repair feasibility meeting with the Contractor to discuss the feasibility of repairing rejected piling. The Engineer will consider the size of the defect, the location of the defect, and the design information and corrosion protection considerations for the pile. This information will be made available to the Contractor, if appropriate, for the development of the mitigation plan. If the Engineer determines that it is not feasible to repair the rejected pile, the Contractor shall not include repair as a means of mitigation and shall proceed with the submittal of a mitigation plan for replacement or supplementation of the rejected pile.

If the Engineer determines that a rejected pile does not require mitigation due to structural, geotechnical, or corrosion concerns, the Contractor may elect to 1) repair the pile per the approved mitigation plan, or 2) not repair anomalies found during acceptance testing of that pile. For such unrepaired piles, the Contractor shall pay to the State, $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 21 working days to review the mitigation plan after a complete submittal has been received.

Should the Engineer fail to review the complete pile mitigation submittal within the time specified, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the pile mitigation plan, an extension of time commensurate with the delay in completion of the work thus caused will be granted in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

When repairs are performed, the Contractor shall submit a mitigation report to the Engineer within 10 days of completion of the repair. This report shall state exactly what repair work was performed and quantify the success of the repairs relative to the submitted mitigation plan. The mitigation report shall be stamped and signed by an engineer that is licensed as a Civil Engineer by the State of California. The mitigation report shall show the State assigned contract number, bridge number, full name of the structure as shown on the contract plans, District-County-Route-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.

10-1.43 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.

Where pavement subsealing has been performed under existing approach slabs, the subsealing material shall be removed for its full depth. Where removal of cement treated base is required to construct the approach slab, the entire thickness of the cement treated base shall be removed.

Voids between the new reinforced structure approach slab and the base material remaining in place that are caused by removal of subsealing material or cement treated base shall be filled, at the option of the Contractor, with aggregate base (approach slab) or structure approach slab concrete.

The Contractor shall establish a grade line for new approach slabs which shall provide a smooth profile grade. The profile grade will be subject to the approval of the Engineer.

The Contractor shall schedule his operations so that the pavement and base materials removed during a work period shall be replaced, in that same work period, with approach slab concrete that shall be cured for at least 6 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 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 asphalt concrete shall conform to the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions.

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 EXISTING PAVEMENT AND BASE MATERIALS

The outline of portland cement concrete to be removed shall be sawed full depth with a power-driven concrete saw.

The outlines of excavations in asphalt concrete shall be cut on a neat line to a minimum depth of 75 mm with a power-driven concrete saw or wheel-type rock cutting excavator before any asphalt concrete material is removed. These excavations shall be permanently or temporarily backfilled to conform to the grade of the adjacent pavement prior to opening the lane to public traffic. Surplus excavated material may be used as temporary backfill material.

Regardless of the type of equipment used to remove concrete within the sawed outline, the surface of the concrete to be removed shall not be impacted within 0.5-m of the pavement to remain in place. Removing existing pavement and base materials shall be performed without damage to the adjacent structure or pavement that is to remain in place. Damage to the structure or to the pavement that is to remain in place shall be repaired in conformance with the provisions in Section 7-1.11, "Preservation of Property," of the Standard Specifications.

Materials removed shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The base material remaining in-place, after removing the existing pavement and base materials to the required depth, shall be graded uniformly, watered, and compacted. The finished surface of the base material at any point shall not extend above the grade approved by the Engineer.

Areas of the base material that are low as a result of over excavation shall be filled, at the Contractor's expense, with structure approach slab concrete at the time and in the same operation that the new concrete is placed.

AGGREGATE BASE (APPROACH SLAB)

The aggregate base (approach slab) for filling voids below the reinforced structure approach slab concrete shall be produced from commercial quality aggregates consisting of broken stone, crushed gravel or natural rough-surfaced gravel, and sand, or any combination thereof. The grading of the aggregate base shall conform to the 19-mm maximum grading specified in Section 26-1.02A, "Class 2 Aggregate Base," of the Standard Specifications.

Aggregate base (approach slab) for filling voids below the reinforced structure approach slab concrete shall be spread and compacted by methods that will produce a well-compacted, uniform base, free from pockets of coarse or fine material. The aggregate base shall be watered and compacted to the grade approved by the Engineer. Where the required thickness of aggregate base is 200 mm or less, the base may be spread and compacted in one layer. Where the required thickness of aggregate base is more than 200 mm, the base shall be spread and compacted in 2 or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed 200 mm. The finished surface of the base material at any point shall not extend above the grade approved by the Engineer. Areas of the base material that are lower than the grade approved by the Engineer, shall be filled with structure approach slab concrete at the time and in the same operation that the new concrete is placed.

STRUCTURE APPROACH SLAB

Reinforced concrete approach slabs shall conform to the provisions for approach slabs in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Concrete for use in approach slabs shall contain not less than 400 kg of cementitious material per cubic meter.

Steel components of abutment ties including plates, nuts, washers, and rods shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

The steel angles at the concrete barrier joint shall conform to the provision in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

Approach slab concrete that requires a minimum curing period of 6 hours shall be constructed using a non-chloride Type C chemical admixture. Mineral admixture will not be required in this concrete.

Portland cement for use in concrete using a non-chloride Type C chemical admixture shall be Type II Modified, Type II Prestress, or Type III. Type II Modified and Type III cement shall conform to the provisions in Section 90-2.01, "Cement," of the Standard Specifications. Type II Prestress cement shall conform to the requirements of Type II Modified cement, except the mortar containing the portland cement to be used and Ottawa sand, when tested in conformance with California Test 527, shall not contract in air more than 0.053-percent.

The non-chloride Type C chemical admixture shall be approved by the Engineer and shall conform to the requirements in ASTM Designation: C 494 and Section 90-4, "Admixtures," of the Standard Specifications.

The concrete with non-chloride Type C chemical admixture shall be prequalified prior to placement in conformance with the provisions for prequalification of concrete specified by compressive strength in Section 90-9.01, "General," of the Standard Specifications and the following:

A. Immediately after fabrication of the 5 test cylinders, the cylinders shall be stored in a temperature medium of 21 ± 1.5°C until the cylinders are tested.
B. The 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.

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°C during the curing period, an insulating layer or blanket shall cover the surface. The insulation layer or blanket shall have an R-value rating given in the table below. At the Contractor's option, a heating tent may be used in lieu of or in combination with the insulating layer or blanket:

Temperature range during curing period	R-value, minimum
13°C to 18°C	1
7°C to 13°C	2
4°C to 7°C	3

Tests to determine the coefficient of friction of the final textured surface will be made only if the Engineer determines by visual inspection that the final texturing may not have produced a surface having the specified coefficient of friction. Tests to determine the coefficient of friction will be made after the approach slab is opened to public traffic, but not later than 5 days after concrete placement. The coefficient of friction will be measured by California Test 342. Portions of completed concrete surfaces that are found to have a coefficient of friction less than 0.35 shall be ground or grooved parallel to the center line in conformance with the provisions for bridge decks in Section 42, "Groove and Grind Pavement," of the Standard Specifications.

JOINTS

Hardboard and expanded polystyrene shall conform to the provisions in Section 51-1.12D, "Sheet Packing, Preformed Pads and Board Fillers," of the Standard Specifications.

Type AL joint seals shall conform to the provisions in Section 51-1.12F, "Sealed Joints," of the Standard Specifications. The sealant may be mixed by hand-held power-driven agitators and placed by hand methods.

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.

Full compensation for removing and disposing of portions of existing structures and pavement materials, and for furnishing and placing miscellaneous metal, 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 and abutment tie rods shall be considered as included in the contract price paid per cubic meter for structural concrete, approach slab (Type R) and no separate payment will be made therefor.

10-1.44 PAVING NOTCH EXTENSION

This work shall consist of extending existing paving notches in conformance with the details shown on the plans and these special provisions.

Concrete for paving notch extension shall be a high-strength material consisting of either magnesium phosphate concrete, modified high alumina based concrete, or portland cement based concrete. Magnesium phosphate concrete shall conform to the provisions for magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions. Modified high alumina based concrete and portland cement based concrete shall be water activated and shall conform to the provisions for single component (water activated) magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions.

At least one hour shall elapse between the time of placing concrete for the paving notch extension and placing concrete for the structure approach slab.

A clean uniform rounded aggregate filler may be used to extend the concrete. The moisture content of the aggregate shall not exceed 0.5-percent. Grading of the aggregate shall conform to the following:

Sieve Sizes	Percentage Passing
12.5-mm	100
1.18-mm	0-5

The amount of aggregate filler shall conform to the manufacturer's recommendation, but in no case shall the concrete strengths be less than that specified for magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications.

The components of dual component (with a prepackaged liquid activator) magnesium phosphate shall be combined by mixing complete units supplied by the manufacturer. Portions of units shall not be used. Water shall not be added to dual component magnesium phosphate.

Magnesium phosphate concrete shall not be mixed in containers or worked with tools containing zinc, cadmium, aluminum or copper. Modified high alumina based concrete shall not be mixed in containers or worked with tools containing aluminum.

Concrete shall not be retempered. Finishing tools that are cleaned with water shall be thoroughly dried before working the concrete.

When placing concrete on slopes exceeding 5 percent, the Engineer may require the Contractor to provide a flow controlled modified material.

Modified high alumina based concrete and portland cement based concrete shall be cured in conformance with the provisions in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications. Magnesium phosphate concrete shall not be cured.

The surface temperature of the areas to receive the concrete shall be 5°C or above when the concrete is placed. The contact surface to receive the magnesium phosphate concrete shall be dry. The contact surfaces to receive the modified high alumina concrete or portland cement based concrete may be damp but not saturated.

The construction joint between the paving notch extension and the existing abutment shall conform to the provisions for horizontal construction joints in Section 51-1.13, "Bonding," of the Standard Specifications. Concrete shall be placed in the spalled portions of the existing paving notch concurrently with the concrete for the paving notch extension.

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

Structure excavation and backfill shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications, except for payment.

Drilling of holes and bonding of reinforcing steel dowels shall conform to the provisions for drilling and bonding dowels in Section 83-2.02D(1), "General," of the Standard Specifications. If reinforcement is encountered during drilling before the specified depth is attained, the Engineer shall be notified. Unless the Engineer approves coring through the reinforcement, the hole will be rejected and a new hole, in which reinforcement is not encountered, shall be drilled adjacent to the rejected hole to the depth shown on the plans.

The quantity of concrete for paving notch extension will be measured by the cubic meter as determined in conformance with the dimensions shown on the plans or other dimensions that may be ordered in writing by the Engineer.

The contract price paid per cubic meter for paving notch extension shall include full compensation for furnishing all labor, materials (including concrete for the paving notch spalled areas), tools, equipment, and incidentals, and for doing all the work involved in constructing the paving notch extension, complete in place, including structure excavation and backfill, reinforcement, and drilling and bonding dowels, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.45 CLEAN EXPANSION JOINTS

All deck joints shown on the plans to be cleaned, shall be cleaned as specified herein.

Cleaning shall include removal of all existing seal material, dirt, debris, and joint filler, and shall be accomplished by methods which do not damage existing sound concrete surfaces.

Joint size shall be verified after the joint has been cleaned.

The Contractor shall take necessary precautions to ensure that material removed from expansion joints does not fall onto public traffic, private property, or into the waterway beneath the bridges. The Contractor shall submit for the Engineer's approval, details for preventing material, equipment, or debris from falling onto traffic.

All joint damage shall be repaired as directed by the Engineer.

The cost of repairing damage caused by the Contractor's operations shall be borne by the Contractor.

Materials removed from the expansion joint, except for surface dust, shall be recovered and disposed of away from the site in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Cleaning expansion joints will be measured by the meter for the length of the deck joint as shown on the plans.

The contract price paid per meter for clean expansion joint shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in cleaning expansion joints, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.46 SEALING JOINTS

Joints in concrete bridge decks and joints between concrete structures and concrete approach slabs shall be sealed in conformance with the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

Where polyurethane seals are shown on the plans, a silicone sealant conforming to the provisions in Section 51–1.12F, "Sealed Joints," of the Standard Specifications may be used.

When ordered by the Engineer, a joint seal larger than called for by the Movement Rating shown on the plans shall be furnished and installed. Payment to the Contractor for furnishing the larger seal and for saw cutting the increment of additional depth of groove required will be determined as provided in Section 4-1.03, "Changes," of the Standard Specifications.

Saw cutting of grooves will not be required at existing joints that are to be sealed with Type A joint seal unless ordered by the Engineer. The Contractor shall make saw cuts as ordered by the Engineer and the saw cutting will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

10-1.47 REINFORCEMENT

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

The Department's mechanical splices prequalified list can be found at the following internet site:

http://www.dot.ca.gov/hq/esc/approved_products_list/

The provisions of "Welding Quality Control" of these special provisions shall not apply to resistance butt welding.

10-1.48 STEEL STRUCTURES

Construction of steel structures shall conform to the provisions in Section 55, "Steel Structures," of the Standard Specifications and these special provisions.

Attention is directed to "Welding" in Section 8, "Materials," of these special provisions.

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 (Nominal bolt diameter (mm))	ASTM Designation: A 325 (Nominal bolt diameter (inch))
13, 12.70, or M12	1/2
16, 15.88, or M16	5/8
19, 19.05, or M20	3/4
22, 22.22, or M22	7/8
24, 25, 25.40, or M24	1
29, 28.58, or M27	1 1/8
32, 31.75, or M30	1 1/4
38, 38.10, or M36	1 1/2

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.

The requirements of this section do not apply to high-strength cap screws or high-strength bolts used for slip base plates.

Each combination of bolt production lot, nut lot, and washer lot shall be tested as an assembly.

A rotational capacity lot number shall be assigned to each combination of lots tested. Each shipping unit of fastener assemblies shall be plainly marked with the rotational capacity lot number.

Two fastener assemblies from each rotational capacity lot shall be tested.

The following equipment, procedure, and acceptance criteria shall be used to perform rotational capacity tests on and determine acceptance of long bolts. Fasteners are considered to be long bolts when full nut thread engagement can be achieved when installed in a bolt tension measuring device:

A. Long Bolt Test Equipment:

1. Calibrated bolt tension measuring device with adequate tension capacity for the bolts being tested.
2. Calibrated dial or digital torque wrench. Other suitable tools will be required for performing Steps 7 and 8 of the Long Bolt Test Procedure. A torque multiplier may be required for large diameter bolts.
3. Spacer washers or bushings. When spacer washers or bushings are required, they shall have the same inside diameter and equal or larger outside diameter as the appropriate hardened washers conforming to the requirements in ASTM Designation: 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

(a) Nut rotation is relative to bolt, regardless of the element (nut or bolt) being turned. For bolts installed by 1/2 turn and less, the tolerance shall be plus or minus 30 degrees; for bolts installed by 2/3 turn and more, the tolerance shall be plus or minus 45 degrees.
(b) Applicable only to connections in which all material within grip of the bolt is steel.
(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.

6. Turn the nut to achieve the applicable minimum bolt tension value listed in Table C. After reaching this tension, record the moving torque, in foot-pounds, required to turn the nut, and also record the corresponding bolt tension value in pounds. Torque shall be measured with the nut in motion. Calculate the value, T (in ft-lbs), where T=[(the measured tension in pounds) x (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

7. Turn the nut further to increase bolt tension until the rotation listed in Table B is reached. The rotation is measured from the heavy reference line made on the face plate after the bolt was snug-tight. Record this bolt tension.
8. Loosen and remove the nut and examine the threads on both the nut and bolt.

C. Long Bolt Acceptance Criteria:

1. An assembly shall pass the following requirements to be acceptable: 1) the measured moving torque (Step 6) shall be less than or equal to the calculated value, T (Step 6), 2) the bolt tension measured in Step 7 shall be greater than or equal to the applicable turn test tension value listed in Table D, 3) the nut shall be able to be removed from the bolt without signs of thread stripping or galling after the required rotation in Step 7 has been achieved, 4) the bolt does not shear from torsion or fail during the test, and 5) the assembly does not seize before the final rotation in Step 7 is reached. Elongation of the bolt in the threaded region between the bearing face of the nut and the underside of the bolt head is expected and will not be considered a failure. Both fastener assemblies tested from one rotational capacity lot shall pass for the rotational capacity lot to be acceptable.

Table D

Turn Test Tension Values	
Bolt Diameter (inches)	Turn Test Tension (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[a,b]	
Bolt Length (measured in Step 1)	Required Rotation (turn)
4 bolt diameters or less	1/3
(a) Nut rotation is relative to bolt, regardless of the element (nut or bolt) being turned. For bolts installed by 1/2 turn and less, the tolerance shall be plus or minus 30 degrees. (b) Applicable only to connections in which all material within grip of the bolt is steel.	

7. Tighten the nut further to the 2/3-turn mark as indicated in Table G. The rotation is measured from the heavy reference start line made on the plate or girder when the bolt was snug-tight. Verify that the radial line on the bolt end or on the exposed portions of the threads of tension control bolts is still in alignment with the start line.

Table G

Required Nut Rotation for Rotational Capacity Test	
Bolt Length (measured in Step 1)	Required Rotation (turn)
4 bolt diameters or less	2/3

8. Loosen and remove the nut and examine the threads on both the nut and bolt.

C. Short Bolt Acceptance Criteria:

1. An assembly shall pass the following requirements to be acceptable: 1) the measured moving torque from Step 6 shall be less than or equal to the maximum allowable torque from Table E, 2) the nut shall be able to be removed from the bolt without signs of thread stripping or galling after the required rotation in Step 7 has been achieved, 3) the bolt does not shear from torsion or fail during the test, and 4) the assembly shall not seize before the final rotation in Step 7 is reached. Elongation of the bolt in the threaded region between the bearing face of the nut and the underside of the bolt head will not be considered a failure. Both fastener assemblies tested from one rotational capacity lot shall pass for the rotational capacity lot to be acceptable.

INSTALLATION TENSION TESTING AND ROTATIONAL CAPACITY TESTING AFTER ARRIVAL ON THE JOB SITE

Installation tension tests and rotational capacity tests on high-strength fastener assemblies shall be performed by the Contractor prior to acceptance or installation and after arrival of the fastener assemblies on the project site. Installation tension tests and rotational capacity tests shall be performed at the job-site, in the presence of the Engineer, on each rotational capacity lot of fastener assemblies.

The requirements of this section do not apply to high-strength cap screws or high-strength bolts used for slip base plates.

Installation tension tests shall be performed on 3 representative fastener assemblies in conformance with the provisions in Section 8, "Installation," of the RCSC Specification. For short bolts, Section 8.2, "Pretensioned Joints," of the RCSC Specification shall be replaced by the "Pre-Installation Testing Procedures," of the "Structural Bolting Handbook," published by the Steel Structures Technology Center, Incorporated.

The rotational capacity tests shall be performed in conformance with the requirements for rotational capacity tests in "Rotational Capacity Testing Prior to Shipment to Job Site" of these special provisions.

At the Contractor's expense, additional installation tension tests, tests required to determine job inspecting torque, and rotational capacity tests shall be performed by the Contractor on each rotational capacity lot, in the presence of the Engineer, if 1) any fastener is not used within 3 months after arrival on the 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.

SURFACE PREPARATION

For all bolted connections, the contact surfaces and inside surfaces of bolt holes shall be cleaned and coated before assembly in conformance with the provisions for cleaning and painting structural steel of these special provisions.

SEALING

The perimeter around all direct tension indicator gaps shall be completely sealed with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II. The sealant shall be gray in color and have a minimum thickness of 1.3 mm. If painting is required, the sealing compound shall be applied prior to painting.

When zinc-coated tension control bolts are used, the sheared end of each fastener shall be completely sealed with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II. The sealant shall be gray in color and shall have a minimum thickness of 1.3 mm. The sealant shall be applied to a clean sheared surface on the same day that the splined end is sheared off.

WELDING

Table 2.2 of AWS D1.5 is superseded by the following table:

Base Metal Thickness of the Thicker Part Joined, mm	Minimum Effective Partial Joint Penetration Groove Weld Size, * mm
Over 6 to 13 inclusive	5
Over 13 to 19 inclusive	6
Over 19 to 38 inclusive	8
Over 38 to 57 inclusive	10
Over 57 to 150 inclusive	13
Over 150	16

* Except the weld size need not exceed the thickness of the thinner part

The requirement of conformance with AWS D1.5 shall not apply to work conforming to Section 56-1, "Overhead Sign Structures," or Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications.

10-1.49 FURNISH SIGN

Construction area signs shall be fabricated and furnished in accordance with details shown on the plans, the Traffic Sign Specifications, and these special provisions.

Traffic Sign Specifications for California sign codes are available for review at the Department's internet site:

http://www.dot.ca.gov/hq/traffops/signtech/signdel/specs.htm

Traffic Sign Specifications for signs referenced with Federal MUTCD sign codes can be found in Standard Highway Signs Book, administered by the Federal Highway Administration, which is available for review at the following Internet website:

http://mutcd.fhwa.dot.gov/ser-pubs.htm

Information on cross-referencing California sign codes with the Federal MUTCD sign codes is available at the Department's internet site:

http://www.dot.ca.gov/hq/traffops/signtech/signdel/specs.htm

Temporary or permanent signs shall be free from blemishes that may affect the serviceability and detract from the general sign color and appearance when viewing during daytime and nighttime from a distance of 8 m. The face of each finished sign shall be uniform, flat, smooth, and free of defects, scratches, wrinkles, gel, hard spots, streaks, extrusion marks, and air bubbles. The front, back, and edges of the sign panels shall be free of router chatter marks, burns, sharp edges, loose rivets, delaminated skins, excessive adhesive over spray and aluminum marks.

SHEET ALUMINUM

Alloy and temper designations for sheet aluminum shall be in accordance with ASTM Designation: B209.

The Contractor shall furnish the Engineer a Certificate of Compliance in accordance to Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for the sheet aluminum.

Sheet aluminum shall be pretreated in accordance to ASTM Designation: B449. Surface of the sheet aluminum shall be cleaned, deoxidized, and coated with a light and tightly adherent chromate conversion coating free of powdery residue. The conversion coating shall be Class 2 with a mass between 108 mg/m^2 and 377 mg/m^2, and an average mass of 269 mg/m^2. Following the cleaning and coating process, the sheet aluminum shall be protected from exposure to grease, oils, dust, and contaminants.

Sheet aluminum shall be free of buckles, warps, dents, cockles, burrs, and defects resulting from fabrication.

Base plate for standard route marker shall be die cut.

RETROREFLECTIVE SHEETING

The Contractor shall furnish retroreflective sheeting for sign background and legend in accordance with ASTM Designation: D4956 and "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Retroreflective sheeting shall be applied to sign panels as recommended by the retroreflective sheeting manufacturer without stretching, tearing, and damage.

Class 1, 3, or 4 adhesive backing shall be used for Type II, III, IV, VII, VIII, and IX retroreflective sheeting. Class 2 adhesive backing may also be used for Type II retroreflective sheeting. The adhesive backing shall be pressure sensitive and fungus resistant.

When the color of the retroreflective sheeting determined from instrumental testing is in dispute, the Engineer's visual test will govern.

PROCESS COLOR AND FILM

The Contractor shall furnish and apply screened process color, non-reflective opaque black film, and protective overlay film of the type, kind, and product that are approved by the manufacturer of the retroreflective sheeting.

The Contractor shall furnish the Engineer a Certificate of Compliance in accordance to Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for the screened process color, non-reflective opaque black film, and protective overlay film.

