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

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

Note: Addenda information is NOT included with the electronic documents available via electronic file transfer. Only bidder or non-bidder package holders listed with the Caltrans Plans and Bid Documents section as described above will receive addenda information.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS
AND
SPECIAL PROVISIONS

FOR CONSTRUCTION ON STATE HIGHWAY IN

NAPA COUNTY IN NAPA ON ROUTE 29 FROM

FIRST STREET OVERCROSSING TO SIERRA AVENUE

DISTRICT 04, ROUTE 29

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

CONTRACT NO. 04-120614

04-Nap-29-12.0,18.5/21.7

Federal Aid Project

ACSTP-P029(089)E

Bids Open: October 2, 2001
Dated: August 13, 2001

OSD

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IMPORTANT SPECIAL NOTICES

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- The bidder's attention is directed to Section 5, containing specifications for "Disputes Review Board," of the Special Provisions, regarding establishing a Disputes Review Board (DRB) for the project.

- The Special Provisions for Federal-aid projects (with and without DBE goals) have been revised to incorporate changes made by new regulations governing the DBE Program (49 CFR Part 26).

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

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

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

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

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

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

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

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

- **Payment Bonds**
  Attention is directed to Section 5 of the Special Provisions, regarding contract bonds. The payment bond shall be in a sum not less than one hundred percent of the total amount payable by the terms of the contract.

- Attention is directed to Section 11-2, "Portland Cement Concrete," of these Special Provisions which contains Section 90, "Portland Cement Concrete," of the Standard Specifications.

- Attention is directed to "Miscellaneous Metal," in Section 8-1, "Miscellaneous," of these Special Provisions for new requirements for miscellaneous metal.

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

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A77J	Metal Beam Guard Railing Connections to Bridge Railings, Retaining Walls and Abutments
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DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS

CONTRACT NO. 04-120614

04-Nap-29-12.0,18.5/21.7

Sealed proposals for the work shown on the plans entitled:

STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROJECT PLANS FOR CONSTRUCTION ON STATE HIGHWAY IN NAPA COUNTY IN NAPA ON ROUTE 29 FROM FIRST STREET OVERCROSSING TO SIERRA AVENUE

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 October 2, 2001, 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 NAPA COUNTY IN NAPA ON ROUTE 29 FROM FIRST STREET OVERCROSSING TO SIERRA AVENUE

General work description: 3 CAST-IN-PLACE PRESTRESSED CONCRETE BOX GIRDER BRIDGES, 3 RETAINING WALLS, 2 SOUND WALLS AND A PUMPING PLANT TO BE CONSTRUCTED.

This project has a goal of 14 percent disadvantaged business enterprise (DBE) participation.

No prebid meeting is scheduled for this project.

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

Bids are required for the entire work described herein.

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

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

Bidder inquiries may be made as follows:

The Department will consider bidder inquiries only when a completed "Bidder Inquiry" form is submitted. A copy of the "Bidder Inquiry" form is available at the Internet address shown below. The bidder inquiry shall include the bidder's name and telephone number. Submit "Bidder Inquiry" forms to:

Construction Program Duty Senior
111 Grand Avenue
Oakland, CA 94612

Fax Number: (510) 622-1805
E-mail: DUTY_SENIOR_DISTRICT04@ dot.ca.gov
Tel. Number: (510) 286-5209

To expedite processing, submittal of "Bidder Inquiry" forms via Fax or E-mail is preferred.

To the extent feasible and at the discretion of the Department, completed "Bidder Inquiry" forms submitted for consideration will be investigated, and responses will be posted on the Internet at:

http://www.dot.ca.gov /hq/esc/oe/project_status/bid_inq.html

The responses to bidders' inquiries, unless incorporated into formal addenda to the contract, are not a part of the contract, and are provided for the bidder's convenience only. In some instances, the question and answer may represent a summary of the matters discussed rather than a word-for-word recitation. The availability or use of information provided in the responses to bidders' inquiries is not to be construed in any way as a waiver of the provisions of Section 2-1.03 of the Standard Specifications or any other provision of the contract, the plans, Standard Specifications or Special Provisions, nor to excuse the contractor from full compliance with those contract requirements. Bidders are cautioned that subsequent responses or contract addenda may affect or vary a response previously given.

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

Cross sections for this project are available at the office of the District Director of Transportation of the district in which the work is situated in paper or electronic copy format.

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

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

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

Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates in the county, or counties, in which the work is to be done have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, available at the Labor Compliance Office at the offices of the District Director of Transportation for the district in which the work is situated, and available from the California Department of Industrial Relations' Internet Web Site at: http://www.dir.ca.gov. The Federal minimum wage rates for this project as predetermined by the United States Secretary of Labor are set forth in the books issued for bidding purposes entitled "Proposal and Contract," and in copies of this book that may be examined at the offices described above where project plans, special provisions, and proposal forms may be seen. 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.

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

DEPARTMENT OF TRANSPORTATION

Deputy Director Transportation Engineering

Dated August 13, 2001

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COPY OF ENGINEER'S ESTIMATE

(NOT TO BE USED FOR BIDDING PURPOSES)

04-120614

Item	Item Code	Item	Unit of Measure	Estimated Quantity
1	022065	CONSTRUCT RAILROAD TRACKS	LS	LUMP SUM
2	022066	REMOVE RAILROAD TRACKS	LS	LUMP SUM
3	022067	SURVEY OF EXISTING NON-HIGHWAY FACILITIES	LS	LUMP SUM
4	022068	VIBRATION MONITORING	EA	650
5	022069	TEMPORARY MONITORING WELLS	M	190
6	022070	TEMPORARY DECKING	LS	LUMP SUM
7	070010	PROGRESS SCHEDULE (CRITICAL PATH)	LS	LUMP SUM
8	070018	TIME-RELATED OVERHEAD	WDAY	910
9	071322	TEMPORARY FENCE (TYPE CL-1.8)	M	1440
10	022071	4.3 M TEMPORARY GATE (TYPE CL-1.8)	EA	2
11	073026	300 MM TEMPORARY CULVERT	M	154
12	022072	300 MM TEMPORARY AFES	EA	3
13	022073	JACKED 300 MM TEMPORARY CULVERT	M	13
14	073028	450 MM TEMPORARY CULVERT	M	3
15	073031	900 MM TEMPORARY CULVERT	M	35
16	073034	1350 MM TEMPORARY CULVERT	M	93
17	022074	LEAD COMPLIANCE PLAN	LS	LUMP SUM
18	022075	NON-STORM WATER DISCHARGE	LS	LUMP SUM
19	022076	HEALTH AND SAFETY PLAN (HAZARDOUS MATERIAL)	LS	LUMP SUM
20	074019	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	LUMP SUM

Item	Item Code	Item	Unit of Measure	Estimated Quantity
21 (S)	074020	WATER POLLUTION CONTROL	LS	LUMP SUM
22 (S)	022077	TEMPORARY COVER	LS	LUMP SUM
23 (S)	022078	TEMPORARY DRAINAGE INLET PROTECTION	EA	40
24 (S)	022079	TEMPORARY CONCRETE WASHOUT FACILITY	LS	LUMP SUM
25 (S)	022080	TEMPORARY FENCE (TYPE ESA)	M	270
26	022081	TEMPORARY ENTRANCE/EXIT	LS	LUMP SUM
27 (S)	074023	TEMPORARY EROSION CONTROL	M2	100 000
28 (S)	074029	TEMPORARY SILT FENCE	M	300
29 (S)	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM
30 (S)	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM
31 (S)	128650	PORTABLE CHANGEABLE MESSAGE SIGN	EA	3
32 (S)	129000	TEMPORARY RAILING (TYPE K)	M	9150
33 (S)	129100	TEMPORARY CRASH CUSHION MODULE	EA	240
34	150205	ABANDON REINFORCED CONCRETE BOX	EA	1
35	150206	ABANDON CULVERT	EA	3
36	150221	ABANDON INLET	EA	3
37	150305	OBLITERATE SURFACING	M2	11 300
38	150608	REMOVE CHAIN LINK FENCE	M	1320
39	022082	RECONSTRUCT STEEL GATE	LS	LUMP SUM
40	150662	REMOVE METAL BEAM GUARD RAILING	M	200

Item	Item Code	Item	Unit of Measure	Estimated Quantity
41	150668	REMOVE FLARED END SECTION	EA	1
42	150711	REMOVE PAINTED TRAFFIC STRIPE	M	4250
43	150713	REMOVE PAVEMENT MARKING	M2	120
44	150714	REMOVE THERMOPLASTIC TRAFFIC STRIPE	M	230
45	022083	REMOVE YELLOW THERMOPLASTIC TRAFFIC STRIPE	M	1050
46	150722	REMOVE PAVEMENT MARKER	EA	490
47	150771	REMOVE ASPHALT CONCRETE DIKE	M	130
48	150805	REMOVE CULVERT	M	500
49	150820	REMOVE INLET	EA	9
50	150821	REMOVE HEADWALL	EA	5
51	150826	REMOVE MANHOLE	EA	5
52	150860	REMOVE BASE AND SURFACING	M3	160
53	151265	SALVAGE SINGLE THRIE BEAM BARRIER	M	700
54	151266	SALVAGE DOUBLE THRIE BEAM BARRIER	M	610
55	151281	SALVAGE ROADSIDE SIGN	EA	50
56	151540	RECONSTRUCT CHAIN LINK FENCE	M	278
57	152390	RELOCATE ROADSIDE SIGN	EA	3
58 (S)	153153	COLD PLANE ASPHALT CONCRETE PAVEMENT (45 MM MAXIMUM)	M2	6650
59 (S)	153154	COLD PLANE ASPHALT CONCRETE PAVEMENT (60 MM MAXIMUM)	M2	540
60	022084	REMOVE CONCRETE PAVEMENT	M3	90

Item	Item Code	Item	Unit of Measure	Estimated Quantity
61	153211	REMOVE CONCRETE SIDEWALK AND DRIVEWAY	M3	76
62	153215	REMOVE CONCRETE (CURB AND GUTTER)	M3	11
63	153222	REMOVE CONCRETE ISLAND (PORTIONS)	M3	110
64	153239	REMOVE CONCRETE (CURB, GUTTER, AND SIDEWALK)	M3	180
65	153250	REMOVE SOUND WALL	LS	LUMP SUM
66	160101	CLEARING AND GRUBBING	LS	LUMP SUM
67	170101	DEVELOP WATER SUPPLY	LS	LUMP SUM
68	190101	ROADWAY EXCAVATION	M3	411 000
69	190103	ROADWAY EXCAVATION (TYPE Y) (AERIALLY DEPOSITED LEAD)	M3	9000
70	022085	ROADWAY EXCAVATION (TYPE R)	M3	1350
71 (F)	048659	STRUCTURE EXCAVATION, INVERTED SIPHON	M3	2220
72 (F)	192020	STRUCTURE EXCAVATION (TYPE D)	M3	3170
73 (F)	192026	STRUCTURE EXCAVATION (PUMPING PLANT)	M3	4550
74 (F)	048660	STRUCTURE EXCAVATION, RETAINING WALL (TYPE D)	M3	5825
75 (F)	192027	STRUCTURE BACKFILL (PUMPING PLANT) (TYPE A)	M3	1800
76 (F)	048661	STRUCTURE BACKFILL, INVERTED SIPHON	M3	950
77 (F)	193003	STRUCTURE BACKFILL (BRIDGE)	M3	2090
78 (F)	193013	STRUCTURE BACKFILL (RETAINING WALL)	M3	7000
79	193114	SAND BACKFILL	M3	27
80	194001	DITCH EXCAVATION	M3	500

Item	Item Code	Item	Unit of Measure	Estimated Quantity
81	198200	SUBGRADE ENHANCEMENT FABRIC	M2	6560
82 (S)	203001	EROSION CONTROL (BLANKET)	M2	5010
83 (S)	203026	MOVE IN/MOVE OUT (EROSION CONTROL)	EA	6
84 (F)	022131	MOVE IN/MOVE OUT (TEMPORARY EROSION CONTROL)	EA	6
85 (S)	203003	STRAW (EROSION CONTROL)	TONN	45
86 (S)	203014	FIBER (EROSION CONTROL)	KG	7170
87 (S)	203021	FIBER ROLLS	M	5170
88 (S)	203024	COMPOST (EROSION CONTROL)	KG	20 700
89 (S)	022086	PURE LIVE SEED-TYPE 1 (EROSION CONTROL)	KG	330
90 (S)	022087	PURE LIVE SEED-TYPE 2 (EROSION CONTROL)	KG	87
91 (S)	022088	PURE LIVE SEED-TYPE 3 (EROSION CONTROL)	KG	14
92 (S)	022089	PURE LIVE SEED-TYPE 4 (EROSION CONTROL)	KG	170
93 (S)	022090	PURE LIVE SEED-TYPE 5 (EROSION CONTROL)	KG	91
94 (S)	203061	STABILIZING EMULSION (EROSION CONTROL)	KG	1580
95 (S)	022091	INITIAL SITE WORK	LS	LUMP SUM
96 (S)	022092	MAINTAIN EXISTING PLANTING	LS	LUMP SUM
97 (S)	022093	WATER METER	EA	2
98	022094	150 MM PLASTIC PIPE SCH 40 SUPPLY LINE	M	79
99 (S)	208731	200 MM CORRUGATED HIGH DENSITY POLYETHYLENE PIPE CONDUIT	M	150
100	250401	CLASS 4 AGGREGATE SUBBASE	M3	10 800

Item	Item Code	Item	Unit of Measure	Estimated Quantity
101	260201	CLASS 2 AGGREGATE BASE	M3	455
102	260301	CLASS 3 AGGREGATE BASE	M3	16 900
103	290201	ASPHALT TREATED PERMEABLE BASE	M3	4080
104	373900	ASPHALTIC EMULSION	TONN	5.4
105	390152	ASPHALT CONCRETE	TONN	37 500
106	390165	ASPHALT CONCRETE (OPEN GRADED)	TONN	3030
107	394002	PLACE ASPHALT CONCRETE (MISCELLANEOUS AREA)	M2	1480
108	394040	PLACE ASPHALT CONCRETE DIKE (TYPE A)	M	3190
109	394048	PLACE ASPHALT CONCRETE DIKE (TYPE E)	M	940
110	490706	FURNISH PILING (CLASS 900C)	M	3042
111 (S)	490707	DRIVE PILE (CLASS 900C)	EA	220
112	490757	FURNISH PILING (CLASS 625C)	M	1995
113 (S)	490758	DRIVE PILE (CLASS 625C)	EA	153
114	490759	FURNISH PILING (CLASS 400C)	M	9285
115 (S)	490760	DRIVE PILE (CLASS 400C)	EA	963
116 (S)	498030	600 MM CAST-IN-DRILLED-HOLE CONCRETE PILING (SOUND WALL)	M	1871
117 (S)	500001	PRESTRESSING CAST-IN-PLACE CONCRETE	LS	LUMP SUM
118 (S)	500060	TIEDOWN ANCHOR	EA	50
119	510000	SEAL COURSE CONCRETE	M3	640
120	022095	STRUCTURAL CONCRETE, BOX CULVERT	M3	180

Item	Item Code	Item	Unit of Measure	Estimated Quantity
121 (F)	510051	STRUCTURAL CONCRETE, BRIDGE FOOTING	M3	567
122 (F)	048662	STRUCTURAL CONCRETE, INVERTED SIPHON	M3	620
123 (F)	510053	STRUCTURAL CONCRETE, BRIDGE	M3	2930
124 (F)	510060	STRUCTURAL CONCRETE, RETAINING WALL	M3	2663
125 (F)	510069	STRUCTURAL CONCRETE (PUMPING PLANT)	M3	900
126 (F)	048663	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE RAILROAD)	M3	17
127 (F)	510086	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE N)	M3	155
128	510217	CLASS 3 CONCRETE	M3	140
129	022096	MINOR CONCRETE (BROOM FINISH)	M2	2330
130 (F)	510502	MINOR CONCRETE (MINOR STRUCTURE)	M3	640
131	510526	MINOR CONCRETE (BACKFILL)	M3	240
132 (F)	048664	ARCHITECTUAL TREATMENT (CHISELED LIMESTONE)	M2	280
133 (F)	048665	ARCHITECTUAL TREATMENT (FRACTURED RIB/GRAPEVINE PATTERN)	M2	815
134 F)	511064	FRACTURED RIB TEXTURE	M2	760
135 (S-F)	517961	SOUND WALL (BARRIER) (MASONRY BLOCK)	M2	1255
136 (S-F)	518002	SOUND WALL (MASONRY BLOCK)	M2	1960
137 (S)	518205	MASONRY BLOCK VENEER	M2	310
138 (S)	519124	JOINT SEAL ASSEMBLY (MR 60 MM)	M	10
139 (S)	519142	JOINT SEAL (MR 40 MM)	M	66
140	520101	BAR REINFORCING STEEL	KG	14 400

Item	Item Code	Item	Unit of Measure	Estimated Quantity
141 (S-F)	048666	BAR REINFORCING STEEL, INVERTED SIPHON	KG	56 200
142 (S-F)	520102	BAR REINFORCING STEEL (BRIDGE)	KG	566 700
143 (S-F)	520103	BAR REINFORCING STEEL (RETAINING WALL)	KG	170 500
144	520107	BAR REINFORCING STEEL (BOX CULVERT)	KG	180
145 (S-F)	520113	BAR REINFORCING STEEL (PUMPING PLANT)	KG	95 300
146 (S-F)	540104	WATERPROOFING AND COVER	M2	1342
147 (F)	560218	FURNISH SIGN STRUCTURE (TRUSS)	KG	11 410
148 (S-F)	560219	INSTALL SIGN STRUCTURE (TRUSS)	KG	11 410
149	561008	760 MM CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	M	12
150	561009	920 MM CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	M	5
151	566011	ROADSIDE SIGN - ONE POST	EA	49
152	566012	ROADSIDE SIGN - TWO POST	EA	13
153	568001	INSTALL SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	6
154	620910	450 MM ALTERNATIVE PIPE CULVERT (TYPE A)	M	2820
155	620913	600 MM ALTERNATIVE PIPE CULVERT	M	270
156	620924	900 MM ALTERNATIVE PIPE CULVERT	M	5
157	620930	1050 MM ALTERNATIVE PIPE CULVERT	M	2120
158	620940	1500 MM ALTERNATIVE PIPE CULVERT	M	96
159	650067	300 MM REINFORCED CONCRETE PIPE	M	6
160	650068	375 MM REINFORCED CONCRETE PIPE	M	300

Item	Item Code	Item	Unit of Measure	Estimated Quantity
161	650069	450 MM REINFORCED CONCRETE PIPE	M	230
162	650075	600 MM REINFORCED CONCRETE PIPE	M	110
163	650077	750 MM REINFORCED CONCRETE PIPE	M	92
164	664008	300 MM CORRUGATED STEEL PIPE	M	1
165	022097	450 MM CORRUGATED STEEL PIPE	M	62
166	022098	450 MM CORRUGATED STEEL PIPE WITH MEC	M	12
167	022099	80 MM UNSLOTTED PLASTIC PIPE (BRIDGE)	M	100
168	022100	80 MM SLOTTED PLASTIC PIPE (BRIDGE)	M	300
169	022101	80 MM PLASTIC PIPE (OUTLET) (BRIDGE)	M	60
170	681134	80 MM PLASTIC PIPE (EDGE DRAIN)	M	5340
171	022102	80 MM PLASTIC PIPE (APPROACH SLAB DRAIN) (BRIDGE)	M	70
172	022103	80 MM PLASTIC PIPE (APPROACH SLAB DRAIN OUTLET) (BRIDGE)	M	50
173	681990	FILTER FABRIC	M2	109 000
174	682045	CLASS 3 PERMEABLE MATERIAL	M3	16 300
175	685067	200 MM ALTERNATIVE PIPE UNDERDRAIN	M	5346
176	703450	WELDED STEEL PIPE CASING (BRIDGE)	M	47
177	703543	300 MM WELDED STEEL PIPE (3.40 MM THICK)	M	4
178	703568	450 MM WELDED STEEL PIPE (3.40 MM THICK)	M	180
179	022104	450 MM STEEL SPIRAL RIB PIPE (2MM THICK)	M	11
180	022105	1350 MM TEMPORARY WSP	M	17

Item	Item Code	Item	Unit of Measure	Estimated Quantity
181	703699	1500 MM WELDED STEEL PIPE (9.53 MM THICK)	M	30
182	703716	1800 MM WELDED STEEL PIPE (6.35 MM THICK)	M	230
183	705336	450 MM ALTERNATIVE FLARED END SECTION	EA	2
184	705575	1800 MM AUTOMATIC DRAINAGE GATE	EA	2
185	705659	1800 MM SLIDE HEADGATE	EA	2
186	022106	600 MM KNIFE GATE VALVE	EA	4
187	707479	900 MM REINFORCED CONCRETE PIPE RISER	M	62
188	022107	CITY MANHOLE	EA	6
189	022108	DRAINAGE PULL BOX	EA	5
190	721810	SLOPE PAVING (CONCRETE)	M2	920
191	731502	MINOR CONCRETE (MISCELLANEOUS CONSTRUCTION)	M3	520
192 (F)	731517	MINOR CONCRETE (GUTTER)	M	395
193	731530	MINOR CONCRETE (TEXTURED PAVING)	M2	95
194 (S)	740500	DRAINAGE PUMPING EQUIPMENT	LS	LUMP SUM
195 (S)	741001	PUMPING PLANT ELECTRICAL EQUIPMENT	LS	LUMP SUM
196 (F)	750001	MISCELLANEOUS IRON AND STEEL	KG	31 200
197 (S-F)	750501	MISCELLANEOUS METAL (BRIDGE)	KG	5050
198 (S-F)	750520	PUMPING PLANT METAL WORK	KG	5600
199 (S-F)	048667	INVERTED SIPHON METAL WORK	KG	15 000
200	800391	CHAIN LINK FENCE (TYPE CL-1.8)	M	400

Item	Item Code	Item	Unit of Measure	Estimated Quantity
201	022109	INSTALL TEMPORARY GATE	LS	LUMP SUM
202	802592	2.4 M CHAIN LINK GATE (TYPE CL-1.8)	EA	2
203	802671	4.3 M CHAIN LINK GATE (TYPE CL-1.8)	EA	2
204	820107	DELINEATOR (CLASS 1)	EA	50
205	820141	OBJECT MARKER (TYPE K-1)	EA	1
206 (S)	832003	METAL BEAM GUARD RAILING (WOOD POST)	M	370
207 (S-F)	833032	CHAIN LINK RAILING (TYPE 7)	M	682
208 (S-F)	833034	CHAIN LINK RAILING (TYPE 7L)	M	272
209 (S-F)	833088	TUBULAR HANDRAILING	M	19
210 (S-F)	833128	CONCRETE BARRIER (TYPE 25 MODIFIED)	M	296
211 (S-F)	833142	CONCRETE BARRIER (TYPE 26 MODIFIED)	M	147
212 (F)	833161	CONCRETE BARRIER (TYPE 27A)	M	300
213 (F)	833184	CONCRETE BARRIER (TYPE 27SV MODIFIED)	M	318
214 (S)	839302	SINGLE THRIE BEAM BARRIER (WOOD POST)	M	720
215 (S)	839311	DOUBLE THRIE BEAM BARRIER (WOOD POST)	M	1320
216 (S-F)	839521	CABLE RAILING	M	422
217 (S)	839545	RETURN SECTION (THRIE BEAM BARRIER)	EA	2
218 (S)	839552	TERMINAL SECTION (TYPE C)	EA	7
219	839559	TERMINAL SYSTEM (TYPE ET)	EA	1
220	839565	TERMINAL SYSTEM (TYPE SRT)	EA	7

Item	Item Code	Item	Unit of Measure	Estimated Quantity
221 (S)	839569	TERMINAL ANCHOR ASSEMBLY (TYPE CA)	EA	3
222	839631	CRASH CUSHION MODULE, SAND FILLED	EA	42
223	839704	CONCRETE BARRIER (TYPE 60D)	M	670
224 (F)	048668	CONCRETE BARRIER (TYPE 60D MODIFIED)	M	202
225 (S)	840515	THERMOPLASTIC PAVEMENT MARKING	M2	610
226 (S)	840561	100 MM THERMOPLASTIC TRAFFIC STRIPE	M	11 600
227 (S)	840562	150 MM THERMOPLASTIC TRAFFIC STRIPE	M	180
228 (S)	022110	150 MM THERMOPLASTIC TRAFFIC STRIPE (BROKEN 2.44 M - 1.22 M)	M	390
229 (S)	840563	200 MM THERMOPLASTIC TRAFFIC STRIPE	M	1630
230 (S)	840564	200 MM THERMOPLASTIC TRAFFIC STRIPE (BROKEN 3.66 M - 0.92 M)	M	460
231 (S)	840567	100 MM THERMOPLASTIC TRAFFIC STRIPE (BROKEN 1.83 M - 0.30 M)	M	270
232 (S)	840571	100 MM THERMOPLASTIC TRAFFIC STRIPE (BROKEN 5.18 M - 2.14 M)	M	1430
233 (S)	840656	PAINT TRAFFIC STRIPE (2-COAT)	M	13 200
234 (S)	840666	PAINT PAVEMENT MARKING (2-COAT)	M2	320
235 (S)	022111	PAVEMENT MARKER (NON-REFLECTIVE TYPE A)	EA	1200
236 (S)	850110	PAVEMENT MARKER (RETROREFLECTIVE-SPECIAL TYPE C)	EA	20
237 (S)	022111	PAVEMENT MARKER (RETROREFLECTIVE-SPECIAL TYPE D)	EA	340
238 (S)	850112	PAVEMENT MARKER (RETROREFLECTIVE-SPECIAL TYPE G)	EA	1120
239 (S)	850113	PAVEMENT MARKER (RETROREFLECTIVE-SPECIAL TYPE H)	EA	710
240 (S)	022113	SIGNAL AND LIGHTING (STAGE CONSTRUCTION)	LS	LUMP SUM

Item	Item Code	Item	Unit of Measure	Estimated Quantity
241 (S)	860251	SIGNAL AND LIGHTING (LOCATION 1)	LS	LUMP SUM
242 (S)	860252	SIGNAL AND LIGHTING (LOCATION 2)	LS	LUMP SUM
243 (S)	860253	SIGNAL AND LIGHTING (LOCATION 3)	LS	LUMP SUM
244 (S)	860254	SIGNAL AND LIGHTING (LOCATION 4)	LS	LUMP SUM
245 (S)	860402	LIGHTING (CITY STREET)	LS	LUMP SUM
246 (S)	022114	LIGHTING (POC)	LS	LUMP SUM
247 (S)	860460	LIGHTING AND SIGN ILLUMINATION	LS	LUMP SUM
248 (S)	022115	TRAFFIC OPERATIONS SYSTEM	LS	LUMP SUM
249	022116	305 MM DIP WATER MAIN INSIDE BRIDGE	M	59
250	022117	305 MM DIP WATER MAIN-BURIED	M	66
251	022118	305 MM BUTTERFLY VALVE	EA	2
252	022119	305 MM FLEXIBLE EXPANSION JOINT	EA	2
253	022120	TIE-IN TO EXISTING 305 MM WATER MAIN	EA	2
254	022121	203 MM DIP WATER MAIN (BURIED)	M	420
255	022122	FIRE HYDRANT	EA	3
256	022123	WATER SERVICES	EA	2
257	022124	TIE-IN TO EXISTING 203 MM WATER MAIN	EA	4
258	022125	TRASH RACK	EA	2
259	999990	MOBILIZATION	LS	LUMP SUM

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISIONS

Annexed to Contract No. 04-120614

SECTION 1. SPECIFICATIONS AND PLANS

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

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 indented 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.

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.

SECTION 2. PROPOSAL REQUIREMENTS AND CONDITIONS

2-1.01 GENERAL

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

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

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

Submit request for substitution of an "or equal" item, and the data substantiating the request to the Department of Transportation, Division Of Construction - Duty Senior, Mail Station: 3 - B, 111 Grand Avenue / P. O. Box 23660, Oakland, Ca 94623-0660, so that the request is received by the Department by close of business on the fourth day, not including Saturdays, Sundays and legal holidays, following bid opening.

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

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

2-1.015 FEDERAL LOBBYING RESTRICTIONS

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

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

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

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

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

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

2-1.02 DISADVANTAGED BUSINESS ENTERPRISE (DBE)

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

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

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

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

D. A DBE joint venture partner must be responsible for specific contract items of work, or portions thereof. Responsibility means actually performing, managing and supervising the work with its own forces. The DBE joint venture partner must share in the capital contribution, control, management, risks and profits of the joint venture. The DBE joint venturer must submit the joint venture agreement with the proposal or the DBE Information form required in the Section entitled "Submission of DBE Information" of these special provisions.
E. A DBE must perform a commercially useful function, i.e., must be responsible for the execution of a distinct element of the work and must carry out its responsibility by actually performing, managing and supervising the work.
F. DBEs must be certified by either the California Department of Transportation, or by a participating State of California or local agency which certifies in conformance with Title 49, Code of Federal Regulations, Part 26, as of the date of bid opening. It is the Contractor's responsibility to verify that DBEs are certified. Listings of DBEs certified by the Department are available from the following sources:

    1. The Department's DBE Directory, which is published quarterly. This Directory may be obtained from the Department of Transportation, Materiel Operations Branch, Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, California 95815, Telephone: (916) 445-3520.
    2. The Department's Electronic Information Bulletin Board Service, which is accessible by modem and is updated weekly. The Bulletin Board may be accessed by first contacting the Department's Business Enterprise Program at Telephone: (916) 227-8937 and obtaining a user identification and password.
    3. The Department's web site at http://www.dot.ca.gov/hq/bep/index.htm.
    4. The organizations listed in the Section entitled "DBE Goal for this Project" of these special provisions.

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

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

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

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

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

2-1.02A DBE GOAL FOR THIS PROJECT

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

Disadvantaged Business Enterprise (DBE): 14 percent

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

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

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

2-1.02B SUBMISSION OF DBE INFORMATION

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

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

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

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

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

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

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

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

SECTION 3. AWARD AND EXECUTION OF CONTRACT

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

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

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

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

Attention is directed to the provisions in 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.

This work shall be diligently prosecuted to completion before the expiration of **910 WORKING DAYS** beginning on the fifteenth calendar day after approval of the contract.

The Contractor shall pay to the State of California the sum of $1,300 per day, for each and every calendar day's delay in finishing the work in excess of the number of working days prescribed above.

SECTION 5. GENERAL

SECTION 5-1. MISCELLANEOUS

5-1.01 PLANS AND WORKING DRAWINGS

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

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

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

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

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

5-1.012 DIFFERING SITE CONDITIONS

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

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

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

5-1.015 LABORATORY

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

5-1.017 CONTRACT BONDS

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

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

5-1.018 EXCAVATION SAFETY PLANS

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."

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.

5-1.019 COST REDUCTION INCENTIVE

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

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

5-1.02 LABOR NONDISCRIMINATION

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

NOTICE OF REQUIREMENT FOR NONDISCRIMINATION PROGRAM

(GOV. CODE, SECTION 12990)

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

5-1.03 INTEREST ON PAYMENTS

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

A. Unpaid progress payments, payment after acceptance, and final payments shall begin to accrue interest 30 days after the Engineer prepares the payment estimate.
B. Unpaid extra work bills shall begin to accrue interest 30 days after preparation of the first pay estimate following receipt of a properly submitted and undisputed extra work bill. To be properly submitted, the bill must be submitted within 7 days of the performance of the extra work and in conformance with the provisions in Section 9-1.03C, "Records," and Section 9-1.06, "Partial Payments," of the Standard Specifications. An undisputed extra work bill not submitted within 7 days of performance of the extra work will begin to accrue interest 30 days after the preparation of the second pay estimate following submittal of the bill.
C. The rate of interest payable for unpaid progress payments, payments after acceptance, final payments, and extra work payments shall be 10 percent per annum.

D. The rate of interest payable on a claim, protest or dispute ultimately allowed under this contract shall be 6 percent per annum. Interest shall begin to accrue 61 days after the Contractor submits to the Engineer information in sufficient detail to enable the Engineer to ascertain the basis and amount of said claim, protest or dispute.

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

5-1.031 FINAL PAYMENT AND CLAIMS

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

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

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

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

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

5-1.04 PUBLIC SAFETY

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

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

A. Excavations**.—**The near edge of the excavation is 3.6 m or less from the edge of the lane, except:

1. Excavations covered with sheet steel or concrete covers of adequate thickness to prevent accidental entry by traffic or the public.
2. Excavations less than 0.3-m deep.
3. Trenches less than 0.3-m wide for irrigation pipe or electrical conduit, or excavations less than 0.3-m in diameter.
4. Excavations parallel to the lane for the purpose of pavement widening or reconstruction.
5. Excavations in side slopes, where the slope is steeper than 1:4 (vertical:horizontal).
6. Excavations protected by existing barrier or railing.

B. Temporarily Unprotected Permanent Obstacles**.—**The work includes the installation of a fixed obstacle together with a protective system, such as a sign structure together with protective railing, and the Contractor elects to install the obstacle prior to installing the protective system; or the Contractor, for the Contractor's convenience and with permission of the Engineer, removes a portion of an existing protective railing at an obstacle and does not replace such railing complete in place during the same day.

C. Storage Areas.—Material or equipment is stored within 3.6 m of the lane and the storage is not otherwise prohibited by the provisions of the Standard Specifications and these special provisions.

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

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

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

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

Approach Speed of Public Traffic (Posted Limit) (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 SURFACE MINING AND RECLAMATION ACT

Attention is directed to the Surface Mining and Reclamation Act of 1975, commencing in Public Resources Code, Mining and Geology, Section 2710, which establishes regulations pertinent to surface mining operations, and to California Public Contract Code Section 10295.5.

Material from mining operations furnished for this project shall only come from permitted sites in compliance with California Public Contract Code Section 10295.5.

The requirements of this section shall apply to materials furnished for the project, except for acquisition of materials in conformance with the provisions in Section 4-1.05, "Use of Materials Found on the Work," of the Standard Specifications.

5-1.06 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES

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

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

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

5-1.07 YEAR 2000 COMPLIANCE

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

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

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

5-1.075 BUY AMERICA REQUIREMENTS

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

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

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

5-1.08 SUBCONTRACTOR AND DBE RECORDS

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

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

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

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

5-1.083 DBE CERTIFICATION STATUS

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

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

5-1.086 PERFORMANCE OF DBE SUBCONTRACTORS AND SUPPLIERS

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

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

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

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

5-1.09 SUBCONTRACTING

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

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

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

The provisions in the third paragraph of Section 8-1.01, "Subcontracting," of the Standard Specifications, that the Contractor shall perform with the Contractor's own organization contract work amounting to not less than 50 percent of the original contract price, is not changed by the Federal Aid requirement specified under "Required Contract Provisions Federal-Aid Construction Contracts" in Section 14 of these special provisions that the Contractor perform not less than 30 percent of the original contract work with the Contractor's own organization.

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

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

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

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

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

5-1.10 PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS

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

5-1.102 PROMPT PAYMENT OF WITHHELD FUNDS TO SUBCONTRACTORS

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

5-1.11 PARTNERING

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

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

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

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. 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 special provision shall be considered as an essential prerequisite to filing a claim, for arbitration or 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 until the day of acceptance of the contract, at which time the work of the DRB will cease except for completion of unfinished dispute hearings and reports. After acceptance of the contract, disputes or potential claims that the Contractor wants to pursue that have not been settled, 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 completion of the State's administrative claims procedure, the Contractor may resort to arbitration in conformance with the provisions in Section 9-1.10, "Arbitration," of the Standard Specifications.

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 claims not actionable against the State as specified in these special provisions. Whenever the term "dispute" or "disputes" is used herein, it shall be deemed to include potential claims as well as disputes.

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

The DRB shall consist of one member selected by the State, one member selected by the Contractor, 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 DRB Chairperson.

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 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.

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.

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

The State and the Contractor shall select their respective 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 member along with the prospective member's written disclosure statement.

Before their appointments are final, the first 2 prospective DRB members shall submit complete disclosure statements to both the State and the Contractor. The statement shall include a resume of the prospective member's experience, together with a declaration describing past, present, and anticipated or planned future 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, the parties' principals or the parties' counsel. The DRB members shall also include a full disclosure of close professional or personal relationships with all key members of the parties to the contract. Either the Contractor or the State may object to the others nominee and that person will not be selected for the DRB. No reason need be given for the first objection. Objections to subsequent nominees must be based on a specific breech or violation of nominee responsibilities under this specification. A different person shall then be nominated within 14 Days. The third DRB member shall supply a full disclosure statement to the first 2 DRB members and to the parties prior to appointment. Either party may reject any of the 3 prospective DRB members who fail to fully comply with all required employment and financial disclosure conditions of DRB membership as described in the Dispute Review Board Agreement and herein. A copy of the Dispute Review Board Agreement is included in this special provision.

The first duty of the State and Contractor selected members of the DRB is to select and recommend prospective third member(s) 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 14 days of the notification.

An impasse shall be considered to have been reached if the parties are unable to approve a third member within 14 days of receipt of the recommendation of the first 2 DRB members, or if the first 2 members are unable to agree upon a recommendation within the 14 day time limit allowed in the preceding paragraph. In the event of an impasse in selection of the third DRB member, the State and the Contractor shall each propose 3 candidates for the third 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.

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 14 days of the parties' concurrence in the selection of the third member. 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.

The State and the Contractor shall bear the costs and expenses of the DRB equally. Each DRB board member shall be compensated at an agreed rate of $1,000 per day if time spent per meeting, including on-site time plus one hour of travel time, is greater than 4 hours. Each DRB board member shall be compensated at an agreed rate of $600 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, that has been specifically agreed to in advance by the parties, will be compensated at an agreed rate of $100 per hour. The agreed amount of $100 per hour shall include all incidentals including expenses for telephone, fax, and computer services. Members serving on more than one DRB, 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 provisions for compensation and expenses of the DRB. DRB members shall be compensated at the same daily and hourly rate. The Contractor shall make direct payments to each DRB member for their participation in authorized meetings and approved hourly rate charges from invoices submitted by each DRB member. The State will reimburse the Contractor for its share of the costs. There will be no markups applied to expenses connected with the DRB, either by the DRB members or by the Contractor when requesting payment of the State's share of DRB expenses.

Service of a DRB member may be terminated at any time with not less than 14 days notice as follows:

A. The State may terminate service of the State appointed member.
B. The Contractor may terminate service of the Contractor appointed member.
C. Upon the written recommendation of the State and Contractor members for the removal of the third member.
D. Upon resignation of a member.

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 14 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.

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, including provision of applicable cost documentation; or file written protests or notices in conformance with the provisions in the Standard Specifications and these special provisions.
B. The Engineer will respond, in writing, to the Contractor's written protest or notice within 14 days of receipt of the written protest or notice.
C. Within 14 days after receipt of the Engineer's written response, the Contractor shall, if the Contractor still objects, file a written reply with the Engineer, stating clearly and in detail the basis of the objection.
D. Following the Contractor's objection to the Engineer's decision, the Contractor shall refer the dispute to the DRB if the Contractor wishes to further pursue the objection to the Engineer's decision. The Contractor shall make the referral in writing to the DRB, simultaneously copied to the State, within 21 days after receipt of the written reply from the Engineer. The written dispute referral shall describe the disputed matter in individual discrete segments so that it will be clear to both parties and the DRB what discrete elements of the dispute have been resolved, and which remain unresolved and shall include an estimate of the cost of the affected work and impacts, if any, on project completion.
E. The Contractor, by failing to submit the written notice of referral of the matter to the DRB, within 21 days after receipt of the State's written reply, waives future claims 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 14 days prior to the date the DRB is scheduled to convene the hearing for the dispute. Either party shall produce such additional evidence as the DRB may deem necessary to reach an understanding and determination of the dispute. The party furnishing additional evidence shall furnish copies of such additional evidence to the other party at the same time the evidence is provided to the DRB. The DRB will not consider evidence not furnished in conformance with the terms specified herein.

G. 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 shall complete its reports, including minority opinion, if any, and submit them to the parties within 30 days of the DRB hearing, except that time extensions may be granted at the request of the DRB with the written concurrence of both parties. The report shall include the facts and circumstances related to the matters under consideration, applicable laws and regulations, the pertinent provisions of the Contract and the actual costs and time incurred as shown on the Contractor's cost accounting records. The DRB shall make recommendations on the merit of the dispute, and if appropriate, recommend guidelines for determining compensation.

H. 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 presented in the report by either party, shall conclusively indicate that the party(s) failing to respond accepts the DRB recommendation. Immediately after responses have been received by both parties, the DRB will provide copies of both responses to the parties simultaneously. Either party may request clarification of elements of the DRB's report from the DRB prior to responding to the report. The DRB will consider any clarification request only if submitted within 10 days of receipt of the DRB's report, and if submitted simultaneously in writing to both the DRB and the other party. Each party may submit only one request for clarification for any individual DRB report. The DRB shall respond, in writing, to requests for clarification within 10 days of receipt of such requests.

I. 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.

J. 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.

K. The State or the Contractor shall not call 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.

L. 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.

M. 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 CLAIMS

For purposes of this section, a "subcontractor claim" shall include any claim by a subcontractor (including also any pass through 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 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 claim or claims.

B. The Contractor shall include, as part of its submission pursuant to Step 4 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 claim. The Contractor shall submit a certification that the subcontractor claim is acknowledged and forwarded by the Contractor. The form for these certifications are available from the Engineer.

C. At any DRB meeting on a dispute that includes one or more subcontractor claims, the Contractor shall require that each subcontractor that is involved in the dispute have present an authorized representative with actual knowledge of the facts underlying the subcontractor claim to assist in presenting the subcontractor claim and to answer questions raised by the DRB members or the Department's representatives.

D. Failure by the Contractor to declare a subcontractor claim on behalf of its subcontractor (including lower tier subcontractors' and suppliers' pass through claims) at the time of submission of the Contractor's claims, as provided hereunder, shall constitute a release of the Department by the Contractor on account of such subcontractor claim.

E. The Contractor shall include in all subcontracts under this contract that subcontractors and suppliers of any tier (a) agree to submit subcontractor 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 claims; (c) agree that, to the extent a subcontractor 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 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 claims between the subcontractor(s) or supplier(s) and the Contractor that is not actionable by the Contractor against the Department.

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 (01-05-98)

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 which is serious enough to warrant the DRB's review does develop, the process for prompt and efficient action will be in place.

B. PROCEDURES

The DRB shall render written reports on disputes between the parties arising from the construction contract. Prior to consideration of a dispute, the DRB shall establish rules and regulations that will govern the conduct of its business and reporting procedures in conformance with the requirements of the contract and the terms of this AGREEMENT. DRB recommendations, resulting from its consideration of a dispute, shall be furnished in writing to both parties. The recommendations shall be based on the pertinent contract provisions, and the facts and circumstances involved in the dispute. The recommendations shall find one responsible party in a dispute; shared or "jury" determinations shall not be rendered. The DRB shall make recommendations on the merit of the dispute, and if appropriate, recommend guidelines for determining compensation. If the parties cannot agree on compensation within 60 days of the acceptance by both parties of the DRB's recommendation, either party may request the DRB to make a recommendation regarding compensation.

The DRB shall refrain from officially giving advice or consulting services to anyone involved in the contract. The individual members shall act in a completely independent manner and while serving as members of the DRB shall have no consulting business connections with either party or its principals or attorneys or other affiliates (subcontractors, suppliers, etc.) who have a beneficial interest in the contract.

During scheduled meetings of the DRB as well as during dispute hearings, 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 6 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 claims.

The STATE's representative will prepare minutes of all regular meetings and circulate them for revision and approval by all concerned.

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 DRB shall determine the time and location of DRB hearings, with due consideration for the needs and preferences of the parties while recognizing the paramount importance of speedy resolution of issues. If the matter is not urgent, it may be scheduled for the time of the next scheduled DRB visit to the project. For an urgent matter, and upon the request of either party, the DRB shall meet at its earliest convenience.

Normally, hearings shall be conducted at or near the project site. However, any location which 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 hearings. It is expressly understood that the DRB members are to act impartially and independently in the consideration of the contract provisions, and the facts and conditions surrounding any dispute presented by either party, and that the recommendations concerning any such dispute are advisory and nonbinding on the parties.

The DRB may request that written documentation and arguments from both parties be sent to each DRB member, through the DRB Chairperson, for review before the hearing 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 hearings 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 hearings and all other DRB activities. The parties shall have a representative at all hearings. Failure to attend a duly noticed meeting by either of the parties shall be conclusively considered by the DRB as indication that the non-attending party considers written submittals as their entire and complete argument. The claimant shall discuss the dispute, followed by the other party. Each party shall then be allowed one or more rebuttals until all aspects of the dispute are thoroughly covered. DRB members may ask questions, seek clarification, or request further data from either of the parties. 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. Claims shall not necessarily be computed by merely subtracting bid price from the total cost of the affected work. However, if claims are based on the "total cost method," then, to be considered by the DRB, they shall be supported by evidence furnished by the CONTRACTOR that (1) the nature of the dispute(s) makes it impossible or impracticable to determine costs with a reasonable degree of accuracy, (2) the CONTRACTOR's bid estimate was realistic, (3) the CONTRACTOR's actual costs were reasonable, and (4) the CONTRACTOR was not responsible for the added expenses. As to claims based on the CONTRACTOR's field or home office accounting records, those claims shall be supported by an audit report of an independent Certified Public Accountant unless the contract includes special provisions that provide for an alternative method to calculate unabsorbed home office overhead. Any of those claims shall also be subject to audit by the DRB with the concurrence of the parties. In large or complex cases, additional hearings 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 hearings, 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 hearings 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 chairman shall complete and furnish a summary report to the DRB Program Manager, Construction Program, 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 14 days. This AGREEMENT will be amended to indicate change in DRB membership.

SECTION III CONTRACTOR RESPONSIBILITIES

The CONTRACTOR shall furnish to each DRB member one copy of pertinent documents which are or may become necessary for the DRB to perform their function. Pertinent documents are 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 board member shall be compensated at an agreed rate of $1,000 per day if time spent per meeting, including on-site time plus one hour of travel time, is greater than 4 hours. Each DRB board member shall be compensated at an agreed rate of $600 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 $100 per hour. The agreed amount of $100 per hour shall include all incidentals including expenses for telephone, fax, and computer services. Members serving on more than one DRB, regardless of the number of meetings per day, shall not be paid more than the all inclusive rate per day or rate per hour for an individual project. The STATE will provide, at no cost to the CONTRACTOR, administrative services such as conference facilities and secretarial services to the DRB.

B. PAYMENTS

DRB members shall be compensated at the same rate. The CONTRACTOR shall make direct payments to each DRB member for their participation in authorized meetings and approved hourly rate charges from invoices submitted by each DRB member. The STATE will reimburse the CONTRACTOR for its share of the costs of the DRB.

The DRB members may submit invoices to the CONTRACTOR for partial payment for work performed and services rendered for their participation in authorized meetings not more often than once per month during the progress of the work. The invoices shall be in a format approved by the parties and accompanied by a general description of activities performed during that billing period. Payment for hourly fees, at the agreed rate, shall not be paid to a DRB member until the amount and extent of those fees are approved by the STATE and CONTRACTOR.

Invoices shall be accompanied by original supporting documents, which the CONTRACTOR shall include with the extra work billing when submitting for reimbursement of the STATE's share of cost from the STATE. The CONTRACTOR will be reimbursed for one-half of approved costs of the DRB. No markups will be added to the CONTRACTOR's payment.

C. INSPECTION OF COSTS RECORDS

The DRB members and the CONTRACTOR shall keep available for inspection by representatives of the STATE and the United States, for a period of 3 years after final payment, the cost records and accounts pertaining to this AGREEMENT. If any litigation, claim, or audit arising out of, in connection with, or related to this contract is initiated before the expiration of the 3-year period, the cost records and accounts shall be retained until such litigation, claim, or audit involving the records is completed.

SECTION VII ASSIGNMENT OF TASKS OF WORK

The DRB members shall not assign the work of this AGREEMENT.

SECTION VIII TERMINATION OF AGREEMENT, THE DRB, AND DRB MEMBERS

DRB members may resign from the DRB by providing not less than 14 days written notice of the resignation to the STATE and CONTRACTOR. DRB members may be terminated by their original appointing power, 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

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

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

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

Cost	Percent Markup
Labor	28
Materials	10
Equipment Rental	10

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

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

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

5-1.14 COMPENSATION ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS

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

ITEM CODE	ITEM
290201	ASPHALT TREATED PERMEABLE BASE
39015	ASPHALT CONCRETE (TYPE A)
390165	ASPHALT CONCRETE (Open Graded)

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

The adjustment in compensation will be determined in conformance with the following formulae when the item of asphalt concrete or asphalt treated permeable base (or both) is included in a monthly estimate:

A. Total monthly adjustment = AQ

B. For an increase in paving asphalt price index exceeding 5 percent:

$$A = 0.90\ (1.1023)\ (Iu/Ib - 1.05)\ Ib$$

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

$$A = 0.90\ (1.1023)\ (Iu/Ib - 0.95)\ Ib$$

D. Where:

A = Adjustment in dollars per tonne of paving asphalt used to produce asphalt concrete and asphalt treated permeable base rounded to the nearest $0.01.

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

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

Q = Quantity in tonnes of paving asphalt that was used in producing the quantity of asphalt concrete shown under "This Estimate" on the monthly estimate using the amount of asphalt determined by the Engineer plus the quantity in tonnes of paving asphalt that would have been used in producing the quantity of asphalt treated permeable base shown under "This Estimate" on the monthly estimate using the amount of asphalt specified in the specifications.

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. The total price adjustment for price index increases of paving asphalt on this project shall not exceed $211,000.
D. In the event of an overrun of contract time, adjustment in compensation for paving asphalt included in estimates during the overrun period will be determined using the California Statewide Paving Asphalt Price Index in effect on the first business day of the month within the pay period in which the overrun began.

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

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

5-1.15 HAZARDOUS AND NONHAZARDOUS MATERIAL, GENERAL

Attention is directed to "Earthwork" of these special provisions regarding the removal and disposal of hazardous and nonhazardous material.

Hazardous and nonhazardous material have been discovered through testing within the project limits. Portions of the test results are included in the "Materials Information Handout." The complete report entitled "Site Investigation Report for Route 29/Trancas Street Interchange, Napa County, Napa, California" is available for inspection at the Department of Transportation, Duty Senior's Desk, 111 Grand Avenue, Oakland, California, (510) 286-5209.

Within the context of this contract, the designation "hazardous" shall apply to material with contaminant levels that meet or exceed the contaminant levels specified in the California Code of Regulations (CCR) Title 22. The designation "nonhazardous" shall apply to all material with either contaminant levels below the levels specified in CCR Title 22 or with non-detect contaminant levels. The levels of material designated as hazardous are not regulated under the Resource Conservation and Recovery Act (RCRA).

Hazardous materials shall be transferred directly from the excavation to a transport vehicle, a storage container, or a stockpile location approved by the Engineer. Stockpile locations shall be maintained in accordance with the following requirements:

The material shall not contain free liquids that separate readily from the material. The presence or absence of free liquids shall be demonstrated by United States Environmental Protection Agency Method 9095 as modified by Section 66264.314 of Title 22 of the California Code of Regulations (CCR).

The material shall be stored on undamaged 60-mil high density polyethylene or an equivalent impermeable barrier unless the stockpiling location is on a paved surface. If the location is on a paved surface the thickness of the barrier can be reduced to 20-mil high density polyethylene or its equivalent. The dimensions of the barrier shall exceed the dimensions of the stockpile at all times. Any seams in the barrier shall be sealed to prevent leakage.

At the end of each day the material shall be covered with undamaged 12-mil polyethylene or an equivalent impermeable barrier to prevent windblown dispersion and precipitation run-off and run-on. When more than one sheet is required to cover the material, the sheets shall be overlapped a minimum of 0.5 meter in a manner that prevents water from flowing onto the material. The cover shall be secured in a manner that keeps it in place at all times. Driven anchors shall not be used except at the perimeter of the stockpile. The cover shall be inspected and maintained in accordance with the requirements of "Water Pollution Control" of these special provisions.

These stockpiling requirements apply to all temporary storage of hazardous material outside of an excavation or a transport container including, but not limited to, staging of excavated material next to the excavation prior to pick up by loading equipment, accumulating material for full transport loads, and awaiting test results required by a disposal facility. The removal of stockpiles shall begin within 30 days of accumulating 100 kg of hazardous material. After final removal has occurred the Contractor shall be responsible for any cleanup deemed necessary by the Engineer.

All hazardous and nonhazardous materials on exteriors of transport vehicles shall be removed and placed either into the current transport vehicle or the excavation prior to the vehicle leaving the exclusion zone. No hazardous material or nonhazardous material shall be deposited on public roads. The Contractor shall indemnify the State from any costs due to spillage during the transport of the hazardous material or nonhazardous material to the disposal facility.

The Contractor shall monitor the air quality continuously during excavation operations at all locations containing hazardous material.

Disposal of additional material resulting from the Contractor's option to slope the excavations in lieu of shoring at locations where this is possible or any excavation operations outside structure excavation pay limits will be at the Contractor's expense. This resultant material shall be treated as either hazardous material or nonhazardous if the test results for the location indicate that the material being excavated is hazardous or nonhazardous.

APPLICABLE RULES AND REGULATIONS.--Excavation, transport and disposal of hazardous and nonhazardous material shall be in accordance with the rules and regulations of the following agencies:

United States Department of Transportation (USDOT)
United States Environmental Protection Agency (USEPA)
California Environmental Protection Agency (CAL-EPA)
1. Department of Toxic Substance Control (DTSC)
2. Integrated Waste Management Board
3. Regional Water Quality Control Board, Region 2 (RWQCB)
4. State Air Resources Board

Bay Area Air Quality Management District (BAAQMD)
California Division of Occupational Safety and Health Administration (CAL-OSHA)
Napa County Department of Environmental Management (NCDEM)

PERMITS AND LICENSES.--The Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material. The California Environmental Quality Act (CEQA)of 1970 (Chapter 1433, Stats. 1970), as amended may be applicable to permits, licenses and authorizations which the Contractor shall obtain from all agencies in connection with performing the work of the contract. The Contractor shall comply with the provisions of said statutes in obtaining such permits, licenses and other authorizations.

The Engineer will obtain the Environmental Protection Agency Generator Identification No. and Board of Equalization Identification Number as the State is the Generator.

SAFETY.--Prior to performing any work at the locations containing material classified as hazardous, all personnel, including State Personnel, shall complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified. The training shall be provided by the Contractor. The Contractor shall provide a certification of completion of the Safety Training Program to all personnel. Any personal protective equipment required by the Contractor's Health, Safety and Work Plan for personnel working within the exclusion zone will be supplied to State personnel by the Contractor. The number of State personnel requiring the above mentioned safety training program and personal protective equipment will be 5.

The decontamination area shall be located outside of the exclusion zone. Water from decontamination procedures shall be collected and disposed of at an appropriate disposal site by the Contractor. Non-reusable protective equipment, once used by any personnel, including State personnel, shall be collected and disposed of at an appropriate disposal site by the Contractor. The Contractor shall implement a plan to prevent exposure of personnel working in hazardous material excavations. The Contractor's plan to prevent exposure of personnel shall consist of a physical barrier. The barrier shall be

maintained by the Contractor. When no longer required, as determined by the Engineer, the physical barrier shall be removed and either decontaminated or disposed of by the Contractor.

SAMPLING AND ANALYSIS.--The Contractor shall test the material to be excavated at his own expense for any additional acceptance requirements put forth by the disposal facility. Sampling and analysis shall be performed using the sampling and analysis procedure required by the disposal facility.

The Contractor may perform additional tests on the material to be excavated at his option and expense for confirmation of the material classification as contaminated or hazardous. Sampling and analysis shall be the same or equivalent tests specified in the Materials Information Handout. The Contractor shall submit for approval by the Engineer, his sampling and analysis procedure and the name and address of the laboratory to be used fifteen (15) working days prior to beginning any sampling or analysis. The laboratory used shall be certified by the California Department of Health Services. Analytical results shall be sent by facsimile or hand delivered to the Engineer as soon as they are available. A summary report of sampling protocols, chain of custody, analysis and laboratory data sheets shall be supplied to the Engineer within 30 days of completion of sampling.

MEASUREMENT AND PAYMENT.--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 affected by this section and no additional compensation will be allowed therefor.

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.

The Contractor shall obtain encroachment permits prior to occupying State-owned parcels outside the contract limits. The required encroachment permits may be obtained from the Department of Transportation, Permit Engineer, (510) 286-6462.

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

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

5-1.17 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	$49,500
B.	Develop Water Supply	$27,000
C.	Prepare Storm Water Pollution Prevention Plan	$ 3,150
D.	Health & Safety Plan (Hazardous Material)	$10,000
E.	Lead Compliance Plan	$10,000
D.	Initial Site Work	$ 6,000

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. Water Meters
B. Supply Lines
C. High Density Polyethylene Pipe Conduit
D. Piling
E. Tiedown anchors
F. Soundwall (Barrier, Masonry Block, & Veneer)
G. Prestressing steel for cast-in-place members (sealed packages only)
H. Prestressing ducts and anchorages
I. Joint seal (Type B)
J. Joint seal assemblies
K. Bar reinforcing steel
L. Sign Structures
M. Pipe Culverts (All Types)
N. Underdrain Pipes (All Types)
O. Edge Drain Pipes (All Types)
P. Filter & Subgrade Fabric
Q. Miscellaneous Drainage Facilities
R. Welded steel pipe
S. Bridge deck drain
T. Drainage pumping equipment
U. Pumping plant equipment
V. Pumping plant metal work
W. Inverted siphon metal work
X. Miscellaneous Iron & Steel
Y. Miscellaneous metal (bridge)
Z. Fences & Gates
AA. Chain link railing
BB. Tubular handrailing
CC. Cable railing
DD. Metal beam guard railing
EE. Thrie Beam Barrier
FF. Terminal Anchor Assemblies
GG. Crash Cushions
HH. Pavement Markers
II. Lighting Fixtures
JJ. Luminaires
KK. Signal & Lighting Standards
LL. Signal Heads & Mounting Brackets
OO. Twisted Pair Cable

5-1.18 SOUND CONTROL REQUIREMENTS

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

The noise level from the Contractor's operations, between the hours of 9:00 p.m. and 6:00 a.m., shall not exceed 86 dbA at a distance of 15 m. This requirement shall not relieve the Contractor from responsibility for complying with local ordinances regulating noise level.

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

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

5-1.19 PROJECT APPEARANCE

The Contractor shall maintain a neat appearance to the work.

In areas visible to the public, the following shall apply:

A. When practicable, broken concrete and debris developed during clearing and grubbing shall be disposed of concurrently with its removal. If stockpiling is necessary, the material shall be removed or disposed of weekly.

B. Trash bins shall be furnished for debris from structure construction. Debris shall be placed in trash bins daily. Forms or falsework that are to be re-used shall be stacked neatly concurrently with their removal. Forms and falsework that are not to be re-used shall be disposed of concurrently with their removal.

Full compensation for conforming to the provisions in this section, not otherwise provided for, shall be considered as included in prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

5-1.20 RELATIONS WITH CALIFORNIA DEPARTMENT OF FISH AND GAME

A portion of this project is located within the jurisdiction of the California Department of Fish and Game. An agreement regarding a stream or lake has been entered into by the Department of Transportation and the Department of Fish and Game. The Contractor shall be fully informed of the requirements of this agreement as well as rules, regulations, and conditions that may govern the Contractor's operations in these areas and shall conduct the work accordingly.

Copies of the agreement may be obtained at the Department of Transportation, Plans and Bid Documents Section, MS 26, 1120 N Street, Room 200, Sacramento, CA 95814, Telephone (916) 654-4490, and are available for inspection at the office of the District Director of Transportation at District 04 Duty Senior Office, 111 Grand Avenue, Oakland, California 94612, telephone number (510) 286-5209, fax (510) 622-1805, e-mail address Duty_Senior_District04@dot.ca.gov.

It is unlawful for any person to divert, obstruct or change the natural flow of the bed, channel or bank of a stream, river or lake without first notifying the Department of Fish and Game, unless the project or activity is noticed and constructed in conformance with conditions imposed under Fish and Game Code Section 1601.

Attention is directed to Sections 7-1.01, "Laws to be Observed," 7-1.01G, "Water Pollution," and 7-1.12, "Indemnification and Insurance," of the Standard Specifications.

Modifications to the agreement between the Department of Transportation and the Department of Fish and Game which are proposed by the Contractor shall be submitted in writing to the Engineer for transmittal to the Department of Fish and Game for their consideration.