The surface of the screened process color shall be flat and smooth. When the screened process colors determined from the instrumental testing in accordance to ASTM Designation: D4956 are in dispute, the Engineer's visual test will govern.

The Contractor shall provide patterns, layouts, and set-ups necessary for the screened process.

The Contractor may use green, red, blue, and brown reverse-screened process colors for background and non-reflective opaque black film or black screened process color for legend. The coefficient of retroreflection for reverse-screened process colors on white retroreflective sheeting shall not be less than 70 percent of the coefficient of retroreflection specified in ASTM Designation: D4956.

The screened process colors and non-reflective opaque black film shall have the same outdoor weatherability as that of the retroreflective sheeting.

After curing, screened process colors shall withstand removal when tested by applying 3M Company Scotch Brand Cellophane Tape No. 600 or equivalent tape over the color and removing with one quick motion at 90°angle.

SINGLE SHEET ALUMINUM SIGN

Single sheet aluminum signs shall be fabricated and furnished with or without frame. The Contractor shall furnish the sheet aluminum in accordance to "Sheet Aluminum" of these special provisions. Single sheet aluminum signs shall be fabricated from sheet aluminum alloy 6061-T6 or 5052-H38.

Single sheet aluminum signs shall not have a vertical splice in the sheet aluminum. For signs with depth greater than 1220 mm, one horizontal splice will be allowed in the sheet aluminum.

Framing for single sheet aluminum sign shall consist of aluminum channel or rectangular aluminum tubing. The framing shall have a length tolerance of +3 mm. The face sheet shall be affixed to the frame with rivets of 5-mm diameter. Rivets shall be placed within the web of channels and shall not be placed less than 13 mm from edges of the sign panels. Rivets shall be made of aluminum alloy 5052 and shall be anodized or treated with conversion coating to prevent corrosion. The exposed portion of rivets on the face of signs shall be the same color as the background or legend where the rivets are placed.

Finished signs shall be flat within a tolerance of +3 mm per meter when measured across the plane of the sign in all directions. The finished signs shall have an overall tolerance within +3 mm of the detailed dimensions.

Aluminum channels or rectangular aluminum tubings shall be welded together with the inert gas shielded-arc welding process using E4043 aluminum electrode filler wires as shown on the plans. Width of the filler shall be equal to wall thickness of smallest welded channel or tubing.

10-1.50 MINOR CONCRETE (BACKFILL)

Minor concrete (backfill) as shown on the plan or as directed by the Engineer shall conform to the provisions in Sections 64-1.06, "Concrete Backfill," 64-1.08, "Measurement" and 64-1.09, "Payment" of the Standard Specifications.

Portland cement for concrete backfill shall be Type III conforming to the provisions in Section 90-2.01, "Cement," of the Standard Specifications. A Type C accelerating admixture conforming to the requirements in ASTM Designation: C 494 shall be added to the concrete mix for concrete backfill. The admixture shall be used at the rate recommended by the manufacturer of the admixture. The admixture shall not contain chlorides as Cl in excess of one percent by mass as determined by California Test 415.

10-1.51 CORRUGATED METAL PIPE

Slotted corrugated steel pipe culverts shall conform to the provisions in Section 66, "Corrugated Metal Pipe," of the Standard Specifications and these special provisions.

Corrugated steel pipe shall be fabricated from zinc-coated steel sheet.

10-1.52 DRAINAGE INLET MARKER

The Contractor shall furnish and install plastic or thermoplastic drainage inlet markers in conformance with the details and locations shown on the plans, as specified in these special provisions, and as directed by the Engineer.

The Contractor shall furnish a Certificate of Compliance to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for plastic and thermoplastic drainage inlet markers. In addition, samples of each type of drainage inlet marker shall be submitted to the Engineer 10 days before placement of the markers.

If allowed in the plans, dainage inlet markers shall be either plastic or thermoplastic at the option of the Contractor. Once a type is selected, the type of drainage inlet marker shall not be changed without written approval from the Engineer.

Plastic drainage inlet markers shall conform to ASTM Designations: G-53 and D-60 and the requirements as follow. The plastic material shall be white with ultraviolet inhibitors. When placed on the vertical face of a concrete curb, the plastic drainage inlet markers shall have a dome-shaped cover consisting of clear and non-yellowing polyurethane cover. Plastic drainage inlet markers shall be with adhesives or heat as recommended by the manufacturer of the marker.

Property	Specifications	Requirements
Thickness, mm		0.65 – 1.5
Thickness (with dome), mm		1.4 – 3.0
Legend color (non-reflective)	FHWA's Color Tolerance Chart	Blue or Green (PR Color Number 3 or 4)
Background color (non-reflective)	AASHTO Designation: M249-78	White
Weathering Resistance	ASTM Designation: G-53	1500 hours without yellowing or pit

Thermoplastic drainage inlet markers shall be prefabricated, free of lead and chromium, and conform to AASHTO Designation: M249-79 and the requirements as follow. Thermoplastic drainage inlet markers shall be adhered to the surface of the drainage inlet with adhesives or heat as recommended by the manufacturer of the marker.

Property	Specifications	Requirements
Thickness, mm		2.0 – 4.0
Legend color (non-reflective)	FHWA's Color Tolerance Chart	Blue or Green (PR Color Number 3 or 4)
Background color (non-reflective)	AASHTO Designation: M249-78	White
Skid Resistance	ASTM Designation: E-303	60 BPN

The Contractor shall mechanically clean the surface before placing plastic or thermoplastic drainage inlet markers.

Drainage inlet marker will be measured as units determined from actual count in place.

The contract unit price paid for drainage inlet marker shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing drainage inlet markers, complete in place, as shown on the plans, as specified in the Standard Specifications, and these special provisions, and as directed by the Engineer.

10-1.53 MISCELLANEOUS CONCRETE CONSTRUCTION

Minor concrete (paving) at gore area and curb shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications and these special provisions.

Aggregate for minor concrete (paving) shall conform to the grading specified for fine aggregate in Section 90-3.03, "Fine Aggregate Grading," of the Standard Specifications. Aggregate for grout shall conform to the following grading:

Sieve Sizes	Percentage Passing
4.75-mm	100
2.36-mm	90 - 100
1.18-mm	60 - 100
600-µm	35 - 70
300-µm	15 - 35
150-µm	2 - 15

Welded wire fabric, of the size and type shown on the plans and conforming to the provisions in Section 52, "Reinforcement," of the Standard Specifications, shall be placed in the paving areas as shown on the plans.

The minor concrete (paving) shall be placed at the locations shown on the plans, struck off and compacted until a layer of mortar is brought to the surface. The concrete shall be screeded to the required grade and cross section and floated to a uniform surface.

The heavy broom finish for the paving shall be applied to the surfaces while the concrete is still in the plastic stage of set.

Site conditions within the minor concrete (paving) areas may vary. The contractor shall be responsible for site preparation of minor concrete (paving) areas. Site preparation shall include but not be limited to forming work, minor grading, saw cutting asphalt concrete to provide a clean edge, sleeving of posts or reflectors within the minor concrete (paving) areas and adjusting existing pull boxes to grade in conformance with the provisions in Section 86 “Signals, Lighting and Electrical Systems” of the Standard Specifications. Gaps between the cured concrete and existing asphalt concrete surfacing shall be filled with asphalt concrete. Asphalt concrete shall be a minimum 80 mm thick and shall conform to the following material requirements:

A. Asphalt concrete shall be produced at a central mixing plant.
B. Paving asphalt and aggregates shall be commercial quality.
C. The amount of asphalt binder to be mixed with the aggregate shall be between 5 percent and 10 percent by mass of the dry aggregate. The exact amount will be determined by the Engineer.
D. The aggregate shall have a Sand Equivalent value of not less than 30.
E. The aggregate shall conform to the 12.5-mm Maximum grading specified for Type B asphalt concrete in Section 39-2.02, "Aggregate," of the Standard Specifications.

For payment purposes, the area in square meters of minor concrete (paving) will be determined from horizontal measurements of the finished textured paving.

The contract price paid per cubic meter for minor concrete (paving) shall include full compensation for furnishing all labor, materials (including welded wire fabric, where required), tools, equipment, and incidentals, and for doing all the work involved in constructing minor concrete (paving), complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.54 MINOR CONCRETE (WEED BARRIER)

This work shall consist of furnishing and placing minor concrete (weed barrier) at various locations as shown on the plans and in conformance with these special provisions and as directed by the Engineer.

Attention is directed to “Order of Work” of these special provisions regarding guard railing installation requirements.

MATERIALS

Minor Concrete

Concrete for weed barrier shall consist of a mixture of portland cement concrete, crumb rubber, and concrete reinforcing fibers. Concrete shall conform to the provisions for Portland Cement Concrete in Section 90, "Minor Concrete," of the Standard Specifications and these special provisions. Backfill material for leave-out sections in weed barrier shall be as specified under grout below.

Concrete for weed barrier shall include crumb rubber. Crumb rubber shall be scrap tire crumb rubber consisting of ground or granulated rubber derived from a combination of passenger tires, truck tires or tire buffings. The minimum of scrap tire crumb rubber blended into the concrete shall be equivalent to 1.5 percent by mass of the combined mixture of concrete and scrap tire crumb rubber. Crumb rubber shall be ground or granulated at ambient temperature. The maximum size of individual particals shall not exceed 1 mm in diameter and 12 mm in fibrious lengths or 6 mm maximum ground rubber chips. Crumb rubber shall not contain more than 0.01-percent wire (by mass of crumb rubber) and shall be free of other contaminants, except fabric. Fabric shall not exceed 0.05-percent by mass of crumb rubber.

Concrete for weed barrier shall include reinforcing fibers. Concrete reinforcing fibers shall consist of a blended ratio of 4 parts of coarse polypropylene monofilament fibers with an engineered sinusoidal contoured profile, manufactured specifically for use as concrete reinforcement with maximum individual fiber lengths of 50 mm ± 10 mm, and 1 part of fine fibrillated polypropylene fibers of various lengths and thickness, manufactured specifically for concrete reinforcing. Concrete reinforcing fibers shall be of a commercial source, combined with the concrete in proportions as recommended by the manufacturer.

All components of the weed barrier concrete mixture shall be incorporated homogeneously at the concrete plant before delivery to the work site.

Welded Wire Fabric

Grout

Weed barrier located at guardrail posts shall be filled with grout as shown on the plans. Grout shall consist of 1 part hydraulic cement, 2 parts sand, and include sufficient water to provide a consistency that is handled easily and may be spread by trowel. Grout shall have a maximum compressive strength of 0.83 Mpa (120 psi).

Color of grout shall match the color of the minor concrete used to construct the weed barrier.

Landscape Fabric

Landscape fabric shall be manufactured from thermally spun bonded polypropylene fabric and shall conform to the following:

Specification	Minimum Requirement
Grab Tensile Strength	59 kg
Grab Elongation	60%
UV Resistance	70% @ 150 hours
Mass	102 grams/square meter

Staples shall be 50-mm wide, 200-mm in length, and 11 gauge wire.

A copy of the manufacturers product sheet together with instructions for installation shall be furnished to the Engineer 5 days before installation.

A Certificate of Compliance for the landscape fabric shall be furnished to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

Prior to placement of weed barrier, areas shall be cleared as specified under "Clearing and Grubbing" in these special provisions.

Prior to placement of weed barrier, the subgrade surface shall be smooth, firm, stable and free of rocks, clods, foliage, roots or other material greater than 25 mm in diameter.

Earthwork

Earthwork shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

After clearing, areas to receive weed barrier shall be excavated. Where weed barrier is to be placed adjacent to an existing curb or dike, excavate the subgrade such that the finished weed barrier elevation will be flush with the top of the curb or dike. After excavation, areas to receive weed barrier shall be graded to a smooth, uniform surface and compacted to not less than 90% relative compaction.

Attention is directed to "Material Containing Aerially Deposited Lead," of these special provisions regarding the handling and disposal of soil containing aerially deposited lead.

PLACEMENT

Landscape fabric shall be placed as shown on the detail. Landscape fabric shall be placed loosely with longitudinal and transverse joints overlapped 200 mm. Following placement, the fabric shall lie flat, smooth and be in uniform contact with the soil surface, without bulges or wrinkles. Fabric shall be stabled or staked in place to keep fabric in place during placement and compaction. of concrete weed barrier.

Minor concrete weed barrier shall be placed by hand methods to the lines and grades as shown on the plans. A vibratory screed device shall be utilized for compaction. Weed barrier shall be placed to produce a neat and uniform placement as specified in the plans and these special provisions.

Minor concrete (weed barrier) shall have a depth of 50 mm.

Weed barrier leave-out areas (located at guardrail posts) shall be filled with grout to the depth shown on the plans. Grout shall be spread by trowel, flowing into and completely filling all voids.

When work is complete, the finished weed barrier surface shall be smooth and uniform; maintaining planned flow lines, slope gradient and contours of the project site.

When work is complete, the finished weed barrier surface shall not impede drainage along or across it.

MEASUREMENT

Minor concrete (weed barrier) will be measured by the cubic meter computed from measurements of actual areas placed and the theoretical thickness shown on the plans. Minor concrete (weed barrier) placed outside the dimensions shown on the plans will not be paid for.

PAYMENT

The contract price paid per cubic meter for minor concrete (weed barrier) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in minor concrete (weed barrier), including landscape fabric, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.55 CHAIN LINK WALK GATE

Chain link walk gates shall be Type CL-1.8 conforming to the provisions in Section 80, "Fences," of the Standard Specifications and these special provisions.

Gates shall be installed in existing fences at the locations shown on the plans. Gate installations shall be complete with gate post, latch post, concrete footings, braces, truss rods, and hardware. Gate and latch posts shall be braced to the next existing line post as shown on the plans.

At each gate location, an existing line post shall be removed and the new gate installed so that the gate is centered on the post hole of the removed post. Holes resulting from the removal of line posts shall be backfilled.

Gate mounting and latching hardware shall not contain open-end slots for the fastening bolts.

Chain link fabric for gates shall be of the same mesh size as the existing fence in which the gates are installed.

Openings made in existing fences for installation of gates shall be closed during the working day in which the openings are made and when work is not in progress. Temporary closures shall be made with the existing fence fabric or with additional 1.83-m chain link fabric as directed by the Engineer.

Full compensation for making the openings in existing fences, for temporary closing of the openings (including removal of the existing fence and 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 1.2-m chain link gate (Type CL-1.8) and no additional compensation will be allowed therefor.

10-1.56 MARKERS AND DELINEATORS

Markers (highway post marker and concrete barrier markers) and delineators (guard railing 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.

10-1.57 METAL BEAM GUARD RAILING AND THRIE BEAM BARRIER

Metal beam guard railing (single or double) and thrie beam barrier (single or double) shall be constructed in conformance with the provisions in Section 83-1, "Railings," of the Standard Specifications and these special provisions.

Single thrie beam barrier shall be constructed as shown on the plan and in conformance with the provisions in Section 83-2-02B of the Standard Specifications and these special provisions.

Posts of the single thrie beam barrier shall install laterally in line with the existing removed double thrie beam barrier posts to avoid damage of the existing pop-up underground air ducts system for the traffic control system. Damaged the existing pop-up underground air duct system shall repair at the Contractor's own expense.

Attention is directed to "Order of Work" of these special provisions.

Line posts shall be steel,. Blocks shall be wood .

ALTERNATIVE FLARED TERMINAL SYSTEM

Alternative flared terminal system shall be furnished and installed as shown on the plans and in conformance with these special provisions.

The allowable alternatives for a flared terminal system shall consist of one of the following or a Department approved equal.

(1) TERMINAL SYSTEM (TYPE FLEAT) - Terminal system (Type FLEAT) shall be a Flared Energy Absorbing Terminal 350 manufactured by Road Systems, Inc., located in Big Spring, Texas, and shall include items detailed for terminal system (Type FLEAT) shown on the plans. The Flared Energy Absorbing Terminal 350 can be obtained from the distributor, Universal Industrial Sales, P.O. Box 699, Pleasant Grove, UT 84062, Telephone (801) 785–0505 or from the distributor, Gregory Highway Products, 4100 13th Street, S.W., Canton, OH 44708, Telephone (330) 477–4800.

(2) TERMINAL SYSTEM (TYPE SRT) - Terminal system (Type SRT) shall be an SRT-350 Slotted Rail Terminal (8-post system) as manufactured by Trinity Industries, Inc., and shall include items detailed for terminal system (Type SRT) shown on the plans. The SRT-350 Slotted Rail Terminal (8-post system) can be obtained from the manufacturer, Trinity Industries, Inc., P.O. Box 99, 950 West 400S, Centerville, UT 84014, Telephone (800) 772–7976.

The Contractor shall provide the Engineer with a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance shall certify that the terminal systems furnished conform to the contract plans and specifications, conform to the prequalified design and material requirements, and were manufactured in conformance with the approved quality control program.

Terminal systems shall be installed in conformance with the manufacturer's installation instructions and these requirements. Each terminal system installed shall be identified by painting the type of terminal system in neat black letters and figures 60 mm high on the backside of the rail element between system posts numbers 4 and 5.

For terminal system (Type SRT), the steel foundation tubes with soil plates attached shall be, at the Contractor's option, either driven, with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 100 mm thick and each layer shall be moistened and thoroughly compacted. The wood terminal posts shall be inserted into the steel foundation tubes by hand and shall not be driven. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 65°C or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

For terminal system (Type FLEAT), the soil tubes shall be, at the Contractor's option, driven with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 100 mm thick and each layer shall be moistened and thoroughly compacted. Wood posts shall be inserted into the steel foundation tubes by hand. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 65°C or less. The edges of the wood posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

Surplus excavated material remaining after the terminal system has been installed shall be disposed of in a uniform manner along the adjacent roadway where designated by the Engineer.

The contract unit price paid for alternative flared terminal system shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing alternative flared terminal system, complete in place, including excavation, backfill and disposal of surplus material, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.58 CONCRETE BARRIER

Concrete barriers shall conform to the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

The Contractor's attention is directed to the provisions in paragraph 4 of Section 83-2.01, "Description," of the Standard Specifications regarding closure of any gap between the reinstalled barrier and the barrier being installed. Barrier or railing placed to close the gap in accordance with these provisions will not be measured and paid for.

The provisions of the third paragraph in Section 83-2.02D(4), "Finishing," of the Standard Specifications shall not apply.

Concrete barrier markers shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. At those locations shown on the plans, concrete barrier markers shall be cemented to the barrier in conformance with the manufacturer's recommendations.

10-1.59 CRASH CUSHION (REACT)

Crash cushion (REACT) shall be furnished and installed as shown on the plans and in conformance with the provisions in the Standard Specifications and these special provisions.

Crash cushion (REACT) shall be a multiple recoverable type, manufactured by Energy Absorption Systems, Inc. Crash cushion (REACT) and additional components shall conform to the descriptions as follows:

Contract Item Description	Manufacturer's Product Description
Crash Cushion (REACT 9SCBS)	REACT 350.9 Self Contained

The successful bidder can obtain from the following distributors the crash cushion (REACT) manufactured by Energy Absorption Systems, Inc., A Quixote Company, at One East Wacker Drive, Suite 3000, Chicago, IL 60601:

A. Southern California: Traffic Control Service, Inc., 1818 E. Orangethorpe, Fullerton, CA 92831-5324, telephone (800) 222-8274, FAX (714) 526-9561
B. Northern California: Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, telephone (800) 884-8274, FAX (916) 387-9734

The price quoted by the manufacturer for Crash Cushion (REACT 9SCBS), FOB Pell City, Alabama is $33,691, not including sales tax.

The above prices will be firm for orders placed within 30 days of contract award, and provided delivery is accepted within 90 days after the order is placed.

The price quoted for crash cushion (REACT 9SCBS) includes the concrete anchorage devices, but does not include the concrete anchor slab or the W-Beam connection to the barrier.

Crash cushion shall be installed in conformance with the manufacturer's recommendations.

Concrete anchorage devices used for attaching the crash cushion to the base slab shall be limited to those which have been provided by the manufacturer.

The concrete anchor slab and backup block shall conform to the provisions in Section 51, "Concrete Structures," and Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

For crash cushion (REACT 9SCBS), W-Beam connections to the barrier shall conform to the provisions in Section 83-1, "Railings," of the Standard Specifications. The high strength bolts and nuts for W-Beam connections to the barrier shall conform to the requirements in ASTM Designation: A 325/A 325M and A 563/A 563M, respectively.

The Contractor shall furnish the Engineer one copy of the manufacturer's plan and parts list for each model installed.

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 crash cushion conforms with the contract plans and specifications, and conforms to the prequalified design and material requirements.

Crash cushion will be measured by the unit as determined from actual count in place in the completed work.

The contract unit prices paid for crash cushion (REACT 9SCBS) shall include full compensation for furnishing all labor, materials (including anchor bolts, nuts, washers, and marker panels), tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing the crash cushions, complete in place, including structure excavation, structure backfill, concrete anchor slab with bar reinforcing steel, transition plate and W-beam connector, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.60 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.

Thermoplastic material shall be free of lead and chromium, and shall conform to the requirements in State Specification PTH-02ALKYD.

Retroreflectivity of the thermoplastic traffic stripes and pavement markings shall conform to the requirements in ASTM Designation: D 6359-99. White thermoplastic traffic stripes and pavement markings shall have a minimum initial retroreflectivity of 250 $mcd \cdot m^{-2} \cdot lx^{-1}$. Yellow thermoplastic traffic stripes and pavement markings shall have a minimum initial retroreflectivity of 150 $mcd \cdot m^{-2} \cdot lx^{-1}$.

Where striping joins existing striping, as shown on the plans, the Contractor shall begin and end the transition from the existing striping pattern into or from the new striping pattern a sufficient distance to ensure continuity of the striping pattern.

Thermoplastic traffic stripes shall be applied at the minimum thickness and application rate as specified below. The minimum application rate is based on a solid stripe of 100 mm in width.

Minimum StripeThickness (mm)	Minimum Application Rate (kg/m)
2.0	0.4

Thermoplastic traffic stripes and pavement markings shall be free of runs, bubbles, craters, drag marks, stretch marks, and debris.

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.

10-1.61 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.

Traffic stripe and pavement marking paint shall conform to the requirements in State Specification No. PTWB-01.

The color of the painted traffic stripes and pavement markings shall conform to the requirements in ASTM Designation: D 6628-01.

Retroreflectivity of the paint traffic stripes and pavement markings shall conform to the requirements in ASTM Designation: D 6359-99. White painted traffic stripes and pavement markings shall have a minimum initial retroreflectivity of 250 $mcd \cdot m^{-2} \cdot lx^{-1}$. Yellow painted traffic stripes and pavement markings shall have a minimum initial retroreflectivity of 150 $mcd \cdot m^{-2} \cdot lx^{-1}$.

10-1.62 PAVEMENT MARKERS

Pavement markers shall be placed in conformance with the provisions in Section 85, "Pavement Markers," of the Standard Specifications and these special provisions.

Attention is directed to "Traffic Control System For Lane Closure" of these special provisions regarding the use of moving lane closures during placement of pavement markers with bituminous adhesive.

The Contractor shall furnish the Engineer certificates of compliance for the pavement markers in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

Retroreflective pavement markers shall be marked as abrasion resistant on the body of the markers.

SECTION 10-2 HIGHWAY IRRIGATION SYSTEMS

10-2.01 GENERAL

The work performed in connection with highway 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.

COST BREAK-DOWN

The Contractor shall furnish the Engineer a cost break-down for the contract lump sum item of irrigation system. The cost break-down table shall be submitted to the Engineer for approval within 15 working days after the contract has been approved. The cost break-down table will be approved, in writing, by the Engineer before any partial payment will be made for the item of irrigation system.

Attention is directed to "Time-Related Overhead" of these special provisions regarding compensation for time-related overhead.

The cost break-down shall be completed and furnished in the format shown in the sample of the cost break-down included in this section. Line item descriptions of work shown in the samples are the minimum to be submitted. Additional line item descriptions of work may be designated by the Contractor. If the Contractor elects to designate additional line item descriptions of work, the quantity, value and amount for those line items shall be completed in the same manner as for the line item descriptions shown in the samples. The line items and quantities given in the sample are to show the manner of preparing the cost break-down to be furnished by the Contractor.

The Contractor shall determine the quantities required to complete the work shown on the plans. The quantities and their values shall be included in the cost break-down submitted to the Engineer for approval. The Contractor shall be responsible for the accuracy of the quantities and values used in the cost break-down submitted for approval.

The sum of the amounts for the line items of work listed in the cost break-down table for irrigation system work shall be equal to the contract lump sum price bid for the work. Overhead and profit, except for time-related overhead, shall be included in each individual line item of work listed in the cost break-down table.

No adjustment in compensation will be made in the contract lump sum price paid for irrigation system due to differences between the quantities shown in the cost break-down table furnished by the Contractor and the quantities required to complete the work as shown on the plans and as specified in these special provisions.

Individual line item values in the approved cost break-down table will be used to determine partial payments during the progress of the work and as the basis for calculating an adjustment in compensation for the contract lump sum item of irrigation system due to changes in line items of work ordered by the Engineer. When the total value of ordered changes to line items of work increases or decreases the lump sum price bid for irrigation system by more than 25 percent, the adjustment in compensation will be determined in the same manner specified for increases and decreases in the total pay quantity of an item of work in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications.

IRRIGATION SYSTEM COST BREAK-DOWN

Contract No. 04-269604

UNIT DESCRIPTION	UNIT	APPROXIMATE QUANTITY	VALUE	AMOUNT
25MM PLASTIC PIPE (SUPPLY LINE)	M	40		
CHECK TEST AND RELOCATE IRRIGATION FACILITIES	LS	LUMP SUM		
BACKFLOW PREVENTER ASSEMBLY ENCLOSURE	EA	1		
50 MM BACKFLOW PREVENTER ASSEMBLY	EA	1		

TOTAL _____

10-2.02 EXISTING HIGHWAY PLANTING

In addition to the provisions in Section 20, "Erosion Control and Highway Planting," of the Standard Specifications, work performed in connection with existing highway planting shall conform to the provisions in Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

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 operationsn.

A written list of existing irrigation system deficiencies shall be submitted to the Engineer within 5 working days after checking the existing facilities.

Deficiencies found during checking of the existing facilities shall be corrected as directed by the Engineer. Corrective work ordered by the Engineer will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

Length of watering cycles for use of potable water from water meters for checking or testing existing irrigation facilities shall be as determined by the Engineer.

Additional repairs required for the existing irrigation system as ordered by the Engineer, except as otherwise provided for in "Existing Highway Irrigation Facilities" of these special provisions, will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

RELOCATE EXISTING IRRIGATION FACILITIES

Relocate existing irrigation facilities shall consist of relocating existing sprinklers, and other facilities specified in these special provisions.

Relocate existing sprinklers shall consist of relocating existing sprinklers, risers, riser supports, check valves, and concrete. The existing sprinkler heads that are affected by the construction of the new maintenance vehicle pullout located adjacent to westbound of AN Line at approximately station 142+80 shall be relocated. Relocated sprinklers and new plastic pipe (supply line) shall be installed along the outside perimeter of the new maintenance vehicle pullout to provide irrigation for the existing planted area.

For the contractor's reference, the existing controller for the existing irrigation facilities impacted is located on the west side of the ramp from Laurel Drive to westbound Route 24.

The existing water meter is located on the east side of Oak Hill Road, south of Route 24.

Existing irrigation facilities, to be relocated, that are, in the opinion of the Engineer, unsuitable for the purpose intended, shall be replaced in conformance with the provisions in Section 15-2.05, "Reconstruction," of the Standard Specifications.

After irrigation facilities have been relocated, the Contractor shall demonstrate that the relocated facilities function properly in the presence of the Engineer.

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:

Diquat
Glyphosate
Isoxaben (Preemergent)
Oxadiazon - 50 percent WP (Preemergent)
Oryzalin (Preemergent)
Trifluralin (Preemergent)
Glyphosate shall be used to kill stolon type weeds.

Oxadiazon shall be of the emulsifiable concentration or wettable powder type, except when Oxadiazon is used under mulch in conformance with these special provisions.

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.

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.

Method A pressure testing shall conform to the provisions in Section 20-5.03H(1), "Method A", of the Standard Specifications, except leaks that develop in the tested portion of the system shall be located and repaired after each test period when a drop of more than 35 kPa is indicated by the pressure gage. After the leaks have been repaired, the one hour pressure test shall be repeated and additional repairs made until the drop in pressure is 35 kPa or less.

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 less than 100 mm in diameter shall have solvent cemented type joints. Primers shall be used on the solvent cemented type joints.

A nonhardening joint compound shall be used in place of the pipe thread sealant tape conforming to the provisions in Section 20-5.03E, "Pipe," of the Standard Specifications. Joint compounds shall be applied in conformance with the manufacturer's recommendations.

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.

The Contractor shall make the arrangements and pay the costs and fees required by the serving utility.

The East Bay Municipal Utility District has established a fee of $150,000 for furnishing and installing a water meter. If, at the time of installation, 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 installed. The Contractor shall furnish the Engineer with a copy of the invoice for the installation fee.

The quantity of water meters will be measured by the unit as determined from actual count in place.

The contract unit price paid for water meter shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing water meters, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

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.

Backflow preventers shall have current approval from the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research (USC Foundation).

Before backflow preventer assembly installation, the Contractor shall provide the Engineer with the portion of the USC Foundation "List of Approved Backflow Prevention Assemblies" showing type of assembly, manufacturer's name, model number, edition of the manual under which the assembly was approved, approval date and the last renewal date.

The "List of Approved Backflow Prevention Assemblies" is available to Foundation Members. Membership information to join the USC Foundation is available at:

http://www.usc.edu/dept/fccchr/membership.html

Questions concerning the USC Foundation "List of Approved Backflow Prevention Assemblies" can be answered by calling the Foundation at toll free (866) 545-6340.

Pressure loss through the backflow preventers shall not exceed the following:

BACKFLOW PREVENTER SIZE (millimeters)	FLOW RATE (Liters per minute)	PRESSURE LOSS (kPa)
50	606	58

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 dark green.

When backflow preventer assembly enclosures are specified, the portland cement concrete pads for the enclosures will be paid for in conformance to the provisions in "Backflow Preventer Assembly Enclosures" of these special provisions.

BACKFLOW PREVENTER ASSEMBLY ENCLOSURE

Enclosures shall be fabricated of structural steel angles and flattened expanded metal and shall be installed over backflow preventer assemblies on a portland cement concrete pad as shown on the plans and in conformance with these special provisions.

Expanded metal for sides, ends and top panels shall be fabricated from 1.9 mm (14-gage), minimum thickness, sheet steel. The flattened expanded metal openings shall be approximately 20 mm by 45 mm in size.

Expanded metal panels shall be attached to the steel frames by a series of welds, not less than 6.4 mm in length and spaced not more than 100 mm on centers, along the edges of the enclosure.

Padlocks will be State-furnished in accordance with "State-furnished Materials" of these special provisions.

Enclosures shall be galvanized, after fabrication, in conformance with the provisions in Section 75-1.05, "Galvanizing," of the Standard Specifications.

Concrete for the concrete pad shall conform to Section 90-10, "Minor Concrete," of the Standard Specifications.

Hold down bolt assemblies shall be galvanized and shall be installed when the portland cement concrete pad is still plastic. Nuts shall be hexagonal and washers shall be the lock type.

Enclosures shall be painted with one application of a commercial quality pre-treatment, vinyl wash primer and a minimum of one application of a commercial quality, exterior enamel for metal. The finish color shall be dark green.

The minimum clearance between the backflow preventer assembly and the backflow preventer assembly enclosure shall be 50 mm.

Full compensation for furnishing and installing backflow preventer assembly enclosures and constructing the portland cement concrete pads for the enclosures shall be considered as included in the contract lump sum price for irrigation systemand no separate payment will be made therefor.

TESTING NEW BACKFLOW PREVENTERS

New backflow preventers 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 and before operation of the irrigation systems.

SECTION 10-3. SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

10-3.01 DESCRIPTION

Modifying traffic signals, lighting, highway advisory radio system, and traffic operations system shall conform to the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and these special provisions.

Traffic operations system shall consist of:

1. Extinguishable message sign system.
2. Traffic monitoring station.

Unless shown otherwise, locations of cabinets, standards, foundations, lighting fixtures, conduits, pull boxes, appurtenances and other similar electrical equipment are approximate and may be changed to suit field conditions or as directed by the Engineer.

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 allowed for lane closures listed or specified in "Maintaining Traffic" of these special provisions.

10-3.04 FOUNDATIONS

Reinforced cast-in-drilled-hole concrete pile foundations for lighting standards shall conform to the provisions in "Piling" of these special provisions.

Sleeve nuts shall be used on Type 1-B standard. Foundations for Type 1-B standards shall conform to the details on Standard Plan ES-7B, "Anchor Bolts With Sleeve Nuts", except that the bottom of the base plate shall be flush with the finished grade.

10-3.05 STANDARDS, STEEL PEDESTALS, AND POSTS

Standards shall conform to the provisions in Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, "Steel Structures" of these special provisions, and the following requirements.

Steel bolts not designated on the plans as high-strength (HS) or stainless steel shall be for general applications and shall conform to the requirements in ASTM Designation: A 307.

Handhole reinforcement rings for standards shall be continuous around the handholes.

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.

10-3.06 FIBERGLASS HIGHWAY ADVISORY RADIO POLES

Highway advisory radio (HAR) poles shall be fiberglass-reinforced plastic (FRP) poles conforming to these special provisions.

Fiberglass-reinforced plastic pole standards shall consist of round, fiberglass-reinforced plastic poles and bases. Fiberglass-reinforced plastic poles shall be hollow, tapered or with tapered sections, non-conductive and chemically inert.

Fiberglass-reinforced plastic pole standards shall conform to the details shown on the plans and shall conform to the requirements in "Standard Specifications for Structural Supports for Signs, Luminaires, and Traffic Signals" published by AASHTO, and ANSI Standard: C136.20, "Fiberglass-Reinforced Plastic (FRP) Lighting Poles."

For standards not specified or shown as "Breakaway" type, fiberglass-reinforced plastic pole standards shall not have the machined groove inside the anchor base casting as shown in the "Aluminum Anchor Base Elevation" detail shown on the plans.

The poles shall withstand the bending strength test load shown in the following table. The poles shall withstand this load with the handhole in compression. The poles shall not exceed a maximum deflection of 13 percent of the length of the pole above the ground line when subjected to the deflection test load shown in the following table:

TEST LOAD TABLE

Standard Type	Bending Strength Test Load	Deflection Test Load
Type 21F, Type 21F (Breakaway)	2562 N	1708 N

Test loads shall be applied in conformance with the requirements in Section 12, "Pole Deflection Measurements," of ANSI Standard: C 136.20. Poles shall be loaded 300 mm below the tip.

Fiberglass-reinforced plastic pole standards shall be the anchor base type unless otherwise designated.

The manufacturer of fiberglass-reinforced plastic pole standards shall have an approved testing and quality control program on file at the Transportation Laboratory prior to fabricating pole standards for this contract.

The Engineer shall be provided 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 shall certify that the pole standards conform to the requirements in the specifications and were manufactured in conformance with the approved testing and quality control program. The certificate shall also include the date of the certificate, reference job number, manufacturer product catalog number, pole type number, dates of manufacture and the signature of the manufacturer's management person responsible for the testing and quality control program.

CONSTRUCTION

Poles shall be constructed from ultraviolet-resistant resin which shall be pigmented light gray and be of uniform color throughout the entire body of the pole. The finish of poles shall be smooth.

Each pole shall have 3 handholes and handhole covers. The cover over the handhole nearest the base shall bear the name of the manufacturer. The handhole covers shall be securely attached to the pole with tamper-resistant hardware. The handholes shall be located as shown in the plans.

The base shall be bonded to the pole with a suitable adhesive and coated with an aliphatic-type acrylic-modified polyurethane finish. For new installations, adapter plates shall not be used to attach the pole standards to the foundation.

Each pole standard shall be provided with a removable aluminum or galvanized steel pole top cap.

Each pole standard shall have an identification plate conforming to the provisions in Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications. The identification plate shall show the pole standard type, manufacturer's name, manufacturer's part number and the year of fabrication. If the fiberglass-reinforced plastic pole standard is a breakaway type, the identification plate shall include the word "BREAKAWAY." The plate shall be located either on the anchor base or just above the base handhole.

EXTERIOR PROTECTION

An aliphatic-type acrylic-modified polyurethane coating shall be applied to the exterior of the fiberglass pole. The coating shall be semi-gloss, highly weather resistant and light gray in color matching the color of the resin and shall have a minimum 0.075-mm dry film thickness. A one liter can of the coating matching the poles shall be supplied with each order of poles. The polyurethane coating shall be tested for adhesion to the pole surface in conformance with the requirements in ASTM Designation: D 3359, Method A, and shall have a scale rating of 5A. The adhesion testing shall be conducted before and after the accelerated weathering evaluation.

The finished surface of the poles shall withstand a minimum of 2500 hours of accelerated weathering when tested in conformance with the requirements in ASTM Designation: G 53. Lamps shall be UV-B (313 nm wavelength). The testing cycle shall be 4 hours ultraviolet (UV) exposure at 60°C, then 4 hours condensate exposure at 40°C.

After testing, the finished surface of the poles shall exhibit the following:

Fiber exposure	None
Crazing	None
Checking	None
Chalking	Very slight
Change in color	May dull slightly
Paint adhesion	5A scale rating, per ASTM Designation: D 3359, Method A using Permacel 99 tape.

PACKAGING

Each pole shall be spiral wrapped in its entirety with a weatherproof wrap for protection during shipping and storage.

10-3.07 SLIP BASE INSERTS

Slip base inserts, for installation between the lighting standards and the foundations, shall conform to the details shown on the plans.

The bottom slip base plate shall be welded to the bottom anchor plate before installation. The top slip base plate shall be drilled and tapped to accept the threaded studs as shown on the plans. The studs shall not be welded to the top slip base plate. The pitch diameter of the threaded holes shall conform to the requirements in ANSI Standard: B1.1, having a Class 2B tolerance. Threaded studs installed in the top slip base plate shall match the holes in the base of the lighting standard.

The optional cast steel plate shall conform to the provisions in Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications.

The combined bottom anchor plate and bottom slip base plate shall be bolted to the foundation. The top slip base plate, without the lighting standard attached, shall be bolted to the bottom slip base plate. Each high-strength bolt shall be torqued to 200 ± 10 N·m. After assembly of the insert, the lighting standard shall be erected and installed on the top slip base plate. During installation the lighting standard shall be properly supported to maintain proper alignment of the insert.

High strength bolts, nuts and flat washers used to connect slip base inserts shall conform to the requirements in ASTM Designation: A 325.

10-3.08 CONDUIT

Conduit to be installed underground shall be Type 1 or Type 3 unless otherwise specified. Detector termination conduits shall be Type 3.

The conduit in a foundation and between a foundation and the nearest pull box shall be Type 1.

Conduit sizes shown on the plans and specified in the Standard Specifications and these special provisions are referenced to metallic type conduit. When rigid non-metallic conduit is required or allowed, the nominal equivalent industry size shall be used as shown in the following table:

Size Designation for Metallic Type Conduit	Equivalent Size for Rigid Non-metallic Conduit
21	20
27	25
41	40
53	50
63	65
78	75
103	100

When Type 3 conduit is placed in a trench (not in pavement or under portland cement concrete sidewalk), after the bedding material is placed and the conduit is installed, the trench shall be backfilled with commercial quality concrete, containing not less than 250 kg of portland cement per cubic meter, to not less than 100 mm above the conduit before additional backfill material is placed.

Conduit runs shown on the plans to be located behind curbs may be installed in the street, within 0.9-m of, and parallel with the face of the curb, by the "Trenching in Pavement Method" in conformance with the provisions in Section 86-2.05C, "Installation," of the Standard Specifications. Pull boxes shall be located behind the curb or at the locations shown on the plans.

After conductors have been installed, the ends of conduits terminating in pull boxes, service equipment enclosures, and controller cabinets shall be sealed with an approved type of sealing compound.

At locations where conduit is required to be installed under pavement and if a delay to vehicles will not exceed 5 minutes, conduit may be installed by the "Trenching in Pavement Method."

At the option of the Contractor, the final 0.6-m of conduit entering a pull box in a reinforced concrete structure may be Type 4.

Where 6 or more conduits of metric trade Size 78 enter a No. 6 pull box, the conduits shall enter at an angle not greater than 45-degrees from the horizontal.

10-3.09 PULL BOXES

Grout shall not be placed in the bottom of new or existing pull boxes.

10-3.10 CABLES, CONDUCTORS AND WIRING

Splices shall be insulated by "Method B".

The minimum insulation thickness, at any point, for Type USE, RHH or RHW wire shall be 1.0 mm for conductor sizes No. 14 to No. 10, inclusive, and 1.3 mm for No. 8 to No. 2, inclusive. The minimum insulation thickness, at any point, for Type THW and TW wires shall be 0.69 mm for conductor sizes No. 14 to No. 10, inclusive, 1.02 mm for No. 8, and 1.37 mm for No. 6 to No. 2, inclusive.

10-3.11 TELEPHONE CABLE

The telephone cable (TC) shall consist of 6 pairs of No. 19 solid copper conductors. Conductors shall be twisted in pairs. Each conductor shall be insulated with a high molecular weight, heat stabilized, color coded polyethylene material. The insulation shall be 440 µm nominal.

Color code for TC cable shall be as follows:

1. White/Blue
2. White/Orange
3. White/Green
4. White/Brown
5. White/Gray
6. Red/Blue

The core shall be protected by a non-hygroscopic polyester film with a single longitudinally applied 120 µm thick corrugated copper shield (or 190 µm thick plastic coated aluminum shield). A moisture barrier of petrolatum-polyethylene compound shall be applied over the core tape and over and under the cable shield to fill all cable interstices.

The cable shall be provided with an outer jacket of extruded, black, high molecular weight, heat stabilized polyethylene material. The outer jacket shall have a thickness of 1.5 mm nominal. The outer diameter of the cable shall be 15.25 mm maximum.

Splices will not be allowed, except where shown on the plans.

All conductors shall be terminated inside the telephone demarcation cabinet and the controller cabinet as shown on the plans. All connections from the TBO terminal block to the 8-position connecting block shall be via a cable consisting of 2 pairs of No. 22 solid conductors and shall meet the same specifications as the TC cable.

10-3.12 BONDING AND GROUNDING

Bonding and grounding shall conform to the provisions in Section 86-2.10, "Bonding and Grounding," of the Standard Specifications and these special provisions.

Bonding jumpers in standards with handholes and traffic pull box lid covers shall be attached by a UL listed lug using 4.5-mm diameter or larger brass or bronze bolts and shall run to the conduit or bonding wire in the adjacent pull box. The grounding jumper shall be visible after the standard has been installed and the mortar pad and cap have been placed on the foundation.

Standards without handholes shall have bonding accomplished by jumpers attached to UL listed ground clamps on each anchor bolt.

For slip base standards or slip base inserts, bonding shall be accomplished by jumpers attached to UL listed ground clamps on each anchor bolt, or a UL listed lug attached to the bottom slip base plate with a 4.5-mm diameter or larger brass or bronze bolt.

Equipment bonding and grounding conductors are required in conduits, except when the conduits contain combinations of loop lead-in cable, fiber optic cable, or signal interconnect cable. A No. 8 minimum, bare copper wire shall run continuously in circuits, except for series lighting circuits, where No. 6 bare copper wire shall run continuously. The bonding wire size shall be increased to match the circuit breaker size in conformance with the Code, or shall be as shown on the plans. Conduits to be installed for future conductors, may omit the copper wire.

Bonding of metallic conduits in metal pull boxes shall be by means of bonding bushings and bonding jumpers connected to the bonding wire running in the conduit system.

10-3.13 SERVICE

Type III service equipment enclosures shall be the aluminum type.

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

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 10 000 A, rms.

The neutral conductor shall run from the service equipment enclosure to the controller cabinet without splicing to any other neutral conductor.

The clearance between the bottom of the lowest circuit breaker and the bottom of the service equipment enclosure for a Type III-A series shall be 600 mm minimum.

Installation of a barrier type terminal block in service equipment enclosures is not required.

10-3.14 NUMBERING ELECTRICAL EQUIPMENT

The placement of numbers on electrical equipment will be done by others.

10-3.15 STATE-FURNISHED CONTROLLER ASSEMBLIES

The Model 170 controller assemblies with 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 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.

The Contractor shall furnish and install one rackmount surge power strip with a switch in each Model 334 controller cabinet. The power strip shall be plugged into the non-GFCI duplex outlet normally labeled with "Controller Unit Recp." in the back of the PDA unit. The power strip shall be mounted at the top of the standard EIA-310 rack cage and across the two vertical back rails with four stainless steel EIA mounting screws, two on each side. The power strip shall not hinder the accessibility to the back of all existing electrical equipment. All power cords for permanently field installed electrical equipment shall be plugged into the power strip.

The power strip, at a minimum, shall meet the following requirements:

1. It shall have a maximum rating of 15 A, 120 V(ac), 60 Hz.
2. It shall have a surge protection with UL 1449 Clamping Level of 400 V, an IEEE Let-Through Voltage rating of less than 336 V, a single -pulse energy rating of 210 J and EMI/RFI noise protection rating of 40 dB.
3. It shall be 46 mm (H) x 483 mm (W) x 70 mm (D) maximum and shall not weigh more than 2.0 kg.
4. The front plate of the power strip shall have four cut-off EIA mounting screw holes, two on each side.
5. It shall have six rear outlets with 38 mm minimum apart center to center. The power cord shall enter from the rear with a length of 2 meters minimum. The clearance between the power cord entrance and the nearest outlet shall be 90 mm minimum.
6. It shall have a 15 A circuit breaker and an internally illuminated switch to cut off power to all outlets. Both the circuit breaker and the switch shall be front mounted.

10-3.16 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.

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

At the Contractor's option, where a Type A or a Type B loop is designated on the plans, a Type E loop may be substituted. Substitution is not allowed at locations where a Type D and Type A loops are designated on the plans in a single lane.

For Type E detector loops, sides of the slot shall be vertical and the minimum radius of the slot entering and leaving the circular part of the loop shall be 40 mm. Slot width shall be a maximum of 20 mm. Loop wire for circular loops shall be Type 2. Slots of circular loops shall be filled with elastomeric sealant or 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.

Where one traffic signal detector consists of a sequence of 4 loops in a single lane , the front loop closest to the limit line or crosswalk shall be located 0.3 m from the line. All 4 loops in each lane shall be connected in series.