When the Contractor is notified by the Engineer that a modification to the agreement is under consideration, no work shall be performed which is inconsistent with the original agreement or proposed modification until the Departments take action on the proposed modifications. Compensation for delay will be determined in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The provisions of this section shall be made a part of every subcontract executed pursuant to this contract.

Modifications to any agreement between the Department of Transportation and the Department of Fish and Game will be fully binding on the Contractor. The provisions of this section shall be made a part of every subcontract executed pursuant to this contract.

5-1.21 RELATIONS WITH CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

The location of the project is within an area controlled by the Regional Water Quality Control Board. Regional Water Quality Control Board Order No. 96-078,NPDES General Permit No. CAG 912002 and Water Quality Certification have been issued covering work to be performed under this contract. The Contractor shall be fully informed of rules, regulations, and conditions that may govern the Contractor's operations in the areas and shall conduct the work accordingly.

Copies of the order may be obtained at the Department of Transportation, Plans and Bid Documents Section, MS 26, 1120 N Street, Room 200, Sacramento, CA 95814, Telephone (916) 654-4490, and are available for inspection at the office of the District Director of Transportation at District 04 Duty Senior Office, 111 Grand Avenue, Oakland, California 94612, telephone number (510) 286-5209, fax (510) 622-1805, e-mail address Duty_Senior_District04@dot.ca.gov.

Attention is directed to Section 7-1.11, "Preservation of Property," and Section 7-1.12, "Indemnification and Insurance," of the Standard Specifications.

Attention is directed to Section 8-1.06, "Time of Completion," of the Standard Specifications. Days during which the Contractor's operations are restricted in the floodway by the requirements of this section shall be considered to be nonworking days if these restrictions cause a delay in the current controlling operation or operations.

5-1.22 RELATIONS WITH U.S. ARMY CORPS OF ENGINEERS The location of the project is within an area controlled by U.S. Army Corps of Engineers. A nationwide permit and special condition have .been issued covering work to be performed under this contract. The Contractor shall be fully informed of rules, regulations, and conditions that may govern the Contractor's operations in the areas and shall conduct the work accordingly.

Copies of the order may be obtained at the Department of Transportation, Plans and Bid Documents Section, MS 26, 1120 N Street, Room 200, Sacramento, CA 95814, Telephone 916-654-4490, and are available for inspection at the office of the District Director of Transportation at District 04 Duty Senior Office, 111 Grand Avenue, Oakland, California 94612, telephone number (510) 286-5209, fax (510) 622-1805, e-mail address Duty_Senior_District04@dot.ca.gov.

Attention is directed to Section 7-1.11, "Preservation of Property," and Section 7-1.12, "Indemnification and Insurance," of the Standard Specifications.

Attention is directed to Section 8-1.06, "Time of Completion," of the Standard Specifications. Days during which the Contractor's operations are restricted in the floodway by the requirements of this section shall be considered to be nonworking days if these restrictions cause a delay in the current controlling operation or operations.

5-1.23 MANDATORY DISPOSAL SITE (NON-HAZARDOUS MATERIAL)

Attention is directed to "Order of Work", "Hazardous and Non-Hazardous Material, Excavation", "Material Containing Aerially Deposited Lead", and "Earthwork" of these special provisions.

The Contractor shall dispose of 268,000 cubic meters of surplus material from this project at the American Canyon Sanitary Landfill (ACSL), located at the terminus of Eucalyptus Drive in the City of American Canyon, California. All 268,000 cubic meters of material shall be delivered to ACSL by October 31, 2004. Arrangements for disposal of material can be made with the Manager, Napa/Vallejo Waste Management Authority, 1195 3rd Street, Suite 101, Napa, California 94559; Trent Cave; telephone (707) 253-4471, e-mail tcave@co.napa.ca.us.

The operation of this mandatory disposal site used by the Contractor to dispose of material from this project shall comply with the requirements in the Standard Specifications and these special provisions. Provisions for water pollution, air pollution, and sound control that apply within the limits of the contract shall apply to the disposal site utilized by the Contractor.

The material disposed of at the American Canyon Sanitary Landfill shall conform to the following specifications:

1. The volume to be delivered to the landfill shall be computed by means of average areas and distances between these areas determined from survey measurements at the excavation site before and after removal of the material.
2. Moisture content shall be less than 50 percent when delivered to the landfill.
3. The material shall be obtained from locations outside of those areas, shown on the plans, to contain either "Material Containing Aerially Deposited Lead" or "Hazardous Material".
4. The material shall have contaminant levels below the maximums specified in American Canyon Sanitary Landfill's "Contaminated Soil Acceptance Criteria" pamphlet dated February 2, 1996. For the purpose of disposing of non-hazardous material at American Canyon Sanitary Landfill, the excavated material outside of the locations shown on the plans to contain either "Material Containing Aerially Deposited Lead" or "Hazardous Material" shall be considered to have non-detectable levels of contaminants unless there is reason to believe otherwise.
5. 50,000 cubic meters shall be a clayey material, suitable for use as a clay liner, meeting the following requirements:

   A) The soil shall have at least 30% fines by weight (fine silt & clay particles).
   B) The plasticity index shall range between 10 and 30.
   C) The soil shall have a maximum of 10 percent gravel-sized particles by weight.
   D) The soil shall not contain any chunks or rocks larger than 50 mm.

   This clayey material shall be segregated from other surplus excavated material during transport and delivery to the landfill.

Delivery of surplus excavated material to the American Canyon Sanitary Landfill shall conform to the following:

1. Material will not be accepted between November 1 and March 31 of each year.
2. The Contractor shall provided an advance notification of 45 calendar days to both the City of American Canyon and the Manager, Napa/Vallejo Waste Management Authority, prior to hauling material to the landfill.
   The City of American Canyon can be contacted via the Director of Public Works, John Wankum, telephone (707) 647-4366, e-mail, johnw@ci.american-canyon.ca.us.
3. Delivery of material shall occur between the hours of 7:00 AM thru 4:00 PM Monday thru Friday, excluding holidays.
4. Green Island Road in the City of American Canyon shall be used to access the landfill. The Contractor shall not use Eucalyptus Drive in the City of American Canyon.

5. Material shall be deposited on the ground, in a loose condition, at locations specified by American Canyon Sanitary Landfill.
6. No further spreading or compacting of the surplus excavated material shall be required at American Canyon Sanitary Landfill.

American Canyon Sanitary Landfill is willing to accept topsoil which is segregated from other surplus excavated material as part of the 268,000 cubic meter material delivery. Disposal of segregated topsoil at ACSL is not mandatory. Should the Contractor desire to make arrangements for segregated topsoil delivery to ACSL, the Contractor shall make his own arrangements with the landfill. Should an agreement between ACSL and the Contractor be made concerning disposal of topsoil at ACSL, the specifications for topsoil would be as agreed between the Contractor and ACSL.

Full compensation for complying with the requirements for the mandatory disposal, site (non-hazardous material) in this section shall be considered as included in the price paid for roadway excavation and no additional compensation will be allowed therefor.

5-1.24 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" of these special provisions.

Portions of the Site Investigation Report are included in the "Material Information" handout. The complete reports, entitled "Site Investigation Report for Route29/Trancas Street Interchange, Napa County, Napa, California" and "Site Investigation Report, Soil and Groundwater Investigation, Groundwater Fate and Transport Model, Highway 29 and Trancas Street Intersection" are available for inspection at the Department of Transportation, Duty Senior's Desk, 111 Grand Avenue, Oakland, California, (510) 286-5209.

The Department has received from the California Department of Toxic Substances Control (DTSC) a Variance regarding the use of material containing aerially deposited lead. This project is subject to the conditions of the Variance, as amended. The Variance is available for inspection at the Department of Transportation, District 4.

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

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

United States Department of Transportation (USDOT)
United States Environmental Protection Agency (USEPA)
California Environmental Protection Agency (Cal-EPA)
California Department of Health Services
Department of Toxic Substances Control (DTSC), Region 2
California Division of Occupational Safety and Health Administration (Cal-OSHA)
Integrated Waste Management Board
Regional Water Quality Control Board (RWQCB), Region 2
State Air Resources Control Board
Bay Area Air Quality Management District (AQMD)

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

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

5-1.25 MANDATORY DISPOSAL SITE (AERIALLY DEPOSITED LEAD)

Attention is directed to "Order of Work", "Earthwork", and "Material Containing Aerially Deposited Lead" of these special provisions.

The Contractor shall excavate and dispose of material containing aerially deposited lead, contract item roadway excavation (Type Y) (Aerially Deposited Lead), at the mandatory disposal site(s) shown on the plans, as specified in these special provisions, and as directed by the Engineer.

5-1.26 RESTRICTED MATERIAL, GENERAL

Attention is directed to "Earthwork" of these special provisions regarding the removal and disposal of restricted material except for aerially deposited lead.

Attention is directed to Aerially Deposited Lead elsewhere in these special provisions.

Restricted (Type R) material has been discovered through testing within the project limits. The complete report entitled "Site Investigation Report for Route 29/Trancas Street Interchange, Napa County, Napa, California" is available for inspection at the Department of Transportation, Duty Senior's Desk, 111 Grand Avenue, Oakland, California, (510) 286-5209. Requests to review the reports must be made with the Duty Senior at least 24 hours in advance.

Within the context of this contract, the designation "restricted" shall apply to material with contaminant levels below the levels specified in the California Code of Regulations CCR Title 22 but with detectable contaminant levels that meet or exceed Napa County Environmental Health Management guidance as shown on the plans and shall be disposed at a Class II disposal facility.

No stockpiling of contaminated material or hazardous material will be allowed. Hazardous materials shall be transferred directly from the excavation to a registered transport vehicle, a storage container approved for transport of hazardous waste by the United States Department of Transportation, or a stockpile location approved by the Engineer.

All restricted materials on exteriors of transport vehicles shall be removed and placed either into the current transport vehicle or the excavation prior to the vehicle leaving the exclusion zone. No restricted material shall be deposited on public roads. The Contractor shall indemnify the State from any costs due to spillage during the transport of the restricted material to the disposal facility.

The Contractor shall monitor the air quality continuously during excavation operations at all locations containing restricted material.

Disposal of additional material resulting from the Contractor's option to slope the excavations in lieu of shoring at locations where this is possible or any excavation operations outside structure excavation pay limits will be at the Contractor's expense. This resultant material shall be treated as restricted material if the test results for the location indicate that the material being excavated is restricted.

APPLICABLE RULES AND REGULATIONS.--Excavation, transport and disposal of restricted material shall be in accordance with the rules and regulations of the following agencies:

United States Department of Transportation (USDOT)
United States Environmental Protection Agency (USEPA)
California Environmental Protection Agency (CAL-EPA)
Department of Toxic Substance Control (DTSC)
Integrated Waste Management Board
Regional Water Quality Control Board, Region 2 (RWQCB)
State Air Resources Board
Bay Area Air Quality Management District (BAAQMD)
California Division of Occupational Safety and Health Administration (CAL-OSHA)
Napa County Department of Environmental Management (NCDEM)

PERMITS AND LICENSES.--The Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the restricted material. The California Environmental Quality Act (CEQA) of 1970 (Chapter 1433, Stats. 1970), as amended may be applicable to permits, licenses and authorizations which the Contractor shall obtain from all agencies in connection with performing the work of the contract. The Contractor shall comply with the provisions of said statutes in obtaining such permits, licenses and other authorizations.

SAMPLING AND ANALYSIS.--The Contractor shall test the material to be excavated at his own expense for any additional acceptance requirements put forth by the disposal facility. Sampling and analysis shall be performed using the sampling and analysis procedure required by the disposal facility.

The Contractor may perform additional tests on the material to be excavated at his option and expense for confirmation of the material classification as restricted. Sampling and analysis shall be the same or equivalent tests specified in the Materials Information Handout. The Contractor shall submit for approval by the Engineer, his sampling and analysis procedure and the name and address of the laboratory to be used fifteen (15) working days prior to beginning any sampling or

analysis. The laboratory used shall be certified by the California Department of Health Services. Analytical results shall be sent by facsimile or hand delivered to the Engineer as soon as they are available. A summary report of sampling protocols, chain of custody, analysis and laboratory data sheets shall be supplied to the Engineer within 30 days of completion of sampling.

MEASUREMENT AND PAYMENT.--Full compensation for conforming to the requirements of this section shall be considered as included in the prices paid for roadway excavation (Type R) and no additional compensation will be allowed therefor.

5-1.27 CITY OF NAPA WORK (GENERAL)

The work shall consist of relocating existing City of Napa waterlines and constructing new City of Napa waterlines in bridges and under roadways in accordance with the referenced provisions of the Caltrans and City of Napa Standard Specifications, the details shown on the plans, and these special provisions. Portions of the City of Napa Public Works Department Standard Plans and Standard Specifications are included in an information handout entitled "Plan and Specification Supplement, State Route 29 and Trancas Road Interchange, City of Napa, California." Copies of this handout are available for review at the Department of Transportation, Duty Senior's Desk, 111 Grand Avenue, Oakland, California, (510) 286-5209.

COORDINATION

The Contractor shall notify the Engineer at least 5 days in advance of his intent to begin work on the waterlines. The Contractor shall cooperate with the City's personnel in order to facilitate their inspection work and shall allow them access to the site of the work. No public water services shall be shut off or removed until a new temporary service is installed and operational. Approvals and instructions from the City will be transmitted to the Contractor through the Engineer.

WATER FOR CONSTRUCTION PURPOSES

Water required for the project shall be taken through a hydrant meter supplied by the City of Napa. No direct connections to fire hydrants, use of un-metered water services, or un-authorized connections to the existing water system will be allowed.

The current fees for construction water (July 1, 2001 to June 30, 2002) are as follows:

Hydrant Meter Deposit	**$900.00**
Hydrant Meter Set Fee	**$ 50.00**
Moving Meter within Project	**$ 25.00**
Water Usage Charge	**$ 4.32 per 3785 L (1,000 gallons)**
Service Charge	**$ 50.00 per week**

The Contractor shall pay the current fees for construction water as specified in City of Napa Policy Resolution No. 16 at the time of construction. The Contractor shall apply for a hydrant meter at the Collections Department in City Hall at 955 School Street in Napa. Upon return of the hydrant meter in good condition, the deposit will be refunded to the Contractor.

EXISTING UTILITIES

Where a possible at-grade conflict with existing underground utilities appears on the plans, the Contractor shall determine the location and depth of the existing utilities prior to trenching. Grade and alignment changes shall be made only if approved by the Engineer. Any potholing required will not be paid for as extra work.

Where existing underground utilities are undercut, particular care shall be exercised in selecting, placing, and compacting the backfill material under and around such utility to assure firm support. For at least 12 inches all around the undercut utility, the backfill material shall have a sand equivalent of 50 and a relative compaction of 95 percent.

Where, in the opinion of the Engineer, the native soil is unsuitable for supporting the undercut utility, the material shall be removed. The resulting depression shall be backfilled with suitable backfill material. Such excavation and backfill below the planned elevation of the bottom of the trench will be paid for as extra work as provided in Section 4-1.03D of the Caltrans Standard Specifications.

The Contractor's attention is directed to Section 7-1.11, "Preservation of Property" of the Caltrans Standard Specifications. The Contractor shall be careful to avoid damage to water services, sewer laterals, water and sewer mains during his trenching operation. In the event damage is done requiring new service connections and water main repairs, the Contractor shall pay for work required to be done by the City forces. If requested by the Contractor and approved by the Engineer, the Contractor may perform said repairs.

DRAWINGS AND DATA REQUIRED

Attention is directed to Section 5-1.02, "Plans and Working Drawings," of the Caltrans Standard Specifications.

Prior to the manufacturing of any pipe and fittings the Contractor shall submit, to the Engineer, from the manufacturer the following data:

1. Detailed drawings
2. Tabulated layout schedule.
3. Design calculations for pipe wall thickness. (E' value used shall be indicated on drawings also.)
4. Field joint details.

The layout schedule shall include the station, elevation and piece identification of each pipe special, fitting and appurtenance, and the station and elevation of each pipe joint.

Before preparing the schedule and fabrication drawings, the Contractor shall determine their precise locations and alignment relative to the alignment of the existing pipe as shown on the drawings. The Contractor shall furnish the Engineer with the number of requested copies of the approved schedule and drawings.

WORK TO BE PERFORMED BY THE CITY OF NAPA UTILITIES DEPARTMENT FORCES

City of Napa forces will perform the following work:

1. City forces will isolate the water system, by closing gate valves, to permit the Contractor to begin construction. The Contractor shall notify the Engineer with 5 days notice of the need for City forces. Existing valves shall not be operated by the Contractor except in an emergency.
2. The City forces will take samples for testing, samples will be taken on Monday through Wednesday of each week only. The Contractor shall notify the Engineer a minimum of 72 hours prior to testing
3. The City will make all 305 mm (12") and smaller hot-taps to the existing water system. The Contractor shall notify the Engineer with 5 days notice of the need for City forces. The City shall have 5 working days to complete its work. Each hot tap shall be considered a separate event and will require notification to the Engineer.

REMOVE WATERLINES

Existing waterlines to be removed shall be removed and disposed of. All resulting openings shall be plugged with minor concrete. Abandoned valves shall have the valve nut closed and the riser and box removed.

All material from the removed waterlines and its appurtenances, except valves, shall become the property of the Contractor at the time of its removal from the trench, unless otherwise specified or shown on the plans. Such material shall not be allowed to accumulate along the line of work, but shall be removed from the area at the earliest practical time.

ABANDON WATERLINES

Existing waterlines where shown on the plans to be abandoned shall be abandoned in place. All resulting openings shall be plugged with minor concrete. Where in conflict with bridge abutments, retaining walls or future structures or median widening existing waterlines, shall be removed. Existing waterlines shall not be abandoned until their use is no longer required. The Contractor shall notify the Engineer 3 working days in advance of any intended abandonment.

5-1.28 CITY OF NAPA WATER FACILITY INSTALLATION (GENERAL)

The special provision applies to the work involving City of Napa waterlines only.

STORAGE OF MATERIALS

If pipe or other materials are to be stored for future use, proper storage procedures as recommended by the manufacturer shall be fol1owed and shall include all pipe lubricant, gaskets and appurtenances. Each section of pipe and each fitting shall be thoroughly cleaned out before it is lowered into the trench. Cleaning of each pipe or fitting shall be accomplished by swabbing out, brushing out, blowing out with compressed air, washing out with water, or by any combination of these methods necessary to remove all foreign matter. The most efficient method of cleaning out pipe and fittings will be determined on the job by the Engineer.

TRENCH EXCAVATION

Trench excavation shall conform to the provisions in Sections 19-3, "Structure Excavation and Backfill," 5-1.02A, "Trench Excavation Safety Plans," and 19-1.02 "Preservation of Property," of the Caltrans Standard Specifications and these special provisions.

The narrowest practicable trench width at top of pipe which will allow proper densification of pipe zone bedding and backfill materials shall be maintained regardless of the type of soil or the method of densification. Trench width at the top of

the trench will not be limited except where width of excavation would undercut adjacent structures and footings. In such case, width of trench shall be such that there is at least 610 mm (2 feet) between the top edge of the trench and the structure or footing. Where shoring or encasement is required, trench widths shall be increased accordingly.

Excavate the trench to the lines and grades shown on the plans with allowance for pipe thickness, sheeting and shoring if used, and for pipe base. If the trench is excavated below the required subgrade, refill any part of the trench excavated below the subgrade at no additional cost with imported sand. Place the refilling material over the full width of trench in compacted layers not exceeding 153 mm (6 inches) deep to the established grade with allowance for the pipe base.

INSTALLATION OF DUCTILE IRON PIPE

Ductile iron pipe shall be installed in accordance with AWWA C600, the manufacturer's recommendations, and these special provisions.

Each section of pipe and all fittings and valves shall be inspected prior to lowering them into the trench or their final location. Ends of pipe shall be cleaned thoroughly. Foreign matter and dirt shall be removed from the inside of the pipe, and pipe shall be kept clean during and after laying. All pipe and fittings shall be free from fins and burrs.

Pipe shall be handled in a manner to avoid damage to the pipe, lining, and coating. Pipe shall not be dropped or allowed to fall into trenches. Pipe shall be hoisted with mechanical equipment using a cloth belt sling to avoid damaging the lining or coating. Steel cables or chains shall not be used. Place the pipe in the order which it is to be installed and secure it from rolling. Support the pipe on wooden blocks, sandbags, mounds of sand, or other suitable supports where rocks or other obstructions could damage the pipe coating. Do not move pipe by inserting any devices or pieces of equipment into the pipe barrel. No field repair of linings or coatings damaged by unloading or installation procedures will be permitted; replace the defective or damaged pipe or fitting.

During pipe laying operations, tools, clothing, or other materials shall not be placed in the pipe. When laying pipe is not in progress, including the noon hours, the open ends of the pipe shall be closed. Trench water, animals, or foreign material shall not be allowed to enter the pipe.

Each section of pipe shall be carefully lowered into the trench using slings in such a way that the coating and lining are not damaged by flexure or abrasion. The spigot shall be entered into the bell or collar and forced home. The joint shall be made carefully to avoid undue stressing of, or impact damage to, the pipe and gasket, and stabbing as a method of installation will not be permitted. Unless otherwise detailed on the plans, pipe shall not be set on blocks of any kind (including wood) in the trench bottom. If blocking becomes necessary, bags filled with sand may be placed under the pipe. These bags shall be broken after the haunches are packed. Concrete solid blocking will be allowed under the pipe where the pipe is to be concrete encased. Temporary wood blocking will be allowed under the pipe where the pipe is to be installed inside the bridge structure. Temporary wood blocking shall be removed after the pipe supports in the bridge are completed.

The pipe shall not be dragged along the bottom of the trench, but shall be securely supported by the slings until the joint is assembled. Each spigot shall be inserted into the bell or collar the distance shown on the approved fabrication drawings so as to avoid cumulative gain or loss of laying length.

Suitable excavations shall be provided in the bedding material for removal of the slings, without damaging the coating, after assembly of the joint. These sling removal holes shall be filled, the pipe length securely blocked on its proper alignment, and the pipe barrel partially backfilled.

Unless the sheeting or shoring is to be cut off and left in place, densification of bedding for pipe shall be accomplished after the sheeting or shoring has been removed from the bedding zone. Alternate methods of pipe bedding which are recommended by the pipe manufacturer may be used if approved by the Engineer.

No pipe or fitting shall be lowered into a trench containing water. The trench bottom shall be free from pieces of rock or other material that would tend to damage the pipe. Water shall be pumped from wet trenches and the trenches shall be kept dry until the joints have been completed and the open ends of the main have been closed with watertight plugs or bulkheads. Whenever pipe laying is discontinued on any job for short periods, or whenever work is stopped at the end of the day, the open ends of the main shall be closed with approved water-tight plugs or bulkheads. The plug or bulkhead shall not be removed unless the trench is dry. Every effort shall be made to keep the trench dry at all times.

When approved by the Engineer, changes in alignment or grade may be accomplished by deflections at the joints between lengths of standard pipe. In no event shall the angle of deflection exceed three degrees at any deflected joint.

BACKFILL

Upon completion of the required bedding, the trench backfill shall be placed and mechanically compacted. Pipe bedding, trench backfill, and compaction shall conform to the provisions in the City of Napa Standard Specifications, as shown on the plans, and these special provisions.

All waterlines shall be bedded and backfilled in the pipe zone to 305 mm (12 inches) above the top of pipe with imported sand except where pipe is concrete encased. Sand bedding shall also be placed a minimum of 153 mm (6 inches) below and on each side of the pipe.

Only lightweight tamping equipment shall be used within 0.9 meter (3 feet) of pipe or appurtenances.

Backfill material shall be Class II Aggregate Base. A minimum relative compaction of 95 percent shall be achieved. For areas within roadways, the top 305 mm (12 inches) below pavement and base shall be compacted to 95 percent relative compaction.

POLYETHYLENE ENCASEMENT

All buried ductile iron pipe and fittings, and valves shall be wrapped with polyethylene tube. The adjoining polyethylene tube shall overlap a minimum of 305 mm (12 inches) and shall be secured in place with adhesive tape prior to backfill.

Polyethylene material that is damaged during installation shall be repaired using polyethylene sheet placed over damaged or torn area and secured in place with 50 mm (2 inches) wide adhesive tape. All seams shall be taped to prevent the entry of moisture.

DUCTILE IRON PIPE FIELD CUTS AND REPAIRS

All field cuts and damage to the coating shall be repaired with a coating of approved epoxy at a minimum dry film thickness of 304 μm. The epoxy shall be applied after all foreign matter has been removed by the wire brush method or by sandpaper.

All damage to the lining shall be repaired by reapplying the lining at its full thickness, using a method approved by the Engineer.

All costs for repairs of the lining or coating shall be considered included in the contract lump sum price of the water main and no additional payment will be made.

DUCTILE IRON PIPE INSPECTION AND CERTIFICATION

Manufacturer testing on each length of pipe shall be completed per AWWA C151. Certified copies of testing reports shall be provided to the Engineer

The weight class, nominal thickness, manufacturers work, and the production date shall be stamped on each length of pipe.

BUTTERFLY AND GATE VALVES

Valves shall be inspected prior to the installation and shall be operated from closed to fully open, then closed again before installing. Valves shall be checked for missing parts, malfunctioning stem, scored or damaged surfaces on interior lining, and faulty operation. Valves with gear operators shall be installed with the stem in the horizontal position. The flanged end connections shall be accomplished as previously described. After installation, valves shall be operated through ten full cycles of opening and closing. Valves shall operate from full open to full close without sticking or binding. If a valve sticks or binds, the valve shall be repaired or replaced and the tests shall be repeated. Valves shall be tested at the same time that the connecting pipelines are pressure tested. Leaks shall be repaired and retested.

VALVE BOX ASSEMBLIES

A valve box assembly shall be provided for each buried valve consisting of a frame, lid, and one piece extension pipe. Frame and lid shall be cast iron designed for traffic loading. Castings shall be smooth, clean, and free from blisters, blowholes, and shrinkage. Bearing surfaces of frame and lid shall be machined to provide a close fit without rocking. The word "WATER" shall be cast on the lid. Extension pipe shall be 203 mm (8 inch) diameter PVC gravity sewer piping conforming to ASTM 3034, SDR 35. Valve box shall be Christy Products, Inc. G5 Traffic Valve Box, or equal.

Trench backfill shall be placed and compacted to the height of the valve stem. Mechanical tamping shall be used around valve stem risers to obtain 90 percent minimum relative compaction for subgrade and 95 percent minimum relative compaction for base.

The one-piece extension pipe shall be set over the operating nut and centered in place. The extension pipe shall be maintained in a vertical position during backfilling. The valve box frame shall be slipped over the extension pipe, and both shall be adjusted to finish grade. A concrete ring shall be poured around the valve box frame. Valve box and frame shall be flush with the finish surface of the pavement.

CONCRETE FOR ANCHOR AND THRUST BLOCKS

Concrete thrust collars and anchor blocks if any, shall be only used where shown on the plans and shall conform to Section 90-10, "Minor Concrete," of the Caltrans Standard Specifications. Concrete shall be poured against undisturbed earth. The undisturbed earth which is to receive the resultant thrust shall be a plane surface located at right angles to the force to be resisted. Unless otherwise directed, blocking shall be placed so that joints of pipe and fitting will be accessible for repair. Additional concrete required as determined by the Engineer, due to soil conditions, will be paid for as extra work as provided in Section 4-l.03D of the Caltrans Standard Specifications.

TEMPORARY BLOWOFF ASSEMBLIES

Temporary blowoffs shall be used for hydrostatic testing. After testing, the Contractor shall supply and install the connections and equipment necessary to convey the discharge water to a storm drain adequate for the discharge volume.

Caps and plugs installed by the Contractor to temporarily close the ends of new pipes shall contain 50 mm (2 inch) outlets with gate valves for 50 mm (2 inch) temporary blowoff assemblies. Valves shall protrude free from thrust blocks and be used for testing and relieving pressure. Caps and outlets will be the property of the Contractor and may be claimed by him after connections are made. The Contractor shall be responsible for picking up his caps and plugs.

5-1.29 CITY OF NAPA WATER FACILITY TESTING (GENERAL)

The special provision applies to the work involving City of Napa waterlines only.

The Contractor shall notify the Engineer at least three working days in advance of performing any pressure tests, except no pressure test shall be made on Saturdays, Sundays or designated legal holidays.

The pipelines shall be hydrostatically tested by the Contractor in the presence of the Engineer after all pipes and appurtenances have been installed as shown on the plans, all anchors, thrust blocks and encasements have been placed and have attained sufficient strength, and the required select and/or other specified backfill have been partially completed.

Complete pipe installation, including both the buried sections and the section within the bridge, shall be hydrostatically tested and disinfected before being connected to the existing City system. New water mains shall be subjected to a hydrostatic pressure/leakage test for a period of 4 hours at 1034 kPa (150 pounds per square inch) after installation of all sections of pipe, and prior to connection to the existing water system. The water mains shall be tested as a complete system including all fire hydrants. Testing of multiple portions of a continuous run of water main shall not be accepted. The measured pressure shall not change by ± 14 kPa (2 psi) during the test.

The pressure/leakage test shall not be made until at least thirty-six (36) hours after the last concrete thrust block has been poured when Type III cement is used, or at least seven (7) days after the last thrust block has been poured when Type II cement is used.

Prior to starting the test, the pipeline shall be filled with water for twenty-four (24) hours. During the filling of the line, and before applying the specified test pressure, all air shall be expelled from the pipe. If necessary, taps shall be made as directed at the points of highest elevation and plugged upon completion of the test. Each section of pipeline shall be slowly filled with water, and the specified test pressure applied at the point of lowest elevation by means of a pump connected to the pipe by a corporation cock. During the test, all exposed pipe, fittings, valves, hydrants, and joints will be carefully examined. The water lost due to leakage shall be none.

Any cracked or defective material shall be removed and replaced by the Contractor to the satisfaction of the Engineer, and no additional payment will be made therefor. The test shall be repeated until no defects remain. If water leakage occurs in the pipeline being tested, the Contractor shall locate and repair the defective joints or fittings, and no additional payment will be made therefor. The Contractor shall retest the pipeline until leakage has been eliminated.

Contractor is required to conduct pressure/leakage testing on the isolated system, i.e.; Contractor is not allowed to connect into the City's system until the tests are passed. This will usually require that plugs and thrust blocks to be used, which may not appear on the plans. Closing pieces will be laid after testing is complete. No testing against closed valves is allowed.

Water pressure testing shall be in accordance with these special provisions.

DISINFECTION

All new pipelines and appurtenances shall be disinfected and field-tested by the Contractor in accordance with the following standards and supplementary details:

Standard or Supplement Detail	
Disinfection of Water Main	AWWA C651.
Flushing Location	Preliminary and final flushing shall be done at the ends of mains that have been hydrostatically tested.
Temporary Blowoffs	The Contractor shall provide temporary blowoffs that are needed in excess of permanent blowoffs shown on the plans.
Flushing Velocity	Preliminary and final flushing shall be in accordance with AWWA C651 Section 5.2.2.
Form of Chlorine	Chlorine shall be supplied from liquid chlorine or hypochlorite in accordance with AWWA C651 Section 2.
Method of Application	The chlorine application shall be in accordance with AWWA C651 Section 5 .
Chlorine Concentration	Chlorine shall be applied to the main in sufficient quantity to obtain a residual chlorine content between 50 mg/1 and 100mg/1.
Chlorine Residual Tests	Contractor is responsible for verifying residual.
Final Flushing	Final flushing shall be in accordance with AWWA C651 Section 6 and be done by the Contractor after he has been notified of a satisfactory chlorine residual test by the City.
Bacteriological Tests	City forces shall take water samples for bacteriological tests in accordance with AWWA C651 Section 7. Two consecutive satisfactory test results are required for a passing test.
Repetition of Procedure	The disinfection testing procedure shall be repeated if the initial tests fails to produce satisfactory results. Two consecutive satisfactory test results shall be required after any unsatisfactory test. The tablet method shall not be used for repeated disinfection.
Notice to Proceed	The City shall notify the Contractor through the Engineer of test results and request the Contractor to connect the new main to the water system as stated on the plans.
Disinfection of Connections	Pipe and appurtenances used to connect the newly installed water main shall be disinfected in accordance with AWWA C651 Section 9.
Bacteriological Sampling	No hoses or fire hydrants shall be used in collecting samples. Contractor shall have all curb stops and blowoff assemblies exposed for flushing and sampling.
Disposal of Chlorinated Water	Disposal shall be to the Sanitary Sewer System Only.

The Contractor shall disinfect the newly installed pipeline by use of HTH tablets in accordance with AWWA C600 and AWWA C651 and as stated herein. Tablets shall be attached to the crown of the pipe at each 5.5 meter (18') length of pipe at each joint with Permatex Type B, or equal. Four tablets shall be placed per length of 305 mm (12-inch) pipe.

The pipeline shall be slowly filled to allow proper circulation of the HTH and the solution shall be allowed to stand for a minimum of twenty-four (24) hours.

Following chlorination, all treated water shall be thoroughly flushed from the mains until the replacement water shall, upon both chemical and bacteriological tests, be proved equal to the water quality at the point of supply. Disposal of chlorinated water shall be to the sanitary sewer system only.

Bacteriological tests shall be by the City of Napa in its own laboratory, as specified in "Standard Methods for the examination of Water and Waste Water". Two sets of bacteria tests will be taken. One set twenty-four (24) hours after flushing has been completed and one set forty-eight (48) hours after flushing has been completed. Two consecutive passing tests are required. Only after all testing is complete, and upon approval of the Inspector, can the Contractor connect new facilities to the City's existing mains.

SECTION 6. (BLANK)

SECTION 7. (BLANK)

SECTION 8. MATERIALS

SECTION 8-1. MISCELLANEOUS

8-1.01 SUBSTITUTION OF NON-METRIC MATERIALS AND PRODUCTS

Only materials and products conforming to the requirements of the specifications shall be incorporated in the work. When metric materials and products are not available, and when approved by the Engineer, and at no cost to the State, materials and products in the United States Standard Measures which are of equal quality and of the required properties and characteristics for the purpose intended, may be substituted for the equivalent metric materials and products, subject to the following provisions:

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

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

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

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

SUBSTITUTION TABLE FOR PLAIN WIRE REINFORCEMENT
ASTM Designation: A 82

METRIC SIZE SHOWN ON THE PLANS 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 or 12.70	1/2
14 or 14.29	9/16
16 or 15.88	5/8
19 or 19.05	3/4
22 or 22.22	7/8
24, 25, or 25.40	1
29 or 28.58	1-1/8
32 or 31.75	1-1/4
35 or 34.93	1-3/8
38 or 38.10	1-1/2
44 or 44.45	1-3/4
51 or 50.80	2
57 or 57.15	2-1/4
64 or 63.50	2-1/2
70 or 69.85	2-3/4
76 or 76.20	3
83 or 82.55	3-1/4
89 or 88.90	3-1/2
95 or 95.25	3-3/4
102 or 101.60	4

SUBSTITUTION TABLE FOR NOMINAL THICKNESS OF SHEET METAL

UNCOATED HOT AND COLD ROLLED SHEETS		HOT-DIPPED ZINC COATED SHEETS (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 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 in the list of Prequalified and Tested Signing and Delineation Materials, only those products shown within the listing may be used in the work. Other categories of products, not included in the list of Prequalified and Tested Signing and Delineation Materials, may be used in the work provided they conform to the requirements of the Standard Specifications.

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

PAVEMENT MARKERS, PERMANENT TYPE

Retroreflective

A. Apex, Model 921 (100 mm x 100 mm)
B. Ray-O-Lite, Models SS (100 mm x 100 mm), RS (100 mm x 100 mm) and AA (100 mm x 100 mm)
C. Stimsonite, Models 88 (100 mm x 100 mm), 911 (100 mm x 100 mm), 953 (70 mm x 114 mm)
D. 3M Series 290 (89 mm x 100 mm)

Retroreflective With Abrasion Resistant Surface (ARS)

A. Apex, Model 921AR (100 mm x 100 mm)
B. Ray-O-Lite "AA" ARS (100 mm x 100 mm)
C. Stimsonite, Models 911 (100 mm x 100 mm), 953 (70 mm x 114 mm)
D. 3M Series 290 (89 mm x 100 mm)

Retroreflective With Abrasion Resistant Surface (ARS)

(Used for recessed applications)

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

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

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

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

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

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

PAVEMENT MARKERS, TEMPORARY TYPE

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

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

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

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

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

STRIPING AND PAVEMENT MARKING MATERIAL

Permanent Traffic Striping and Pavement Marking Tape

A. Advanced Traffic Marking, Series 300 and 400
B. Brite-Line, Series 1000
C. Brite-Line "DeltaLine XRP"
D. Swarco Industries, "Director 35" (For transverse application only)

E. Swarco Industries, "Director 60"
F. 3M, "Stamark" Series 380 and 5730
G. 3M, "Stamark" Series 420 (For transverse application only)

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

A. Advanced Traffic Marking, Series 200
B. Brite-Line, Series 100
C. P.B. Laminations, Aztec, Grade 102
D. Swarco Industries, "Director-2"
E. 3M, "Stamark," Series 620
F. 3M Series A145 Removable Black Line Mask
(Black Tape: For use only on Asphalt Concrete Surfaces)
G. Advanced Traffic Marking Black "Hide-A-Line"
(Black Tape: For use only on Asphalt Concrete Surfaces)
H. Brite-Line "BTR" Black Removable Tape
(Black Tape: For use only on Asphalt Concrete Surfaces)

Preformed Thermoplastic (Heated in place)

A. Flint Trading, "Premark" and "Premark 20/20 Flex"
B. Pavemark, "Hotape"

Removable Traffic Paint

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

Ceramic Surfacing Laminate, 150 mm x 150 mm

A. Safeline Industries/Highway Ceramics, Inc.

CLASS 1 DELINEATORS

One Piece Driveable Flexible Type, 1700 mm

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

Special Use Flexible Type, 1700 mm

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

Surface Mount Flexible Type, 1200 mm

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

CHANNELIZERS

Surface Mount Type, 900 mm

A. Bent Manufacturing Company, Masterflex Models MF-360-36 (Round) and MF-180-36 (Flat)
B. Carsonite, "Super Duck" (Flat SDF-436, Round SDR-336)
C. Carsonite, "Super Duck II" Model SDCF203601MB "The Channelizer"
D. Davidson Plastics, Flex-Guide Models FG300LD and FG300UR
E. FlexStake, Surface Mount, Models 703 and 753 TM
F. GreenLine, Model SMD-36

G. Hi-Way Safety, Inc. "Channel Guide Channelizer" Model CGC36
H. The Line Connection, "Dura-Post" Model DP36-3 (Permanent)
I. The Line Connection, "Dura-Post" Model DP36-3C (Temporary)
J. Repo, Models 300 and 400
K. Safe-Hit, Guide Post, Model SH236SMA

CONICAL DELINEATORS, 1070 mm
(For 700 mm Traffic Cones, see Standard Specifications)
A. Bent Manufacturing Company "T-Top"
B. Plastic Safety Systems "Navigator-42"
C. Roadmaker Company "Stacker"
D. TrafFix Devices "Grabber"

OBJECT MARKERS
Type "K", 450 mm
A. Carsonite, Model SMD-615
B. FlexStake, Model 701 KM
C. Repo, Models 300 and 400
D. Safe-Hit, Model SH718SMA
E. The Line Connection, Model DP21-4K

Type "K-4" / "Q" Object Markers, 600 mm
A. Bent Manufacturing "Masterflex" Model MF-360-24
B. Carsonite, Super Duck II
C. FlexStake, Model 701KM
D. Repo, Models 300 and 400
E. Safe-Hit, Models SH8 24SMA_WA and SH8 24GP3_WA
F. The Line Connection, Model DP21-4Q

TEMPORARY RAILING (TYPE K) REFLECTORS AND CONCRETE BARRIER MARKERS
Impactable Type
A. ARTUK, "FB"
B. Davidson Plastics, Model PCBM-12
C. Duraflex Corp., "Flexx 2020" and "Electriflexx"
D. Hi-Way Safety, Inc., Model GMKRM100

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

THRIE BEAM BARRIER MARKERS
(For use to the left of traffic)
A. Duraflex Corp., "Railrider"
B. Davidson Plastics, "Mini" (75 mm x 254 mm)

CONCRETE BARRIER DELINEATORS, 400 mm
(For use to the right of traffic. When mounted on top of barrier, places top of reflective element at 1200 mm)
A. Davidson Plastics, Model PCBM T-16
B. Safe-Hit, Model SH216RBM
C. Sun-Lab Technology, "Safety Guide Light, Model TM," 130 mm x 130 mm x 80 mm

CONCRETE BARRIER-MOUNTED MINI-DRUM (260 mm x 360 mm x 570 mm)
A. Stinson Equipment Company "SaddleMarker"

SOUND WALL DELINEATOR
(Applied vertically. Place top of 75 mm x 300 mm reflective element at 1200 mm above roadway)
A. Davidson Plastics, PCBM S-36
B. Sun-Lab Technology, "Safety Guide Light, Model SM12," 130 mm x 130 mm x 80 mm

GUARD RAILING DELINEATOR
(Top of reflective element at 1200 mm above plane of roadway)

Wood Post Type, 686 mm

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

Steel Post Type

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

RETROREFLECTIVE SHEETING

Channelizers, Barrier Markers, and Delineators

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

Traffic Cones, 330 mm Sleeves

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

Traffic Cones, 100 mm and 150 mm Sleeves

A. 3M Series 3840
B. Reflexite Vinyl, "TR" (Semi-transparent) or "Conformalite"

Barrels and Drums

A. Reflexite, "Super High Intensity" or "High Impact Drum Sheeting"
B. 3M Series 3810

Barricades: Type I, Engineer Grade

A. American Decal, Adcolite
B. Avery Dennison, T-1500 and T-1600
C. 3M, Scotchlite, Series CW

Barricades: Type II, Super Engineer Grade

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

Signs: Type II, Super Engineer Grade

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

Signs: Type III, High-Intensity Grade

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

Signs: Type IV, High-Intensity Prismatic Grade

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

Signs: Type VII, High-Intensity Prismatic Grade

A. 3M Series 3900

Signs: Type VI, Roll-Up Signs

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

SPECIALTY SIGN (All Plastic)

A. All Sign Products, STOP Sign, 750 mm

SIGN SUBSTRATE FOR CONSTRUCTION AREA SIGNS

Aluminum

Fiberglass Reinforced Plastic (FRP)

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

8-1.03 STATE-FURNISHED MATERIALS

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

The following materials will be furnished to the Contractor:

A. Sign panels for roadside signs and overhead sign structures.
B. Mast arm sign hanger assemblies.
C. Laminated wood box posts with metal caps for roadside signs.
D. Hardware for mounting sign panels.
E. Padlocks for model 170 controller cabinets, walk gates, and irrigation controller enclosure cabinets.
F. Disks for survey monuments.
G. LED modules.
H. Model 170 controller assemblies, including controller unit, completely wired controller cabinet, and inductive loop detector sensor units.
I. City furnished electroliers.

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 Contractor shall notify the City of Napa Assistant Public Work Director at the 1600 First Street, Napa, CA 94559-0660, Telephone Number: (707) 257-9520, not less than 48 hours before City furnished electroliers is to be picked up by the Contractor.

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

8-2.02 CEMENT AND WATER CONTENT

The amount of free water used in concrete for deck slabs of bridges and structure approach slabs shall not exceed 195 kg/m^3, plus 20 kg for each required 100 kg of cementitious material in excess of 400 kg/m^3.

SECTION 8-3. WELDING

8-3.01 WELDING

General

Flux core welding electrodes conforming to the requirements of AWS A5.20 E6XT-4 or E7XT-4 shall not be used to perform any type of welding for this project.

Wherever reference is made to the following AWS welding codes in the Standard Specifications, on the plans, or in these special provisions, the year of adoption for these codes shall be as listed:

AWS Code	Year of Adoption
D1.1	2000
D1.4	1992
D1.5	1995
D1.5 (metric only)	1996

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

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

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

The QC Inspector shall be the duly designated person who acts for and on behalf of the Contractor for inspection, testing, and quality related matters for all welding.

Quality Assurance (QA) is the prerogative of the Engineer. The QA Inspector is the duly designated person who acts for and on behalf of the Engineer.

Each QC Inspector shall be responsible for quality control acceptance or rejection of materials and workmanship, and shall be currently certified as an AWS Certified Welding Inspector (CWI) in conformance with the requirements in AWS QC1, "Standard and Guide for Qualification of Welding Inspectors."

The QC Inspector may be assisted by an Assistant QC Inspector provided that this individual is currently certified as an AWS Certified Associate Welding Inspector (CAWI) in conformance with the requirements in AWS QC1, "Standard and Guide for Qualification of Welding Inspectors," or has equivalent qualifications. The QC Inspector shall monitor the Assistant QC Inspector's work, and shall be responsible for signing all reports.

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

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

Personnel performing NDT shall be qualified in conformance with the requirements of the American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A and the Written Practice of the NDT firm. The Written Practice of the NDT firm shall meet or exceed the requirements of the ASNT Recommended Practice No. SNT-TC-1A. Only individuals who are 1) qualified for NDT Level II, or 2) Level III technicians who have been directly certified by the ASNT and are authorized to perform the work of Level II technicians, shall perform NDT, review the results, and prepare the written reports.

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

The QC Inspector shall inspect and approve the joint preparation, assembly practice, welding techniques, and performance of each welder, welding operator, and tack welder to make certain that the applicable requirements of this code and the approved welding procedure specification (WPS) are met.

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

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

Section 6.6.5, "Nonspecified Nondestructive Testing Other Than Visual," of AWS D 1.1, Section 6.6.5 of AWS D 1.4 and Section 6.6.5 of AWS D 1.5 shall not apply.

For any welding, the Engineer may direct the Contractor to perform NDT that is in addition to the visual inspection or NDT specified in the AWS welding codes, in the Standard Specifications, or in these special provisions. Additional NDT required by the Engineer, will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. Should any welding deficiencies be discovered by this additional NDT, the cost of the testing will not be paid for as extra work but shall be at the Contractor's expense.

Required repair work to correct welding deficiencies, whether discovered by the required visual inspection or NDT, or by additional NDT directed by the Engineer, and any associated delays or expenses caused to the Contractor by performing these repairs, shall be at the Contractor's expense.

The Engineer shall have the authority to verify the qualifications or certifications of any welder, QC Inspector, or NDT personnel to specified levels by retests or other means.

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

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

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

The period of effectiveness for a welder's or welding operator's qualification shall be a maximum of 3 years for the same weld process, welding position, and weld type. A valid qualification at the beginning of work on a contract will be acceptable for the entire period of the contract, as long as the welder's work remains satisfactory.

Welding Quality Control

Welding quality control shall conform to the requirements in the AWS welding codes, the Standard Specifications, and these special provisions.

Unless otherwise specified, welding quality control shall apply when any work is welded in conformance with the provisions in Section 49, "Piling," Section 52, "Reinforcement," Section 55, "Steel Structures," of the Standard Specifications.

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

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

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

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

Welding inspection personnel or NDT firms to be used in the work shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project, except for the following conditions:

A. The welding is performed at a permanent fabrication facility which is certified under the AISC Quality Certification Program, Category Cbr, Major Steel Bridges.
B. The welding is performed at a permanent fabrication facility which is certified under the AISC Quality Certification Program, Category Sbd, Conventional Steel Building Structures. This condition shall apply only for work welded in conformance with the provisions in Section 56-1, "Overhead Sign Structures" or Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications.

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

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

Except for work that is welded in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, prior to performing any welding, the Contractor shall submit to the Engineer, in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, 3 copies of a separate WQCP for each item of work for which welding is to be performed.

Prior to furnishing materials welded in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts, " of the Standard Specifications, the Contractor shall submit to the Engineer, in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, 3 copies of a separate WQCP for each fabrication facility supplying these materials or proof of previous Engineer approval of a WQCP for such a facility no more than one year prior to the delivery of materials for inspection.

As a minimum, each WQCP shall include the following:

A. The name of the welding firm and any required NDT firm, should one be required;
B. A manual prepared by the NDT firm that shall include equipment, testing procedures, code of safe practices, the Written Practice of the NDT firm, and the names, qualifications, and documentation of certifications for all personnel to be used;
C. The name of the QCM and the names, qualifications, and documentation of certifications for all QC Inspectors and Assistant QC Inspectors to be used;
D. An organizational chart showing all QC personnel and their assigned QC responsibilities;
E. The methods and frequencies for performing all required quality control procedures, including QC inspection forms to be used, as required by the specifications including:

    1. all visual inspections;
    2. all NDT including radiographic geometry, penetrameter and shim selection, film quality, film processing, radiograph identification and marking system, and film interpretation and reports; and
    3. calibration procedures and calibration frequency for all NDT equipment;

F. A system for the identification and tracking of all welds, NDT, and any required repairs, and a procedure for the reinspection of repaired welds. The system shall have provisions for 1) permanently identifying each weld and the person who performed the weld, 2) placing all identification and tracking information on each radiograph, 3) a

method of reporting nonconforming welds to the Engineer, and 4) a method of documentation of repairs and reinspection of nonconforming welds;

G. Standard procedures for performing noncritical repair welds. Noncritical repair welds are defined as welds to deposit additional weld beads or layers to compensate for insufficient weld size and to fill limited excavations that were performed to remove unacceptable edge or surface discontinuities, rollover or undercut. The depth of these excavations shall not exceed 65 percent of the specified weld size;
H. The WPS, including documentation of all supporting Procedure Qualification Record (PQR) tests performed, and the name of the testing laboratory who performed the tests, to verify the acceptability of the WPS. The submitted WPS shall be within the allowable period of effectiveness;
I. Documentation of all certifications for welders for each weld process and position that will be used. Certifications shall list the electrodes used, test position, base metal and thickness, tests performed, and the witnessing authority. All certifications shall be within the allowable period of effectiveness;
J. One copy each of all AWS welding codes and the FCP which are applicable to the welding to be performed. These codes and the FCP shall become the permanent property of the Department; and
K. Forms to be used for Certificates of Compliance, daily production logs, and daily reports.

The Engineer shall have 10 working days to review the WQCP submittal after a complete plan has been received. Except for work that is welded in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, no welding shall be performed until the WQCP is approved in writing by the Engineer. No materials welded in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, shall be incorporated into the work until the WQCP is approved in writing by the Engineer. Should the Engineer fail to complete the review within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the WQCP, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

An amended WQCP or addendum shall be submitted to, and approved in writing by the Engineer, for proposed revisions to the approved WQCP. An amended WQCP or addendum will be required for revisions to the WQCP, including but not limited to a revised WPS, additional welders, changes in NDT firms or procedures, QC, or NDT personnel, or updated systems for tracking and identifying welds. The Engineer shall have 3 working days to complete the review of the amended WQCP or addendum. Work that is affected by any of the proposed revisions shall not be performed until the amended WQCP or addendum has been approved. Should the Engineer fail to complete the review within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the amended WQCP or addendum, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

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

It is expressly understood that the Engineer's approval of the Contractor's WQCP shall not relieve the Contractor of any responsibility under the contract for the successful completion of the work in conformity with the requirements of the plans and specifications. The Engineer's approval shall not constitute a waiver of any requirement of the plans and specifications nor relieve the Contractor of any obligation thereunder, and defective work, materials, and equipment may be rejected notwithstanding approval of the WQCP.

A daily production log for welding shall be kept by the QCM for each day that welding is performed. The log shall clearly indicate the locations of all welding, except partial penetration longitudinal seam welds performed in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications. The log shall include the welders' names, amount of welding performed, any problems or deficiencies discovered, and any testing or repair work performed, at each location. The daily report from each QC Inspector shall also be included in the log.

The following items shall be included in a Welding Report that is to be submitted to the Engineer within 7 days following the performance of any welding. For work welded in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, the following items shall be included in a Welding Report that is to be submitted to the Engineer 48 hours prior to the Contractor furnishing a Certificate of Compliance for the material:

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

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

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

The Engineer will review the Welding Report to determine if the Contractor is in conformance with the WQCP. Unless otherwise specified, the Engineer shall be allowed 7 working days to review the report and respond in writing after a complete Welding Report has been received. Prior to receiving notification from the Engineer of the Contractor's conformance with the WQCP, the Contractor may encase in concrete or cover welds for which a Welding Report has been submitted. However, should the Contractor elect to encase or cover those welds prior to receiving notification from the Engineer, it is expressly understood that the Contractor shall not be relieved of the responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase or cover welds pending notification by the Engineer, and should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The QC Inspector shall provide reports to the QCM on a daily basis for each day that welding is performed.

Except for noncritical weld repairs, the Engineer shall be notified immediately in writing when welding problems, deficiencies, base metal repairs, or any other type of repairs not submitted in the WQCP are discovered and also of the proposed repair procedures to correct them. The Engineer shall have 5 working days to review these procedures. No remedial work shall begin until the repair procedures are approved in writing by the Engineer. Should the Engineer fail to complete the review within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the proposed repair procedures, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The QCM shall sign and furnish to the Engineer, a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each item of work for which welding was performed. The certificate shall state that all of the materials and workmanship incorporated in the work, and all required tests and inspections of this work, have been performed in conformance with the details shown on the plans and the provisions of the Standard Specifications and these special provisions.

Payment

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

SECTION 9. DESCRIPTION OF BRIDGE WORK

The bridge work to be done consists, in general, of constructing three bridge structures, three retaining walls, two sound walls, one pump plant and one inverted siphon, as shown on the plans and briefly described as follows:

TRANCAS STREET OVERCROSSING
(Bridge No. 21-0101)

A two-span cast-in-place prestressed concrete box girder bridge approximately 60 meters in length, 1.3 meters in depth and 31.8 meters in width supported on driven pile foundations.

NORTH NAPA UNDERPASS
(Bridge No. 21-0102)

A six-span cast-in-place prestressed concrete box girder bridge approximately 129 meters in length, 1.5 meters in depth and 10.2 meters in width supported on driven pile foundations.

NORTH NAPA PEDESTRIAN OVERCROSSING
(Bridge No. 21-0107)

A three-span cast-in-place prestressed concrete box girder bridge approximately 112 meters in length, 1.9 meters in depth and 4.8 meters in width supported on driven pile foundations.

RETAINING WALL NO. 1
(Bridge No. 21-RETW1)

A reinforced concrete retaining wall (Type 1) approximately 370 meters in length and of variable in height between 1.8 meters to 8.5 meters supported on driven pile and spread footing foundations.

RETAINING WALL NO. 2
(Bridge No. 21-RETW2)

A reinforced concrete retaining wall (Type 7S) approximately 300 meters in length and of variable in height between 3.0 meters to 4.8 meters supported on driven pile, tiedown anchor and CIDH pile foundations.

RETAINING WALL NO. 3
(Bridge No. 21-RETW3)

A reinforced concrete retaining wall (Type 1) approximately 32 meters in length and of variable in height between 1.6 meters to 4.8 meters supported on spread footing foundations.

SOUNDWALL NO. 1
(Bridge No. 21-SNDW1)

A masonry block sound wall with Type 27 SV (Mod) barrier approximately 318 meters in length and 4.3 meters in height supported on CIDH pile foundations.

SOUNDWALL NO. 2
(Bridge No. 21-SNDW2)

A masonry block sound wall approximately 458 meters in length and 4.3 meters in height supported on CIDH pile foundations.

TRANCAS STREET PUMPING PLANT
(Bridge NO. 21-101W)

A reinforced concrete stormwater and groundwater drainage pumping plant, related mechanical and electrical equipment, approximately 48 meters long and 16 meters wide supported on spread footing foundations.

TRANCAS STREET INVERTED SIPHON
(Bridge NO. 21-101W)

A reinforced concrete stormwater drainage inverted siphon supported on spread footing foundations.

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.

Attention is directed to "Aerially Deposited Lead", and "Material Containing Aerially Deposited Lead" of these special provisions. A first order of work for each stage or drainage system installation shall be to excavate and remove material containing aerially deposited lead from the area to be disturbed during that stage or drainage system installation, to haul this

material to the Mandatory Disposal Site for material containing aerially deposited lead, to place and compact such material, and to cover this material as shown on the plans. Areas shown on the plans to contain both aerially deposited lead and hazardous material shall not be excavated in accordance with the aerially deposited lead special provisions, but shall be excavated in accordance with "Hazardous and Non-hazardous Material, General", "Hazardous and Non-hazardous Material, Excavation" of these special provisions.

Attention is directed to "Alternative Pipe Culverts" and "Non-Storm Water Discharges" of these special provisions and to the drainage plans. A first order of work shall be to install Drainage System 11 from the planned connection to an existing manhole near Napa Creek to Drainage Unit 11 (d), in order to prepare for groundwater dewatering. Drainage System 11 shall be used as the primary method of discharging treated groundwater from the project.

Attention is directed to "Concrete Structures" and "Temporary Culverts" of these special provisions, to the structural plans, the temporary drainage plans, and to the drainage plans. A first order of work shall be to install a portion of the Trancas Street Inverted Siphon, Drainage System No. 10, and temporary culverts as shown in the temporary drainage plans, in order to intercept runoff from flowing across planned excavation areas. The concrete box Structure No. 4 for the Trancas Street Inverted Siphon shall not be subject to any construction equipment traffic loadings for the duration of the contract.

Attention is directed to "Survey of Existing Non-Highway Facilities" of these special provisions. The Contractor shall install survey monitoring hubs and conduct the preconstruction photographic survey prior to beginning any Project or Local Dewatering, and prior to performing any roadway or structural excavation exceeding 0.61 meters in depth.

Attention is directed to "Hazardous and Non-hazardous Material, General", "Hazardous and Non-hazardous Material, Excavation", and "Non-Storm Water Discharges" of these special provisions. A first order of work for Stage 1 and Stage 2 construction shall be to excavate and dispose of hazardous material located within each stage of construction as shown on the plans. The hazardous material for both stages 1 and 2 shall be excavated and disposed of prior to beginning any Project or Local Dewatering, or roadway or structural excavation exceeding 0.61 meters in depth for that stage of construction.

Attention is directed to "Project and Local Dewatering" and "Non-Storm Water Discharges" of these special provisions. A first order of work for each stage of construction shall be to perform Project Dewatering or Local Dewatering for that stage of construction prior to beginning any roadway or structural excavation exceeding 0.61 meters in depth for that stage of construction.

Attention is directed to "Maintain Existing Planting " and "Cooperation" of these special provisions. Attention is directed to "Project and Local Dewatering" and "Temporary Sheet Pile Wall (Galvani Wines)" of these special provisions, and the stage construction plans. The Galvani Wine Building, located between A Line Stations 139+41 - 139+67 (Rt), shall be protected from settlement due to ground water drawdown by the installation of a water-tight sheet pile wall as shown on the plans, as specified in these special provisions and as directed by the Engineer.

Attention is directed to "Cooperation", "Temporary Alternative Earth Retainers" and "Construct Railroad Tracks" of these special provisions. The Contractor shall notify the Engineer in writing a minimum of 100 working days prior to performing any work requiring installation or removal of temporary or permanent railroad signals or gates. The Contractor shall notify the Engineer in writing a minimum of 70 working days prior to performing any work on railroad property or work requiring railroad inspection. The Contractor shall submit shoring plans for temporary shoring within the vicinity of the temporary and permanent tracks, as shown on the plans, to the Engineer a minimum of 70 working days prior to performing the shoring work.

Attention is directed to "Asphalt Concrete" of these special provisions. The asphalt pavement on the Route 29 freeway lanes and ramps (M-Line, O-Line, A-Line, B-Line, and D-Line), for stages 1 through 3, shall be kept to a temporary grade of 75 mm below finished grade until the end of stage 3. At the end of stage 3, and prior to stage 4, the final lifts of asphalt concrete (Type A) and open-graded asphalt concrete shall be placed. The intent for this requirement is to facilitate attainment of pavement smoothness requirements as specified in these special provisions.

Attention is directed to "Signals, Lighting, and Electrical Systems" of these special provisions. In addition to the order of work shown in the stage construction plans, the signal and lighting work at Location 1, as shown in the electrical plans, shall be installed and fully operational during Stage 2 of this contract.

Attention is directed to "Maintaining Traffic" of these special provisions. Work that interferes with public traffic during the Grape Harvest, which runs from August 1 through October 15 of each year, shall be limited to work which is on the then-current project schedule critical path.

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.

A first order of work shall be to place the order for the electrical equipment. The Engineer shall be furnished a statement from the vendor that the order for the electrical equipment has been received and accepted by the vendor.