The Contractor shall provide two reports per location on the status of each detector loop replacement showing continuity and insulation resistance readings. The reports shall be submitted to the Engineer, one before starting work and the other after work has been completed at each location.

10-3.17 PHOTOELECTRIC CONTROLS

Contactors shall be the mercury type.

10-3.18 EXTINGUISHABLE MESSAGE SIGN (LED)

Each extinguishable message sign (EMS) shall use the technologies of Light Emitting Diodes (LED) in clusters (pixels), the clusters forming a module, and the module forming legends in nominal 250 mm size letters. The LED messages shall automatically adjust its light output by means of one or more photosensors installed in the housing. All EMSs may be controlled from the same photosensor. The light output shall be proportional to the ambient light (more light / more output and less light / less output). There shall be at least three (3) adjustable levels of luminance: 100 percent, 30 percent and other levels between 30 percent and 100 percent. The signs shall have a 30 percent luminance manual control per the plans.

The dimensions of the EMS panel shall be 2440 mm in length, 1210 mm in height and shall not exceed more than 200 mm in width.

CONSTRUCTION

The sign shall be constructed so that a clear front face panel shall be contained within an extruded aluminum frame.

As an option, the signs engineering specifications may allow a 6mm minimum transparent anti-glare polycarbonate or hardened acrylic front face panel. The extruded aluminum frame shall be hinged to allow access to the interior of the sign and have fully welded seams with a high gloss textured black finish powder coat paint meeting the color standards of Federal specifications 595b, 17038. A 9.5mm nominal black anodized aluminum hex cell louver having 95 percent open area and providing 60 degree shielding shall be installed between the lamp cluster and the front face panel to enhance resistance to sun phantom. The louvers shall be secured in front of the module with captive type retainers.

The sign shall be gasketed with a closed cell neoprene gasket making the sign rain tight. Stainless steel latches shall provide for quick access to the interior of the sign. The sign shall be provided with devices to retain the face panel in a fully open mode assisting the servicing of the sign. All exterior hardware shall be of stainless steel or cadmium plated materials.

The sign shall be vented on the bottom and shall be provided with an interior temperature controlled ventilation fan. Additional ventilation shall be provided such as to ensure the interior of the housing remains below 55 degrees centigrade without compromising the rain tight integrity. All vents shall have an insect screen installed.

The LED sign cluster shall utilize Aluminum Indium Gallium Phosphide (AlInGaP), and shall be the ultra bright type rated for 100,000 hours of continuous operation from –37°C to +74°C. The individual LED's shall be wired such that a catastrophic failure of one LED will result in the loss of not more than one third of a pixel.

LED sign clusters shall be rated for a minimum useful life of 48 months and shall maintain not less than 85 percent of the standard light output values found below in Photometric Requirements section. The LED sign clusters shall be UV stabilized.

Each letter module shall be comprised of multiple pixels in a 5w x 7h configuration. Each pixel shall consist of at least 12 high intensity LEDs. Each pixel shall be 590nM nominal amber in color having an initial nominal luminous intensity of 9.5 cd on the maximum setting. Each module shall consume no more than 16 watts. Each pixel shall be removable or replaceable on the module without the use of any tools other than a screwdriver, and each module shall be removable from the housing in the same way, thus making the sign fully serviceable.

All LEDs shall be soldered in place, and the LED leads shall not be shortened or a removal device installed. All LED's shall be from the same manufacturer and same color bin.

OPERATION

The unit shall be turned ON and OFF by means of 120V(ac), 60 Hz inputs. The LED messages shall be steadily lit when activated. The sign shall be provided with internal power supplies and dimming capability to fully operate the sign. The unit power factor shall be greater than 90 percent, and current total harmonic distortion shall be less than 25 percent.

LED extinguishable message sign shall operate from a 60Hz +/- 3Hz AC line over a voltage ranging from 80 to 135 volts. The LED circuitry shall prevent perceptible flicker over the voltage range specified. The line voltage fluctuations shall show no visible effect on the luminous intensity of the LED sign. Rated voltage for all measurements shall be 120 volts AC.

The sign on-board circuitry shall include voltage surge protection to withstand high repetition noise transient as stated in section 2.1.6 of NEMA Standard TS-2, 1992.

LED sign and associated on-board circuitry must meet Federal Communications Commission (FCC) Title 47, SubPart B, Section 15 regulations concerning the emission of electronic noise.

PHOTOMETRIC REQUIREMENTS

The LED extinguishable message sign cluster shall meet at least 85 percent of the minimum intensity requirements while operating throughout the operating range of –37°C to +74°C.

The minimum initial luminous intensity values for LED sign cluster shall be 650 cd/m^2 at 25°C. Each sign cluster shall have a viewing angle of 30 degrees.

The measured chromatic coordinates of the LED sign cluster shall conform to the chromaticity requirements of section 5.3.2.1. and Figure C of the Equipment and Materials Standards of the Institute of Transportation Engineers (ITE Publication No. ST-017A).

TERMINAL BLOCKS

Terminal blocks shall be installed in the interior bottom of the sign housing with sufficient number of terminals to accommodate all of the wiring. All wiring shall be bundled, wrapped, and labeled.

DOCUMENTATION

All documents shall be submitted to the engineer for approval before ordering or fabrication of any equipment. Complete shop drawings shall be provided and shall include mechanical, electrical, and physical drawings.

The following operating characteristics shall be identified: Rated Voltage, Power Consumption, Amperes and volt-ampere. Each LED sign shall have the manufacturers name, trademark, and other necessary identification permanently marked on the side of sign. Each individual LED sign shall be identified with a serial number for warranty purposes.

GUARANTEE

The manufacturer shall provide a Certificate of Conformance to this standard and shall replace or repair any sign that exhibits a failure due to workmanship or material defects within 12 months of delivering the sign to the State. Further, the manufacturer shall replace or repair any sign which exhibits light degradation greater than 50 percent within the first 36 months of delivery, or if more than 20 percent of the LEDs fail during that period.

10-3.19 EXTINGUISHABLE MESSAGE SIGN RADIO CONTROLLER ASSEMBLY

Each extinguishable message sign (EMS) radio controller assembly shall consist of an AM radio receiver unit with antenna and a DTMF decoder unit completely wired as a stand alone assembly.

Radio receiver unit shall conform to the following specifications:

Frequency range	530-1710 kHz
Modulation type	AM
IF rejection	60 dB
Image rejection	60 dB
Selectivity	60 dB
Signal-to-noise (S/N) ratio	50 dB
Usable sensitivity	20 μV (20 dB S/N)
Power source	12 V(dc) Negative Ground
Tone control effects	10 to 22 dB at 10 kHz
Speaker output impedance	4 or 8 Ω
Output power	8W (4 W per channel)

DTMF decoder unit shall consist of a MT8870 DTMF Decoder integrated circuit (IC). The audio signal is coupled to MT8870 with a capacitor-resistor network. The capacitor-resistor network will provide DC blocking and input biasing to the MT8870. The MT8870 DTMF Decoder shall decode all 16 DTMF tones and shall compensate for "twist." (Each tone is made up of one higher frequency tone and one lower frequency tone. "Twist" on radio link is caused by the fact that the higher frequencies travel through the air at a different speed than the lower frequencies).

The MT8870 Decoder gives a binary output on pins 11, 12, 13, and 14. The output is stored in a non-volatile Electrically Erasable Programmable Read Only Memory (EEPROM). The output relay shall have a nominal rating of 20 A at 120 V(ac) per output contact.

DTMF shall have the following codes:

Low Frequency (Hz)	High Frequency (Hz)	Digit
697	1209	1
697	1336	2
697	1477	3
770	1209	4
770	1336	5
770	1477	6
852	1209	7
852	1336	8
852	1477	9
941	1336	0
941	1209	*
941	1477	#
697	1633	A
770	1633	B
852	1633	C
941	1633	D

Front Panel

The front panel of the EMS radio controller assembly shall have the following controls, display, battery tray, and output jack:

a. A "STORE" push button switch which shall be used to teach the DTMF Decoder the code that will be used to energize the output relay.
b. A "STOP" push button switch which shall be used to manually de-energize the output relay.
c. A manual/automatic control switch which activates output relay ON/OFF while in manual mode, and tone remote control in automatic mode.
d. A audio level control nub.
e. A frequency selection nub.
f. A LED display panel which shall always display AM radio frequency in a minimum of four digits.
g. A 9 V battery tray which holds one 9 V battery to maintain the radio receiver frequency selection during a power outage.
h. An audio output jack which is used to monitor the radio reception and DTMF tone storage.

Rear Panel

The rear panel of the EMS radio controller assembly shall provide antenna connection, power connection, and a fuse holder with a 2 A fuse.

Physical Requirements

The assembly shall not exceed 49 mm x 176 mm x 134 mm in size and shall not weight more than 1.5 kg.

Environmental Requirements

The assembly shall operate over a temperature range from -37°C to +74°C, with up to 95 percent relative humidity.

10-3.20 CAMERA UNIT

Each camera unit shall consist of a camera, lens, environmental housing and camera unit cable assembly. The camera, lens and environmental housing, combined, shall not weigh more than 6.8 kg. Each camera unit shall be interchangeable with the existing camera units already installed on various traffic operations system (TOS) projects without changes or adjustments to either the system or the camera unit.

Each camera unit shall be assembled, inspected, and tested in accordance with these special provisions prior to delivery to the job site. Installation, operations and maintenance manuals shall also be submitted at the time of delivery.

Applicable Documents - The following documents of the U.S. Military Specification (MIL-SPEC), Underwriters' Laboratory, Inc. (UL), Electronics Industries Association (EIA) Standards, and other Standards form parts of the specification to the extent specified in these standards. In the event of a conflict between the content of this section and the content of the specification, the standards defined in this section shall supersede.

Military Specification Documents	
MIL-I-45208A	Inspection System Requirements, Dec. 16, 1963
MIL-C-45662	Calibration System Requirements, June 10, 1980
MIL-STD-416A	Electromagnetic Interface Characteristics Requirements for Equipment, Subsystems & Systems, Aug. 1, 1968
MIL-E-5400T	Electronic Equipment, Airborne General Specification
MIL-STD-810	Environmental Test Methods, 19 July 1983
MIL-C-5541	Chemical Conversion Coatings on Aluminum Alloys, June 3, 1970

Underwriters' Laboratory, Inc. and other documents	
UL-796	Printed Circuit Boards
EIA-170A	Electrical Performance Standards Color Television Studio Facilities
EIA RS-330	Electrical Performance Standards for Closed Circuit Television (CCTV) Camera 525/60 Interlaced

CAMERA

Approved Camera - The cameras listed below have been approved by the Engineer. Further information such as the source of the cameras can be provided upon demand. Any camera submitted by the Contractor that is not one of the approved cameras listed below shall be stringently compared to the specifications set forth in these special provisions before it is approved by the Engineer.

Approved Cameras:

Cohu 8240
Sony SSC-C374
Burle/Philips TC293C-Z0P2X596

1. **General**

a. Each camera shall be self-contained and designed for continuous unattended 24-hour operation.
b. Camera performance shall meet or exceed EIA-170A standards.
c. Each camera shall have automatic sensitivity and black level control so that it operates without further adjustment when illumination ranges from the minimum specified herein to that of full daylight.
d. Each active electronic device within the camera shall be solid-state.
e. Each camera shall have a switch selectable electronic shutter. The shutter speed shall range from 1/60 of a second (off) to 1/10,000 of a second in 8 steps. The control of the electronic shutter rate shall be accessible through a side panel opening. Remote on/off control of the shutter shall be accomplished via an output connector on the rear of the environmental housing.

2. **Light sensitivity**

At a scene with 50 percent light reflectivity and with light level on the scene measured to be 10 lux and greater, each camera with its 10:1 zoom lens shall generate a picture on the monitor specified in these special provisions which resolves all 10 shades of gray on the EIA Television Test Chart. Not every camera shall be required to resolve the same gray scale when the light level on the same scene is measured to be less than one lux.

3. **Electrical Power**

Each camera shall operate when the applied voltage is between 95 to 130 V(ac), 60 Hz ±0.3 Hz, single phase. The power consumption of camera shall not exceed 10 W. All camera circuitry shall be powered by a regulated, over-voltage protected DC power supply contained in the camera.

4. **Synchronization**

a. Each camera shall generate synchronization signals by means of a single integrated circuit.
b. Each camera shall operate with the internal EIA-170A crystal as the sync reference source with the field rate of 59.94 Hz.
c. Each camera shall have the capability of synchronizing to an external input source.
d. The synchronization signal at the video output shall conform to EIA-170A.

5. **Scanning**

Each camera's mode of scanning shall be two-to-one interlaced at 525 lines, 60 fields per second, as specified by EIA-170A.

6. **Video Processing**

a. The video output level shall be maintained to within 3 dB for changes in scene brightness of 0.17 to 109 600 cd/m^2 using a motorized iris lens having a transmission range of F/1.2 to F/1200.
b. Each camera shall have a black-level control system.
c. Each camera shall have an automatic white (color) balance control to maintain proper color rendition by automatically referencing to white areas of the scene. Manual control of the white balance shall be accessible through side panel or remotely controlled via the rear connector on the environmental enclosure.
d. Automatic gain control (AGC). The switch selectable fixed gain response shall maintain the output video level to 90 percent video when the light level on the image sensor falls too low to maintain full video output. The video out will be maintained at 90 percent peak-average setting to optimize video output under varying lighting conditions. The controls for the on/off and peak average adjustments shall be accessible through the side panel of the camera.
e. One 75 Ω (±1 percent) source-terminated, single-ended video output jack shall be provided.
f. An adjustable white clipper shall be provided to limit highlight brightness.
g. The video output level shall be 1.0 V peak-to-peak composite (0.7 V video, 0.3 V sync) signal, polarity black negative, across a 75 Ω load impedance.
h. The minimum signal-to-noise ratio shall be 50 dB at 25°C.

7. **Imager**

a. Each camera shall be designed to use a 12.7 or 16.9 mm format solid-state, color, interline transfer charged-coupled device (CCD) imager.b. The imager shall have a minimum resolution of 768 horizontal by 493 vertical active picture elements.c. When provided with 6.89 lux of highlight illumination on the environmental housing window, the camera shall provide the following resolution with AGC off:

   i. Horizontal center resolution shall be 460 TV lines minimum.
   ii. Vertical resolution shall be 350 TV lines minimum in the center and all corners simultaneously.

8. **Mechanical**

a. All camera circuitry shall be on a printed circuit board which shall be removable and replaceable using no more than common hand tools.
b. Test points and adjustment identifications shall be etched or silk-screened on the boards.
c. Each camera shall be self-supporting and operable when removed from the environmental housing and shall have a lens adapter ring which accommodates a standard 16 mm C-mount. A back focal distance adjustment shall be provided.
d. Each camera shall utilize the rigidity of the environmental housing for strength against shock and vibration.

9. **Environmental Operation**

a. Each camera within its environmental housing shall withstand the following requirements:

   i. Operate over an ambient temperature range on -10°C to +50°C with the use of heaters.
   ii. Peak random vibration of 5 g from 60 to 1000 Hz, with camera in operation.
   iii. Shock up to 15 g in all axes under non-operating conditions.

iv. Exposure to sand, dust, fungus, and salt atmosphere as per MIL-E-5400T paragraphs 3.2.24.7, 3.2.24.8, 3.2.24.9, and 3.2.24.10.
v. Up to 100 percent relative humidity as per MIL-E-5400T, paragraph 3.2.24.2.

10. **Picture Quality**

a. The quality of the picture shall be such that most objects in low light levels can be distinguished without excess interference from undesirable picture attributes.b. Undesirable picture attributes include blooming, transfer smear, vertical register shifting.

LENS

1. **General**

a. Each lens shall be fully compatible with the camera provided.b. Each lens shall have a maximum aperture of no less than F/1.2, and a minimum range of F/1.2 to F/1200.c. Each lens shall be a 16 mm C-mount.d. Each lens shall have a minimum zoom range of 10 to 1. The lens focal length for a 16.9-mm CCD camera shall be shall be 10-100 mm, 10.5-105 mm or 11-110 mm. The lens focal length for a 12.7 mm CCD camera shall be shall be 8-80 mm. A 1.5-X extender shall be included with the lens.e. Each lens shall be equipped with a motorized zoom and focus control.f. Each lens shall have an automatic, motor-driven iris with manual override. The iris shall be controlled directly through the camera in automatic mode and from the camera control unit in the manual mode. The automatic iris shall provide continuous aperture adjustments of the lens as determined by the amount of light reaching the camera imager. The power supply and electronics for iris motor shall be contained within the environmental housing.g. Each lens shall be fitted with an intra-spot neutral density filter.h. Each lens must be able to respond to the following inputs from camera control unit (CCU) for lens control:

Focus near	+9.0VDC @ 100 mA
Focus far	-9.0VDC @ 100 mA
Zoom in	+9.0VDC @ 100 mA
Zoom out	-9.0VDC @ 100 mA
Iris closed	+9.0VDC @ 100 mA
Iris open	-9.0VDC @ 100 mA

i. The travel time for the upper limit stop to the lower limit stop for zoom and focus shall be from 5 seconds minimum to 10 seconds maximum.j. Each lens shall have the capability of at least 10 pre-positioning positions.

2. **Environmental Operation**

a. Each lens within its pressurized environmental enclosure shall withstand the following requirements:

i. Operate over an ambient temperature range on -10°C to +50°C with the use of heaters.
ii. Peak random vibration of 5 g from 60 to 1000 Hz, with lens in operation.
iii. Shock up to 15 g in all axes under non-operating conditions.
iv. Exposure to sand, dust, fungus, and salt atmosphere as per MIL-E-5400T paragraphs 3.2.24.7, 3.2.24.8, 3.2.24.9, and 3.2.24.10.
v. Up to 100 percent relative humidity as per MIL-E-5400T, paragraph 2.24.2.

ENVIRONMENTAL HOUSING

1. **General**

a. Each camera and lens shall be mounted in a sealed, cylindrical, environmental housing which shall not exceed 165 mm in diameter and 560 mm in length.b. The housing shall be fabricated of seamless aluminum tubing Type 6061-T6 and shall be finished with heat reflecting, weather resisting enamel. The rear plate shall be fabricated of Type 6061-T6 aluminum.c. The front of the housing shall be closed with a clear optically flat glass or Lexan window.d. The housing shall include a sun shroud which shall be strapped to the housing bindings in such a manner as to minimize heat conduction by maintaining air space between shroud and housing. The shroud shall shield the entire top portion of the housing from the sun, and shall extend a minimum of 76 mm in front of the housing's glass plate.e. The housing shall not interfere with the widest viewing angle of the lens.f. The housing shall include a thermostatically controlled heating pad rated at 115 V(ac), 100 W maximum.g. The backplate, which is an integral part of the housing, shall have a nameplate attached bearing the manufacturer's camera assembly model number and serial number.h. Camera connector.

i. The camera connector shall be designed to MIL-C-28462 Series 1 specifications with solder contacts. It shall be PT-07C-20-39 P, the male counterpart to PT-06A-20-39 S SR.
ii. The connector shall be made of the same shell material and pin arrangement as the PT-06A-20-39 S SR connector on the end of the wiring harness.
iii. The pinout of the connector shall be as shown on the plans.
iv. Each camera connector shall be mounted on the rear plate with an airtight connection and a watertight seal for each conductor on its connecting cable.

i. Each camera shall be designed for operating with the housing purged of air and filled with dry nitrogen to 35 kPa.j. Valves -

i. The housing shall have two valves, both on the rear end plate of the housing.
ii. One valve shall be a standard Schrader valve. It shall have a tube running from the valve to the front end of the housing.
iii. The other valve shall be an air escape/pressure relief valve preset to 140 kPa.
iv. The two valves shall be arranged such that filling with dry nitrogen from the Schrader valve will force gas to flow from front end of the housing to the rear end and vent through the air escape valve.
v. The leakage rate with both valves closed and the housing pressurized to 70 kPa, shall leak less than 7 kPa per year, and less than 0.7 kPa per month.

k. The enclosure shall be factory pressurized to 35 kPa with dry nitrogen.l. The notation "CAUTION PRESSURIZED" shall be printed on the rear plate of the enclosed.m. A safety pressure release bolt shall be incorporated such that the enclosure may not be opened without first releasing the internal pressure.n. A low-pressure (LP) sensor with related circuitry shall be provided to send an LP alarm (dry contact closure) via the camera connector. The LP sensor threshold shall be preset to activate the LP alarm at 14 kPa.o. Two units of desiccant shall be placed inside the housing but will not obstruct the camera view or operation.p. A humidity level indicator strip with discrete indications for 10, 20 and 30 percent humidity, shall be installed inside the housing in a position that allows inspection, while facing directly, through the window without obstructing the view of the camera at the widest viewing angle of the lens.

2. **Mounting Base**

a. A mounting base shall surround the enclosure to provide a tamper-resistant attachment of the environmental housing to the pan/tilt unit and securely hold the housing in either an upright or inverted position. The combined height of camera housing and mounting base shall be less than 254 mm. The mounting base attachment shall be as shown on the plans.
b. All fasteners and nuts used in attaching the mounting base to the environmental housing shall be of grade 18-8 stainless steel.
c. Each camera unit shall be provided with three stainless steel hex head bolts to secure the camera unit to the pan/tilt unit.

CAMERA UNIT CABLE ASSEMBLY

1. **General**

Each camera unit cable assembly shall consist of box mounting socket connector and a wiring harness.

2. **Box Mounting Socket Connector**

a. Each box mounting socket connector shall be MS-3102E-28-21S-F80.
b. One full set of crimp contacts shall be provided with each box mounting socket connector.
c. The pinout of the connector shall be as shown on the plans.

3. **Wiring Harness**

a. The camera unit cable assembly wiring harness shall be 3 m long and shall be COHU AC27E or other cable approved by the Engineer. The coaxial cables' impedance shall be 75 Ω. One end of each wiring harness shall be type PT06A-20-39S (SR) and shall mate with the camera connector. It shall have a 90-degree end bell, Bendix 10-25997-203 or equal, for strain relief. The end bell shall be positioned such that the opening is 180 degrees from the main key on the connector. The other end of each wiring harness shall be type MS-3106E-28-21P and shall mate with the box mounting socket connector.
b. All connectors shall be potted with an appropriate potting compound for environmental sealing.
c. All connectors' pinout shall be as shown on the plans.

10-3.21 PAN/TILT UNIT

General

a. Each pan/tilt unit, with camera unit attached, shall pan 355 degrees minimum in either direction, and tilt 60 degrees minimum from horizontal position to either up or down positions.
b. Each pan/tilt unit shall be capable of minimum ten preset positions for each pan and tilt operation.

Electrical

a. Each pan/tilt unit shall operate with input voltage of 115 V(ac), 60 Hz ±0.3 Hz.
b. Each pan/tilt unit shall not exceed 200 W power consumption.
c. The motors shall be impedance overload protected, two phase induction type, rated for continuous duty and shall be instantaneous reversing.
d. The limit switches shall be rated 5 A, 10 million cycles and with external adjustments.
e. Each pan/tilt unit shall be provided with box-mounting type connector.
f. One mating connector with full set of crimp contacts and strain relief shall be provided with the box-mounting connector.