The uppermost layer of new pavement shall not be placed until all underlying conduits and loop detectors have been installed.

Prior to commencement of the traffic signal functional test at any location, all items of work related to signal control shall be completed and all roadside signs, pavement delineation, and pavement markings shall be in place at that location.

No overhead sign panel shall be installed until the overhead sign lighting is completely operational.

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" and "Temporary Pavement Delineation" of these special provisions and to the stage construction sheets of the plans.

Attention is directed to "Progress Schedule (Critical Path Method)" of these special provisions regarding the submittal of a general time-scaled logic diagram within 10 days after approval of the contract. The diagram shall be submitted prior to performing any work that may be affected by any proposed deviations to the construction staging of the project.

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

In each stage, after completion of the preceding stage, the first order of work shall be the removal of existing pavement delineation as directed by the Engineer. Pavement delineation removal shall be coordinated with new delineation so that lane lines are provided at all times on traveled ways open to public traffic.

Before obliterating any pavement delineation 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 pavement delineation shall be considered as included in the contract prices paid for new pavement delineation and no additional compensation will be allowed therefor.

Construction of the new structural section and temporary staging structural sections adjacent to the existing traveled way shall be performed in successive and, once all operations are under way, concurrent operations of excavating, preparing subgrade, placing base materials and paving. Excavation within 2.4 meters of the existing traveled way and not protected by temporary k-rail (Type K) shall not precede the paving operation by more than 3 working days unless:

A. approved in writing by the Engineer and;
B. material is placed and compacted against the vertical cuts within 2.4 meters of the existing traveled way. During excavation operations, native material may be used for this purpose, however, once the placing of the structural section commences, structural material shall be used. The material shall be placed to the level of the elevation of the top of existing pavement and tapered at a slope of 1:4 (vertical:horizontal) or flatter to the bottom of the excavation. Treated base shall not be used for the taper. Full compensation for placing the material on a 1:4 slope, regardless of the number of times it is required, and subsequent removing or reshaping of the material to the lines and grades shown on the plans shall be considered as included in the contract price paid for the materials involved and no additional compensation will be allowed therefor. No payment will be made for material placed in excess of that required for the structural section.

At those locations exposed to public traffic where guard railings or barriers are to be constructed, 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.

Upon completion of the pumping plant work at the Trancas Street OC Pumping Plant, as described in Section 74 of the Standard Specifications, and these special provisions, the contractor shall be responsible for maintaining drainage pumping capacity of the drainage area, and maintenance of the pumping plant throughout the life of the contract. Section 7-1.15, "Relief From Maintenance and Responsibility," of the Standard Specifications shall not apply to the Trancas Street Pumping Plant.

The total drainage capacity (stormwater) to be maintained shall not be less than 45,424 liters per minute at 11.0 meters of head. The total drainage capacity (groundwater) to be maintained shall not be less than 946 liters per minute at 10.7 meters of head. Maintenance of the pumping plant shall include, but not be limited to, providing necessary adjustments and repairs, and cleaning of the storage box, entrance bay, and the various sumps, for the proper operation of the Drainage Pumping Plant Equipment and Pumping Plant Electrical Equipment. Pumping capacity shall be maintained at the Contractor's option, by one of the following methods:

1. Staging the work such that the entire pumping plant is complete in place and capable of maintaining drainage pumping capacity. Attention is directed to Section 74-1.055, "Use of Pumps by Contractor Prior to Acceptance of Work", of the Standard Specifications.
2. Providing an auxiliary pumping system consisting of temporary drainage system, sump pumps and discharge piping.
3. A combination of the above two methods.

The Contractor shall submit his proposed method for maintaining drainage pumping capacity to the Engineer for approval.

10-1.02 WATER POLLUTION CONTROL (STORM WATER POLLUTION PREVENTION PLAN)

Water pollution control work shall conform to the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications and these special provisions.

This project lies within the boundaries of the San Francisco Bay Regional Water Quality Control Board and shall conform to the requirements of the National Pollutant Discharge Elimination System (NPDES) Permit for General Construction Activities No. CAS000002, Order No, 99-08-DWQ, and the NPDES Permit for the State of California Department of Transportation Properties, Facilities, and Activities, No. CAS000003, Order No, 99-06-DWQ issued by the State Water Resources Control Board. These permits, hereafter referred to as the "Permits," regulate storm water discharges associated with construction activities.

Water pollution control work shall conform to the requirements in the "Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual" and the "Construction Site Best Management Practices (BMPs) Manual," and addenda thereto issued up to, and including, the date of advertisement of the project, hereafter referred to respectively as the "Preparation Manual" and the "Construction Site BMP Manual" and collectively as the "Manuals." Copies of the Manuals and the Permits may be obtained from the Department of Transportation, Material Operations Branch, Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, California 95815, Telephone: (916) 445-3520. Copies of the Manuals may also be obtained from the Department's Internet Web Site at: http://www.dot.ca.gov/hq/construc/stormwater.html.

In addition, a Conceptual Storm Water Pollution Prevention Plan (CSWPPP) has been prepared for this project by the Department and is available for review at 111 Grand Avenue, Oakland, California 94601. Please call the Construction Office Duty Senior, telephone number (510) 286-5209, to reserve a copy of the documents at least 24 hours in advance. This document shall be used by the Contractor for developing the actual contract Storm Water Pollution Prevention Plan (SWPPP).

The Contractor shall know and fully comply with the applicable provisions of the Manuals, Permits, and Federal, State, and local regulations that govern the Contractor's operations and storm water discharges from both the project site and areas of disturbance outside the project limits during construction. The Contractor shall maintain copies of the Permits at the project site and shall make the Permits available during construction.

Unless arrangements for disturbance or use of areas outside the project limits are made by the Department and made part of the contract, it is expressly agreed that the Department assumes no responsibility for the Contractor or property owner with respect to any arrangements made between the Contractor and property owner. The Contractor shall implement, inspect and maintain all necessary water pollution control practices to satisfy all applicable Federal, State, and Local laws and regulations that govern water quality for areas used outside of the highway right-of-way or areas arranged for the specific use of the Contractor for this project. Installing, inspecting, and maintaining water pollution control practices on areas outside the highway right-of-way not specifically arranged for and provided for by the Department for the execution of this contract will not be paid for.

The Contractor shall be responsible for the costs and for liabilities imposed by law as a result of the Contractor's failure to comply with the provisions set forth in this section "Water Pollution Control", including but not limited to, compliance with the applicable provisions of the Manuals, Permits and Federal, State and local regulations. Costs and liabilities include, but are not limited to, fines, penalties, and damages whether assessed against the State or the Contractor, including those levied under the Federal Clean Water Act and the State Porter Cologne Water Quality Act.

In addition to the remedies authorized by law, money due the Contractor under the contract, in an amount determined by the Department, may be retained by the State of California until disposition has been made of the costs and liabilities.

When a regulatory agency or other third party identifies a failure to comply with the permit or any other local, State, or federal requirement, the Engineer may retain money due the Contractor, subject to the following:

A. The Department will give the Contractor 30 days notice of the Department's intention to retain funds from partial payments which may become due to the Contractor prior to acceptance of the contract. Retention of funds from payments made after acceptance of the contract may be made without prior notice to the Contractor.
B. No retention of additional amounts out of partial payments will be made if the amount to be retained does not exceed the amount being withheld from partial payments pursuant to Section 9-1.06, "Partial Payments," of the Standard Specifications.
C. If the Department has retained funds and it is subsequently determined that the State is not subject to the costs and liabilities in connection with the matter for which the retention was made, the Department shall be liable for interest on the amount retained for the period of the retention, and the rate of interest payable shall be 6 percent per annum.

Conformance with the provisions of this section "Water Pollution Control" shall not relieve the Contractor from the Contractor's responsibilities, as provided in Section 7, "Legal Relations and Responsibilities," of the Standard Specifications.

The Contractor shall notify the Engineer immediately upon request from the regulatory agencies to enter, inspect, sample, monitor or otherwise access the project site or the Contractor's records pertaining to water pollution control work.

STORM WATER POLLUTION PREVENTION PLAN PREPARATION, APPROVAL AND AMENDMENTS

As part of the water pollution control work, a Storm Water Pollution Prevention Plan, hereafter referred to as the "SWPPP," is required for this contract. The SWPPP shall conform to the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications, the requirements in the Manuals, the requirements of the Permits, and these special provisions. Upon the Engineer's approval of the SWPPP, the SWPPP shall be considered to fulfill the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications for development and submittal of a Water Pollution Control Program.

No work having potential to cause water pollution, as determined by the Engineer, shall be performed until the SWPPP has been approved by the Engineer.

The Contractor shall designate a Water Pollution Control Manager. The Water Pollution Control Manager shall be responsible for the preparation of the SWPPP and any required modifications or amendments and shall be responsible for the implementation and adequate functioning of the various water pollution control practices employed. The Water Pollution Control Manager shall serve as the primary contact for all issues related to the SWPPP or its implementation. The Contractor shall submit to the Engineer a statement of qualifications, describing the training, previous work history and expertise of the individual selected by the Contractor to serve as Water Pollution Control Manager. The Engineer will reject the Contractor's submission of a Water Pollution Control Manager if the submitted qualifications are deemed to be inadequate.

Within 30 days after the approval of the contract, the Contractor shall submit 3 copies of the draft SWPPP to the Engineer. The Engineer will have 15 days to review the SWPPP. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the SWPPP within 15 days of receipt of the Engineer's comments. The Engineer will have 15 days to review the revisions. Upon the Engineer's approval of the SWPPP, 3 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. The SWPPP shall apply to all areas that are directly related to construction including, but not limited to, staging areas, storage yards, material borrow areas, and access roads within or outside of the highway right-of-way.

The SWPPP shall incorporate water pollution control practices in the following six categories:

A. Soil stabilization;
B. Sediment control;
C. Wind erosion control;
D. Tracking control;
E. Non-storm water control; and
F. Waste management and material pollution control.

The Contractor shall develop a Water Pollution Control Schedule that shall describe the timing of grading or other work activities that could affect water pollution. The Water Pollution Control Schedule shall be updated by the Contractor to reflect any changes in the Contractor's operations that would affect the necessary implementation of water pollution control practices.

The Contractor shall incorporate the "Minimum Requirements" presented in the Preparation Manual into the SWPPP. In addition to the "Minimum Requirements" presented in the Preparation Manual, the Contractor shall complete the BMP Consideration Checklist presented in the Preparation Manual. The Contractor shall identify and incorporate into the SWPPP the water pollution control practices selected by the Contractor or as directed by the Engineer.

In addition to the Minimum Requirements presented in the Preparation Manual, special requirements shall be incorporated into the SWPPP and the Water Pollution Control Cost Break-Down as follows:

Special Requirement(s)

Category	BMP, location and quantity
Soil Stabilization Practices	SS-1 Scheduling SS-2 Preservation of Existing Vegetation SS-7 Geotextiles, Mats/Plastic Covers & Erosion Control Blankets
Sediment Control Practices	SC-1 Silt Fences
Non Storm Water Control	NS-2 Dewatering
Waste Management & Materials Pollution Control	WM-8 Concrete Waste Management WM-1 Material Delivery and Storage WM-2 Material Use WM-4 Spill Prevention and Control WM-5 Solid Waste Management NS-8 Vehicle and Equipment Cleaning NS-9 Vehicle and Equipment Fueling NS-10 Vehicle and Equipment Maintenance

The following contract items of work, shall be incorporated into the SWPPP as "Temporary Water Pollution Control Practices": Temporary Storm Drain Inlet Protection, Temporary Cover, Temporary Entrance/Exit, Temporary Concrete Washout Facility. The Contractor's attention is directed to these special provisions provided for each temporary water pollution control practice and to the Storm Water Information Handout which is available at 111 Grand Avenue Oakland, California 94612. Please call the Construction Duty Senior, telephone number (510) 286-5209 to reserve a copy of the documents at least 24 hours in advance.

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 (Type D) , Fiber Rolls, Erosion Control Blanket. 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. In addition the SWPPP shall include a copy of the following:

1.Notification of Construction
2 RWQCB 401 Certification

The Contractor shall prepare an amendment to the SWPPP when there is a change in construction activities or operations which may affect the discharge of pollutants to surface waters, ground waters, municipal storm drain systems, or when the Contractor's activities or operations violate any condition of the Permits, or when directed by the Engineer. Amendments shall show additional water pollution control practices or revised operations, including those areas or operations not shown in the initially approved SWPPP. Amendments to the SWPPP shall be prepared, and submitted for review and approval in the same manner as specified for the SWPPP approval. Subsequent amendments shall be submitted within a time approved by the Engineer, but in no case longer than the time specified for the initial submittal and review of the SWPPP. At a minimum, the SWPPP shall be amended annually and submitted to the Engineer 25 days prior to the defined rainy season.

The Contractor shall keep one copy of the approved SWPPP and approved amendments at the project site. The SWPPP shall be made available upon request of a representative of the Regional Water Quality Control Board, State Water Resources Control Board, United States Environmental Protection Agency or the local storm water management agency. Requests by the public shall be directed to the Engineer.

COST BREAK-DOWN

The Contractor shall submit to the Engineer a cost break-down for the contract lump sum item of water pollution control, together with the SWPPP.

The cost break-down shall be completed and furnished in the format shown in the example of the cost break-down included in this section. Unit descriptions and quantities shall be designated by the Contractor, except for the specified special requirements shown in the example. The units and quantities given in the example, if provided, are special requirements specified for the SWPPP, and shall be included in the cost break-down furnished to the Engineer. The Contractor shall verify the estimated quantities of the special requirements and submit revised quantities in the cost break-down.

The Contractor shall determine the quantities required to complete the work of water pollution control. The quantities and their values shall be included in the cost break-down submitted to the Engineer for approval. The Contractor shall be responsible for the accuracy of the quantities and values used in the cost break-down submitted for approval. The cost break-down shall not include water pollution control practices which are shown on the plans and for which there is a separate contract item.

The sum of the amounts for the units of work listed in the cost break-down shall be equal to the contract lump sum price bid for water pollution control. Overhead and profit shall be included in each individual unit listed in the cost break-down. The cost break-down shall be submitted and approved within the same times specified for the SWPPP. Partial payment for the item of water pollution control will not be made until the cost break-down is approved, in writing, by the Engineer.

Adjustments in the items of work and quantities listed in the approved cost break-down shall be made when required to address amendments to the SWPPP, except when the adjusted items are paid for as extra work.

No adjustment in compensation will be made in the contract lump sum price paid for water pollution control due to differences between the quantities shown in the approved cost break-down and the quantities required to complete the work as shown on the approved SWPPP. No adjustment in compensation will be made for ordered changes to correct SWPPP work resulting from the Contractor's own operations or from the Contractor's negligence.

The approved cost break-down will be used to determine partial payments during the progress of the work and as the basis for calculating the adjustment in compensation for the item of water pollution control due to increases or decreases of quantities ordered by the Engineer. When an ordered change increases or decreases the quantities of an approved cost break-down item, the adjustment in compensation will be determined in the same manner specified for increases and decreases in the quantity of a contract item of work in conformance with the provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications. If an ordered change requires a new item not on the approved cost break-down, the adjustment in compensation will be determined in the same manner specified for extra work in conformance with Section 4-1.03D, "Extra Work," of the Standard Specifications.

If requested by the Contractor and approved by the Engineer, changes to the water pollution control practices listed in the approved cost break-down, including the addition of new water pollution control practices, will be allowed. The changes shall be included in an approved amendment to the SWPPP. If the changes to the water pollution control practices requested by the Contractor would result in a net cost increase to the lump sum price for water pollution control, an adjustment in compensation will be made without change to the item of water pollution control. The net cost increase to the item of water pollution control resulting from changes requested by the Contractor will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

WATER POLLUTION CONTROL COST BREAK-DOWN

Contract No. 04 120614

UNIT DESCRIPTION	UNIT	APPROXIMATE QUANTITY	VALUE	AMOUNT
NS-2 Dewatering	LS	Lump Sum		
WM-8 Concrete Waste Management	LS	Lump Sum		
WM-1 Material Delivery & Storage	LS	Lump Sum		
WM-4 Spill Prevention and Control	LS	Lump Sum		
WM-5 Solid Waste Management	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		
SS-1 Scheduling	LS	Lump Sum		
SS-2 Preservation of Existing Vegetation	LS	Lump Sum		
SS-7 Geotextiles, Mats/Plastic Covers & Erosion Control Blankets	LS	Lump Sum		
SC-1 Silt Fences	LS	Lump Sum		

TOTAL _____

SWPPP IMPLEMENTATION

Upon approval of the SWPPP, the Contractor shall be responsible throughout the duration of the project for installing, constructing, inspecting, maintaining, removing and disposing of the water pollution control practices included in the SWPPP and any amendments. Unless otherwise directed by the Engineer, the Contractor's responsibility for SWPPP implementation shall continue throughout any temporary suspension of work ordered in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications. Requirements for installation, construction, inspection, maintenance, removal, and disposal of water pollution control practices are specified in the Manuals and these special provisions.

If the Contractor or the Engineer identifies a deficiency in any aspect of the implementation of the approved SWPPP or amendments, the deficiency shall be corrected immediately. The deficiency may be corrected at a later date and time if requested by the Contractor and approved by the Engineer in writing, but not later than the onset of precipitation. If the Contractor fails to correct the identified deficiency by the date agreed or prior to the onset of precipitation the project shall be in noncompliance. Attention is directed to Section 5-1.01, "Authority of the Engineer," of the Standard Specifications and the payment sections of these special provisions for possible noncompliance penalties.

If the Contractor fails to conform to the provisions of "Water Pollution Control," the Engineer may order the suspension of construction operations which create water pollution.

Implementation of water pollution control practices may vary by season. The Construction Site BMP Manual and these special provisions shall be followed for control practice selection of year round, rainy season and non-rainy season water pollution control practices.

Year-Round Implementation Requirements

The Contractor shall have a year-round program for implementing, inspecting and maintaining water pollution control practices for wind erosion control, tracking control, non-storm water control, and waste management and materials pollution control.

The National Weather Service weather forecast shall be monitored and used by the Contractor on a daily basis. An alternative weather forecast proposed by the Contractor may be used if approved by the Engineer. If precipitation is predicted, the necessary water pollution control practices shall be deployed prior to the onset of the precipitation.

Disturbed soil areas shall be considered active whenever the soil disturbing activities have occurred, continue to occur or will occur during the ensuing 21 days. Non-active areas shall be protected as prescribed in the Construction Site BMP Manual within 14 days of cessation of soil disturbing activities or prior to the onset of precipitation, whichever occurs first.

In order to provide effective erosion control the Contractor may be directed to apply permanent erosion control in small or multiple units as disturbed soil areas are deemed substantially complete by the Engineer. The Contractor's attention is directed to "Erosion Control" and "Move-In Move-Out (Erosion Control)" of these special provisions.

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
SC-1 Silt Fences	

Rainy Season Requirements

Soil stabilization and sediment control practices conforming to the requirements in the Special Requirements and applicable Preparation Manual Minimum Requirements, shall be provided throughout the rainy season, defined as between October 1 and May 1.

Rainy Season Requirements

An implementation schedule of required soil stabilization and sediment control practices for disturbed soil areas shall be completed not later than 20 days prior to the beginning of each rainy season. The implementation schedule shall identify the soil stabilization and sediment control practices to be implemented and the dates on which the implementation will be 25 percent, 50 percent and 100 percent complete, respectively. Construction activities beginning during the rainy season shall implement applicable soil stabilization and sediment control practices. 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 1.0 hectares. The Engineer may approve, on a case-by-case basis, expansions of the active disturbed soil area limit. Soil stabilization and sediment control materials shall be maintained on site sufficient to protect the unprotected disturbed soil area. A detailed

plan for the mobilization of sufficient labor and equipment shall be maintained to deploy the water pollution control practices required to protect the project site prior to the onset of precipitation events.

Non-Rainy Season Requirements

The non-rainy season shall be defined as all days outside the defined rainy season. The Contractor's attention is directed to the Construction Site BMP Manual for soil stabilization and sediment control implementation requirements on disturbed soil areas during the non-rainy season. Disturbed soil areas within the project shall be protected in conformance with the requirements in the Construction Site BMP Manual with an effective combination of soil stabilization and sediment control.

MAINTENANCE

To ensure the proper implementation and functioning of water pollution control practices, the Contractor shall regularly inspect and maintain the construction site for the water pollution control practices identified in the SWPPP. The construction site shall be inspected by the Contractor as follows:

A. Prior to a forecast storm;
B. After a precipitation event which causes site runoff;
C. At 24 hour intervals during extended precipitation events;
D. Routinely, a minimum of once every week 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 CSWPPP or an alternative inspection checklist provided by the Engineer. One copy of each site inspection record shall be submitted to the Engineer within 24 hours of completing the inspection.

REPORTING REQUIREMENTS

Report of Discharges, Notices or Orders

If the Contractor identifies any discharge in a manner causing, or potentially causing, a condition of pollution, or if the project receives a written notice or order from any regulatory agency, the Contractor shall immediately inform the Engineer. The Contractor shall submit a written report to the Engineer within 7 days of the discharge event, notice, or order. The report shall include the following information:

A. The date, time, location, nature of the operation, and type of discharge, including the cause or nature of the notice or order.
B. The water pollution control practices deployed before the discharge event, or prior to receiving the notice or order.
C. The date of deployment and type of water pollution control practices deployed after the discharge event, or after receiving the notice, or order, including additional measures installed or planned to reduce or prevent reoccurrence.
D. An implementation and maintenance schedule for any affected water pollution control practices.

Report of First-Time Non-Storm Water Discharge

The Contractor shall notify the Engineer at least 3 days in advance of each first-time non-storm water discharge event, excluding exempted discharges. The Contractor shall notify the Engineer of each different operation causing a non-storm water discharge and shall obtain field approval for each first-time non-storm water discharge. Non-storm water discharges shall be monitored at each first-time occurrence and routinely thereafter.

Annual Certifications

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

PAYMENT

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

Attention is directed to Section 9-1.06, "Partial Payments," and Section 9-1.07, "Payment After Acceptance," of the Standard Specifications. Payments for prepare storm water pollution prevention plan will be made as follows:

A. After the SWPPP has been approved by the Engineer, 75 percent of the contract item price for prepare storm water pollution prevention plan will be included in the monthly partial payment estimate; and
B. After acceptance of the contract in conformance with the provisions in Section 7-1.17, "Acceptance of Contract," of the Standard Specifications, payment for the remaining 25 percent of the contract item price for prepare storm water pollution prevention plan will be made in conformance with the provisions in Section 9-1.07.

The contract lump sum price paid for water pollution control shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing, constructing, removing, and disposing of water pollution control practices, including non-storm water and waste management and materials pollution water pollution control practices except those shown on the plans and for which there is a contract item of work, and excluding developing, preparing, obtaining approval of, revising, and amending the SWPPP, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The cost of maintaining the temporary water pollution control practices shall be divided equally by the State and the Contractor as follows:

Soil Stabilization

All temporary water pollution control practices except:
SS-1 Scheduling
SS-2 Preservation of Existing Vegetation

Sediment Control

All temporary water pollution control practices.

Tracking Control

All temporary water pollution control practices except:
SC-7 Street Sweeping and Vacuuming

Wind Erosion Control

All temporary water pollution control practices.

Non-Storm Water Control

No sharing of maintenance costs will be allowed.

Waste Management & Material Control

No sharing of maintenance costs will be allowed.

The division of cost will be made by determining the cost of maintaining temporary water pollution control practices in conformance with the provisions in Section 9-1.03, "Force Account Payment," of the Standard Specifications and paying to the Contractor one-half of that cost. Clean-up, repair, removal, disposal, improper installation, and replacement of temporary water pollution control practices damaged by the Contractor's negligence shall not be considered as included in the cost for performing maintenance and no additional compensation will be allowed therefor.

The provisions for sharing maintenance costs shall not relieve the Contractor from the responsibility for providing appropriate maintenance on those items where maintenance costs are not shared.

Full compensation for maintenance costs of water pollution control practices not shared, as specified in these special provisions, shall be considered as included in the contract lump sum price paid for water pollution control and no additional compensation will be allowed therefor.

Those water pollution control practices which are shown on the plans and for which there is a contract item of work will be measured and paid for as that contract item of work.

The Engineer will retain an amount equal to 25 percent of the estimated value of the contract work performed during estimate periods in which the Contractor fails to conform to the provisions of this section "Water Pollution Control," as determined by the Engineer.

Retention for failure to conform to the provisions in this section "Water Pollution Control" shall be in addition to the other retention provided for in the contract. The amounts retained for failure of the Contractor to conform to the provisions in this section will be released for payment on the next monthly estimate for partial payment following the date that an approved SWPPP has been implemented and maintained, and water pollution is adequately controlled, as determined by the Engineer.

10-1.03 CONSTRUCT RAILROAD TRACKS

This work shall consist of constructing and maintaining temporary and permanent track, constructing and maintaining temporary and permanent track crossings, surveying existing track beyond the limits of track removal, and removing, when necessary, permanent and temporary track and track crossings in accordance with the details shown on the plans, as specified in these special provisions.

This special provision contains measurements in both English and Metric units. For all railroad work, English units shall govern over metric conversions.

The All track work and track-related work shall be done in conformance with the American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual for Railway Engineering (current issue), and to the applicable provisions in the Standard Specifications.

All temporary shoring within the vicinity of the temporary and permanent tracks, as shown on the plans, shall conform Cooper E80 loading requirements.

Attention is directed to "Order of Work" and "Cooperation" of these special provisions regarding staging of the work, advance notification requirements, and coordination of work with the railroad.

Work which interferes with public traffic on existing Route 29 shall only be performed in accordance with the lane closure charts for Route 29 and only during those periods when the Napa Valley Wine Train has no train service scheduled.

All shifts from existing track to temporary track, and from temporary track to new permanent track, shall be performed when the Napa Valley Wine Train has no train service scheduled.

GENERAL

The construction work shall include removing and disposing of existing permanent track, ballast, and roadway pavement, preparing subgrade, surveying existing track in order to establish the correct alignment of new temporary and permanent track, furnishing and placing temporary and permanent track subballast, ballast, ties, rails and all appurtenant track materials needed to complete the track work, planing asphalt concrete pavement to prepare for constructing temporary asphalt concrete track crossing on Route 29, constructing temporary asphalt concrete track crossing on Route 29, constructing permanent precast concrete panel track crossings on California Boulevard and Redwood Road, and removing and disposing of temporary track and track crossing on Route 29 when no longer required.

This work does not include installation or removal of temporary or permanent railroad signals or gates. Installation and removal of temporary or permanent railroad signals or gates will be performed by railroad forces and shall be coordinated as specified in "Order of Work" of these special provisions.

WORKMANSHIP AND SUPERVISION

The Contractor and his authorized representative shall keep themselves fully informed of Railroad's rules, regulations and instructions governing the use of signals and flags, for signaling or flagging trains as a protection against accidents, and governing the protection of tracks and property of the Railroad and the traffic moving on such tracks, as set forth herein and as specified in 'Railroad Relations and Insurance," of these special provisions. The Contractor and his authorized representative shall observe and comply with, and shall cause all his agents and employees to observe and comply with all special instructions of the Engineer relative to the safe operation of the tracks and property of Railroad and the traffic moving on such tracks, as well as wires, signals and other property, at or in the vicinity of the work.

The Contractor and his authorized representative, his agents and employees shall not use red flags, lights, or other red material which may be mistaken for signals or flags.

All track construction shall be performed under the direction of qualified and competent supervisory personnel, including foreman and gang leaders, experienced in railroad construction.

Track construction materials shall be unloaded and handled in conformance with recommended practices for the materials involved. Any material which has been damaged by unloading or handling, as determined by the Engineer, shall be removed and replaced by the Contractor at his expense.

ROADBED CONSTRUCTION

Earthwork required to construct subgrade for track construction, at the level of the grading plane, shall be as provided in the section entitled "Earthwork" elsewhere in these special provisions.

Relative compaction for a minimum depth of 0.5 foot (152 mm) below the grading plane shall be not less than 90 percent.

Roadbed, grade, bridges and drainage shall be approved by the Engineer prior to any distribution of track construction material.

RAILROAD MATERIALS

Manufactured railroad materials shall be standard products used in railroad construction conforming to the requirements of AREMA or other nationally recognized specifications and to Section 6, "Control of Materials," of the Standard Specifications.

All materials for temporary and permanent track shall be new.

CROSS TIES

Unless otherwise approved, cross ties shall be new and manufactured from the following kind of wood: Western Mixed-Douglas Fir.

Ties shall be made from sound, straight, live timber, and free of any defects that may impair their strength or durability, such as bark, decay, splits, shakes, large or numerous holes or knots, pitch seams, pitch rings, grain with slant greater than one in fifteen, or other imperfections.

Ties shall be of compact wood throughout the top fourth of the tie, where any inch (25.4 mm) of any radius from the pith shall have not less than one-third summer wood in six or more rings of annual growth, or not less than one-half summer wood in fewer rings.

Ties shall be a minimum of 9 feet (2.74m)in length and shall measure 7" thick x 9" wide (178 mm x 229 mm) on top throughout both sections between 20 inches (508 mm) and 40 inches (1016 mm) from the middle of the tie.

Ties shall be well sawn on all sides and cut square at the ends to the dimensions specified. Ties shall be straight, and opposite faces of ties shall be true and parallel.

Ties will be inspected after treatment at suitable and convenient places satisfactory to the Engineer.

Ties will be rejected when decayed in the slightest degree, except that peck in cypress will be allowed up to the limitations of hole as specified elsewhere in these special provisions. Blue stain will be allowed in any wood.

Large Hole - A large hole is one more than 1/2 inch (12.7 mm) in diameter and 3 inches (76.2 mm) deep within, or more than 1 inch (25.4 mm) in diameter and 3 inches (76.2 mm) deep outside the sections of the tie between 20 inches (508 mm) and 40 inches (1016 mm) from its middle. Numerous holes are any number equaling a large hole in damaging effect.

Large Knot - A large knot is one whose width exceeds 1/4 of the width of the surface on which it appears, but such knot, if sound, may be allowed if it occurs outside the sections of the tie between 20 inches (508 mm) and 40 inches (1016 mm) from its middle. Numerous knots are any number equaling a large knot in damaging effect.

Shake - A shake is a separation of one ring of annular growth from another. A tie containing a shake more than 1/3 the width of the tie in length or more than 1/8 inch (3.2 mm) wide will be rejected.

Split - A split is a break across annular rings. A tie containing a split over 8 inches (203.2 mm) long, or 1/8 inch (3.2 mm) wide or 2 inches (50.8 mm) deep will be rejected.

A tie is not well sawn when its surfaces are cut into with score-marks more than 1/2 inch (12.7 mm) deep or when its surfaces are not even.

Sawn ties will be considered straight: (a) when a straight line along the top from the middle of one end to the middle of the opposite end is nowhere less than 2 inches (50.8 mm) from the edge of the tie; and (b) when a straight line along the side from the middle of one end to the middle of the opposite end is nowhere less than 1.5 inches (38.1 mm) from the edge of the tie.

The top and bottom of the tie will be considered parallel if any difference in the thickness at the sides or ends does not exceed 1/2 inch (12.7 mm). All edges shall be square except that ties having wane will be rejected.

Ties more than 1/4 inch (6.35 mm) narrower in width or 1/4 inch (6.35 mm) thinner in thickness or 1 inch (25.4 mm) shorter in length than sized as specified will be rejected

Ties delivered on right of way shall be unloaded as nearly as practicable at the locations where required, but must not be thrown down high embankments. They must be placed clear of the track and walkways and must not be left in or adjacent to streets or highways, in cuts where they may obstruct the drainage, in places subject to overflow, adjacent to buildings where they may be subject to fire hazard, or where they may be hazardous.

Contractor to supply certification from tie manufacturer that ties furnished comply with these special provisions and have been tested in accordance with the latest AREMA requirements outlined in Volume 1, Chapter 30 (Ties).

Ties not conforming to the special provisions will be rejected and must be removed immediately from state or railroad right of way.

STEEL RAIL

Rail shall be new 136 pounds (61.69 kg) per lineal yard (910 mm), control cooled and shall conform to the dimensions and details as shown on the plans and be equal or superior to the following minimum requirements.

Length - Jointed rails shall be a minimum of 39 feet (11.89 m) in length, except for closure rails.

Drilling - Rail ends shall be drilled in accordance with the plans; however, one additional hole shall be drilled at 6 1/2" (165.1 mm) centers when 36" (914.4 mm) six-hole angle bars are used. Any additional holes in rail will be sufficient cause for rejection. Hole in rail must be drilled to proper size and not punched, slotted or cut with a torch and all chips and burrs shall be removed in accordance with the details shown on the plans before applying joints. A variation of 1/32" (0.79 mm) in size and location of bolt holes will be allowed. Rail Ends - Rail shall be cut with rail saw to a tolerance of 1/32" (0.79 mm)from square. All burrs shall be removed and ends made smooth and beveled. Torch cut rails will be rejected. Battered or mismatched ends must be built up or ground off to conform to minimum tolerance of 1/16" (1.59 mm) on top and gage side to adjoining rail.

Rail End Hardening - The top of ball of each rail end, except heat treated rail, must be hardened for a minimum distance of 2 1/4 (57.15 mm) inches from the end to penetration depth of 1/4 inch (6.35 mm) to Brinell hardness of 341 to 415.

Rail End Chamfer - The top of ball at each end of rail shall be chambered by grinding to an angle 1/16 inch (1.59 mm) inward from rail end to a depth of 1/8 inch (3.2 mm) at rail end.

Continuous Welded Rail - Welding of continuous welded rail shall be in accordance with these special provisions. Rail shall be of the same weight, section and grade within the limits of each individual track.

Angle Bars.--Angle bars used for joining 39 foot (11.89 m) or 78 foot (23.77 m) welded rails shall be new and shall conform to the dimensions and details as shown on the plans. Angle bars used for joining continuous welded rail shall be new and shall have the physical characteristics as shown on the plans with exception that length shall be extended to provide for two (2) additional bolt holes at 6 1/2" (165.1 mm) centers.

Insulated Joints - Insulated joints shall be in accordance with the latest AREMA specifications.

Track Bolts, Nuts Nutlocks --Track bolts, nuts and nutlocks shall be new, of the correct size to properly fit the rails and joint bars furnished in accordance with the details shown on the plans.

Tee Plates - Tie plates shall be new and shall be 8" x 14" (203.2 mm x 355.6 mm) in accordance with the details shown on the plans.

Track Spikes.--Track spikes shall be new 5/8" (15.9 mm) with reinforced throat in accordance with the details shown on the plans and in accordance with the latest revision of the AREMA specifications Volume 1 Chapter 5 Part 2 for "Soft-Steel Track Spikes."

Rail Anchors --Rail anchors shall be new of the one piece type of standard weight normally applied with a spike maul and of a design, size and construction to properly fit base of rail on which being applied and conforming to AREMA requirements.

BALLAST

Ballast -Ballast shall be crushed from rock, copper slag, open-hearth slag or gravel (as specified) composed of hard, strong and durable particles. All boulders which will pass through a 5 inch (127 mm) circular opening before crushing shall be rejected. Approved crush material shall be angular, rough-surfaced, clean and free of sand, loam, clay, flat elongated, soft or disintegrated pieces and other deleterious substances. All particles of the ballast shall have been broken by the crusher and have at least two broken surfaces. The percentage of wear of prepared ballast, tested in accordance with the current ASTM Method of Test, designation C535, shall not be greater than 32 percent. The soundness of prepared ballast shall be such that when tested in sodium sulfate in accordance with the current ASTM Method of Test, designation C88, the weighted average loss shall not be in excess of 5 percent after five cycles.

The grading of prepared ballast shall be tested with square opening laboratory sieves (ASTM El1) and 100 percent by weight shall pass the 2-inch (50.8 mm) sieve size and zero to five percent passing the 3/8-inch (9.5 mm) sieve size. The percent passing the sieve sizes between the 2-inch (50.8 mm) and 3/8-inch (9.5 mm) shall depend upon the natural breaking pattern which results from natural rock cleavage planes and sharpness of the break. No ballast particles shall measure over 2 1/2 inches (63.5 mm) in any dimension.

Shipment of ballast not conforming to these special provisions shall be rejected at the Contractor's expense; however, ballast not conforming to the above special provisions may be accepted if specifically approved by the Engineer.

Metal Preservative.-Metal preservative shall be a soft grease-type material consisting of petroleum or petroleum based compound with a corrosion inhibitor. The applied film of metal preservative shall be non-drying.

ROAD CROSSING WITH PRECAST CONCRETE PANELS

Road crossings with precast concrete panels shall be in accordance with the plans and the latest AREMA specifications.

CONSTRUCTION, GENERAL

Survey of existing track -- Prior to removing existing permanent track, the Contractor shall survey existing track to be removed and the existing track 300 feet (109 m) beyond the limits of staged track work in order to ensure proper conformance of new track with existing track to remain in place. Prior to removing new temporary track, the Contractor shall survey existing track 300 feet (109 m) beyond the limits of staged track work in order to ensure proper conformance of new track with existing track to remain in place.

Roadbed.--Roadbed section shall conform the dimensions and details as shown on the plans. Contractor shall construct subgrade to within one tenth (0.10) foot (30.5 mm) of the design grade. No track materials shall be placed on the roadbed until the subgrade has been constructed and finished to the grades as defined by the contract drawings and approved by the Engineer.

Cross Ties --Cross ties shall be placed square to the line of rails and shall be spaced in accordance with the details shown on the plans.

Ties must be handled with care and not damaged by puncturing with pick, shovel or other tool. They shall be installed with heart-side down.

Whenever ties are added, cut, drilled, or otherwise altered after treatment, the affected area shall be thoroughly saturated with creosote or heavy oil. Holes caused by withdrawal of spikes shall be fitted with tight fitting soft-wood, treated plugs in accordance with AREMA specifications. Unnecessary alterations to ties after treatment may be grounds for rejection of the tie.

Tie Plates --Tie plates must be placed under each rail at every tie. Plates must be positioned so that the batter of plate will cant rail to gage side and shall be centered on tie and so applied as to obtain proper bearing of rail.

Rail -Continuous welded rail shall be used on structures and at all paved road crossings. The standard gage of track is 4'- 8 1/2" (1.435 m) measured between heads of rails at right angles, measured in a plane 5/8 of an inch (15.9 mm) below top of rail. Rail shall be laid to standard gage except that on curves gage will be widened as follows:

From 12 degrees - 01" to 14 degrees inclusive:4'- 8 5/8" (1.438 m)

Over 14 degrees: 4'-8 3/4" (1.441 m)

When laying rail, the line rail is the outer rail on curves and shall first be spiked to line. The gage rail shall then be spiked to proper gage. The track shall be gauged at least every third tie. Unless otherwise specified, rail shall be laid with joints staggered so that joints on one side will not be more than four feet from center of opposite rail.

Rail shall be handled carefully. During loading and unloading of rail, care must be taken not to allow rails to strike together or upon any hard material which might bend or damage them. Bumping or striking the rail during handling or laying will not be permitted. Nicked or gouged rail shall be rejected or repaired as determined by the Engineer.

Continuous welded rail shall be unloaded and placed on ties with rollers or other devices approved by the Engineer, which shall prevent damage to the rails and ties.

Layout plans showing rail types, continuous welded rail lengths and field welds shall be prepared by the contractor and submitted to the Engineer for approval a minimum of 30 working days prior to track construction.

The bottom of the rail, fastener assemblies, and all bearing surfaces of rail, ties and tie plates, shall be broom cleaned before rail is laid.

Rails must be brought squarely together and bolted before spiking. Rails must not be driven into position, but shall be moved with rail tongs, lining bars or crane.

Rail ends and surfaces of rail for the entire joint area shall be cleaned of all dirt, rust or scale and coated with an approved lubricant.

Shimming --When laying jointed rail, each rail shall be carefully placed on the ties with ends square using shims 1/16 inch (1.6 mm) to 5/16 inch (7.9 mm) placed between the ends of adjoining rails to ensure proper opening of joint. Shims to be removed after all joint bolts are tightened. The thickness of the shim to be used will be determined by the following table from temperatures taken on the rails when they are being laid:

39 FOOT (11.89m) RAILS	
Temperature (F)	Thickness of Shim (inches)
Below 6 (-14C)	5/16 (7.9mm)
6-25(-14C to -3C)	_1/4 (6.3mm)
26-45(-3C to 7C)	3/16 (4.7mm)
46-65 (8C to 18C)	1/8 (3.2mm)
66-85 (19C to 29C)	1/16 (1.6mm)
85+ (29C+)	None

The temperature of the rail shall be determined by use of a standard rail thermometer placed for 30 minutes on the web of the rail on the shady side.

Joints --All joint bars must be well oiled and properly applied with full number and correct size of bolts, nuts and spring washers. Joint bolts must be properly tightened before spiking rail and the two center bolts will be tightened in advance of the end bolts.

Bolts shall be placed with nuts alternately on the inside and outside of the rail. Nuts must be placed with the flat side toward the rail.

Track bolts, joint bars and fishing surfaces of rails at joint bars shall be swabbed with oil.

Spiking --Track shall be spiked with not less than six spikes to each tie. Spikes must be placed so there will be not less than two inches (50.8 mm) from the center of the spike to the edge of tie. The number of spikes per tie plate shall be as shown on the plans.

When placing spikes, the two interior opposing holes on the tie plate (each measuring 3 1/8" (79.4 mm) from the edges) must always be used.

Spikes must be started and driven vertically, square with and snug against the rail to a full bearing on the base of the rail. They must not be straightened during driving, but should be withdrawn and replaced with a new spike. The last few blows must be given lightly, so as not to bend or break the spike head. Care must be taken not to strike the rail when driving spikes.

When spiking, care must be taken to see that shoulder of tie plate has full bearing against base of rail on field side.

Rail Anchors --Rail anchors shall be located in accordance with the patterns as illustrated on the plans.

In applying rail anchors, they shall be set with full bearing against the side of tie. Care must be taken to avoid overdriving, as this may fracture or spread the metal, resulting in loss of holding power. Any rail anchor that is fractured or with metal spread will be rejected.

Ballast --When ballast is delivered in railroad cars, the track shall be capable of supporting the cars without damaging rail or the subgrade.

Ballast shall be placed to provide a depth under tie as shown on the plans.

Ballast shall be thoroughly tamped with a distance of not less than 13" (3.30 m) from each side of base of rail along both sides of tie. In tamping ties within the above described limits, simultaneous tamping must be performed under each rail. Tamping is not permitted at the center of the tie.

Pneumatic or electric tamping tools, either hand held or machine mounted, will be used. Hand tamping with shovels or picks will not be permitted unless authorized by the Engineer.

Two tamping tools shall always be used opposite each other on the same tie. Tampers shall be started from a nearly vertical position and worked downward past the bottom of the tie, after which the tool should be slanted downward to force ballast under the tie. Special attention will be given to tamping joint ties.

All ties must be tamped uniformly. Ties found to be improperly tamped shall be retamped.

After the track has been raised, lined and surfaced, the ballast shall be dressed to conform to the section as shown on the plans.

Care must be taken when handling ballast to prevent contamination by dirt or other materials. Contaminated ballast shall be removed and replaced with clean ballast at Contractor's expense.

Alignment and Surface --Track shall be constructed to the alignment and grade prescribed by the Engineer and shall conform to center line and top of rail stakes set at not more than 50 foot (15.24 m) intervals. Deviation from established gage and cross level shall not exceed 1/8" (3.2 mm) and profile grade and horizontal alignment shall not exceed 1/8" in 50 feet and must be acceptable to the Engineer.

Tangent track shall be cross level and superelevation and runoffs shall be provided on all curves in conformance with the plans. The inside rail of track on curves shall be maintained at the prescribed grade and the proper superelevation shall be provided by raising the outer rail.

When raising track, a spot board or other approved device shall be used to maintain grade and a level shall be used to keep track to proper cross level. Jacks shall be placed in the crib ahead of the joint and at the crib midway between joints when raising track, to prevent undue bending of rail or straining the joint connection. Horizontal alignment must be maintained during the raising operation.

No humps or sags in surface will be accepted, nor will irregularities in alignment, either on tangent or curved track, be accepted, that exceeds deviations allowed.

RAIL WELDING

The work specified in this section includes shop welding and field welding of all rails as indicated.

SHOP WELDING

This special provision concerning shop welding applies to track work only.

Continuous welded rails (CWR) shall be shop welded into lengths up to 1,521 feet (463.6 m) by the electric-flash butt welding process. The Contractor shall submit his proposed welding process and procedure to the Engineer for approval a minimum of 30 working days before welding is started. All rails for electric-flash butt welds shall have the scale removed down to bright metal in those end zones, top and bottom of the rails where the welding current-carrying electrodes contact on head and base of rail. All electric-flash butt welds shall be forged to point of refusal to further plastic deformation and have a *minimum* upset of 1/2 inch (12.7 mm) with 5/8 inch (15.8 mm) as standard. If flashing on electric-flash butt welds is interrupted because of malfunction or external reason, with less than 1/2 inch (12.7 mm) of flashing distance remaining before upsetting, rails shall be reclamped in the machine and flashing initiated again.

All rail shall be examined at the welding shop prior to welding. Rails having vertical or horizontal misalignment in the last four feet of the rail in excess of 0.030 inch (0.76 mm) per foot (3.05 m) tangential deviation measured with a straightedge will be rejected. See AREA Bulletin 605, dated February 1967, for diagrams of this and the following rail alignment tolerances.

Alignment of rail in the welding machine shall be done on the head of the rail.

Vertical alignment shall provide for a flat running surface. Any difference of height of the rails shall be in the base.

Horizontal alignment shall be done in such a manner that any difference in the width of heads of rails shall be divided equally on both sides of the head.

Horizontal offsets shall not exceed 0.040 inch (1 mm) in the head and 0.125 inch (3.2 mm) in the base.

Misalignment Tolerance:

(a) Combined vertical offset and crown camber shall not exceed 0.010 inch (0.25 mm) per foot (3.05 m) at 600º F. (316ºC) or less.
(b) Combined vertical offset and dip camber shall not exceed 0.010 inch (0.25 mm) per foot (3.05 m) at 600º F. (316ºC) or less.
(c) Gauge Misalignment Tolerance- Combined horizontal offset and horizontal kink camber shall not exceed 0.040 inch (1 mm) per foot (305 mm) at 600º F. or less.

Finishing Tolerance:

(a) A finishing deviation of not more than plus 0.010 inch (0.25 mm) to 0.000 inch (0 mm) of the parent section of the rail head surface will be allowed.
(b) The sides of the rail head shall be finished to plus or minus 0.010 inch (0.25 mm) of the parent section. The bottom of rail base shall be finished to within 0.010 inch (0.25 mm) of the lowest rail.
(c) The web zone (underside of head, web, top of base, both fillets each side) shall be finished to not greater than 1.8 inch (45.7 mm) of parent contour or closer but shall not be deeper than the parent section. Finishing shall eliminate all cracks.

All notches created by offset conditions or twisted rails shall be eliminated by grinding to blend the variations.

All fins on the weld due to grinding drag shall be removed prior to final inspection.

All heavy grinding shall be performed on the hot metal, immediately following welding, to prevent metallurgical damage.

Jagged, notched or badly mismatched end faces shall be preflashed to an even or mated condition before setting up rails for preheating and final flashing to assure that the entire surfaces of rail ends are uniformly flashing immediately preceding upsetting.

A straightening press shall be included in the welding production line to achieve the alignment tolerances as specified elsewhere in this section.

Each completed weld shall have full penetration and complete fusion and be entirely free of cracks.

All shop weld testing shall be carried out by and at the expense of the Contractor and shall be subject to inspection by the Engineer. One hundred percent of the welds shall be magnetic particle tested. The testing shall be done by the dry powder method in accordance with ASTM Designation: E109. All welds giving fault indications shall be cut out and rewelded.

FIELD WELDING

This special provision concerning field welding applies to track work only.

Sections of CWR laid in tracks shall be joined together by field welding. All field welding shall be performed by approved process using preformed, factory-made molds. Alignment, support, and clamping of rails shall be so arranged as to produce welds conforming to the specified tolerances.

The Contractor shall prepare for the Engineer's approval, a detailed procedure specification covering the step by step procedures to be employed in making the field welds. A complete description of each of the following items and any other essential characteristics shall be included in the procedure specification:

(a) Manufacturer's trade name for the welding process.
(b) Method used for cutting and cleaning of the rail ends.
(c) Minimum and maximum spacing between
rail ends.
(d) Method used for maintaining the rails in alignment during welding.
(e) Method used for preheating including time and temperature.
(f) Tapping procedure including the minimum time required to cool the weld under the mold insulation.
(g) Method used, including a description of special tools and equipment for removing the gates and risers and finishing the weld to the final contour.

The Contractor shall qualify the field welding process that he intends to use in track construction. The step by step method of welding used for qualifying shall be performed in strict accordance with the welding procedure and these special provisions.

The Contractor shall prepare 2 full scale welds in rail of the same nominal weight to be welded in track construction. One of the qualification welds shall be subject to the slow bend test as outlined in AREA Bulletin 598, Page 434, February 1966, and the other weld shall be longitudinally cross sectioned, macroetched and Brinell hardness tested.

The slow bend specimen shall have a minimum modulus of rupture of at least 100,000 pounds (45360 kg) per square inch (645 mm^2) and a deflection of not less than 3/4 inch (19 mm) . The macroetched section shall show no evidence of cracks, lack of fusion or incomplete weld penetration. The total area of internal defects such as porosity and slag inclusions shall not exceed 0.60 square inch (387 mm^2) and the largest single porosity or slag defect shall not exceed 1/8 inch (3.2 mm) in diameter.

The Brinell hardness of the weld measured on the head of the rail in the center of the weld shall be equal to the hardness of the adjoining rail plus or minus 20 Brinell hardness number.

Ten copies of the welding procedure qualification test records shall be submitted to the Engineer (six copies to be forwarded to the Railroad).

Prior to beginning track welding, each crew of the welders, including the welding foreman or supervisor for that crew shall prepare and test a qualification weld. The welding shall be done in accordance with the approved procedure specification and will be witnessed by the Engineer. The qualification weld shall be ultrasonically inspected and shall meet the quality and hardness requirements as specified elsewhere in this section. Ten copies of the welder qualification test record shall be submitted to the Engineer (six copies to be forwarded to the Railroad).

The test record shall contain the names of the welders and welding foreman or supervisor who made the test weld and briefly describe their specific duties. It shall also show the results of the ultrasonic and hardness tests.

The Engineer reserves the night to require a requalification, at the Contractor's expense, of any crew of welders whose work fails to meet the specified requirements.

All welding shall be performed under the direct supervision of an experienced welding foreman or supervisor. In addition, a manufacturer's representative, experienced in boutet welding shall be present at the job side and shall witness a sufficient number of welds to assure that proper procedure is understood by Contractor's personnel.

The ends of the rails to be welded shall be cleaned to remove all grease, oil, dirt, loose scale, and moisture. The cleaned area shall extend at least six inches (1.52 m) back from the rail ends and shall include all of the rail surfaces. The faces of the rail ends shall be arranged at right angles by cutting or grinding and shall be further cleaned to remove all scale and rust.

The ends of the rails to be welded shall be properly gapped and aligned to produce a weld which will conform to the alignment tolerances specified elsewhere in this section.

There shall be no holes within 12 inches (3.05 m) of the rail to be welded.

The rail ends shall be preheated prior to welding to a sufficient temperature and for sufficient time to ensure full fusion of the weld metal to the rail ends without cracking of the rail or weld.

The molds shall be left in place after tapping for sufficient time to permit complete solidification of the molten metal and proper slow cooling to prevent cracking and provide a completed weld with the proper hardness and ductility.

The completed weld shall be finished by mechanically controlled grinding to conform to the requirements specified elsewhere in this section.

Each completed weld shall have full penetration and complete fusion and be entirely free of cracks. The total area of internal defects such as porosity and stag inclusions shall not exceed 0.060 square inch (39 mm^2) and the largest single porosity or slag defect permitted shall not exceed 1/8 inch (3.2 mm) in diameter.

The hardness of the weld measured on the head of the rail in the center of the weld shall be equal to the Brinell hardness of the parent metal with a tolerance of plus or minus 20 Brinell hardness number.

Field welding record shall be provided by the Contractor. The field welding record shall be continuously maintained to record details of field welding as follows:

(a) Date and time
(b) Location by station stating track and rail
(c) Contractor's foreman
(d) Engineer's representative
(e) Manufacturer's representative
(f) Weather, air and rail temperature
(g) Weld trade name
(h) Track condition and anchorage

All weld testing shall be carried out by and at the expense of the Contractor and shall be witnessed by the Engineer. Weld testing shall be ultrasonically inspected as follows:

(a) Ultrasonic inspection of weld shall be performed using pulse echo technique. Inspection shall be accomplished by contact method using angle beams of 45º and 70º to locate lack of bond, slag inclusions, voids, cracks and gas pockets. Search may be conducted from top surface of the rail. The scan is to be conducted in both longitudinal directions of the rail to completely sweep the head, web and base area of the rail.

(b) Transducers shall have active element of at least 1/2" x 1/2" (12.7 mm x 12.7 mm) and no longer than 3/4" x 3/4" (19 mm x 19 mm). The test frequency shall be 2.25 MHz.
(c) Test equipment shall be calibrated to give a 10dB above base line indication from a 1/8" (3.2 mm) flat bottom hole at 8 3/4" (2.19 m) using a 45º transducer. Flat bottom hole to be perpendicular to the sound beam.
(d) A defect reflection of 6 dB from the base area or lower half of web is rejectable. A 10 dB signal from the upper half of the web or the head web area is rejectable.
(e) The test equipment shall be calibrated to give a 6 dB above base line indication from a 1/8" (3.2 mm) flat bottom hole, a 3" (76.2 mm) using the 70º transducer. A defect reflection of 6 dB or greater shall be cause for rejection.
(f) Light scattered porosity is acceptable. Concentrations where four or more returns in one group or more than one group occur in the same area is cause for rejection.

PAYMENT

The lump sum price paid for construct railroad tracks shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing railroad tracks, complete in place, including removing and disposing of existing permanent track, ballast, and roadway pavement, preparing subgrade, surveying existing track in order to establish the correct alignment of new temporary and permanent track, furnishing and placing temporary and permanent track subballast, ballast, ties, rails and all appurtenant track materials needed to complete the track work, planing asphalt concrete pavement to prepare for constructing temporary asphalt concrete track crossings on Route 29 and California Boulevard, constructing temporary asphalt concrete track crossings on Route 29 and California Boulevard, constructing permanent precast concrete panel track crossings on California Boulevard and Redwood Road, and removing and disposing of temporary track and track crossing on Route 29 when no longer required, submittals and material testing, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.04 TEMPORARY ENTRANCE/EXITS

This work shall consist of constructing and maintaining the temporary entrance/exits as shown on the plans, as directed by the Engineer, and as specified in these special provisions. When no longer required for the work, temporary entrance/exits shall be removed as specified in these special provisions.

Each temporary entrance/exits shall include a clean out sump. The minimum number of temporary entrance/exits required for this project shall be 6.

The type of temporary entrance/exits shall be either Type 1 or Type 2 at the option of the Contractor.

The Contractor shall provide as many temporary entrance/exits, as shall be required for the duration of the contract. Attention is directed to "Water Pollution Control" of these special provisions.

The Contractor shall use temporary entrance/exits as one of the various measures to prevent water pollution. The Storm Water Pollution Prevention Plan shall graphically show the use of temporary entrance/exits in relation to other water pollution control work specified elsewhere in these special provisions.

MATERIALS

Materials shall conform the following:

Temporary Entry/Exits Fabric.

Temporary entrance/exits fabric shall be manufactured from one or more of the following materials: polyester, nylon or polypropylene. Temporary entrance/exits fabric shall be nonwoven type fabric conforming to the following:

	Non-Woven Needle Punched
Mass per unit area, grams per Square Meter, Min. ASTM Designation: D 5261	235
Grab Tensile Strength, 25 mm grip, kiloNewtons (kN), Min. ASTM Designation: D4632*	0.89
Elongation at Break, Percent, Min., ASTM Designation: D4632*	50
Toughness, grab tensile strength times percent elongation (kN x %)	53

* or appropriate test for method for specific polymer

Temporary entrance/exits fabric shall be a non-woven, needle-punched fabric, free of any needles which may have broken off during manufacturing. It may be manufactured from either virgin polymer materials, recycled materials, or a combination of recycled and virgin polymer materials such as polyester polyethylene terephthalate 'PETE'. None of the materials, whether virgin or recycled, shall contain biodegradable filler materials that degrade the physical or chemical characteristics of the finished roll products. To confirm the absence of biodegradable filler materials the Engineer may order tests such as ASTM E 204 (Fourier Transformed Infrared Spectroscopy-FTIR) or other appropriate tests.

Temporary entrance/exits fabric shall be accompanied by a Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

Aggregate

Aggregate shall range in size from 100 mm to 150 mm, shall be angular to subangular in shape, and shall conform to the provisions in Section 26, "Aggregate Base," of the Standard Specifications and these special provisions.

Corrugated Steel Panels

Manufactured corrugated steel panels with raised bars shall be provided in individual sections. Steel plate and raised bars shall be a minimum 12.7 mm thick. Bars shall be a minimum of 38.1 mm in height and shall be uniformly distributed 190.5 mm apart longitudinally throughout the full section of each panel. Raised bars shall be welded to the bottom plate and approximately 12.7 mm thick at the base and tapering to 6.35 mm thick at the top of the bar. Each panel shall have a nominal dimension of 3 m x 2.43 m with an approximate weight of 1454 kg for each panel. Each end of the panel shall have a slot or hooked section to facilitate coupling at the ends.

CONSTRUCTION

Temporary entrance/exits shall be installed as shown on the plans and as follows:

A. Prior to placing the temporary entrance/exits fabric, the areas shall be cleared of all trash and debris. Vegetation shall be removed to the ground level. Cleared trash, debris, and removed vegetation shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13, Disposal of Material Outside the Highway Right of Way, of the Standard Specifications.
B. The ground to receive temporary entrance/exits fabric shall be graded to a uniform plane, watered and compacted, and shall be free of sharp objects that may damage the temporary entrance/exits fabric, and shall be graded to drain to the sump as shown on the plans.
C. Temporary entrance/exits fabric shall be positioned longitudinally along the alignment of the temporary entrance/exits.
D. Where needed, adjacent borders of the fabric shall be overlapped a minimum of 300 mm.
E. Aggregate to be placed directly over the fabric shall be spread in the direction of traffic, longitudinally along the alignment of the temporary entrance/exits. All remaining materials shall be uniformly placed and spread with 1:4 (V:H) tapers at the perimeter edges of the temporary entrance/exits where it conforms to existing roadway
F. During spreading of the aggregate, vehicles or equipment shall not be driven directly on the fabric. A minimum thickness of 150 mm of aggregate shall be maintained between the fabric and the equipment to prevent damage to the fabric. Damage to the fabric resulting from the Contractor's vehicles, equipment, or operations shall be repaired at the Contractor's expense.
G. Should the fabric be damaged during placing, the damaged section shall be repaired by placing a new piece of fabric over the damaged area. The piece of fabric shall be large enough to cover the damaged area and provide a minimum 450 mm overlap on all edges.

For Type 2 temporary entrance/exits, a minimum of 3 panel sections coupled to one another is required at each temporary entrance/exits. Prior to installing panels, the ground surface shall be cleared of all debris which may prevent uniform contact with the ground surface.

A sump shall be constructed within 6 m of each temporary entrance/exits. The sump shall be sized sufficiently to hold soil removed from the temporary entrance/exits in order to maintain efficiency.

MAINTENANCE

The Contractor shall maintain temporary entrance/exits, throughout the contract period. The Contractor shall prevent displacement or migration of the aggregate surfacing or corrugated steel panels. Any significant depressions, as determined by the Engineer, which form due to settling or heavy traffic shall be repaired by the Contractor.

Temporary entrance/exits, shall be maintained to minimize tracking of soil and sediment onto paved roads. If the efficiency of a temporary entrance/exits to minimize tracking of soil and sediment is compromised by the buildup of soil and

sediment, or by other means, as determined by the Engineer, the Contractor shall remove and dispose of the soil and sediment, install additional corrugated steel panels, or spread additional aggregate.

Pavement cleaning shall be required at all locations where construction equipment is visibly tracking sediments onto the roadway.

Pavement cleaning shall be required each and every day when temporary entrance/exits are in use. Soil and sediment or other extraneous material tracked onto pavement shall not be allowed to enter drainage facilities and shall be removed at least once each day.