Mechanical

a. The maximum load shall be 45 kg at 127 mm from tilt table to center of gravity in both upright and inverted position.
b. Each pan/tilt unit shall have maximum dimensions of 400 mm high, 355 mm wide and 230 mm deep.
c. Each pan/tilt unit shall not exceed the maximum weight of 27 kg.
d. Each pan/tilt unit shall be constructed in aluminum casting and plate. All internal parts shall be corrosion protected.
e. Each pan/tilt shall have textured semi-gloss beige enamel finish.
f. All bearings shall be heavy duty ball or roller bearing.
g. All gears shall be hardened steel.
h. All gasket seals shall be designed for all weather protection.
i. Each pan/tilt unit shall have a mounting hole pattern as shown on the plans.
j. Each pan/tilt unit shall have a minimum pan torque rating of 34 N·m and an instantaneous minimum tilt torque of 68 N·m.
k. The pan speed at no load shall be 6 to 8 degrees per second, nominal.
l. The tilt speed at no load shall be 3 to 4 degrees per second, nominal.

Environmental

a. Ambient operating temperature shall be from -10°C to 50°C.
b. It shall be able to withstand vibration of 760 µm total excursion from 5 to 30 Hz and a peak random vibration of 5 g from 30 to 1000 Hz.
c. It shall be able to withstand shock up to 15 g in all axes under non-operating conditions, conforming to MIL-E-5400R, Para. 3.2.24.6.
d. It shall be able to operate in atmospheres up to 95 percent relative humidity, conforming to MIL-E-5400R, Para 3.2.24.4.
e. It shall be able to withstand exposure to sand, dust, fungus, and salt atmosphere, conforming to MIL-E-5400R, Para 3.2.24.7, 3.2.24.8 and 3.2.24.9.

Pan and tilt unit mounting

The nuts and bolts securing the pan and tilt unit to the camera platform shall be hex head and made of stainless steel. Before each bolt is fastened, a locking type coating shall be applied to the threads. The coating shall lock the bolts and nuts in place making it impossible to turn bolt or nut without tools. This coating shall last and be effective through at least 10 insertions and withdrawals of the bolt or nut.

10-3.22 HIGHWAY ADVISORY RADIO SYSTEM

Highway advisory radio (HAR) equipment will be State-furnished as provided under "Materials" of these special provisions. The Contractor shall install the HAR system, including the State-furnished HAR equipment, and the following equipment, specified elsewhere in these special provisions, as described herein and as shown on the plans:

1. One HAR grounding system.
2. One fiberglass HAR pole.
3. One HAR arrestor enclosure.

4. One HAR antenna coaxial cable (ACC).
5. One HAR antenna feeding cable (AFC).
6. Coaxial cable connectors for type ACC and AFC.

GROUNDING SYSTEM

The grounding system shall consist of single ground rod system as specified in these special provisions and as shown on the plans. All hardware and connectors required to connect the grounding system to the HAR equipment shall be included. The grounding system shall allow the maximum Federal Communications Commission (FCC) approved field strength to be achieved on any frequency from 530 kHz to 1710 kHz with 10 W or less of output power.

SINGLE GROUND ROD SYSTEM

The single ground rod system shall consist of a 12 m ground rod placed in a 150 mm, minimum, vertically drilled hole. The hole shall be backfilled with bentonite slurry.

The ground rod shall be a UL listed ground electrode designed for the purpose. The Contractor shall provide the Engineer a certificate of compliance from the manufacturer in accordance with the provisions of Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for the ground rod and bentonite backfill material. The certificate of compliance shall be provided to the Engineer for approval, prior to ordering or shipping the material.

The ground rod shall be a nominal 54 mm outside diameter hollow tube of Type K copper, with nominal 2.11 mm wall thickness, 12 m in length. A rod formed from two 6 meter sections and joined with an outside threaded copper coupler will be acceptable. The top end of the rod shall have a shop welded ground connection with a 4/0 gauge, minimum, copper pigtail. The ends of the rod shall have press-on end caps.

The breather and weep holes on the top and bottom of the rod, as shown on the plans, shall be protected with tape until the installation of the rod. The Contractor shall remove the tapes and provide them to the Engineer before installation.

The drilled hole shall be backfilled with 100 percent bentonite clay slurry and consolidated around the rod. The bentonite slurry shall be placed in the presence of the Engineer. Two working days notice shall be provided to the Engineer prior to backfilling.

The bentonite backfill material shall be a natural volcanic, non-corrosive form of bentonite clay grout. The backfill material shall be capable of absorbing 50 liters of water per 22.78 kg to obtain an optimal 30 percent solids density. The pH value shall be between 8 to 10 with maximum resistivity of 3 Ω-cm at 30 percent solids density.

The ground rod shall be connected to a surge arrestor ground lug. The ground wire splice to the pigtail shall be made by a UL listed exothermic (Cadweld, or similar) connection method. Soldering, brazing, or field welding will not be acceptable.

The ground rod shall be filled with non-hazardous Calsolyte to enhance grounding performance. The filler shall hygroscopically extract moisture from the air to activate the electrolytic process, improving ground performance. The ground rod system shall be 100 percent self activating and maintenance free. No additions of chemicals or water solutions shall be required.

PROTECTIVE PULL BOX

The protective pull box shall be made of reinforced concrete with lift holes and a vented cast iron grate cover to permit air circulation into the "breather" holes of the ground rod(s).

ARRESTOR ENCLOSURE

The arrestor enclosure shall be a NEMA Type 3R with hinged cover, with dimensions of 380 mm x 300 mm x 150 mm, and shall have provisions for padlocking. A 100 mm x 100 mm x 3 mm aluminum plate shall be installed vertically, facing the door, in the enclosure. The Contractor shall terminate the ground conductor with an aluminum-copper NEMA one-bolt hold tongue. The ground conductor and lightning arrestor shall be mounted on the aluminum plate.

ANTENNA COAXIAL CABLE (ACC)

Type ACC shall consist of an RG-8/U single foil single braid flexible coaxial cable with a solid bare copper center conductor, Cellular Polyethelene dielectric, 97 percent tinned copper braid, and 100 percent shield coverage and shall conform to the following requirements:

Electrical Characteristics	
Capacitance	75 pF/m (nominal)
Impedance	50 Ω (nominal)
Velocity of propagation	78% (nominal)
DC loop resistance	0.004 Ω/m (nominal) @ 20° C.

Attenuation at 20° C.	
Frequency (MHz)	Nominal dB/100 m
10.0	0.016
50.0	0.039
100.0	0.052
200.0	0.079

Physical Dimensions	
	Nominal O.D. (mm)
Center conductor	2.62
Dielectric	7.24
Outer jacket	10.29

ANTENNA FEEDING CABLE (AFC)

The AFC shall consist of a No. 12 AWG solid copper conductor. The AFC shall have a length necessary to connect the lighting arrestor and the antenna without causing stress to the cable and shall be terminated with a UG plug and a reducing adapter as specified elsewhere in these special provisions.

After installing the AFC between the arrestor enclosure and the antenna, the Contractor shall seal the 40 mm nipple near the top of the fiberglass pole.

COAXIAL CABLE CONNECTORS (FOR TYPE ACC AND AFC)

Coaxial cable connectors for attaching type ACC and AFC including the reducing adapter shall be UG Standard and meet the following requirements:

Electrical Characteristics	
Impedance:	50 Ω (nominal)
Frequency range:	0 to 300 MHz
Voltage rating:	500 V peak

Mechanical	
Mating:	Standard size: 5/4- 24 threaded coupling. Push-on mates with any standard size threaded receptacle
Method of attachment:	Clamp and crimp.
Composition:	Bodies- Brass or die cast zinc Contacts- brass, silver plated Insulators- TFC, copolymer of styrene, polystyrene, mica-filled phenolic and/or, PBT polester or equal Plating- ASTRO plate and silver Other metal parts- Brass

Environmental	
Temperature	-55°C to +165°C.
Moisture	Weather resistant design.

HAR SYSTEM INSTALLATION

The Contractor shall provide a crew with experience installing RF systems similar to the HAR and any work on the transmitter (adjustments) must be performed by, or under the immediate supervision of a person holding a general class radio telephone operators license.

GROUNDING SYSTEM TESTING

The Contractor shall take certified measurements before and after the installation of the grounding system.

The testing shall utilize an earth resistance meter and be conducted in accordance with IEEE Standard 3-point fall of potential method.

The Contractor provide all test equipment, take and document resistivity measurements on the grounding system as shown on the plans and these special provisions and submit them to the Engineer for approval.

CABLE TESTING

The ACC shall be tested by the Contractor. Any cable found to have faults shall be replaced. The testing shall utilize a time domain reflectormeter.

For the purpose of these special provisions, a fault in a length of cable is defined as any of the following:

1. A return loss measurement indicating that there is a short in the cable.
2. A return loss measurement indicating a cut or open circuit in the cable.
3. A visual inspection which reveals exposure or damage to the cable shielding.

HAR SYSTEM TESTING

After the completion of all work under "HAR SYSTEM INSTALLATION," each system shall be tested by the Contractor.

Minimum test equipment required for the testing shall consist of:

1. Dummy load, 50 Ω.
2. Power meter.
3. Communications monitor.
4. Field strength meter.

The Contractor shall tune the HAR system with the impedance matching network of the coupling unit and by adjusting the stainless steel tip of the antenna.

The HAR system shall be considered tuned when the system's voltage standing wave ratio (VSWR) is at a lowest possible value as directed by the Engineer.

After the system has been tuned, the Contractor shall record and transmit a test message with the output power level of the transmitter set at approximate 10 W or lower. Modulation shall be adjusted between 85 to 95 percent as specified by the FCC for the standard AM broadcast band.

The Contractor shall make actual on-the-air field strength measurements. A sufficient number of points must be selected to determine the distance at which the attenuated field of 2 mV/m exists, as measured with a calibrated standard field strength meter. This may be done in a 5 to 8 radial directions facilitating a plot of a 2 mV/m at a distance of 1.5 km from the antenna. If the measured field exceeds 2 mV/m at a distance of 1.5 km, the transmitter output power must be decreased accordingly and if the measured field is less than 2 mV/m at the same distance then the power may be increased as directed by the Engineer.

At the completion of all HAR system testing as specified in these special provisions, the Contractor shall submit a written report of all measurements to the Engineer for approval. The report shall include a map showing a 2 mV/m contour based on the actual on-the-air field strength measurements. The VSWR, percent modulation and transmitter output power measurements shall be tabulated.

PAYMENT

The contract unit price paid for the HAR System shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the highway advisory radio system, complete in place, including testing and manuals, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-3.23 GENERAL PACKET RADIO SYSTEM WIRELESS MODEM ASSEMBLY

The General Packet Radio System (GPRS) Wireless Modem Assembly shall be configured with the following major components:

A. Modem
B. Power supply
C. Modem mounting bracket and hardware
D. Serial communication cable
E. Antenna

MODEM

All modems shall be configurable remotely through the wireless network and through the modem serial port. The contractor shall configure all modems prior to acceptance. The contractor shall provide the Engineer with the modem serial and SIM numbers 30 days prior to requiring the PDP context. The Engineer will make available the PDP context comprising the IP (assigned) and APN (obtained from service provider) and configuration parameters (if different from those listed below) after the serial and SIM numbers are provided to the Engineer by the Contractor. All modems shall be complete with all cables, conductors, hardware, antenna and other equipment as required to make the system completely operational. Location and mounting of the equipment shall be directed by the Engineer and details shown on the plans. The modems shall be fully compliant with PCCA STD-101.

Environmental Requirements

The operating temperature range of the modem shall range from -30°C to +70°C, with humidity from 5 percent to 95 percent (non-condensing) and have transmissions at 10 percent duty cycle above 60°C.

Physical Characteristics

The modem shall weigh less than 1 kg and shall have overall dimensions of less than 180 mm × 90 mm × 30 mm. The housing shall be constructed of anodized aluminum.

The modem shall have the following status indicators:

1. Power (on).
2. Channel acquired.
3. Link status.
4. Network registration.
5. Received signal strength indicator.
6. Transmit and receive data.
7. Block errors.

Operational Parameters

The modem shall operate in a dynamic IP addressing environment of GPRS Networks at 1900/850 MHz and meet the following operational parameters:

Transmit power at antenna port	1.0 W for 1900 MHz 0.8 W for 850 MHz
Transmit frequency	1850-1910 MHz and 824-849 MHz
Receiver frequency	1930-1990 MHz and 869-894 MHz
Receiver sensitivity	-107 dBm (2.439 % bit error rate)
Input voltage	10 VDC to 28 VDC
Input current	40 mA to 200 mA

Application Interfaces

The modem shall have the following standard interfaces:

1. The AT command serial character stream uses TCP/IP.
2. Host communicates with modem using either UDP or TCP packet modes.
3. Computer terminal platform using Windows 98/2000/NT and Dial-Up Networking communicates with the modem using PPP.

Features

The modem shall have the following features:

1. 53.6 kbps raw data transfer rate minimum.
2. Full duplex transceiver.
3. 1900/850 MHz dual band networking.
4. Integrated TCP/IP protocol stack with UDP.
5. Security such to prevent unauthorized access.
6. Includes a DC power cable at least 1 meter in length with a connector compatible with the modem power connector.

7. Packet buffering and forwarding feature that provides discipline to the output of the serial port. The packet forwarding time interval shall be configurable from a rate of 0 (undisciplined) to 400ms in increments of 100ms or less.
8. Choice of "Friends Only" access mode.

Configuration parameters

The modem shall be configured with the following parameters (using the default AT command mode):

Command	Current value and Description
ADBGP=n(?)	n=0
AIP=n(?)	n=1: Allow any incoming IP to connect when UDP auto answer is enabled.
DAE=n(?)	n=0: Enable +++AT escape sequence detection.
E=n(?)	n=1: Toggle AT command echo On.
FM=n(?)	n=0: Disable Friends mode.
HOR=n(?)	n=0: No response codes when UDP session is initiated.
I0?	#####GPRS: Returns the product name.
I1?	###########: Returns firmware version, hardware ID, and copyright.
I2?	###########: Returns firmware version and relevant hardware ID.
I3?	##########: Returns the OEM Modem's unique ID.
MD=nn(?)	nn=00: normal (AT command) mode.
MVLEN=n(?)	n=0: Modbus-Variant length
MVMSK=nn(?)	nn=00:Modbus-Variant ID Mask
MVOFF=n(?)	n=0:Modbus-Variant offset
MVTYP=n(?)	n=0: Modbus –Variant Type
Q=n(?)	n=1: Quiet-mode On
RKEY=n(?)	n=0: Disable Transceiver Keying
S0=n(?)	n=1: On, TCP Auto Answer Mode
S7=nn(?)	nn=30: TCP Establishment Timeout in seconds
S23=<speed>,<databits>,<parity>, <stopbits>	9600,8,N,1: Serial line parameters are set
S50=n(?)	n=1: Data Forwarding Timeout in tenths of seconds
S51=n(?)	n=0: No Data Forwarding character
S53=d/[ppppp](?)	T/12345: Destination IP address, port and method
S60=n(?)	n=1: Telnet echo mode, Local echo(Default)
S82=n(?)	n=2: Enable UDP auto answer mode
S83=n(?)	n=10: UDP auto answer timeout in seconds
S110=d.d.d.d/[ppppp](?)	192.168.36.24/12345: IP address and port for GPRS modems
S211=n(?)	n=1: Ignore DTR.
S221=n(?)	n=1: Delay Connect Response in seconds.
TCPS=n(?)	n=0: TCP connection timeout in minutes.
TCPT=n(?)	n=6: TCP inactive timeout in minutes.

V=n(?)	n=1: Command Response Mode, Verbose(default)
&C=n(?)	n=1: Assert DCD when in a data mode.
&D=n(?)	n=0: Ignore DTR
&S=n(?)	n=1: Assert DSR when in a data mode.
*CTSE=n(?)	n=0: Clear To Send Enable, Disabled (default)
*DATE=[mm/dd/yyyy],[hh:mm:ss](?)	Sets the date and time, hours specified in 24-hours format.
*DATZ=n(?)	n=0: Normal Reset (default) on ATZ.
*DEVICEID=n(?)	Queries the 64-bit Device ID that is used by the modem to identify itself to the server.
*DNS1=d.d.d.d(?)	209.183.48.10: Sets the DNS addresses to be returned during the PPP negotiations.
*DNS2=d.d.d.d(?)	209.183.48.11: Sets the DNS addresses to be returned during the PPP negotiations.
*DPORT=n(?)	12345: Sets the modem's Device Port.
*DU=n(?)	n=0: dial command always uses UDP.
*ENQ=n(?)	n=0: Outputs an ENQ after the TCP CONNECT delay, Disabled (default).
*HOSTPRIVMODE=n(?)	n=0: public IP to be used when the Host initiates a PPP connection to the modem.
*HOSTPRIVIP=d.d.d.d(?)	0.0.0.0: private IP address if *HOSTPRIVMODE=1
*IPMANAGER1=d.d.d.d(?)	155.173.38.215: IP addresses to send IP change notifications to.
*IPMANAGER2=d.d.d.d(?)	155.173.38.210: Second IP address to send IP notifications to.
*IPMGRKEY1=[key](?)	0000000000: Sets the 128-bit key to use to authenticate the IP update notifications. If the key's value is all zeros, a default key will be used, with IPMANAGER1.
*IPMGRKEY2=[key](?)	0000000000: Sets the 128-bit key to use to authenticate the IP update notifications. If the key's value is all zeroes, default key will be used with IPMANAGER2.
*IPMGRUPDATE1=n(?)	xx: Sets the number of minutes to periodically send an IP update to IPMANAGER1.
*IPMGRUPDATE2=n(?)	xx: Sets the number of minutes to periodically send an IP update to IPMANAGER2.
*MODEMNAME=[name](?)	Name of the modem(up to 20 characters long) to use when performing IP change notices to IP Manager. This name should not be a fully qualified domain name, but simply the first portion.
*MSCIUPDADDR=[name/port](?)	Modem Status Update Address-where Name/Port is the domain name and port of the machine where the modem status updates will be sent.
*MSCIUPDPERIOD=n(?)	Modem status update period- where n is in minutes.
*NETCHAN?	Returns the current active channel number.
*NETIP?	Queries the current public(network) IP address of the modem. Note: This could be 0.0.0.0 if there is no current network IP.
*NETPHONE?	Queries the device's phone number, if applicable.
*NETPW=pw(?)	The password that is used to login to wireless network.
*NETRSSI?	Returns the current RSSI of the modem as a negative dBm value.

*NETSTATE?	Queries the current network state.
*NETUID=[uid](?)	The login that is used to login to the network, when required
*TPORT=ppppp(?)	Sets or queries the port used for the AT Telnet server. Valid values are 0-65535.
*UALL=n(?)	n=0: No(default).If there is no UDP session active, an incoming UDP packet will be treated according to the UDP auto answer and AIP settings.
*UDPLAST=n(?)	n=0. Does not change S53 setting.(default). If enabled, sets S53 to the last accepted IP address through UDP auto answer.

System Compliance

The modem and associated firmware, software, hardware, protocol, and other features shall be fully and completely compatible with the existing GPRS network currently in use. The existing GPRS network utilizes the AT&T Wireless (now Cingular) cellular system (band compatible with this modem), the AirLink Raven GPRS modem, and the AirLink Gateway. The Contractor shall demonstrate the compatibility to the Engineer by actual installation demonstration or by other means approved by the Engineer.

Installation

The installation of the modem shall be according to the plans, the manufacturer's instructions, and adjusted per field conditions with the Engineers approval.

Certificate of Compliance

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

Warranty

The manufacturer shall provide a written warranty against defects in materials and workmanship for modems for a period of 12 months after installation for parts and labor. Replacement modems shall be provided within 5 days after receipt of failed modem at no cost to the State, except the cost of shipping the failed modem. All warranty documentation shall be given to the Engineer prior to installation. Replacement modems shall be delivered to Caltrans Maintenance Electrical Shop at 30 Rickard Street, San Francisco, CA 94134.

The software warranty shall be for one (1) year, including upgrades and feature enhancements.

POWER SUPPLY

The power supply shall be vertically mountable on a 483-mm standard rack rail using two machine screws and two wing nuts. The power supply shall have provisions to attach the modem power cable securely without the need for modifying the modem power cable.

The power supply shall meet the following requirements:

Power Cord	Standard 120 V(ac), 3 prong cord, at least 1 meter in length (may be added by Contractor)
Type	Switching mode type
Power Rated	40 W minimum with no minimum load required
Operating Temperature Range	From -30°C to +70°C
Operating Humidity Range	From 5 percent to 95 percent non-condensing
Input Voltage	From 85 V (ac) to 264 V (ac) or 120 V (dç) to 370 V (dc)
Input Frequency	From 47 Hz to 63 Hz
Inrush Current	Cold start, 25 A at 115 V
Output Voltage	12 V (dc), adjustable over a ±10 percent range
Overload Protection	From 105 percent to 150 percent in output pulsing mode
Over Voltage Protection	From 115 percent to 135 percent of output voltage
Setup, Rise, Hold Up Time	800 ms, 50 ms,15 ms at 115 V (ac)
Withstand Voltage	I/P-0/P:3 kV, I/P-FG:1.5 kV, for 60 seconds
Working Temperature*	70°C@30%
Safety Standards	UL 1012, TUV EN60950
EMC Standards	EN55022 Class B, EN61000-4-2, 3, 4, 5 and EN61000-3-2, 3

- Note: A substitute may be proposed by the Contractor which meets the 70°C environmental rating at a lower load percentage as long as the temperature rating is maintained at the maximum modem load and all other electrical specifications are met.

Certificate of Compliance

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

Warranty

The manufacturer shall provide a written warranty against defects in materials and workmanship for power supplies for a period of 12 months after installation for parts and labor. Replacement power supplies shall be provided within 5 days after receipt of failed power supply at no cost to the State, except the cost of shipping the failed power supply. All warranty documentation shall be given to the Engineer prior to installation. Replacement power supplies shall be delivered to Caltrans Maintenance Electrical Shop at 30 Rickard Street, San Francisco, CA 94134.

MODEM MOUNTING BRACKET AND HARDWARE

The mounting bracket and hardware shall be stainless steel. The mounting bracket shall securely hold the modem in a vertical attitude with all cables and conductors installed. The mounting bracket shall contain the modem using a method that allows the removal of the modem without tools or without removing the bracket from its attachment to the cabinet frame.

D SERIAL COMMUNICATION CABLE

Where the modem is designed to interface with a Model 170E controller, the Contractor shall provide a communication cable known as the C2 cable. The C2 cable shall interface the Model 170E controller C2 connector and the GPRS modem and include all conductors and connectors required for that purpose. The GPRS modem connector shall meet EIA RS-232 standard using a DB-9 connector. The Model 170E controller end connector shall comply with AMP 201360-2-ND or equivalent. All pins in both connectors shall be gold plated. The cable shall have four No. 20 AWG conductors with (UL) Type CM shielded or AWM 2464 80C 300 Volts – C (UL) CMG. The cable shall be at least 1 meter long. The cable wiring shall comply with the following:

AMP 201360-2-ND -L to DB9-P - 2
AMP 201360-2-ND -K to DB9-P - 3
AMP 201360-2-ND -N to DB9-P - 5
AMP 201360-2-ND -D to AMP 201360-2-ND - H
AMP 201360-2-ND -J to AMP 201360-2-ND - M

ANTENNA

The antenna shall be the low profile disc type, and shall adhere to the cabinet using a factory installed double-sided waterproof acrylic foam adhesive. The coax cable shall be at least 1 meter in length and shall have a 50 Ω TNC connector on the modem end. In addition, the antenna shall meet the following requirements:

VSWR (at resonant point)	2:1 or less
Frequency	1850-1990 MHz and 824-894 MHz
Nominal Impedance	50 Ω
Gain	2 dB
Radiation Pattern	Omni-directional
Polarization	Vertical
Ground Plane Required	Yes, see note below

Ground plane requirements: The antenna shall require a reflective ground plane to function properly. The required ground plane shall extend beyond the antenna at least 20 cm in all directions.