Once the temporary entrance/exits are no longer needed, the aggregate, temporary entrance/exits fabric, and any soil and sediments shall be removed and disposed of as provided for in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications. Following removal of the temporary entrance/exits, areas shall be graded smooth and compacted to conform with adjacent areas.

PAYMENT

The contract lump sum price paid for temporary entrance/exits shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing temporary entrance/exits, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.05 TEMPORARY CONCRETE WASHOUT FACILITY

Temporary concrete washout facilities shall be constructed, maintained, and later removed as shown on the plans, in conformance with these special provisions and as directed by the Engineer.

Temporary concrete washout facilities shall be installed prior to beginning any placement of concrete and located a minimum of 15 m from storm drain inlets, open drainage facilities, and watercourses, unless determined infeasible by the Engineer. Each facility shall be located away from construction traffic or access areas to prevent disturbance or tracking.

A sign shall be installed as shown on the plans adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.

Temporary concrete washout facilities shall be constructed on grade or below grade at the option of the Contractor. The minimum quantity of concrete washouts required for this project shall be 8.

Temporary concrete washout facilities shall be constructed and maintained 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.

MATERIALS

Materials used in the construction of temporary concrete washout facility shall conform to the following:

A **PLASTIC SHEETING.—**Plastic sheeting shall be new and a minimum of 0.33 mm thick polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material. Plastic sheeting shall not have seams or overlapping joints.

B **ROCK BAG.—**Rock bag fabric shall be non-woven polypropylene, with a minimum unit weight of 250 g/m^2. The fabric shall have a mullen burst strength of at least 2500 kPa, per ASTM Designation: D3786 and an ultraviolet (UV) stability exceeding 70 percent at 500 hours. Rock bags shall have a length of 600 mm to 800 mm, width of 400 mm to 500 mm, thickness of 150 mm to 200 mm, and shall be filled to a weighted mass ranging from 13 kg to 22 kg. Rock bag fill material shall be non-cohesive, gravel, free from deleterious material. After filling, the opening shall be secured such that rock shall not escape from the bag.

C **STRAW BALES.—**Straw for straw bales shall conform to the provisions in Section 20-2.06, "Straw," of the Standard Specifications.

Each straw bale shall be a minimum of 360 mm wide, 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.

Bales shall be bound by either wire, nylon or polypropylene string. Jute and cotton binding shall not be used. Wire shall be a minimum of 1.57 mm (16-gage) baling wire. Nylon or polypropylene string shall be approximately 2 mm in diameter with 360 N of breaking strength.

D **STAKES.—**Stakes shall be 50 mm x 50 mm wood posts. Each stake shall have a minimum length of one meter. 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.

E **STAPLES.—** Staples shall be made of 11-gage minimum steel wire and shall be U-shaped with 200-mm legs and 50-mm crown.

TEMPORARY CONCRETE WASHOUT FACILITY (TYPE ON GRADE)

Temporary concrete washout facility (type on grade) shall be constructed as shown on the plans with a minimum length of 3 m and a minimum width of 4.5 m. The length and width of a facility may be increased, at the Contractor's expense, upon approval of the Engineer.

TEMPORARY CONCRETE WASHOUT FACILITY (TYPE BELOW GRADE)

Temporary concrete washout facility (type below grade) shall be constructed as shown on the plans with a minimum length of 3 m and a minimum width of 4.5 m. The length and width of a facility may be increased, at the Contractor's expense, upon approval of the Engineer.

MAINTENANCE AND REMOVAL

Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 100mm for on grade facilities and 300mm for below grade facilities. Maintaining temporary concrete washout 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. Minor holes and tears in the plastic sheeting may be taped as long as the repair does not compromise the impermeability of the material.

When temporary concrete washout facilities are no longer required for the work, as determined by the Engineer, the hardened concrete shall be removed and disposed of in conformance with the provisions in Section 15-3.02 of the Standard Specifications. Materials used to construct temporary concrete washout facilities shall become the property of the Contractor, shall be removed from the site of the work, and shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.

Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled and repaired in conformance with the provisions in Section 15-1.02, "Preservation of Property," of the Standard Specifications.

PAYMENT

The contract lump sum price paid for temporary concrete washout facilities shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing, maintaining and removing temporary concrete washout facilities, complete in place, including straw bales, plastic lining, sign, portable delineators, lath and flagging, rock bags, stakes, and staples, and excavation and backfill, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.06 TEMPORARY DRAINAGE INLET PROTECTION

Temporary drainage inlet protection shall be installed, maintained and later removed as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

Temporary drainage inlet protection shall be limited to those areas that are not adjacent to, nor drain toward, areas of active traffic.

The Contractor shall select the appropriate drainage inlet protection shown on the plans commensurate to the field condition around the drainage inlet. For all other drainage inlets within the project limits that do not conform to the details shown on the plans, the Contractor shall submit to the Engineer for approval, provisions for providing temporary drainage inlet protection.

Special attention shall be given to existing and new drainage inlets adjacent to traffic. The Engineer shall review the need for drainage inlet protection commensurate to each location. Any proposed drainage inlet protection in such cases shall be approved by the Engineer for safety related concerns.

Throughout the duration of the contract, the Contractor shall be required to provide protection commensurate with the changing condition of the drainage inlet. It is recognized that the drainage inlet changes during the course of construction and the actual protection provided may require selecting the appropriate type or types of drainage inlet protection as it changes during the course of construction.

Some conditions may require combining materials outlined in the special provision to address conditions that cannot be accounted for at this time. The Contractor shall submit temporary drainage inlet protection drawings for such cases to the Engineer for approval prior to installation.

The Contractor shall use temporary drainage inlet protection as one of the various measures to prevent water pollution. The Storm Water Pollution Prevention Plan shall graphically show the use of temporary drainage inlet protection in relation to other water pollution control work specified elsewhere in these special provisions.

MATERIALS.—

Materials shall conform to the provisions in Section 20-2, "Materials," of the Standard Specifications and these special provisions.

A. **SILT FENCE.—**Sedimentation control fabric for temporary silt fence shall be a prefabricated silt fence with a minimum woven polypropylene fabric width of 900 mm and a minimum tensile strength of 0.44-kN, conforming to ASTM Designation: D 4632.

B. **ROCK BAG.—**Rock bag fabric shall be non-woven polypropylene, with a minimum unit weight of 250 g/m^2. The fabric shall have a mullen burst strength of at least 2500 kPa, per ASTM Designation: D3786 and an ultraviolet (UV) stability exceeding 70 percent at 500 hours. Rock bags shall have a length of 600 mm to 800 mm, width of 400 mm to 500 mm, thickness of 150 mm to 200 mm, and shall be filled to a weighted mass ranging from 13 kg to 22 kg. Rock bag fill material shall be non-cohesive, gravel, free from deleterious material. After filling, the opening shall be secured such that rock shall not escape from the bag.

C. **TEMPORARY FLEXIBLE DIKE.—**Temporary flexible dike fabric cover and skirt shall be a woven polypropylene fabric with a minimum tensile strength of 0.44-kN, conforming to ASTM Designation: D 4632. The prefabricated fabric shall be high visibility orange in color that is integral to the fabric; painting shall not be allowed. The fabric shall have an ultraviolet (UV) stability exceeding 70 percent.

Temporary flexible dike inner material shall be urethane foam and shall be shaped and dimensioned as shown on the plans.

Adhesive for temporary flexible dike shall be a solvent free rubber modified asphalt emulsion. The color of the emulsion shall be brown when wet and shall have a drying period of not more than 3 hours.

Anchoring nails or spikes for temporary flexible dike shall be a minimum of 25 mm in length and capable of penetrating concrete and asphalt surfaces.

D. **EROSION CONTROL BLANKET.—**Erosion control blanket shall consist of straw and coconut or wood excelsior blanket secured in place with wire staples and shall conform to one of the following:

E. **EXCELSIOR BLANKET.—**Excelsior blanket material shall consist of machine produced mats of curled wood excelsior with 80 percent of the fiber 150 mm or longer. The erosion control blanket shall be of consistent thickness and the wood fiber shall be evenly distributed over the entire area of the blanket. The top surface of the blanket shall be covered with an extruded plastic mesh. The blanket shall be smolder resistant without the use of chemical additives and shall be non-toxic and non-injurious to plant and animal life. Erosion control blanket shall be furnished in rolled strips, 1220 mm -2440 mm in width, and shall have an average mass of 0.5-kg/m^2, ± 10 percent, at the time of manufacture.

F. **STRAW AND COCONUT BLANKET.—**Straw and coconut blanket shall be machine produced mats of straw and coconut with a light weight netting on top. The straw and coconut shall be adhered to the netting with biodegradable thread or glue strip. The straw and coconut erosion control blanket shall be of consistent thickness with the straw and coconut evenly distributed over the entire area of the blanket. Straw and coconut erosion control blanket shall be furnished in rolled strips with a minimum width of 1.8 meters, minimum length of 20 meters (± 1 meter) and a minimum mass of 0.27-kg/m^2.

G. **STAPLES.—**Staples for erosion control blankets shall be made of 11-gage minimum steel wire and shall conform to the dimensions shown on the plans.

H. **SEDIMENT BAG.—**Sedimentation control fabric for sediment bags shall be a prefabricated sedimentation control fabric envelop with a woven polypropylene fabric and sewn with a double stitched seam using nylon thread. The fabric shall have a grab tensile strength of at least 120 kg and grab elongation of 20 percent, per ASTM Designation: D4632. The fabric shall have a mullen burst strength of at least 2895 kPa, per ASTM Designation: D3786 and an

ultraviolet (UV) stability exceeding 90 percent. The sedimentation control fabric shall be capable of a flow rate of 70.3 L/minute/m^2, per ASTM Designation: D4491.

The sediment bag shall be sized to fit the catch basin or drop inlet and be complete with lifting loops and dump straps attached at the bottom to facilitate emptying of the sediment bag. The sediment bags shall have a restraint cord approximately halfway up the bag to keep the sides away from the catch basin walls.

INSTALLATION AND MAINTENANCE.—

Temporary flexible dike consists of individual sections of dike installed in conjunction with one another adjacent to existing drainage inlets as shown on the plans. The spacing and angle of placement shall be in accordance with the table shown on the plans. Temporary flexible dike shall be installed flush against the sides of concrete or asphalt curbs, dikes and pavement with the inner material and fabric cover cut smoothly and evenly to provide a tight flush joint.

Temporary flexible dike and rock bag dike installed as part of temporary drainage inlet protection shall be maintained to provide for adequate sediment holding capacity. Sediment deposits shall be removed when the deposit reaches one-half of the temporary flexible dike height. Removed sediment shall be deposited within the project in such a way that it is not subject to erosion by wind or water, or as directed by the Engineer.

Temporary rock bag dike consisting of filled rock bags placed in multiple layers shall be installed as shown on the plans.

When no longer required for the purpose, as determined by the Engineer, temporary drainage inlet protection facilities shall be removed. Removed facilities shall become the property of the Contractor and shall be removed from the site of the work.

Temporary drainage inlet protection damaged due to storms or as a result of the Contractors operations shall be replaced at the Contractor's at expense.

Sediment bags shall be installed by removing the drainage inlet grate, placing the sediment bag in the opening, and replacing the grate to secure the sediment bag in place. Removal of the bag shall be facilitated by the use of 25 mm steel reinforcing bars placed through the lifting loops.

Sediment bags installed as part of temporary drainage inlet protection shall be emptied when the restraint cords are no longer visible. Emptying of the bag shall be facilitated by the use of 25 mm steel reinforcing bars placed through the dump loops. The sediment bag shall be emptied of material with a shovel and rinsed before replacement in the catch basin or drop inlet.

MEASUREMENT AND PAYMENT.—

The quantity of temporary drainage inlet protection to be paid for will be determined from each drainage inlet protected conforming to the details shown on the plans. The protection is measured one time only and no additional measurement is recognized, and no additional compensation made, if it changes during the course of construction.

The contract price paid per temporary drainage inlet protection shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing temporary drainage inlet protection, complete in place, including excavation and backfill, all modifications occurring during the course of construction, and maintenance and removal of temporary drainage inlet protection, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Temporary drainage inlet protection for protection at drainage inlets other than as shown on the project plans or directed by the Engineer, in accordance with the Contractor's Storm Water Pollution Prevention Plan (SWPPP), will not be measured as temporary drainage inlet protection. Payment for drainage inlet protection that is required as part of the SWPPP, but is not shown on the project plans, will be paid for as specified in "Water Pollution Control" elsewhere in these special provisions.

No adjustment of compensation will be made for any increase or decrease in the quantities of temporary drainage inlet protection required, regardless of the reason for the increase or decrease. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," shall not apply to temporary drainage inlet protection.

10-1.07 TEMPORARY COVER

Temporary cover shall conform to the details shown on the plans. The minimum quantity of temporary cover required for this project shall be 400 square meters.

The Contractor shall use temporary cover as one of the various measures to prevent water pollution. The Storm Water Pollution Prevention Plan shall graphically show the use of temporary cover in relation to other water pollution control work specified elsewhere in these special provisions.

MATERIALS

Materials shall conform to the following for either plastic or fabric sheeting:

If fabric is used, the fabric shall be a minimum 115 g/m2 slit film woven fabric made of monofilaments of polypropylene. The fabric shall be non biodegradable, resistant to sunlight deterioration, inert to most soil chemicals and furnished with sealed edges on all sides to prevent unraveling. The fabric shall also conform to the following:

Properties	
Grab tensile strength	0.85-0.95 kn
Elongation at break (minimum)	15%

If plastic sheeting is used, the sheeting shall be polyethylene, new and a minimum of 0.33 mm thickness.

INSTALLATION

Fabric or plastic sheeting shall be placed and anchored as shown on the plans. Abutting edges shall overlap a minimum of a 0.6 m. Rock bags with a weighted mass ranging from 13 kg to 22 kg shall be placed on the overlap area and along the toe at a maximum spacing of 2.4 m. Anchoring temporary cover by using staples or wooden lath and anchors may be allowed instead of rock bags as determined by the Engineer. The Contractor shall submit details for any alternative anchoring system to the Engineer for approval prior to installation. Non-abutting edges shall be embedded a minimum of 150 mm in native soil.

Temporary cover damaged as a result of the Contractors operations shall be replaced by the Contractor at his expense.

MEASUREMENT AND PAYMENT

The contract lump sum price paid for temporary cover shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing, maintaining and removing temporary cover, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer. If the Contractor removes the temporary cover in order to facilitate any other work, the temporary cover shall be replaced and secured by the contractor at no additional cost to the State.

10-1.08 TEMPORARY EROSION CONTROL

Temporary erosion control shall conform to the provisions for erosion control in Section 20-3, "Erosion Control," of the Standard Specifications and these special provisions.

Attention is directed to "Water Pollution Control" of these special provisions.

Temporary erosion control work shall consist of applying erosion control materials to embankment slopes, excavation slopes and other inactive areas to reduce disturbed soil areas as defined in "Water Pollution Control" of these special provisions. Temporary erosion control work shall be implemented on active disturbed soil areas as directed by the Engineer.

MATERIALS

Materials shall conform to the provisions in Section 20-2, "Materials," of the Standard Specifications and the following:

Straw

Straw shall be derived from wheat or barley. Wheat and barley straw shall not be derived from dry farmed cereal crops.

Stabilizing Emulsion

Stabilizing emulsion shall conform to the provisions in Section 20-2.11, "Stabilizing Emulsion," of the Standard Specifications and these special provisions.

The requirement of an effective life of at least one year for stabilizing emulsion shall not apply.

Stabilizing emulsion shall be in a dry powder form, may be re-emulsifiable, and shall be a processed organic adhesive derivative of Plantago ovata used as a soil tackifier.

APPLICATION

Temporary erosion control materials shall be applied in 2 separate applications in the following sequence:

A. Straw shall be applied at the rate of 4 tonnes per hectare based on slope measurements. Incorporation of straw will not be required.
B. The following mixture in the proportions indicated shall be applied with hydro-seeding equipment:

Material	Kilograms Per Hectare (Slope Measurement)
Fiber	1680
Stabilizing Emulsion	135

C. The ratio of total water to total stabilizing emulsion in the mixture shall be as recommended by the manufacturer.
D. Once straw work is started in an area, the remaining applications shall be completed in that area on the same working day.

At the option of the Contractor, temporary soil stabilizer (solids) may be applied instead of temporary erosion control. Temporary soil stabilizer (solids) shall be applied in conformance with these special provisions.

Temporary soil stabilizer (solids) shall consist of applying a mixture of processed gypsum plaster, color hardener, fiber, and water to slopes and other areas as provided for in this special provision.

MATERIALS

Materials shall conform to the provisions in Section 20-2, "Materials," of the Standard Specifications and the following requirements for soil stabilizers:

Stabilizing Emulsion (Solids)

A. Stabilizing emulsion (solids) shall consist of a gypsum plaster processed into a dry, ground powder of calcium sulfate hemi-hydrate. Plaster shall be furnished either in bags or bulk. Plaster that has set into a lumpy or caked condition prior to use shall be rejected.
B. Stabilizing emulsion (solids) shall be formulated specifically for use in erosion control and soil stabilization. Emulsion (solids) shall be non-corrosive and water-soluble emulsion such that, upon application, cures to a water insoluble binding and cementing agent.

Color Hardener

Coloring material shall consist of a processed powdered cementitious hardener with a muted green color conforming to ASTM C 979.

APPLICATION

Temporary soil stabilizers shall be applied as follows:

A. The application shall consist of applying the following mixture in the proportions indicated with hydro-seeding equipment:

Material	Kilograms Per Hectare (Slope measurement)
Fiber	840
Stabilizing Emulsion (solids)	6740
Color Hardener (solids)	54

B. The dilution of stabilizing emulsion (solids) to water (liter) per hectare shall be as required to facilitate even application of material. Several applications may be required to apply all specified materials. Stabilizing emulsion (solids) and color hardener (solids) shall be added to the water and fiber mixture in the tank.
C. Stabilizers shall not be applied to areas with standing water.
D. The application of soil stabilizer will be applied in a down slope direction to provide uniform coverage when possible. Application of material shall be performed during dry weather with a minimum of 8 hours of dry weather predicted following application prior to any anticipated rain.
E. Due to the cementatious nature of the stabilizing emulsion (solids) and color hardener, it is recommended that application of the soil stabilizer be performed continuously without interruption to prevent setting up of the material. All equipment used to apply soil stabilizer shall be flushed immediately following application and cleaned thoroughly as soon as possible as recommended by the manufacturer.
F. Any areas disturbed or displaced by construction operations or equipment following application shall be replaced by the Contractor at no cost to the State.

MEASUREMENT AND PAYMENT

Temporary erosion control will be measured and paid for by the square meter in the same manner specified for erosion control in Sections 20-3.06 and 20-3.07 of the Standard Specifications. No additional compensation shall be provided if the Contractor elects to use temporary soil stabilizer (solids) as an alternative.

Temporary erosion control placed at locations other than as shown on the project plans or directed by the Engineer, in conformance with the Contractor's Storm Water Pollution Prevention Plan, will not be measured and will be paid for as specified in "Water Pollution Control" of these special provisions.

No adjustment of compensation will be made for any increase or decrease in the quantities of temporary erosion control required, regardless of the reason for the increase or decrease. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications shall not apply to temporary erosion control.

10-1.09 TEMPORARY CULVERTS

300 mm, 450 mm, 900 mm, and 1350 mm temporary culverts shall be furnished, installed, maintained, and later removed as shown on the plans, as specified in these special provisions and as directed by the Engineer.

Prior to performing any work on the double 1800 mm welded steel pipe siphons, or the inlet or outlet structures, the Contractor shall prepare and submit to the Engineer for review and approval, details for temporary connections to the siphon, and any temporary bulkhead details needed to maintain a watertight system. No work shall be performed on the siphons before the plans are approved by the Engineer in writing.

The 1800 mm welded steel pipe siphon used for stage drainage shall remain watertight during the various stages of construction. The other 1800 mm welded steel pipe not in use shall be protected from any damage and maintained clean.

The size and type of temporary culvert to be installed at each location shall be at the option of the Contractor; however, the culvert shall be capable of sustaining the intended load and of discharging a quantity of water equivalent to the type and size of culvert shown on the plans. Adequacy as to equivalent strength and capacity shall be subject to approval, in writing, by the Engineer.

Used materials may be installed provided the used materials are good, sound and are suitable for the purpose intended, as determined by the Engineer.

Excavation and backfill for temporary culverts shall be performed in a manner that will provide adequate support for the culvert with a firm, nonsettling foundation for the roadbeds to be constructed over the culverts.

Temporary culverts that are damaged from any cause during the progress of the work shall be repaired or replaced by the Contractor at the Contractor's expense.

When no longer required for the work as determined by the Engineer, temporary culverts shall be removed. Removed facilities shall become the property of the Contractor and shall be removed from the site of the work, except as otherwise provided in this section.

Removed temporary culverts that are not damaged may be installed in the permanent work provided the culverts conform to the requirements specified for the permanent work and the culverts are new when installed as temporary culverts.

Trenches and pits caused by the removal of temporary culverts shall be backfilled in conformance with the provisions in the second paragraph of Section 15-1.02, "Preservation of Property," of the Standard Specifications.

Regardless of the sizes or kinds of temporary culverts installed, temporary culverts will be measured and paid for by the meter for the sizes of temporary culverts shown on the plans and listed in the Engineer's Estimate in the same manner specified for corrugated metal pipe in Section 66-4.01, "Measurement," and Section 66-4.02, "Payment," of the Standard Specifications.

Full compensation for maintaining, removing and disposing of temporary culverts shall be considered as included in the contract prices paid per meter for the various sizes or kinds of temporary culverts and no additional compensation will be allowed therefor.

10-1.10 TEMPORARY INLETS

Temporary inlets shall be furnished, installed, maintained, and later removed as shown on the plans, as specified in these special provisions and as directed by the Engineer.

The size and type of temporary inlets to be installed at each location shall be at the option of the Contractor; however, the inlets shall be equivalent to the type and size of inlets shown on the plans and shall be traffic bearing. Adequacy as to equivalent strength shall be subject to approval, in writing, by the Engineer.

Used materials may be installed provided the used materials are good, sound and are suitable for the purpose intended, as determined by the Engineer.

Excavation and backfill for temporary inlets shall be performed in a manner that will provide adequate support for the inlets with a firm, nonsettling foundation for the roadbeds to be constructed over and adjacent to the inlets.

Temporary inlets that are damaged from any cause during the progress of the work shall be repaired or replaced by the Contractor at the Contractor's expense. Any permanent pipes connected to temporary inlets shall be protected from any damage by the Contractor. Any permanent pipes or pipe ends damaged during construction shall be repaired by the Contractor, at the Contractor's expense, in a manner satisfactory to the Engineer.

When no longer required for the work as determined by the Engineer, temporary inlets shall be removed. Removed facilities shall become the property of the Contractor and shall be removed from the site of the work, except as otherwise provided in this section.

Removed temporary inlets that are not damaged may be installed in the permanent work provided the inlets conform to the requirements specified for the permanent work and the inlets are new when installed as temporary inlets.

Trenches and pits caused by the removal of temporary inlets shall be backfilled in conformance with the provisions in the second paragraph of Section 15-1.02, "Preservation of Property," of the Standard Specifications.

Regardless of the sizes or kinds of temporary inlets installed, temporary inlets will be measured and paid for by the cubic meter of minor concrete (minor structure) for the inlet box, and, by kilograms for miscellaneous iron and steel for the frame and cover shown on the plans. Payment for the temporary inlets shall be also as listed in the Engineer's Estimate in the same manner specified for minor concrete in Section 90-11.01, "Measurement," and Section 90-11.02, "Payment," of the Standard Specifications, and, for miscellaneous metal in Section 75-1.06, "Measurement," and Section 75-1.07, "Payment," of the Standard Specifications.

Full compensation for maintaining, removing and disposing of temporary inlets shall be considered as included in the contract prices paid per cubic meter of concrete and kilogram of iron and steel for the various sizes or kinds of temporary inlets and no additional compensation will be allowed therefor.

10-1.11 TEMPORARY MANHOLES

Temporary manholes shall be furnished, installed, maintained, and later removed as shown on the plans, as specified in these special provisions and as directed by the Engineer.

The size and type of temporary manholes to be installed at each location shall be at the option of the Contractor; however, the manholes shall be equivalent to the type and size of manholes shown on the plans and shall be traffic bearing. Adequacy as to equivalent strength shall be subject to approval, in writing, by the Engineer.

Used materials may be installed provided the used materials are good, sound and are suitable for the purpose intended, as determined by the Engineer.

Excavation and backfill for temporary manholes shall be performed in a manner that will provide adequate support for the manholes with a firm, nonsettling foundation for the roadbeds to be constructed over and adjacent to the manholes.

Temporary manholes that are damaged from any cause during the progress of the work shall be repaired or replaced by the Contractor at the Contractor's expense. Any permanent pipes connected to temporary manholes shall be protected from any damage by the Contractor. Any permanent pipes or pipe ends damaged during construction shall be repaired by the Contractor, at the Contractor's expense, in a manner satisfactory to the Engineer.

When no longer required for the work as determined by the Engineer, temporary manholes shall be removed. Removed facilities shall become the property of the Contractor and shall be removed from the site of the work, except as otherwise provided in this section.

Removed temporary manholes that are not damaged may be installed in the permanent work provided the manholes conform to the requirements specified for the permanent work and the manholes are new when installed as temporary manholes.

Trenches and pits caused by the removal of temporary manholes shall be backfilled in conformance with the provisions in the second paragraph of Section 15-1.02, "Preservation of Property," of the Standard Specifications.

Regardless of the sizes or kinds of temporary manholes installed, temporary manholes will be measured and paid for by the cubic meter of minor concrete (minor structure) for the manhole box, and, by kilograms for miscellaneous iron and steel for the frame and cover shown on the plans. Payment for the temporary manholes shall be also as listed in the Engineer's Estimate in the same manner specified for minor concrete in Section 90-11.01, "Measurement," and Section 90-11.02, "Payment," of the Standard Specifications, and, for miscellaneous metal in Section 75-1.06, "Measurement," and Section 75-1.07, "Payment," of the Standard Specifications.

Full compensation for maintaining, removing and disposing of temporary manholes shall be considered as included in the contract prices paid per cubic meter of concrete and kilogram of iron and steel for the various sizes or kinds of temporary manholes and no additional compensation will be allowed therefor.

10-1.12 TEMPORARY SILT FENCE

Temporary silt fence shall conform to the details shown on the plans and these special provisions.

Temporary silt fence shall be furnished, installed, maintained, and removed at the locations shown on the plans.

Preparation shall conform to the provisions in Section 20-3.02, "Preparation," of the Standard Specifications.

Attention is directed to "Water Pollution Control" of these special provisions.

MATERIALS

Materials for temporary silt fence shall conform to the provisions in Section 20-2, "Materials," of the Standard Specifications and the following:

Temporary silt fence shall be a prefabricated silt fence of woven polypropylene with or without an integral reinforcement layer of the same material. Silt fence fabric shall have a minimum width of 900 mm and a minimum tensile strength of 0.44-kN, conforming to the requirements of ASTM Designation: D 4632.

INSTALLATION

Temporary silt fence shall be installed as shown on the plans.

When joints are necessary, the temporary silt fence shall overlap a minimum of 150 mm with both posts tied together.

Temporary silt fences shall be maintained to provide for adequate sediment holding capacity. Sediment deposits shall be removed when the sediment deposit reaches approximately one-third of the fence height. Removed sediment shall be deposited within the project in such a way that the sediment is not subject to erosion by wind or water, or as directed by the Engineer.

When no longer required for the intended purpose, as determined by the Engineer, temporary silt fence shall be removed from the site of the work.

Holes, depressions or any other ground disturbance caused by the removal of the temporary silt fence shall be backfilled and repaired in conformance with the provisions in the second paragraph of Section 15-1.02, "Preservation of Property," of the Standard Specifications.

MEASUREMENT AND PAYMENT

The quantity of temporary silt fence will be measured by the meter as determined from actual measurements, the measurements to be made parallel with the ground slope along the line of the completed temporary silt fence, deducting the widths of openings.

The contract price paid per meter for temporary silt fence shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing temporary silt fence, complete in place, including trench excavation and backfill, and maintenance and removal of temporary silt fence, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Temporary silt fence placed at location other than as shown on the project plans or directed by the Engineer, in conformance with the Contractor's Storm Water Pollution Prevention Plan, will not be measured and will be paid for as specified in "Water Pollution Control" of these special provisions.

No adjustment of compensation will be made for any increase or decrease in the quantities of temporary silt fence required, regardless of the reason for the increase or decrease. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications shall not apply to temporary silt fence.

10-1.13 TEMPORARY FENCE AND GATE (TYPE CL-1.8)

Temporary fence (Type CL-1.8) and gate (Type CL-1.8) shall be furnished, constructed, maintained, and later removed as shown on the plans, as specified in these special provisions and as directed by the Engineer.

Except as otherwise specified in this section, temporary fence (Type CL-1.8) and gate (Type CL-1.8) shall conform to the plan details and the specifications for permanent fence of similar character as provided in Section 80, "Fences," of the Standard Specifications.

Used materials may be installed provided the used materials are good, sound and are suitable for the purpose intended, as determined by the Engineer.

Materials may be commercial quality provided the dimensions and sizes of the materials are equal to, or greater than, the dimensions and sizes shown on the plans or specified herein.

Posts shall be either metal or wood at the Contractor's option.

Galvanizing and painting of steel items will not be required.

Treating wood with a wood preservative will not be required.

Concrete footings for metal posts will not be required.

Temporary fence (Type CL-1.8) and gate (Type CL-1.8) that is damaged during the progress of the work shall be repaired or replaced by the Contractor at the Contractor's expense.

When no longer required for the work, as determined by the Engineer, temporary fence (Type CL-1.8) and gate (Type CL-1.8) shall be removed. Removed facilities shall become the property of the Contractor and shall be removed from the site of the work, except as otherwise provided in this section.

Removed temporary fence and gate (Type CL-1.8) materials that are not damaged may be constructed in the permanent work provided the materials conform to the requirements specified for the permanent work and such materials are new when used for the temporary fence.

Holes caused by the removal of temporary fence and gate (Type CL-1.8) shall be backfilled in conformance with the provisions in the second paragraph of Section 15-1.02, "Preservation of Property," of the Standard Specifications.

The various types and kinds of temporary fence will be measured and paid for in the same manner specified for permanent fence of similar character as provided in Section 80, "Fences," of the Standard Specifications.