10-3.24 SERVICE MANUAL REQUIREMENTS

The Contractor shall provide to the Engineer a minimum of ten copies of service manuals for the camera unit and pan/tilt unit under this special provisions. Each manual shall contain the following sections and sub-sections.

General information section

a. A list of applicable subassemblies that comprise the specified equipment.
b. Overall description of the equipment design features (including all enhance features if applicable), performance, and applications.
c. Equipment specifications summary.
d. Equipment installation instructions.

Theory of operations section

a. Theory of operation of the standard equipment, with unique or unusual circuitry described in detail.
b. Theory of operation reflecting any modifications to the standard equipment.

Maintenance section

a. Recommended test equipment and fixtures, or minimum operational and performance requirements for appropriate test equipment.
b. Trouble shooting information and charts.
c. Removal and installation procedures for replacing assemblies and subassemblies, if not obvious or if improper sequencing of steps may result in component damage.

Replacement parts section

a. Each manual shall contain an equipment replacement parts list including electrical parts, mechanical parts and assemblies.
b. All semiconductors shall be identified by the supplier's numbers and by JEDEC numbers if applicable.

Diagram section

a. Schematic diagrams(s) identifying all circuit components and showing normal test voltages and levels.
b. An overall functional block diagram.
c. Detailed interconnecting diagram(s) showing wiring between modules, circuit boards and major components.
d. Pictorial circuit board layout diagram(s) showing both component placement and printed wiring detail.
e. Diagram(s) showing location of circuit boards and other subassemblies.
f. Exploded view diagram(s) of complex mechanical assemblies.

Physical requirements

a. All pages, including latest revisions, shall be securely fastened together between protective covers (loose-leaf ring binding is acceptable).
b. No page shall be subject to fading from exposure to any normal source of ambient lighting (ozalid reproduced pages are not acceptable).

10-3.25 TRAFFIC OPERATIONS SYSTEM EQUIPMENT TESTING

Prior to shipping to the project, the Contractor shall submit the following items to the State of California, Department of Transportation Laboratory, 5900 Folsom Blvd., Sacramento, CA 95819 for acceptance testing:

1. Camera unit
2. Pan/tilt unit
3. Extinguishable Message Sign Panels

Approximately 30 days will be required for the testing. The Contractor will be notified upon completion of the testing and shall arrange for delivery of the equipment to a storage location designated by the Contractor. The costs of such testing and the transportation to and from the Laboratory shall be borne by the Contractor.

In addition to the above items, the Contractor shall submit all additional equipment listed elsewhere in these special provisions to the Laboratory for acceptance testing.

Approximately 30 days will be required for the testing. Additional equipment shall be accepted by the State and will not be returned to the Contractor upon satisfactory completion of testing.

10-3.26 REMOVING, REINSTALLING OR SALVAGING ELECTRICAL EQUIPMENT

Salvaged electrical materials shall be hauled to Caltrans Electrical Maintenance Station, 30 Rickard Street, San Francisco, CA 94134, (415) 330-6509 and stockpiled.

The Contractor shall provide the equipment, as necessary, to safely unload and stockpile the material. A minimum of 2 working days' notice shall be given prior to delivery.

10-3.27 PAYMENT

Full compensation for hauling and stockpiling electrical materials shall be considered as included in the contract price paid for the item requiring the material to be salvaged and no additional compensation will be allowed therefor.

The contract lump sum price paid for traffic operations system shall include full compensation for furnishing all labor, materials (except items covered by other bid items), tools, equipment, and incidentals, and for doing all the work involved in installing traffic operations system, complete in place, including all the foundations (except for the changeable message sign), poles, manuals and testing, 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 the additional equipment as specified in these special provisions shall be paid for under separate bid items.

The contract unit price paid for each of the following items shall include full compensation for furnishing all materials, tools, equipment, and incidentals, as shown on the plans, as specified in these special provisions, and as directed by the Engineer:

1. Camera unit.
2. Pan/tilt unit.
3. Extinguishable message sign radio controller assembly
4. Extinguishable message sign panel (LED)
5. Highway advisory radio system
6. General packet radio system (GPRS) wireless modem assembly

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 the provisions in 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 provisions of this Section 11-1 and with the requirements in California Test 125. Testing shall be performed using California Test Methods 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. The grade of asphalt binder shall be 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 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 the grade specified 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 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-µm sieve, including, but not limited to, lime, 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, including supplemental fine aggregate, 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-µm	15 - 18	600-µm	18 - 21
75-µm	3 - 7	75-µm	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-µm	20 - 25	600-µm	22 - 27
75-µm	3 - 7	75-µm	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-µm sieve shall be reported to the first decimal place (tenths).

The combined aggregate shall conform to the following quality requirements before 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.)		10%	
Loss at 500 Rev. (Max.)		45%	50%
Sand Equivalent (Min.)[1]	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, antistrip additives, 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 (per Engineer)	
		Type A	Type B	Type A	Type B
Hveem Stabilometer Value (Min)	366[1, 2]	37	35	37	35
Percent air voids (Mix Design)	367[1]	4[3]	4[3]	5[3]	5[3]
(3 briquettes at Mix Design)[4]		3 - 5	3 - 5	4 - 6	4 - 6
(Start-Up Production Evaluation)[5]		Design Value ±2.0			
Swell [4] (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. A set of 3 briquettes shall be prepared and tested separately. 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 and tested.
3. California Test 367, Paragraph C5, is modified to "4%" for Coast and Valley and "5%" for Desert. California Test 309 shall be used to determine the theoretical maximum specific gravity of each asphalt content in conformance with the requirements in "Determination of Theoretical Maximum Specific Gravity of Mixtures with Different Asphalt Contents" located at:

   http://www.dot.ca.gov/hq/esc/Translab/fpmlab.htm

4. Mix design submittal shall include test results for percent air voids for 3 briquettes constructed using the submitted aggregate and asphalt blended at the proposed target values. Result shall be average for the 3 briquettes.
5 For production evaluation of air voids, California Test 309 shall be used to measure theoretical maximum specific gravity instead of calculating maximum specific gravity in California Test 367. Determine the theoretical maximum specific gravity once for a single split sample. For bulk specific gravity, the reported value shall be the average of 3 tests from a single split sample.

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 ±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 the provisions in 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 target asphalt content of placed asphalt concrete (other than those allowed during the start-up evaluation process), in aggregate grading target values, or in aggregate sources 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. Adjustment to the control setting at the plant to achieve a target asphalt content in the field is allowed and shall not be considered as a change in the asphalt concrete mixture.

39-2.04 PAVEMENT REINFORCING FABRIC

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

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 7 days before 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 Independent 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.

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 and raw test data for aggregate quality and asphalt concrete mixture requirement; plots of the combined gradings showing the production tolerances; plots of unit mass, 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 supplemental fine aggregate:

1. Target values for percent passing each sieve size for the aggregate blend;
2. Results of quality tests for aggregate;
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; and
5. Gradation of each aggregate stockpile, cold feed or hot bin to be used.

B. Asphalt binder:

1. Asphalt binder source and target value;
2. Type and grade of binder; and
3. Material Safety Data Sheets.

C. Antistrip additives, when applicable:

1. 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 submittal items, including the mix design letter, test results, and plots, 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. The Engineer will have 7 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 submittal conforms to the requirements of this Section 11-1. If the Engineer fails to complete the review within the time allowed and if, in the opinion of the Engineer, the completion of work is delayed by reason of the failure to review, the Engineer will adjust payment and contract time in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

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 before 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 "Quality Control and Quality Assurance Manual for Asphalt Concrete Production and Placement," available at:

http://www.dot.ca.gov/hq/construc

Asphalt concrete production and placement shall not begin until the Engineer has approved the Quality Control Plan. 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 qualification if required, and their experience if no qualification is required. The Contractor shall maintain this list with current information. The Quality Control Plan 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 qualification 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 "Quality Control and Quality Assurance Manual for Asphalt Concrete Production and Placement"), 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 qualification 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 Representative, the testing consultant, or both. The proficiency of the testing consultant shall be reviewed and qualified in conformance with the requirements of the Department's Independent 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 the Engineer approves revisions to the Quality Control Plan or personnel.

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 "Quality Control and Quality Assurance Manual for Asphalt Concrete Production and Placement."

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 specifications of this Section 11-1. 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, certified, and qualified 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 "Quality Control and Quality Assurance Manual for Asphalt Concrete Production and Placement."

The Contractor shall retain for inspection the records generated as part of the Contractor's Quality Control, inspection, sampling, and testing for at least 3 years.

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 to this Section 11-1.

Minimum process control sampling and testing shall be performed in compliance with Table 39-4

Table 39-4 MINIMUM PROCESS CONTROL REQUIREMENTS

Quality Characteristic	Action Limit	California Test	Minimum Sampling and Testing Frequency	Point of Sampling[6] ‡	Reporting Time Allowance
Sand Equivalent (Min)	47 (Type A) 42 (Type B)	217 (Reported value shall be the average of 3)[1]	One sample per 2,500 tonnes. Not less than one sample per 2 days	Batch plant - from hot bins. Drum plant - from composite cold feed.	24 hours
Stability	37 (Type A) 35 (Type B)	366[2,3] (Reported value shall be the average of 3)[1, 4]	See Note 5. Not less than one sample per 5 days		48 hours

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 and the average shall be reported.
2. Modify California Test 304, Part 2.B.2.c: "After compaction in the mechanical compactor, cool to 60±3°C by allowing the briquettes to cool at room temperature for 0.5-hour, then place the briquettes in the oven at 60°C for a minimum of 2 hours and not more than 3 hours before applying the 56 kN leveling off load."
3. Modify California Test 304, Part 1.B.1. Paragraph 2, eliminate the requirement of curing sample for 15 hours.
4. Briquettes shall be fabricated from a single, combined sample obtained from at least 4 locations in a line transversely across the mat immediately behind the paver in conformance with the requirements of California Test 125. If the range of stability for the 3 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."
5. Asphalt concrete shall be sampled daily. Asphalt concrete shall be 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, testing will be increased to one test for each of the following 5 days of production and may be decreased to one for each 5 days thereafter unless stability drops below the action limit. The sequence of the first 5 test results shall not be broken by more than 7 days of suspended operations.
6. Aggregate that has been lime-treated before asphalt concrete production shall be sampled and tested for sand equivalent before lime treatment.

Aggregate that will be lime-treated shall be sampled and tested for sand equivalent before asphalt concrete production and lime treatment.

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 reported values of test results for an individual characteristic fall below the action limit, the asphalt concrete represented by the 2 tests shall be considered to be not in conformance with the provisions in this Section 11-1 and the Contractor shall suspend production, notify the Engineer, and take corrective action. The asphalt concrete represented by the 2 tests shall be considered to be the asphalt concrete placed after the last test that was in-conformance and the asphalt concrete placed before the report date of the second test that was not in conformance. With the approval of the Engineer, up to 500 tonnes of asphalt concrete may be placed to demonstrate that the asphalt concrete is once again in conformance with the provisions of this Section 11-1. Production shall begin only after the Engineer has received test results confirming conformance.

If asphalt concrete has 2 consecutive stability test results below the specified action limits but above 26 for Type A and 24 for Type B, the Engineer will not consider that asphalt concrete in the quality factor calculation for individual quality characteristic and composite. The asphalt concrete quantity represented by these tests will be paid for at the contract price per tonne for the type of asphalt concrete in the Engineer's Estimate multiplied by a quality factor of 0.9.

The Engineer will reject asphalt concrete that has 2 consecutive stability test results less than or equal to 26 for Type A or 24 for Type B.

The Engineer will reject asphalt concrete placed to demonstrate conformance with the stability action limits that does not conform to the provisions of this Section 11-1.

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 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 the provisions in 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 split samples taken for theoretical maximum density into 4 portions. The Contractor shall use one portion for determination of theoretical maximum density and submit the other 3 portions to the Engineer. The Contractor shall notify the Engineer when the sample was used to determine theoretical maximum density. The Engineer will store the 3 portions for other uses including dispute resolution.

The Contractor shall obtain a one-liter sample of the asphalt binder in conformance with the provisions in Section 39-7.01C, "Asphalt Binder Storage," of this Section 11-1 for each day of asphalt concrete production. Modified binders shall be canned in one-liter cylindrical cans with open top, friction lids. The Contractor shall send the samples to the Transportation Laboratory with a Sample Identification Form TL-101 on a weekly basis. A copy of the Sample Identification Form TL-101 and shipping documents 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 the provisions in 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 1,000 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.

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 "Quality Control and Quality Assurance Manual for Asphalt Concrete Production and Placement" 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 "Quality Control and Quality Assurance Manual for Asphalt Concrete Production and Placement" locations of postings, and times and means of submissions shall be provided in the Quality Control Plan.

The Contractor shall submit the process control and quality control test results using the Department's statistical evaluation program "PACRS" 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 resubmit the updated record by the start of the following working day. When errors or omissions in the inspection or testing records occur repeatedly as determined by the Engineer, 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 "Quality Control and Quality Assurance Manual for Asphalt Concrete Production and Placement." 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" in conformance with the Department's "Quality Control and Quality Assurance Manual for Asphalt Concrete Production and Placement." 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 business 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 2 business days when requested.

The Engineer may test the asphalt, aggregates or asphalt concrete mixture to determine conformance with the provisions in this Section 11-1 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 to this Section 11-1 will be rejected in conformance with the provisions in 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 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 included in the calculation of Quality Factor and compensation adjustment.

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.

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 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 the provisions in 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:

$$t = \frac{\left|\overline{X}_c - \overline{X}_v\right|}{S_p\sqrt{\frac{1}{n_c} + \frac{1}{n_v}}} \qquad \text{and} \qquad S_p^2 = \frac{S_c^2(n_c - 1) + S_v^2(n_v - 1)}{n_c + n_v - 2}$$

Where:

n_c	=	Number of Contractor's quality control tests (minimum of 2 required)
n_v	=	Number of Verification tests (minimum of 1 required)
$\overline{X}_c$	=	Mean of the Contractor's quality control tests
$\overline{X}_v$	=	Mean of the Verification tests
S_p	=	Pooled standard deviation (When $nv = 1$, $S_p = S_c$)
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 (nc+nv-2)	t_{crit} (for $\alpha = 0.01$)	degrees of freedom (nc+nv-2)	t_{crit} (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} ($t \leq t_{cri}t$). If the quality control test results of any asphalt quality characteristics are not verified by the *t*-value comparison, then the difference between the means of the quality control test results and verification test results will be compared with an allowable testing difference. Quality control test results are not verified if the difference between the means exceeds the allowable testing difference. The allowable testing difference in means attributable to normal test variation shall be determined as follows:

$$d_{\bar{x}} = 2S_r\left[\frac{1}{n_c} + \frac{1}{n_v}\right]^{1/2}$$

Where:

d_x = Allowable difference between means
S_r = Precision Index for the test method from Table 39-6
n_c = Number of Contractor's quality control tests (minimum of 2 required)
n_v = Number of Verification tests (minimum of one required)

Table 39-6 PRECISION INDEX

Quality	California Test	Precision Index
Sand Equivalent (min.)	217	8
Hveem Stabilometer Value (min.)	366	6.6
Percent Air Voids[1]	367	1.6
Asphalt Content	379 382	0.23% 0.18%
Gradation 19-mm or 12.5-mm 9.5-mm 4.75-mm 2.36-mm 600-µm 75-µm	202	 0.9% 2.4% 2.0% 1.4% 1.1% 0.7%
Percent of Theoretical Maximum Density	375	0.88%
Theoretical Maximum Density	309	0.03 g/cc

1. Air voids will be tested only during production start-up evaluation.

If quality control test results of any asphalt quality characteristics 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 or continued conditionally in conformance with the provisions in Section 39-6.03, "During Production," of this Section 11-1. If 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.

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 before 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 or placed before and during the disagreement will be evaluated based on the results of the Engineer's verification test results.

39-6.02 DURING THE PRODUCTION START-UP EVALUATION

If a dispute occurs during production start-up, the Contractor and Engineer shall review their sampling, testing, and test results. If the Contractor's and the Engineer's review do 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 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.

39-6.03 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 verify the quality control test results in conformance with the provisions in Section 39-5.03, "Verification," of this Section 11-1.

If the verification test results do not verify the quality control test results 3 consecutive times, production and placement of asphalt concrete will be suspended and 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. During the review by the Independent Third Party, the Contractor may continue the production and placement if both means of quality control test results and verification test results conform to the specification limits in Table 39-9, "Minimum Quality Control Requirements," for any quality characteristic. If suspended, the Contractor may produce and place up to 500 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 has 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 the provisions in Section 39-11.02, "Statistical Evaluation, Determination of Quality Factor and Compensation Adjustment," 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 quality factor for the lot of asphalt concrete which brought about the dispute resolution shall be determined in conformance with the provisions in Section 39-11.02, "Statistical Evaluation, Determination of Quality Factor and Compensation Adjustment," 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:

A. Aggregates for asphalt concrete shall be separated into 3 or more sizes.
B. 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-quart 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 before 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 one 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.

Adjustments to control settings at the plant to achieve the target asphalt content in the field is allowed and shall not be considered as a change in the asphalt concrete mixture. 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. Asphalt Meters used for proportioning at the continuous mixing asphalt concrete plants shall be accurate to within 0.5-percent of the test load for an average of three test runs provided no individual error exceeds one percent.

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 before 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 weigh-box 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 shutdown 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), PAVEMENT REINFORCING FABRIC, AND RECLAIMED ASPHALT PAVEMENT

39-8.01 SUBGRADE

Immediately before applying prime coat or paint binder (tack coat), or immediately before 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 tack coat of asphaltic emulsion shall be furnished and applied in conformance with the provisions in Section 94, "Asphaltic Emulsions," of the Standard Specifications. Paint binder (tack coat) shall be applied to vertical surfaces of existing pavement, curbs, gutters, and construction joints against which asphalt concrete is to be placed in conformance with the provisions in Section 39, "Asphalt Concrete," in Section 10-1, "General," of these special provisions.

Paint binder (tack coat) shall be applied in one application at a rate between 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 and application rate will be determined by the Engineer. 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 paint binder (tack coat), asphalt concrete shall not be placed until the applied 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 therefore.

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.

Immediately before placing binder, pavement reinforcing fabric, and asphalt concrete surfacing, the pavement shall be cleaned of loose and extraneous materials such as, but not limited to, vegetation, sand, dirt, gravel and water.

Before placing the pavement reinforcing fabric, a binder of paving asphalt shall be applied uniformly to the surface to receive the pavement reinforcing fabric at a rate of not less than 1.15 L per square meter of surface covered. At the Contractor's option, the paving asphalt shall be Grade PG 64-10, PG 64-16, PG 64-28, or PG 70-10 conforming to the provisions in Section 92, "Asphalts," of the Standard Specifications. Pavement reinforcing fabric shall not be placed in areas of conform tapers when the thickness of the overlying asphalt concrete will be 40 mm or less. When pavement reinforcing fabric is placed in areas of conform tapers the binder shall be spread at the approximate rate of 1.4 L/m^2 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.

Asphaltic emulsion shall not be substituted for paving asphalt binder for pavement reinforcing fabric.

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 in conformance with the provisions in Section 4-1.03D of the Standard Specifications.

The pavement reinforcing fabric shall be aligned and placed with no wrinkles that lap. The test for lapping shall be made by gathering together the pavement reinforcing 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.

If manual laydown methods are used, the pavement reinforcing fabric shall be unrolled, aligned, and placed in increments of approximately 9 m.

Adjacent borders of the pavement reinforcing 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 pavement reinforcing fabric overlays, both the binder and the fabric shall overlap previously placed fabric by the same amount.

Seating of the pavement reinforcing 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 pavement reinforcing fabric immediately in advance of placing asphalt concrete surfacing in order to prevent fabric from being damaged by construction equipment.

Pavement reinforcing fabric shall not be exposed to public traffic, Contractor's equipment or elements that will damage the fabric before placement of asphalt concrete surfacing, as determined by the Engineer. Public access 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.

39-8.04 RECLAIMED ASPHALT PAVEMENT

The Contractor may produce asphalt concrete using reclaimed asphalt pavement (RAP). Asphalt concrete produced using RAP shall conform to the provisions for asphalt concrete in this Section 11-1 and these special provisions. The Contractor may substitute RAP for a portion of the virgin aggregate in asphalt concrete in an amount not exceeding 15 percent of the asphalt concrete dry aggregate mass.

Virgin aggregate shall conform to the provisions for aggregates in this Section 11-1.

RAP shall be processed from asphalt concrete removed from pavement surfaces. RAP shall be stored in stockpiles on smooth surfaces free of debris and organic material. RAP stockpiles shall consist only of homogeneous RAP. The Contractor may process and stockpile RAP throughout the project's life. Processing and stockpiling operations shall prevent material contamination and segregation.

The Contractor shall determine the amount of asphalt binder to be mixed with the combined virgin aggregate and RAP in conformance with the requirements in California Test 367 amended by Lab Procedure-9 (LP-9), "Hot Mix Asphalt (HMA) Using Up To 15% Reclaimed Asphalt Pavement (RAP)." LP-9 is available at:

http://www.dot.ca.gov/hq/esc/Translab/fpmlab.htm

At least 21 days before starting production of asphalt concrete using RAP, the Contractor shall submit a proposed asphalt concrete mix design in writing to the Engineer. The mix design submittal shall consist of the following:

A. RAP:

1. Processed stockpile locations.
2. LP-9 test results.
3. Correlation factor for aggregate gradations from California Test 382 and LP-9.
4. Three 32-kg samples of processed RAP representing the material to be used. The three samples shall be split from the sample the Contractor uses to determine the mix design. The Contractor shall obtain and split the samples in conformance with the requirements in California Test 125 and LP-9.
5. The substitution rate for virgin aggregate and percent RAP.

B. Virgin aggregate and supplemental fine aggregate blend:

1. Target values for each sieve size.
2. Aggregate quality tests results.
3. Each aggregate source to be used including producer, location, and California Mine Identification number.
4. Percentage of each aggregate stockpile, cold feed, and hot bin to be used.
5. Gradation of each aggregate stockpile, cold feed, and hot bin to be used.

C. Asphalt binder:

1. Source.
2. Material Safety Data Sheets.

D. Antistrip additives, if used:

1. Name of product.
2. Name of manufacturer.
3. Manufacturer's designation and proposed rate.
4. Location and method of addition.
5. Material Safety Data Sheets.

E. Asphalt concrete:

1. A completed mix design that reflects the percent of RAP to be used including the electronic worksheet identified in LP-9.
2. In graphical format, stability and air voids versus asphalt binder percentage of asphalt in conformance with the requirements in CTM 367.

Asphalt concrete production using RAP shall not begin until the Engineer approves the mix design. If the Engineer fails to review the mix design in 21 days, and if, in the opinion of the Engineer, work completion is delayed as a result of the failure to review, the Engineer will adjust payment and contract time in conformance with the requirements in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

If proposing a change in the RAP substitution rate, the Contractor shall notify the Engineer. If the substitution rate changes more than 5 percent by dry aggregate mass in the asphalt concrete mixture, the Contractor shall submit a new mix design.

The aggregate gradation for the asphalt concrete produced with RAP shall be calculated based on the mathematical combination of the virgin aggregate gradation during production and the daily RAP gradation. RAP shall be sampled and gradation shall be determined in conformance with the requirements in LP-9. RAP gradations shall be:

A. Determined daily by the Contractor.
B. Used for the mathematical combination of that day's asphalt concrete production.
C. Reported to the Engineer.

The Contractor shall perform quality control testing of the RAP source each day asphalt concrete using RAP is produced. Daily, the Contractor shall submit to the Engineer:

A. Results for RAP gradation and the asphalt binder content in RAP determined in conformance with the requirements in LP-9. The Contractor shall sample RAP from the weighhopper or pugmill.
B. Mathematical calculation of the gradation of the virgin aggregate and RAP aggregate blend.
C. Correlation factor for RAP burn-off determined in conformance with the requirements in LP-9.

RAP proportioning shall conform to the provisions for aggregate proportioning specified in Section 39-3.03, "Proportioning," of the Standard Specifications and these special provisions. The Contractor's mixing equipment shall have a device that safely provides a sample representative of the virgin aggregate and RAP incorporated into the asphalt concrete. The Contractor shall sample in conformance with the requirements in California Test 125 and LP-9.

The temperature of asphalt concrete using RAP shall not exceed 165°C.

If batch mixing is used, RAP shall be kept separate from the virgin aggregate until both ingredients enter the weighhopper or pugmill. After introduction to the pugmill and before asphalt binder is added, the mixing time for the virgin aggregate and RAP shall not be less than 5 seconds. After asphalt binder is added, the mixing time shall not be less than 30 seconds.

If continuous mixing is used, the RAP shall be protected from direct contact with the burner flame with a device such as a shield, separator, or second drum.

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 the provisions in this Section 11-1.

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*	Minimum Number of Layers	Top Layer Thickness (Millimeters)		Next Lower Layer Thickness (Millimeters)		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 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 provisions 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 the provisions in this Section 11-1. 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 density of 92 percent and a maximum density of 97 percent of theoretical maximum density.

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 in Table 39-2, "Aggregate Quality Requirements," Table 39-3, "Asphalt Concrete Mixture Requirement" for Theoretical Maximum Specific Gravity, sand equivalent, stability, 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 ±2.0 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 specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1 are within the calculated allowable testing difference using the precision index specified in Table 39-6, "Precision Index," of this Section 11-1.

The Contractor shall not proceed to regular production until conforming with the provisions of this Section 39-10.02A, "Production Start-Up Evaluation." At the request of the Contractor, the Engineer may elect to leave the asphalt concrete which does not meet the provisions of this Section 39-10.02A in place if mitigation can be agreed to. If this quantity of asphalt concrete is left in place, the Contractor will be paid 50 percent of the contract price paid per tonne for the type of asphalt concrete designated in the Engineer's Estimate.

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 of up to 500 tonnes of asphalt concrete and the in-place density and relative compaction shall be determined in conformance with the requirements of California Test 375, with modifications as follows:

A. Part 2B, "Test Strip," shall require one core from each test position and the requirement for an average of 2 cores for determining core density at each test site shall not apply. The correlation value for each test site will be determined by subtracting the nuclear density from the core density for the site.
B. Part 6, "Calculating Relative Compaction" shall use theoretical maximum density in conformance with the requirements in California Test 309 instead of test maximum density (TMD) from California Test 375, Part 5, "Determining Test Maximum Density."

The Contractor shall remove 2 cores at each test site witnessed by the Engineer and shall give one core to the Engineer on the same day. The Contractor and Engineer shall each calculate gage bias independently.

The purpose of the test strip is to determine a correlation between the densities of 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 in conformance with the provisions in this Section 11-1. 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 percent of theoretical maximum density for this project. Percent theoretical maximum density results will not be accepted if they have been determined using a nuclear gage that has not been correlated using a test strip. A nuclear density test strip shall be required when the nuclear gages used on the project are replaced, modified, repaired, or recalibrated.

Asphalt concrete in test strips when placed as part of production start-up evaluation may be left in place under the following conditions:

A. If the test strip density is greater than or equal to 92 percent and less than 97 percent of theoretical maximum density, the Contractor will be paid at the contract price per tonne of the type of asphalt concrete designated in the Engineer's Estimate.
B. If the test strip density is determined to be less than 92 percent but greater than 90 percent of the theoretical maximum density, the Contractor will be paid at 50 percent of the contract price per tonne of the type of asphalt concrete designated in the Engineer's Estimate. A new test strip will be required and mitigation measures shall be taken. The State will not pay for the mitigation measures, but will pay for asphalt concrete in the test strip in conformance with these specifications.

Asphalt concrete in test strips will be rejected when the density for the test strip is less than 90 percent or greater than 97 percent of theoretical maximum density. Production and placement shall not begin until the Contractor has demonstrated the ability to achieve 92 percent to 97 percent of theoretical maximum density in conformance with the provisions in this Section 11-1.

If asphalt concrete from the same mix design was tested and placed under this contract and if the thickness of the previously placed asphalt concrete is greater than 75 mm, a test strip will not be required for subsequent layers of asphalt concrete.

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 ±0.06-m straightedge and shall be cut back for surface smoothness as required in conformance with the provisions in 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.

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 not less than 92 percent or more than 97 percent of theoretical maximum density and shall be finished to the lines, grades, and cross sections shown on the plans. In-place density of asphalt concrete will be determined before opening the pavement to public traffic. No rolling will be permitted after the asphalt concrete temperature is below 60°C.

Percent of theoretical maximum density shall be determined in conformance with the requirements in California Test 375 except the test maximum density requirements in Part 5, "Determining Test Maximum Density," shall be replaced with the California Test 309 requirements for theoretical maximum density. If the Contractor compacts the asphalt concrete in any form or quantity after sites for testing have been chosen, the quality control tester shall choose a new set of random numbers for locating test sites.

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.

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 ±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 ±0.06 m long in a direction transverse to the centerline and extending from edge to edge of a 3.6-m wide traffic lane.

Pavement within 15 m of a structure or approach slab shall conform to the smoothness tolerances provisions 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 test results that have been verified shall form the basis for statistical evaluation of the work in conformance with the provisions in Section 39-11.02, "Statistical Evaluation, Determination of Quality Factor and Compensation Adjustment," 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 the provisions in Section 39-11.02C, "Compensation Adjustment," of this Section 11-1.

When there are fewer than 5 verified quality control tests, the work will be accepted or rejected based on whether the individual test results conform to the quality requirements in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. Section 39-11.02, "Statistical Evaluation, Determination of Quality Factor and Compensation Adjustment," of this Section 11-1 shall not apply.

The Engineer may reject a quantity of material that is determined to be defective based on visual inspection.

39-11.02 STATISTICAL EVALUATION, DETERMINATION OF QUALITY FACTOR AND COMPENSATION ADJUSTMENT

39-11.02A GENERAL

Statistical evaluation of the work shall be used to verify the Contractor's quality control test results and to determine conformance with the provisions in this Section 11-1. The number of significant figures used in the calculations including the calculation for compensation adjustment will be in conformance with the requirements of AASHTO Designation: R-11, Absolute Method.

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-µm and 75-µm sieves), and percent of theoretical maximum density shall be considered for purposes of this Section 11-1 to be critical quality characteristics.

A "lot" is asphalt concrete that has been produced using a single mix design and has been placed without suspending production due to failure to meet the specifications. If the production and placement have been suspended for longer than 30 days due to seasonal suspension of phases of work, the Engineer may designate a new lot. More than one lot will be designated if changes in the target values, material sources, or mix design are requested by the Contractor and made in conformance with the provisions in this Section 11-1. If production of asphalt concrete is suspended due to unsatisfactory performance, a new lot may be designated by the Engineer. Asphalt concrete shall be considered part of a lot and the compensation adjustment will be determined at the end of the lot in conformance with the provisions in Section 39-11.02C, "Compensation Adjustment," if it is placed in:

A. Dig outs.
B. Leveling courses.
C. Slope corrections.
D. Detours not part of the finished roadway prism.
E. Areas where, in the judgment of the Engineer, compaction or compaction measurement by conventional methods is impeded.
F. The uppermost lift of shoulders with rolled-in indentations rumble strips.
G. Any asphalt concrete with a quality characteristic waiver.

Each lot consists of sublots. A sublot is the quantity of asphalt concrete being sampled and tested for quality control, generally 500 tonnes or less. Asphalt concrete placed at the end of the day or the lot will be considered as a separate sublot. Asphalt concrete less than the quantity needed for testing will be considered as a separate sublot.

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:

A. Calculate the arithmetic mean ($\overline{X}$) of the test values;

$$\overline{X} = \frac{\Sigma x}{n}$$

where:

$\sum$	=	summation of
x	=	individual test values
n	=	total number of test values

B. Calculate the standard deviation (s);

$$s = \sqrt{\frac{n\Sigma (x^2)-(\Sigma x)^2}{n(n-1)}}$$

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

C. Calculate the upper quality index (Q_u);

$$Q_u = \frac{USL - \overline{X}}{s}$$

where:

USL	=	upper specification limit
s	=	standard deviation
$\overline{X}$	=	arithmetic mean

(Note: The USL is equal to the upper specification limit or the target value plus the production tolerance.)

D. Calculate the lower quality index (Q_L);

$$Q_L = \frac{\overline{X} - LSL}{s}$$

where:

LSL=		lower specification limit or target value minus production tolerance
s	=	standard deviation
$\overline{X}$	=	arithmetic mean

E. 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.)

F. From Table 39-7, "Estimated Percent of Work Outside Specification Limits," of this Section 11-1, determine P_L;

where:

P_L = the estimated percentage of work outside the LSL.
(P_L = 0, when LSL is not specified.)

G. Calculate the total estimated percentage of work outside the USL and LSL, Percent Defective;

Percent Defective $= P_U + P_L$

where:

P_U = the estimated percentage of work outside the USL

P_L = the estimated percentage of work outside the LSL

H. Repeat Steps A through G for each quality characteristic listed for acceptance.

A minimum of 5 samples shall be required to perform a statistical evaluation. If the sampling frequencies and quantity of work would otherwise result in fewer than 5 samples, the Contractor may submit a written request to increase the sampling frequency to provide a minimum of 5 samples. The request shall be included in the Quality Control Plan.

39-11.02C QUALITY FACTOR DETERMINATION AND ACCEPTANCE OF LOT

The lot will be accepted based on the quality factors determined as follows:

1. From Table 39-8, "Quality factors," of this Section 11-1, the quality factor will be determined for each quality characteristic (QF_{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. For asphalt concrete with a quality characteristic waiver, the single quality factor for that quality characteristic shall be one.

2. The quality factor shall be calculated for the lot (QF_C). The quality factor for the lot is a composite of single quality 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:

$$QF_C = \sum_{i=1}^{8} w_i \, QF_{QC_i}$$

Where:

QF_C = the Quality factor for the Lot rounded to 2 decimals for acceptance.

QF_{QCi} = the quality factor for the individual quality characteristic.

w = the weighting factor listed in Table 39-9.

i = the quality characteristic index number in Table 39-9.

A quality factor will be 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 accepting asphalt concrete.

If the current quality factor of a lot is greater than 0.90, the lot will be accepted, provided the lowest single quality factor is not within the reject portion of Table 39-8, "Quality Factors," of this Section 11-1. If the lowest single quality factor is within the reject portion of Table 39-8, "Quality Factors," of this Section 11-1, the lot will terminated and the representative quantity of asphalt concrete within the lot will be rejected. The quantity of rejected asphalt concrete will be determined by the Contractor and submitted to the Engineer for verification and approval.

If the current quality factor of a lot is less than 0.90, production of asphalt concrete shall be suspended and corrective action taken. Upon approval of the Engineer, up to 500 tonnes of asphalt concrete may be placed in conformance with the provisions in Section 39-10.02, "Production Start-Up Evaluation and Nuclear Density Test Strips," to demonstrate that the asphalt concrete is once again in conformance with the provisions in this Section 11-1. Production of asphalt concrete shall not start until the Engineer has received test results confirming conformance with the provisions in this Section 11-1. A new lot will be established when production resumes.

If a quality 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 suspended and corrective action taken. Upon approval of the Engineer, the Contractor may use the provisions in Section 39-10.02, "Production Start-Up Evaluation and Nuclear Density Test Strips," to demonstrate that the asphalt concrete is once again in conformance with the provisions in this Section 11-1. Production of asphalt concrete shall not start until the Engineer has received test results confirming conformance with the provisions in this Section 11-1. A new lot will be established when production resumes.

39-11.02D COMPENSATION ADJUSTMENT

Upon acceptance of lot, payment to the Contractor for the lot of asphalt concrete will be subject to a compensation adjustment. The amount of the compensation adjustment for the lot will be calculated using the following equation:

$$CA = \sum_{i=1}^{n} ACCP * w_i * \left[QF_{QCii} * (ACTT - WACTT_i) + WACTT_i\right] - \left(ACCP * ACTT\right)$$

Where:

CA = Compensation Adjustment rounded to 2 decimal,
ACCP = Asphalt Concrete Contract Price
ACTT = Asphalt Concrete Total Tonnage represented in the lot
$WACTT_i$ = Total Tonnage of waived quality characteristic Asphalt Concrete
QF_{QCi} = the running quality factor for the individual quality characteristic as calculated according to Section 11-02C
w = the weighting factor listed in Table 39-9, and
i = the quality characteristic index number in Table 39-9.

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.

Asphalt concrete that has been assigned a fixed quality factor will not be included in the compensation adjustment calculation.

Table 39-7. ESTIMATED PERCENT OF WORK OUTSIDE SPECIFICATION LIMITS

P_U and/or P_L	Sample Size (n)												
	5	6	7	8	9	10-11	12-14	15-17	18-22	23-29	30-42	43-66	>66
	Upper Quality Index Q_U or Lower Quality Index Q_L												
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_U and/or P_L	Sample Size (n)												
	5	6	7	8	9	10-11	12-14	15-17	18-22	23-29	30-42	43-66	>66
	Upper Quality Index Q_U or Lower Quality Index Q_L												
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_U or Q_L does not correspond to a value in the table, the next lower value will be used.
2. If Q_U or Q_L are negative values, P_U or P_L shall be equal to 100 minus the table value for P_U or P_L.

Table 39-8.—QUALITY 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 Quality Factor ($P_U + P_L$)												
1.05				0	0	0	0	0	0	0	0	0	0
1.04			0	1	3	5	4	4	4	3	3	3	3
1.03		0	2	4	6	8	7	7	6	5	5	4	4
1.02		1	3	6	9	11	10	9	8	7	7	6	6
1.01	0	2	5	8	11	13	12	11	10	9	8	8	7
1.00	22	20	18	17	16	15	14	13	12	11	10	9	8
0.99	24	22	20	19	18	17	16	15	14	13	11	10	9
0.98	26	24	22	21	20	19	18	16	15	14	13	12	10
0.97	28	26	24	23	22	21	19	18	17	16	14	13	12
0.96	30	28	26	25	24	22	21	19	18	17	16	14	13
0.95	32	29	28	26	25	24	22	21	20	18	17	16	14
0.94	33	31	29	28	27	25	24	22	21	20	18	17	15
0.93	35	33	31	29	28	27	25	24	22	21	20	18	16
0.92	37	34	32	31	30	28	27	25	24	22	21	19	18
0.91	38	36	34	32	31	30	28	26	25	24	22	21	19
0.90	39	37	35	34	33	31	29	28	26	25	23	22	20
0.89	41	38	37	35	34	32	31	29	28	26	25	23	21
0.88	42	40	38	36	35	34	32	30	29	27	26	24	22
0.87	43	41	39	38	37	35	33	32	30	29	27	25	23
0.86	45	42	41	39	38	36	34	33	31	30	28	26	24
0.85	46	44	42	40	39	38	36	34	33	31	29	28	25
0.84	47	45	43	42	40	39	37	35	34	32	30	29	27
0.83	49	46	44	43	42	40	38	36	35	33	31	30	28
0.82	50	47	46	44	43	41	39	38	36	34	33	31	29
0.81	51	49	47	45	44	42	41	39	37	36	34	32	30
0.80	52	50	48	46	45	44	42	40	38	37	35	33	31
0.79	54	51	49	48	46	45	43	41	39	38	36	34	32
0.78	55	52	50	49	48	46	44	42	41	39	37	35	33
0.77	56	54	52	50	49	47	45	43	42	40	38	36	34
0.76	57	55	53	51	50	48	46	44	43	41	39	37	35
0.75	58	56	54	52	51	49	47	46	44	42	40	38	36
	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
Reject	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:

1. If 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, the next larger value will be used to obtain a quality factor.
2. The maximum obtainable quality factor is 1.05 (with a minimum of 5 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	Asphalt Content[3, 4]	TV[1] ±0.45%	0.30	379 or 382	One sample per 500 tonnes or part thereof Not less than one sample per day	Mat behind paver
	Gradation			202	One sample per 500 tonnes or part thereof Not less than one sample per day	Batch Plant - from hot bins Drum Plant - from cold feed
	25-mm	100%				
2	19-mm or 12.5-mm [4]	TV ±5	0.01			
3	9.5-mm	TV ±6	0.01			
4	4.75-mm	TV ±7	0.05			
5	2.36-mm	TV ±5	0.05			
6	600-µm [3, 4]	TV ±4	0.08			
7	75-µm[3, 4]	TV ±2	0.10			
8	Percent of Theoretical Maximum Density [2]	92% Min. 97% Max.	0.40	375[2]	One sample per 500 tonnes or part thereof. Not less than one test per day.	Finished mat after final rolling
	Theoretical Maximum Density			309[2]	In conformance with CT 375 per day	Mat behind the paver
9	Mix Moisture Content	≤1%		370	One sample per 1,000 tonnes or part thereof Not less than one sample per day	
	Asphalt and Mix Temperature	120ºC to 190ºC (Asphalt) ≤165ºC (Mix)			Continuous using an automated recording device.	Plant

Notes:

1. TV = Target Value from contractor's proposed mix design.
2. CT 375: Part 5, "Determining Test Maximum Density" shall be replaced with Theoretical Maximum Density in conformance with the requirements in CT 309.
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.

39-12 MEASUREMENT AND PAYMENT

39-12.01 MEASUREMENT

The quantity asphalt concrete of the types designated in the Engineer's Estimate to be paid for shall be the combined mass of the mixture 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 provisions in Section 92, "Asphalts," Section 93, "Liquid Asphalts," or Section 94, "Asphaltic Emulsions," of the Standard Specifications.

When recorded batch masses are printed automatically, these masses may be used for determining pay quantities if the printed batch masses conform to the following:

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 before 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 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 adjustments for asphalt concrete will be made in conformance with the provisions in Section 39-11.02C, "Quality Factor Determination and Compensation Adjustment," of this Section 11-1.

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 in conformance with the provisions in Section 4-1.03D, "Extra Work," of the Standard Specifications.

For the following asphalt concrete locations, the percent theoretical maximum density provisions of Section 39-11.02, "Statistical Evaluation, Determination of Quality Factor and Compensation Adjustment," of this Section 11-1 shall not apply for the quality factor (QF_C) for the lot and the compensation adjustment computation, and an individual quality factor of 1.0 for the percent theoretical maximum density (QF_{QC8}) shall be used:

A. Dig outs.
B. Leveling courses.
C. Slope corrections.
D. Detours not included in the finished roadway prism.
E. In areas where, in the judgment of the Engineer, compaction or compaction measurement by conventional methods is impeded.
F. The uppermost lift of shoulders with rumble strips.

Full compensation for developing the Contractor's Quality Control Plan 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 therefore.

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 therefore.

Full compensation for using reclaimed asphalt pavement 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 therefore.

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 therefore.

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.

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 therefore.

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 therefore.

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.

SECTION 12. (BLANK)

SECTION 13. RELATIONS WITH RAILROAD

GENERAL

The Contractor's attention is directed to the tracks and right-of-way of the **San Francisco Bay Area Rapid Transit District (BART)** (K.P. 0.16-13.34) along the center divide of State Route 24 from the Caldecott Tunnel to El Curtola Road Overcrossing in Contra Costa County, hereinafter referred to as "Railroad," within the limits of the project.

In accordance with the provisions in Section 7-1.12, "Indemnification and Insurance," of the Standard Specifications, the Contractor shall be responsible for all damages to Railroad's track and equipment operating on such track, resulting from his operations.

The Contractor shall not allow any personnel or equipment on Railroad's tracks or right of way.

The Contractor shall conduct his operation in a manner that will prevent debris or any other material from falling onto the tracks and right of way of the Railroad.

SECTION 14 FEDERAL REQUIREMENTS FOR FEDERAL-AID CONSTRUCTION PROJECTS

GENERAL.—The work herein proposed will be financed in whole or in part with Federal funds, and therefore all of the statutes, rules and regulations promulgated by the Federal Government and applicable to work financed in whole or in part with Federal funds will apply to such work. The "Required Contract Provisions, Federal-Aid Construction Contracts, "Form FHWA 1273, are included in this Section 14. Whenever in said required contract provisions references are made to "SHA contracting officer," "SHA resident engineer," or "authorized representative of the SHA," such references shall be construed to mean "Engineer" as defined in Section 1-1.18 of the Standard Specifications.

PERFORMANCE OF PREVIOUS CONTRACT.—In addition to the provisions in Section II, "Nondiscrimination," and Section VII, "Subletting or Assigning the Contract," of the required contract provisions, the Contractor shall comply with the following:

The bidder shall execute the CERTIFICATION WITH REGARD TO THE PERFORMANCE OF PREVIOUS CONTRACTS OR SUBCONTRACTS SUBJECT TO THE EQUAL OPPORTUNITY CLAUSE AND THE FILING OF REQUIRED REPORTS located in the proposal. No request for subletting or assigning any portion of the contract in excess of $10,000 will be considered under the provisions of Section VII of the required contract provisions unless such request is accompanied by the CERTIFICATION referred to above, executed by the proposed subcontractor.

NON-COLLUSION PROVISION.—The provisions in this section are applicable to all contracts except contracts for Federal Aid Secondary projects.

Title 23, United States Code, Section 112, requires as a condition precedent to approval by the Federal Highway Administrator of the contract for this work that each bidder file a sworn statement executed by, or on behalf of, the person, firm, association, or corporation to whom such contract is to be awarded, certifying that such person, firm, association, or corporation has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the submitted bid. A form to make the non-collusion affidavit statement required by Section 112 as a certification under penalty of perjury rather than as a sworn statement as permitted by 28, USC, Sec. 1746, is included in the proposal.

PARTICIPATION BY MINORITY BUSINESS ENTERPRISES IN SUBCONTRACTING.—Part 23, Title 49, Code of Federal Regulations applies to this Federal-aid project. Pertinent sections of said Code are incorporated in part or in its entirety within other sections of these special provisions.

Schedule B—Information for Determining Joint Venture Eligibility

(This form need not be filled in if all joint venture firms are minority owned.)

1. Name of joint venture _____
2. Address of joint venture _____
3. Phone number of joint venture _____
4. Identify the firms which comprise the joint venture. (The MBE partner must complete Schedule A.) _____
   _____

   a. Describe the role of the MBE firm in the joint venture. _____
      _____
   b. Describe very briefly the experience and business qualifications of each non-MBE joint venturer: _____
      _____

5. Nature of the joint venture's business _____
   _____
6. Provide a copy of the joint venture agreement.
7. What is the claimed percentage of MBE ownership? _____
8. Ownership of joint venture: (This need not be filled in if described in the joint venture agreement, provided by question 6.).

   a. Profit and loss sharing.
   b. Capital contributions, including equipment.
   c. Other applicable ownership interests.

9. Control of and participation in this contract. Identify by name, race, sex, and "firm" those individuals (and their titles) who are responsible for day-to-day management and policy decision making, including, but not limited to, those with prime responsibility for:

   a. Financial decisions _____
   b. Management decisions, such as:

      (1) Estimating _____
      (2) Marketing and sales _____
      (3) Hiring and firing of management personnel _____
      _____
      (4) Purchasing of major items or supplies _____
      _____

   c. Supervision of field operations _____

Note.—If, after filing this Schedule B and before the completion of the joint venture's work on the contract covered by this regulation, there is any significant change in the information submitted, the joint venture must inform the grantee, either directly or through the prime contractor if the joint venture is a subcontractor.

Affidavit

"The undersigned swear that the foregoing statements are correct and include all material information necessary to identify and explain the terms and operation of our joint venture and the intended participation by each joint venturer in the undertaking. Further, the undersigned covenant and agree to provide to grantee current, complete and accurate information regarding actual joint venture work and the payment therefor and any proposed changes in any of the joint venture arrangements and to permit the audit and examination of the books, records and files of the joint venture, or those of each joint venturer relevant to the joint venture, by authorized representatives of the grantee or the Federal funding agency. Any material misrepresentation will be grounds for terminating any contract which may be awarded and for initiating action under Federal or State laws concerning false statements."

Name of Firm	Name of Firm
Signature	Signature
Name	Name
Title	Title
Date	Date

Date _____

State of _____

County of _____

On this ____ day of _____, 20___, before me appeared (Name) _____, to me personally known, who, being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by (Name of firm) _____ to execute the affidavit and did so as his or her free act and deed.

Notary Public _____

Commission expires _____

[Seal]

Date _____

State of _____

County of _____

On this ___ day of _____, 20___, before me appeared (Name) _____ to me personally known, who, being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by (Name of firm) _____ to execute the affidavit and did so as his or her free act and deed.

Notary Public _____

Commission expires _____

[Seal]

REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

I. GENERAL

1. These contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

2. Except as otherwise provided for in each section, the contractor shall insert in each subcontract all of the stipulations contained in these Required Contract Provisions, and further require their inclusion in any lower tier subcontract or purchase order that may in turn be made. The Required Contract Provisions shall not be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with these Required Contract Provisions.

3. A breach of any of the stipulations contained in these Required Contract Provisions shall be sufficient grounds for termination of the contract.

4. A breach of the following clauses of the Required Contract Provisions may also be grounds for debarment as provided in 29 CFR 5.12:

   Section I, paragraph 2;
   Section IV, paragraphs 1, 2, 3, 4, and 7;
   Section V, paragraphs 1 and 2a through 2g.

5. Disputes arising out of the labor standards provisions of Section IV (except paragraph 5) and Section V of these Required Contract Provisions shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the U.S. Department of Labor (DOL) as set forth in 29 CFR 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the DOL, or the contractor's employees or their representatives.

6. Selection of Labor - During the performance of this contract, the contractor shall not:

   a. discriminate against labor from any other State, possession, or territory of the United States (except for employment preference for Appalachian contracts, when applicable, as specified in Attachment A), or

   b. employ convict labor for any purpose within the limits of the project unless it is labor performed by convicts who are on parole, supervised release, or probation.

II. NONDISCRIMINATION

(Applicable to all Federal-aid construction contracts and to all related subcontracts of $10,000 or more.)

1. **Equal Employment Opportunity:** Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, and 41 CFR 60) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The Equal Opportunity Construction Contract Specifications set forth under 41 CFR 60-4.3 and the provisions of the American Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

   a. The contractor will work with the State highway agency (SHA) and the Federal Government in carrying out EEO obligations and in their review of his/her activities under the contract.

   b. The contractor will accept as his operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, preapprenticeship, and/or on-the-job training."

2. **EEO Officer:** The contractor will designate and make known to the SHA contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active contractor program of EEO and who must be assigned adequate authority and responsibility to do so.

3. **Dissemination of Policy:** All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

   a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

   b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

   c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minority group employees.

   d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

   e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. **Recruitment:** When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minority groups in the area from which the project work force would normally be derived.

   a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minority group applicants. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority group applicants may be referred to the contractor for employment consideration.

   b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, he is expected to observe the provisions of that agreement to the extent that the system permits the contractor's compliance with EEO contract provisions. (The DOL has held that where implementation of such agreements have the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Executive Order 11246, as amended.)

   c. The contractor will encourage his present employees to refer minority group applicants for employment. Information and procedures with regard to referring minority group applicants will be discussed with employees.

5. **Personnel Actions:** Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with his obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of his avenues of appeal.

6. **Training and Promotion:**

a. The contractor will assist in locating, qualifying, and increasing the skills of minority group and women employees, and applicants for employment.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision.

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of minority group and women employees and will encourage eligible employees to apply for such training and promotion.

7. **Unions:** If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use his/her best efforts to obtain the cooperation of such unions to increase opportunities for minority groups and women within the unions, and to effect referrals by such unions of minority and female employees. Actions by the contractor either directly or through a contractor's association acting as agent will include the procedures set forth below:

a. The contractor will use best efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minority group members and women for membership in the unions and increasing the skills of minority group employees and women so that they may qualify for higher paying employment.

b. The contractor will use best efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the SHA and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of minority and women referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minority group persons and women. (The DOL has held that it shall be no excuse that the union with which the contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority employees.) In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the SHA.

8. **Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment.

   a. The contractor shall notify all potential subcontractors and suppliers of his/her EEO obligations under this contract.

   b. Disadvantaged business enterprises (DBE), as defined in 49 CFR 23, shall have equal opportunity to compete for and perform subcontracts which the contractor enters into pursuant to this contract. The contractor will use his best efforts to solicit bids from and to utilize DBE subcontractors or subcontractors with meaningful minority group and female representation among their employees. Contractors shall obtain lists of DBE construction firms from SHA personnel.

   c. The contractor will use his best efforts to ensure subcontractor compliance with their EEO obligations.

9. **Records and Reports:** The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the SHA and the FHWA.

   a. The records kept by the contractor shall document the following:

      (1) The number of minority and non-minority group members and women employed in each work classification on the project;

      (2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women;

      (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees; and

      (4) The progress and efforts being made in securing the services of DBE subcontractors or subcontractors with meaningful minority and female representation among their employees.

   b. The contractors will submit an annual report to the SHA each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data.

III. NONSEGREGATED FACILITIES

(Applicable to all Federal-aid construction contracts and to all related subcontracts of $10,000 or more.)

a. By submission of this bid, the execution of this contract or subcontract, or the consummation of this material supply agreement or purchase order, as appropriate, the bidder, Federal-aid construction contractor, subcontractor, material supplier, or vendor, as appropriate, certifies that the firm does not maintain or provide for its employees any segregated facilities at any of its establishments, and that the firm does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The firm agrees that a breach of this certification is a violation of the EEO provisions of this contract. The firm further certifies that no employee will be denied access to adequate facilities on the basis of sex or disability.

b. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive, or are, in fact, segregated on the basis of race, color, religion, national origin, age or disability, because of habit, local custom, or otherwise. The only exception will be for the disabled when the demands for accessibility override (e.g. disabled parking).

c. The contractor agrees that it has obtained or will obtain identical certification from proposed subcontractors or material suppliers prior to award of subcontracts or consummation of material supply agreements of $10,000 or more and that it will retain such certifications in its files.

IV. PAYMENT OF PREDETERMINED MINIMUM WAGE

(Applicable to all Federal-aid construction contracts exceeding $2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural minor collectors, which are exempt.)

1. **General:**

a. All mechanics and laborers employed or working upon the site of the work will be paid unconditionally and not less often than once a week and without subsequent deduction or rebate on any account [except such payroll deductions as are permitted by regulations (29 CFR 3)] issued by the Secretary of Labor under the Copeland Act (40 U.S.C. 276c) the full amounts of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment. The payment shall be computed at wage rates not less than those contained in the wage determination of the Secretary of Labor (hereinafter "the wage determination") which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor or its subcontractors and such laborers and mechanics. The wage determination (including any additional classifications and wage rates conformed under paragraph 2 of this Section IV and the DOL poster (WH-1321) or Form FHWA-1495) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. For the purpose of this Section, contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act (40 U.S.C. 276a) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of Section IV, paragraph 3b, hereof. Also, for the purpose of this Section, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in paragraphs 4 and 5 of this Section IV.

b. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein, provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed.

c. All rulings and interpretations of the Davis-Bacon Act and related acts contained in 29 CFR 1, 3, and 5 are herein incorporated by reference in this contract.

2. **Classification:**

a. The SHA contracting officer shall require that any class of laborers or mechanics employed under the contract, which is not listed in the wage determination, shall be classified in conformance with the wage determination.

b. The contracting officer shall approve an additional classification, wage rate and fringe benefits only when the following criteria have been met:

(1) the work to be performed by the additional classification requested is not performed by a classification in the wage determination;

(2) the additional classification is utilized in the area by the construction industry;

(3) the proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and

(4) with respect to helpers, when such a classification prevails in the area in which the work is performed.

c. If the contractor or subcontractors, as appropriate, the laborers and mechanics (if known) to be employed in the additional classification or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the DOL, Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, D.C. 20210. The Wage and Hour Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

d. In the event the contractor or subcontractors, as appropriate, the laborers or mechanics to be employed in the additional classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. Said Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary

e. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 2c or 2d of this Section IV shall be paid to all workers performing work in the additional classification from the first day on which work is performed in the classification.

3. **Payment of Fringe Benefits:**

a. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor or subcontractors, as appropriate, shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly case equivalent thereof.

b. If the contractor or subcontractor, as appropriate, does not make payments to a trustee or other third person, he/she may consider as a part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

4. **Apprentices and Trainees (Programs of the U.S. DOL) and Helpers:**

a. Apprentices:

(1) Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the DOL, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau, or if a person is employed in his/her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State apprenticeship agency (where appropriate) to be eligible for probationary employment as an apprentice.

(2) The allowable ratio of apprentices to journeyman-level employees on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate listed in the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor or subcontractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman-level hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

(3) Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman-level hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator for the Wage and Hour Division determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

(4) In the event the Bureau of Apprenticeship and Training, or a State apprenticeship agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor or subcontractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the comparable work performed by regular employees until an acceptable program is approved.

b. Trainees:

(1) Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the DOL, Employment and Training Administration.

(2) The ratio of trainees to journeyman-level employees on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(3) Every trainee must be paid at not less than the rate specified in the approved program for his/her level of progress, expressed as a percentage of the journeyman-level hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman-level wage rate on the wage determination which provides for less than full fringe benefits for apprentices, in which case such trainees shall receive the same fringe benefits as apprentices.

(4) In the event the Employment and Training Administration withdraws approval of a training program, the contractor or subcontractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Helpers**:**

Helpers will be permitted to work on a project if the helper classification is specified and defined on the applicable wage determination or is approved pursuant to the conformance procedure set forth in Section IV.2. Any worker listed on a payroll at a helper wage rate, who is not a helper under an approved definition, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed.

5. **Apprentices and Trainees (Programs of the U.S. DOT):**
Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

6. **Withholding:**
The SHA shall upon its own action or upon written request of an authorized representative of the DOL withhold, or cause to be withheld, from the contractor or subcontractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements which is held by the same prime contractor, as much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the SHA contracting officer may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

7. **Overtime Requirements:**
No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers, mechanics, watchmen, or guards (including apprentices, trainees, and helpers described in paragraphs 4 and 5 above) shall require or permit any laborer, mechanic, watchman, or guard in any workweek in which he/she is employed on such work, to work in excess of 40 hours in such workweek unless such laborer, mechanic, watchman, or guard receives compensation at a rate not less than one-and-one-half times his/her basic rate of pay for all hours worked in excess of 40 hours in such workweek.

8. **Violation:**
Liability for Unpaid Wages; Liquidated Damages: In the event of any violation of the clause set forth in paragraph 7 above, the contractor and any subcontractor responsible thereof shall be liable to the affected employee for his/her unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer, mechanic, watchman, or guard employed in violation of the clause set forth in paragraph 7, in the sum of $10 for each calendar day on which such employee was required or permitted to work in excess of the standard work week of 40 hours without payment of the overtime wages required by the clause set forth in paragraph 7.

9. **Withholding for Unpaid Wages and Liquidated Damages:**
The SHA shall upon its own action or upon written request of any authorized representative of the DOL withhold, or cause to be withheld, from any monies payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph 8 above.

V. STATEMENTS AND PAYROLLS

(Applicable to all Federal-aid construction contracts exceeding $2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural collectors, which are exempt.)

1. **Compliance with Copeland Regulations (29 CFR 3):**

The contractor shall comply with the Copeland Regulations of the Secretary of Labor which are herein incorporated by reference.

2. **Payrolls and Payroll Records:**

a. Payrolls and basic records relating thereto shall be maintained by the contractor and each subcontractor during the course of the work and preserved for a period of 3 years from the date of completion of the contract for all laborers, mechanics, apprentices, trainees, watchmen, helpers, and guards working at the site of the work.

b. The payroll records shall contain the name, social security number, and address of each such employee; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalent thereof the types described in Section 1(b)(2)(B) of the Davis Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. In addition, for Appalachian contracts, the payroll records shall contain a notation indicating whether the employee does, or does not, normally reside in the labor area as defined in Attachment A, paragraph 1. Whenever the Secretary of Labor, pursuant to Section IV, paragraph 3b, has found that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis Bacon Act, the contractor and each subcontractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, that the plan or program has been communicated in writing to the laborers or mechanics affected, and show the cost anticipated or the actual cost incurred in providing benefits. Contractors or subcontractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprentices and trainees, and ratios and wage rates prescribed in the applicable programs.

c. Each contractor and subcontractor shall furnish, each week in which any contract work is performed, to the SHA resident engineer a payroll of wages paid each of its employees (including apprentices, trainees, and helpers, described in Section IV, paragraphs 4 and 5, and watchmen and guards engaged on work during the preceding weekly payroll period). The payroll submitted shall set out accurately and completely all of the information required to be maintained under paragraph 2b of this Section V. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal stock number 029-005-0014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

d. Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his/her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) that the payroll for the payroll period contains the information required to be maintained under paragraph 2b of this Section V and that such information is correct and complete;

(2) that such laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in the Regulations, 29 CFR 3;

(3) that each laborer or mechanic has been paid not less that the applicable wage rate and fringe benefits or cash equivalent for the classification of worked performed, as specified in the applicable wage determination incorporated into the contract.

e. The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 2d of this Section V.

f. The falsification of any of the above certifications may subject the contractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 231.

g. The contractor or subcontractor shall make the records required under paragraph 2b of this Section V available for inspection, copying, or transcription by authorized representatives of the SHA, the FHWA, or the DOL, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the SHA, the FHWA, the DOL, or all may, after written notice to the contractor, sponsor, applicant, or owner, take such actions as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

VI. RECORD OF MATERIALS, SUPPLIES, AND LABOR

1. On all Federal-aid contracts on the National Highway System, except those which provide solely for the installation of protective devices at railroad grade crossings, those which are constructed on a force account or direct labor basis, highway beautification contracts, and contracts for which the total final construction cost for roadway and bridge is less than $1,000,000 (23 CFR 635) the contractor shall:

   a. Become familiar with the list of specific materials and supplies contained in Form FHWA-47, "Statement of Materials and Labor Used by Contractor of Highway Construction Involving Federal Funds," prior to the commencement of work under this contract.

   b. Maintain a record of the total cost of all materials and supplies purchased for and incorporated in the work, and also of the quantities of those specific materials and supplies listed on Form FHWA-47, and in the units shown on Form FHWA-47.

   c. Furnish, upon the completion of the contract, to the SHA resident engineer on Form FHWA-47 together with the data required in paragraph 1b relative to materials and supplies, a final labor summary of all contract work indicating the total hours worked and the total amount earned.

2. At the prime contractor's option, either a single report covering all contract work or separate reports for the contractor and for each subcontract shall be submitted.

VII. SUBLETTING OR ASSIGNING THE CONTRACT

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the State. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635).

   a. "Its own organization" shall be construed to include only workers employed and paid directly by the prime contractor and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor, assignee, or agent of the prime contractor.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph 1 of Section VII is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the SHA contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the SHA contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the SHA has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

VIII. SAFETY - ACCIDENT PREVENTION

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the SHA contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).

IX. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, the following notice shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

Notice To All Personnel Engaged On Federal-Aid Highway Projects

18 U.S.C. 1020 READS AS FOLLOWS:

"Whoever being an officer, agent, or employee of the United States, or any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined not more that $10,000 or imprisoned not more than 5 years or both."

X. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

(Applicable to all Federal-aid construction contracts and to all related subcontracts of $100,000 or more.)

By submission of this bid or the execution of this contract, or subcontract, as appropriate, the bidder, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any facility that is or will be utilized in the performance of this contract, unless such contract is exempt under the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Pub.L. 91-604), and under the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., as amended by Pub.L. 92-500), Executive Order 11738, and regulations in implementation thereof (40 CFR 15) is not listed, on the date of contract award, on the U.S. Environmental Protection Agency (EPA) List of Violating Facilities pursuant to 40 CFR 15.20.

2. That the firm agrees to comply and remain in compliance with all the requirements of Section 114 of the Clean Air Act and Section 308 of the Federal Water Pollution Control Act and all regulations and guidelines listed thereunder.

3. That the firm shall promptly notify the SHA of the receipt of any communication from the Director, Office of Federal Activities, EPA, indicating that a facility that is or will be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities.

4. That the firm agrees to include or cause to be included the requirements of paragraph 1 through 4 of this Section X in every nonexempt subcontract, and further agrees to take such action as the government may direct as a means of enforcing such requirements.

XI. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

1. **Instructions for Certification - Primary Covered Transactions:**

(Applicable to all Federal-aid contracts - 49 CFR 29)

a. By signing and submitting this proposal, the prospective primary participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective primary participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the department or agency determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause of default.

d. The prospective primary participant shall provide immediate written notice to the department or agency to whom this proposal is submitted if any time the prospective primary participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the department or agency to which this proposal is submitted for assistance in obtaining a copy of those regulations.

f. The prospective primary participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective primary participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the nonprocurement portion of the "Lists of Parties Excluded From Federal Procurement or Nonprocurement Programs" (Nonprocurement List) which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph f of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

2. **Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion — Primary Covered Transactions:**

a. The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(2) Have not within a 3-year period preceding this proposal been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph 1b of this certification; and

(4) Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

3. **Instructions for Certification - Lower Tier Covered Transactions:**
(Applicable to all subcontracts, purchase orders and other lower tier transactions of $25,000 or more - 49 CFR 29)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "primary covered transaction," "participant," "person," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

4. **Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion — Lower Tier Covered Transactions:**

a. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

b. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

XII. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

(Applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000 - 49 CFR 20)

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

   a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

   b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting his or her bid or proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

FEDERAL-AID FEMALE AND MINORITY GOALS

In accordance with Section II, "Nondiscrimination," of "Required Contract Provisions Federal-aid Construction Contracts" the following are the goals for female utilization:

Goal for Women (applies nationwide).....(percent) 6.9

The following are goals for minority utilization:

CALIFORNIA ECONOMIC AREA

		Goal (Percent)
174	**Redding, CA:**	
	Non-SMSA Counties	6.8
	CA Lassen; CA Modoc;CA Plumas;CA Shasta; CA Siskiyou; CA Tehama.	
175	**Eureka, CA**	
	Non-SMSA Counties	6.6
	CA Del Norte; CA Humboldt; CA Trinity.	
176	**San Francisco-Oakland-San Jose, CA:**	
	SMSA Counties:	
	7120 Salinas-Seaside-Monterey, CA	28.9
	CA Monterey.	
	7360 San Francisco-Oakland	25.6
	CA Alameda; CA Contra Costa; CA Marin; CA San Francisco; CA San Mateo.	
	7400 San Jose, CA	19.6
	CA Santa Clara.	
	7485 Santa Cruz, CA.	14.9
	CA Santa Cruz.	
	7500 Santa Rosa, CA	9.1
	CA Sonoma.	
	8720 Vallejo-Fairfield- Napa, CA	17.1
	CA Napa; CA Solano	
	Non-SMSA Counties	23.2
	CA Lake; CA Mendocino; CA San Benito	
177	**Sacramento, CA**:	
	SMSA Counties:	
	6920 Sacramento, CA	16.1
	CA Placer; CA Sacramento; CA Yolo.	
	Non-SMSA Counties	14.3
	CA Butte; CA Colusa; CA El Dorado; CA Glenn; CA Nevada; CA Sierra; CA Sutter; CA Yuba.	
178	**Stockton-Modesto, CA:**	
	SMSA Counties:	
	5170 Modesto, CA	12.3
	CA Stanislaus.	
	8120 Stockton, CA	24.3
	CA San Joaquin.	
	Non-SMSA Counties	19.8
	CA Alpine; CA Amador; CA Calaveras; CA Mariposa;CA Merced; CA Tuolumne.	

		Goal (Percent)
179	**Fresno-Bakersfield, CA**	
	SMSA Counties:	
	0680 Bakersfield, CA	19.1
	CA Kern.	
	2840 Fresno, CA	26.1
	CA Fresno.	
	Non-SMSA Counties	23.6
	CA Kings; CA Madera; CA Tulare.	
180	**Los Angeles, CA:**	
	SMSA Counties:	
	0360 Anaheim-Santa Ana-Garden Grove, CA	11.9
	CA Orange.	
	4480 Los Angeles-Long Beach, CA	28.3
	CA Los Angeles.	
	6000 Oxnard-Simi Valley-Ventura, CA	21.5
	CA Ventura.	
	6780 Riverside-San Bernardino-Ontario, CA.	19.0
	CA Riverside; CA San Bernardino.	
	7480 Santa Barbara-Santa Maria-Lompoc, CA	19.7
	CA Santa Barbara.	
	Non-SMSA Counties	24.6
	CA Inyo; CA Mono; CA San Luis Obispo.	
181	**San Diego, CA:**	
	SMSA Counties	
	7320 San Diego, CA.	16.9
	CA San Diego.	
	Non-SMSA Counties	18.2
	CA Imperial.	

In addition to the reporting requirements set forth elsewhere in this contract the Contractor and subcontractors holding subcontracts, not including material suppliers, of $10,000 or more, shall submit for every month of July during which work is performed, employment data as contained under Form FHWA PR-1391 (Appendix C to 23 CFR, Part 230), and in accordance with the instructions included thereon.

FEDERAL REQUIREMENT TRAINING SPECIAL PROVISIONS

As part of the Contractor's equal employment opportunity affirmative action program, training shall be provided as follows:

The Contractor shall provide on-the-job training to develop full journeymen in the types of trades or job classification involved.

The goal for the number of trainees or apprentices to be trained under the requirements of this special provision will be 9.

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.