Full compensation for maintaining, removing, and disposing of temporary fence and gate (Type CL-1.8) shall be considered as included in the contract prices paid per meter for temporary fence and gate (Type CL-1.8) and no additional compensation will be allowed therefor.

10-1.14 RELIEF FROM MAINTENANCE AND RESPONSIBILITY

The Contractor may be relieved of the duty of maintenance and protection for those items not directly connected with plant establishment work, except highway planting and irrigation systems in conformance with the provisions in Section 7-1.15, "Relief From Maintenance and Responsibility," of the Standard Specifications.

10-1.15 COOPERATION

Attention is directed to Section 7-1.14, "Cooperation," and Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications and these special provisions.

It is anticipated that work by another contractor (Contract No. 04-120624) to landscaping plant establishment areas in and near Napa Creek at the southern side of this contract in the City of Napa on Route 29 from First Street / Browns Ferry Road to D Street (KP 18.7 to KP 21.7) will be ongoing adjacent to and within the limits of this project during progress of drainage and earthwork of this contract.

The Contractor for this contract shall take over plant establishment work for the locations planted under Contract 04-120624. Prior to the completion of plant establishment under Contract 04-120624, the Engineer will arrange a field meeting and site review for all plant establishment work for the locations planted under Contract 04-120624, for the purpose of both establishing the current plant establishment condition for these locations and to transfer all necessary plant establishment information. The Contractor for this contract shall have one person employed at the level of foreman or field superintendent, attend the field coordination meeting.

Attention is directed to "Order of Work", "Temporary Alternative Earth Retainers" and "Construct Railroad Tracks" of these special provisions. The Contractor shall coordinate all track work with the Napa Valley Wine Train through the Engineer as specified in "Order of Work". Installation and removal of the railroad signals and gates will be performed by railroad forces and will need coordination. Shoring submittals will need railroad review.

It is anticipated that work by another contractor (City of Napa) to local roads in the City of Napa will be ongoing adjacent to and within the limits of this project during progress of the work on this contract, as described in the various drainage special provisions of this contract.

It is anticipated that work by another contractor (Napa Valley Wine Train) to install railroad signals on Trancas Street and Redwood Road in the City of Napa will be ongoing adjacent to and within the limits of this project during progress of the work on this contract.

The Contractor shall anticipate and plan to attend work coordination meetings to be arranged by the Engineer. The frequency of the work coordination meetings are anticipated to average one meeting per month, but the short term frequency can be greater or smaller depending on the amount of work ongoing. The Contractor shall have one person employed at the level of foreman or field superintendent, and any affected subcontractors, attend the work coordination meetings.

10-1.16 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.

10-1.17 OVERHEAD

Overhead shall conform to these special provisions. The Contractor will be compensated for time-related overhead in conformance with these special provisions.

Attention is directed to "Force Account Payment" and "Progress Schedule (Critical Path Method)" of these special provisions.

The provisions in Section 9-1.08, "Adjustment of Overhead Costs," of the Standard Specifications shall not apply.

Time-related overhead shall consist of those overhead costs, including field and home office overhead, that are in proportion to the time required to complete the work. Time-related overhead shall not include costs that are not related to time, including but not limited to, mobilization, licenses, permits, and any other charges incurred only once during the contract.

Field office overhead expenses include time-related costs associated with the normal and recurring operations of the construction project, and shall not include costs directly attributable to any of the work of the contract. Such time-related costs include, but are not limited to, the salaries and benefits of project managers, general superintendents, field office managers and other field office staff assigned to the project, and rent, utilities, maintenance, security, supplies and equipment costs of the project field office.

Home office overhead or general and administrative expenses refer to the fixed costs of operating the Contractor's business. These costs include, but are not limited to, general administration, insurance, personnel and subcontract administration, purchasing, accounting, and project engineering and estimating. The rate of home office overhead shall exclude expenses specifically related to other contracts or other businesses of the Contractor, equipment coordination, material deliveries, and consultant and legal fees.

The quantity of time-related overhead to be paid will be measured by the working day, as specified in the Engineer's Estimate as WDAY. The estimated amount will be based on the number of working days, excluding any days for plant establishment, as specified in "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions. In the event an early completion progress schedule, as defined in "Progress Schedule (Critical Path Method)" of these special provisions, is submitted by the Contractor and approved by the Engineer, the quantity of time-related overhead eligible for payment will be based on the total number of working days as specified in "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions, rather than the Contractor's early completion progress

schedule. The quantity of time-related overhead, as measured above, will be adjusted only as a result of suspensions and adjustments of time which revise the current contract completion date and which are also any of the following:

A. Suspensions of work ordered in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications, except:

    1. Suspensions ordered due to weather conditions being unfavorable for the suitable prosecution of the controlling operation or operations; or
    2. Suspensions ordered due to the failure on the part of the Contractor to carry out orders given, or to perform any provision of the contract; or
    3. Any other suspensions mutually agreed upon between the Engineer and the Contractor.

B. Extensions of time granted by the State in conformance with the provisions in the fifth paragraph in Section 8-1.07, "Liquidated Damages," of the Standard Specifications; or
C. Reductions in contract time set forth in approved contract change orders, in conformance with the provisions in Section 4-1.03, "Changes," of the Standard Specifications.

In the event a cost reduction proposal is submitted by the Contractor, and is subsequently approved by the Engineer, which provides for a reduction in contract time, the contract amount of time-related overhead associated with the reduction in contract time shall be considered as a net savings in the total cost of time-related overhead. The Contractor will be paid 50 percent of the estimated net savings of the time-related overhead, in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications.

If the quantity of time-related overhead, measured as specified in this special provision, exceeds 149 percent of the number of working days specified in the Engineer's Estimate, the Contractor shall, within 60 days of the Engineer's written request, submit to the Engineer an audit examination and report performed by an independent Certified Public Accountant of the Contractor's actual overhead costs. The independent Certified Public Accountant's audit examination shall be performed in conformance with the requirements of the American Institute of Certified Public Accountants Attestation Standards. The audit examination and report shall depict the Contractor's project and company-wide financial records and shall specify the actual overall average daily rates for both field and home office overhead for the entire duration of the project, and whether the costs have been properly allocated. The rates of field and home office overhead shall exclude all unallowable costs as determined in the Federal Acquisition Regulations, 48 CFR, Chapter 1, Part 31. The audit examination shall determine if the rates of field and home office overhead:

A. are allowable in conformance with the requirements of the Federal Acquisition Regulations, 48 CFR, Chapter 1, Part 31;
B. are adequately supported by reliable documentation; and
C. related solely to the project under examination.

Upon the Engineer's written request, the Contractor shall make its financial records available for audit by the State for the purpose of verifying the actual rate of time-related overhead specified in the audit submitted by the Contractor. The actual rate of time-related overhead specified in the audit, submitted by the Contractor, will be subject to approval by the Engineer.

If the Engineer elects, or if requested in writing by the Contractor, contract item payments for time-related overhead, in excess of 149 percent of the number of working days designated in the Engineer's Estimate, will be adjusted to reflect the actual rate.

The cost of performing an audit examination and submitting the report, requested by the Engineer, will be borne equally by the State and the Contractor. The division of the cost will be made by determining the cost of providing an audit examination in conformance with the provisions of Section 9-1.03B, "Work performed by Special Forces or Other Special Services" of the Standard Specifications, and paying to the Contractor one-half of that cost.

The contract price paid per working day for time-related overhead shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in time-related overhead, complete in place, including all field and home office overhead costs incurred by the Contractor and by any joint venture partner, subcontractor, supplier or other party associated with the Contractor, and the Contractor's share of costs of audits of overhead costs requested by the Engineer, as specified in these special provisions, and as directed by the Engineer. The provisions in Sections 4-1.03B, "Increased or Decreased Quantities," 4-1.03C, "Changes in Character of the Work," of the Standard Specifications shall not apply to time-related overhead.

Full compensation for additional overhead costs involved in the performance of extra work at force account shall be considered as included in the markups specified in "Force Account Payment," of these special provisions.

Full compensation for additional overhead cost involved in performing additional contract item work that is not a controlling operation and for all overhead, other than the time-related overhead measured and paid for as specified in this section "Overhead", shall be considered as included in the various items of work involved, and no additional compensation will be allowed therefor.

For the purpose of making partial payments pursuant to the provisions in Section 9-1.06, "Partial Payments," of the Standard Specifications, the number of working days to be paid for time-related overhead in each monthly partial payment will be the number of working days, specified above to be measured for payment, that occurred during that monthly estimate period. The amount earned per working day for time-related overhead shall be either the contract item price, or 20 percent of the original total contract amount divided by the number of working days specified in "Beginning of Work, Time of Completion and Liquidated Damages," of these special provisions, whichever is the lesser.

After acceptance of the contract in conformance with the provisions in Section 7-1.17, "Acceptance of Contract," of the Standard Specifications, the amount of the total contract item price for time-related overhead not yet paid, will be included for payment in the first estimate made after acceptance of the contract in conformance with the provisions in Section 9-1.07, "Payment After Acceptance," of the Standard Specifications.

10-1.18 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

If these facilities are not located on the plans in both alignment and elevation, no work shall be performed in the vicinity of the facilities until the owner, or the owner's representative, has located the facility by potholing, probing or other means that will locate and identify the facility. If, in the opinion of the Engineer, the Contractor's operations are delayed or interfered with by reason of the utility facilities not being located by the owner or the owner's representative, the State will compensate the Contractor for the delays to the extent provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications, and not otherwise, except as provided in Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications.

It is anticipated that the following utility facilities will be relocated prior to the dates shown:

Utility	Location	Stage of Construction	Date
Sewer	M Line 135+05	1	12-1-01
PG&E Pole	M Line 136+85 (Lt)	1	12-1-01
PG&E Pole	M Line 137+23 (Lt)	1	12-1-01
PG&E Pole	M Line 137+98 (Lt)	1	12-1-01
PG&E Pole	M Line 138+55 (Lt)	1	12-1-01
PG&E Pole	M Line 138+65 (Rt)	3	12-1-01
PG&E Pole	M Line 138+80 (Lt)	3	12-1-01
PG&E Pole	M Line 138+82 (Lt)	3	12-1-01
PG&E Pole	M Line 139+44 (Lt)	2	12-1-01
PG&E Pole	M Line 139+78 (Lt)	2	12-1-01
PG&E Pole	M Line 139+91 (Rt)	2	12-1-01
PG&E Pole	M Line 140+09 (Lt)	2	12-1-01
PG&E Pole	M Line 140+94 (Lt)	2	12-1-01
PG&E Pole	M Line 140+98 (Rt)	2	12-1-01
Gas Line	M Line 140+33 (Lt) - 141+25 (Rt)	2	12-1-01
PG&E Pole	M Line 141+16 (Lt)	2	12-1-01
Telephone Line	M Line 141+32	2	12-1-01
Gas Line	M Line 141+34	2	12-1-01
Water Line	M Line 141+44	2	12-1-01
PG&E Pole	T Line 10+97 (Rt)	3	12-1-01
PG&E 200-mm Elect. Casing	T Line 14+26 (Lt)	1	12-1-01
PG&E 100-mm Elect. Casing	T Line 14+41 (Rt)	1	12-1-01
PacBell 300-mm Duct	T Line 14+41 (Rt)	1	12-1-01
PG&E Pole	E Line 10+23 (Lt)	1	12-1-01

The following utility facilities will be relocated during the progress of the contract. The Contractor shall notify the Engineer, in writing, prior to doing work in the vicinity of the facility. The utility facility will be relocated within the listed working days, as defined in Section 8-1.06, "Time of Completion," of the Standard Specifications, after the notification is received by the Engineer:

Utility	Location	Working Days
PG&E 12 KV OH Lines	RW2 LOL 142+40 - 144+40	60

In the event that the utility facilities mentioned above are not removed or relocated by the date specified and, if in the opinion of the Engineer, the Contractor's operations are delayed or interfered with by reason of the utility facilities not being removed or relocated by the date specified, the State will compensate the Contractor for the delays to the extent provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications, and not otherwise, except as provided in Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications.

10-1.19 MOBILIZATION

Mobilization shall conform to the provisions in Section 11, "Mobilization," of the Standard Specifications.

10-1.20 CONSTRUCTION AREA TRAFFIC CONTROL DEVICES

Flagging, signs, and all other traffic control devices furnished, installed, maintained, and removed when no longer required shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Category 1 traffic control devices are defined as those devices that are small and lightweight (less than 45 kg), and have been in common use for many years. The devices shall be known to be crashworthy by crash testing, crash testing of similar devices, or years of demonstrable safe performance. Category 1 traffic control devices include traffic cones, plastic drums, portable delineators, and channelizers.

If requested by the Engineer, the Contractor shall provide written self-certification for crashworthiness of Category 1 traffic control devices. Self-certification shall be provided by the manufacturer or Contractor and shall include the following: date, Federal Aid number (if applicable), expenditure authorization, district, county, route and kilometer post of project

limits; company name of certifying vendor, street address, city, state and zip code; printed name, signature and title of certifying person; and an indication of which Category 1 traffic control devices will be used on the project. The Contractor may obtain a standard form for self-certification from the Engineer.

Category 2 traffic control devices are defined as those items that are small and lightweight (less than 45 kg), that are not expected to produce significant vehicular velocity change, but may otherwise be potentially hazardous. Category 2 traffic control devices include: barricades and portable sign supports.

Category 2 devices purchased on or after October 1, 2000 shall be on the Federal Highway Administration (FHWA) Acceptable Crashworthy Category 2 Hardware for Work Zones list. This list is maintained by FHWA and can be located at the following internet address: http://safety.fhwa.dot.gov/fourthlevel/hardware/listing.cfm?code=workzone. The Department maintains a secondary list at the following internet address: http://www.dot.ca.gov/hq/traffops/signtech/signdel/pdffiles.htm.

Category 2 devices that have not received FHWA acceptance, and were purchased before October 1, 2000, may continue to be used until they complete their useful service life or until January 1, 2003, whichever comes first. Category 2 devices in use that have received FHWA acceptance shall be labeled with the FHWA acceptance letter number and the name of the manufacturer by the start of the project. The label shall be readable. After January 1, 2003, all Category 2 devices without a label shall not be used on the project.

Full compensation for providing self-certification for crashworthiness of Category 1 traffic control devices and labeling Category 2 devices as specified shall be considered as included in the prices paid for the various contract items of work requiring the use of the Category 1 or Category 2 traffic control devices and no additional compensation will be allowed therefor.

10-1.21 CONSTRUCTION AREA SIGNS

Construction area signs shall be furnished, installed, maintained, and removed when no longer required in conformance with the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to those construction area signs identified as "Electrical Item" on the plans. The "Electrical Item" signs are paid under "Signal and Lighting" and are not paid under the construction area sign contract item.

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.

The Contractor shall notify the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to commencing excavation for construction area sign posts. The regional notification centers include, but are not limited to, the following:

Notification Center	Telephone Number
Underground Service Alert-Northern California (USA)	1-800-642-2444 1-800-227-2600
Underground Service Alert-Southern California (USA)	1-800-422-4133 1-800-227-2600

Excavations required to install construction area signs shall be performed by hand methods without the use of power equipment, except that power equipment may be used if it is determined there are no utility facilities in the area of the proposed post holes.

Sign substrates for stationary mounted construction area signs may be fabricated from fiberglass reinforced plastic as specified under "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

10-1.22 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.

Lane closures shall conform to the provisions in section "Traffic Control System for Lane Closure" of these special provisions.

Attention is directed to the annual Grape Harvest occurring in this area between August 1 and October 15 of each year and Section 7-1.08, "Public Convenience," of the Standard Specifications. The Contractor shall minimize traffic control impacts to the travelling public during this period to those closures required to complete work on the critical path of the project progress schedule, as reflected in the then-current project schedule.

Personal vehicles of the Contractor's employees shall not be parked on the traveled way or shoulders including any section closed to public traffic.

The Contractor shall notify local authorities of the Contractor's intent to begin work at least 5 days before work is begun. The Contractor shall cooperate with local authorities relative to handling traffic through the area and shall make arrangements relative to keeping the working area clear of parked vehicles.

Whenever vehicles or equipment are parked on the shoulder within 1.8 m of a traffic lane, the shoulder area shall be closed with fluorescent traffic cones or portable delineators placed on a taper in advance of the parked vehicles or equipment and along the edge of the pavement at 7.5 m intervals to a point not less than 7.5 m past the last vehicle or piece of equipment. A minimum of 9 cones or portable delineators shall be used for the taper. A C23 (Road Work Ahead) or C24 (Shoulder Work Ahead) sign shall be mounted on a portable sign stand with flags. The sign shall be placed where designated by the Engineer.

Lanes 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.

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: Northbound – On Rte. 29 – From KP20.1 to KP21.7 at Trancas/Redwood Road I/C, Napa County.

	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**	**1**																		**1**	**1**	
Fridays	**1**	**1**	**1**	**1**	**1**																			**1**	
Saturdays	**1**	**1**	**1**	**1**	**1**	**1**	**1**																	**1**	
Sundays	**1**	**1**	**1**	**1**	**1**	**1**	**1**																**1**	**1**	
Day before designated legal holiday	**1**	**1**	**1**	**1**	**1**																			**1**	
Designated legal holidays	**1**	**1**	**1**	**1**	**1**	**1**	**1**																**1**	**1**	

Legend:

1	One lane open in direction of travel
	No lane closure, shoulder closure, or work that interferes with public traffic allowed

REMARKS:

(F=NAP-29-KP20.1/120611/9.00R/96.13/D)

Chart No. 2
Multilane Lane Requirements

Location: Southbound – On Rte. 29 – From KP20.1 to KP21.7 at Trancas/Redwood Road I/C, Napa County.

	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**	**1**	**1**																	**1**	**1**	
Fridays	**1**	**1**	**1**	**1**	**1**	**1**																		**1**	
Saturdays	**1**	**1**	**1**	**1**	**1**	**1**	**1**																		
Sundays	**1**	**1**	**1**	**1**	**1**	**1**	**1**																**1**	**1**	
Day before designated legal holiday	**1**	**1**	**1**	**1**	**1**	**1**																		**1**	
Designated legal holidays	**1**	**1**	**1**	**1**	**1**	**1**	**1**																	**1**	

Legend:

1	One lane open in direction of travel
	No lane closure, shoulder closure, or work that interferes with public traffic allowed

REMARKS:

(F=NAP-29-KP20.1/120611/9.00R/96.13/D)

Chart No. 3
Multilane Lane Requirements

Location: Trancas Street - Eastbound & Westbound - from Claremont Way to State Route 29

	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**	**1**																		**1**	**1**	
Fridays	**1**	**1**	**1**	**1**																			**1**	**1**	
Saturdays	**1**	**1**	**1**	**1**	**1**	**1**																	**1**	**1**	
Sundays	**1**	**1**	**1**	**1**	**1**	**1**	**1**															**1**	**1**	**1**	
Day before designated legal holiday	**1**	**1**	**1**	**1**	**1**	**1**																		**1**	**1**
Designated legal holidays	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**												**1**	**1**	**1**	**1**	

Legend:

1	One lane open in direction of travel
	No lane closure, shoulder closure, or work that interferes with public traffic allowed

REMARKS:

Chart No. 4
Multilane Lane Requirements

Location: Redwood Road - Eastbound & Westbound - from Linda Vista Avenue to State Route 29

	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**	**1**																		**1**	**1**	
Fridays	**1**	**1**	**1**	**1**																			**1**	**1**	
Saturdays	**1**	**1**	**1**	**1**	**1**	**1**																	**1**	**1**	
Sundays	**1**	**1**	**1**	**1**	**1**	**1**	**1**															**1**	**1**	**1**	
Day before designated legal holiday	**1**	**1**	**1**	**1**	**1**	**1**																	**1**	**1**	
Designated legal holidays	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**												**1**	**1**	**1**	**1**	

Legend:

1	One lane open in direction of travel
	No lane closure, shoulder closure, or work that interferes with public traffic allowed

REMARKS:

Chart No. 5
Multilane Lane Requirements

Location: Solano Avenue - Northbound & Southbound - from Trower Avenue to West Pueblo Avenue

	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**	**1**																		**1**	**1**	
Fridays	**1**	**1**	**1**	**1**																			**1**	**1**	
Saturdays	**1**	**1**	**1**	**1**	**1**	**1**																	**1**	**1**	
Sundays	**1**	**1**	**1**	**1**	**1**	**1**	**1**															**1**	**1**	**1**	
Day before designated legal holiday	**1**	**1**	**1**	**1**	**1**	**1**																	**1**	**1**	
Designated legal holidays	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**												**1**	**1**	**1**	**1**	

Legend:

1	One lane open in direction of travel
	No lane closure, shoulder closure, or work that interferes with public traffic allowed

REMARKS:

Chart No. 6
Multilane Lane Requirements

Location: California Boulevard - Northbound & Southbound - from Trancas Street to Stadium Avenue

	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**	**1**																		**1**	**1**	
Fridays	**1**	**1**	**1**	**1**																			**1**	**1**	
Saturdays	**1**	**1**	**1**	**1**	**1**	**1**																	**1**	**1**	
Sundays	**1**	**1**	**1**	**1**	**1**	**1**	**1**															**1**	**1**	**1**	
Day before designated legal holiday	**1**	**1**	**1**	**1**	**1**	**1**																	**1**	**1**	
Designated legal holidays	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**												**1**	**1**	**1**	**1**	

Legend:

1 One lane open in direction of travel

No lane closure, shoulder closure, or work that interferes with public traffic allowed

REMARKS:

Chart No. 7
Multilane Lane Requirements

Location: Permanente Way - Eastbound & Westbound - from Claremont Way to Dead End

	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**	**1**																		**1**	**1**	
Fridays	**1**	**1**	**1**	**1**																			**1**	**1**	
Saturdays	**1**	**1**	**1**	**1**	**1**	**1**																	**1**	**1**	
Sundays	**1**	**1**	**1**	**1**	**1**	**1**	**1**															**1**	**1**	**1**	
Day before designated legal holiday	**1**	**1**	**1**	**1**	**1**	**1**																	**1**	**1**	
Designated legal holidays	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**												**1**	**1**	**1**	**1**	

Legend:

1 One lane open in direction of travel

No lane closure, shoulder closure, or work that interferes with public traffic allowed

REMARKS:

Chart No. 8
Multilane Lane Requirements

Location: Industrial Way - Eastbound & Westbound - from California Boulevard to Dead End

	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**	**1**																		**1**	**1**	
Fridays	**1**	**1**	**1**	**1**																			**1**	**1**	
Saturdays	**1**	**1**	**1**	**1**	**1**	**1**																	**1**	**1**	
Sundays	**1**	**1**	**1**	**1**	**1**	**1**	**1**															**1**	**1**	**1**	
Day before designated legal holiday	**1**	**1**	**1**	**1**	**1**	**1**																	**1**	**1**	
Designated legal holidays	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**												**1**	**1**	**1**	**1**	

Legend:

1	One lane open in direction of travel
	No lane closure, shoulder closure, or work that interferes with public traffic allowed

REMARKS:

Chart No. 9
Multilane Lane Requirements

Location: Harkness Street - Northbound & Southbound - from Baxter Avenue to Trancas Street

	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**	**1**																		**1**	**1**	
Fridays	**1**	**1**	**1**	**1**																			**1**	**1**	
Saturdays	**1**	**1**	**1**	**1**	**1**	**1**																	**1**	**1**	
Sundays	**1**	**1**	**1**	**1**	**1**	**1**	**1**															**1**	**1**	**1**	
Day before designated legal holiday	**1**	**1**	**1**	**1**	**1**	**1**																	**1**	**1**	
Designated legal holidays	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**												**1**	**1**	**1**	**1**	

Legend:

1	One lane open in direction of travel
	No lane closure, shoulder closure, or work that interferes with public traffic allowed

REMARKS:

10-1.23 PEDESTRIAN ACCESS

Pedestrian access facilities along Trancas Street and Trancas Street detours shall be provided as shown on the plans and as specified herein. Hand railings shall be provided as necessary to protect pedestrian traffic from hazards due to construction operations or adjacent vehicular traffic.

Railings shall be constructed of wood, S4S, and shall be painted white. Railings and walkways shall be maintained in good condition. Walkways shall be kept clear of obstructions.

Full compensation for providing pedestrian facilities shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

10-1.24 CLOSURE REQUIREMENTS AND CONDITIONS

Lane closures shall conform to the provisions in "Maintaining Traffic" of these special provisions and these special provisions.

The term closure, as used herein, is defined as the closure of a traffic lane or lanes, including ramp or connector lanes, within a single traffic control system.

CLOSURE SCHEDULE

By noon Monday, the Contractor shall submit a written schedule of planned closures for the following week period, defined as Friday noon through the following Friday noon.

The Closure Schedule shall show the locations and times when the proposed closures are to be in effect. The Contractor shall use the Closure Schedule request forms furnished by the Engineer. Closure Schedules submitted to the Engineer with incomplete, unintelligible or inaccurate information will be returned for correction and resubmittal. The Contractor will be notified of disapproved closures or closures that require coordination with other parties as a condition of approval.

Amendments to the Closure Schedule, including adding additional closures, shall be submitted to the Engineer, in writing, at least 3 working days in advance of a planned closure. Approval of amendments to the Closure Schedule will be at the discretion of the Engineer.

The Contractor shall confirm, in writing, all scheduled closures by no later than 8:00 a.m. 3 working days prior to the date on which the closure is to be made. Approval or denial of scheduled closures will be made no later than 4:00 p.m. 2 working days prior to the date on which the closure is to be made. Closures not confirmed or approved will not be allowed.

Confirmed closures that are cancelled due to unsuitable weather may be rescheduled at the discretion of the Engineer for the following working day.

CONTINGENCY PLAN

The Contractor shall prepare a contingency plan for reopening closures to public traffic. The Contractor shall submit the contingency plan for a given operation to the Engineer within one working day of the Engineer's request.

LATE REOPENING OF CLOSURES

If a closure is not reopened to public traffic by the specified time, work shall be suspended in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications. The Contractor shall not make any further closures until the Engineer has accepted a work plan, submitted by the Contractor, that will insure that future closures will be reopened to public traffic at the specified time. The Engineer will have 2 working days to accept or reject the Contractor's proposed work plan. The Contractor will not be entitled to any compensation for the suspension of work resulting from the late reopening of closures.

For each 10-minute interval, or fraction thereof past the time specified to reopen the closure, the Department will deduct $1,900 per interval from moneys due or that may become due the Contractor under the contract.

COMPENSATION

The Contractor shall notify the Engineer of any delay in the Contractor's operations due to the following conditions, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of those conditions, and the Contractor's loss due to that delay could not have been avoided by rescheduling the affected closure or by judicious handling of forces, equipment and plant, the delay will be considered a right of way delay within the meaning of Section 8-1.09, "Right of Way Delays," and compensation for the delay will be determined in conformance with the provisions in Section 8-1.09:

A. The Contractor's proposed Closure Schedule is denied and his planned closures are within the time frame allowed for closures in "Maintaining Traffic" of these special provisions, except that the Contractor will not be entitled to any compensation for amendments to the Closure Schedule that are not approved.
B. The Contractor is denied a confirmed closure.

Should the Engineer direct the Contractor to remove a closure prior to the time designated in the approved Closure Schedule, any delay to the Contractor's schedule due to removal of the closure will be considered a right of way delay within the meaning of Section 8-1.09, "Right of Way Delays," and compensation for the delay will be determined in conformance with the provisions in Section 8-1.09.

10-1.25 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE

A traffic control system shall consist of closing traffic lanes and ramps in conformance with the details shown on the plans, the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications, the provisions under "Maintaining Traffic" and "Construction Area Signs" of these special provisions, and these special provisions.

The provisions in this section will not relieve the Contractor of responsibility for providing additional devices or taking measures as may be necessary to comply with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications.

During traffic stripe operations and pavement marker placement operations using bituminous adhesive, traffic shall be controlled, at the option of the Contractor, with either stationary or moving lane closures. During other operations, traffic shall be controlled with stationary lane closures. Attention is directed to the provisions in Section 84-1.04, "Protection From Damage," and Section 85-1.06, "Placement," of the Standard Specifications.

If components in the traffic control system are displaced or cease to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair the components to the original condition or replace the components and shall restore the components to the original location.

STATIONARY LANE CLOSURE

When lane and ramp closures are made for work periods only, at the end of each work period, components of the traffic control system, except portable delineators placed along open trenches or excavation adjacent to the traveled way, shall be removed from the traveled way and shoulder. If the Contractor so elects, the components may be stored at selected central locations, designated by the Engineer within the limits of the highway right of way.

Each vehicle used to place, maintain and remove components of a traffic control system on multilane highways shall be equipped with a Type II flashing arrow sign which shall be in operation when the vehicle is being used for placing, maintaining or removing the components. Vehicles equipped with Type II flashing arrow sign not involved in placing, maintaining or removing the components when operated within a stationary type lane closure shall only display the caution display mode. The sign shall be controllable by the operator of the vehicle while the vehicle is in motion. The flashing arrow sign shown on the plans shall not be used on the vehicles which are doing the placing, maintaining and removing of components of a traffic control system and shall be in place before a lane closure requiring the sign's use is completed.

The 150-m section of a lane closure, shown along lane lines between the 300-m lane closure tapers on the plans entitled "Traffic Control System for Lane Closures on Freeways and Expressways" and "Traffic Control System for Lane and Complete Closures on Freeways and Expressways" shall not be used.

The traffic cones shown to be placed transversely across closed traffic lanes and shoulders on the plans entitled "Traffic Control System for Lane Closures on Freeways and Expressways" and "Traffic Control System for Lane and Complete Closures on Freeways and Expressways" shall not be placed.

MOVING LANE CLOSURE

Flashing arrow signs used in moving lane closures shall be truck-mounted. Changeable message signs used in moving lane closure operations shall conform to the provisions in Section 12-3.12, "Portable Changeable Message Signs," of the Standard Specifications, except the signs shall be truck-mounted and the full operation height of the bottom of the sign may be less than 2.1 m above the ground, but should be as high as practicable.

Flashing arrow signs shall be in the caution display mode when used on 2-lane, 2-way highways.

Truck-mounted attenuators (TMA) for use in moving lane closures shall be any of the following approved models, or equal:

A. Hexfoam TMA Series 3000, Alpha 1000 TMA Series 1000 and Alpha 2001 TMA Series 2001, manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601-2076, Telephone (312) 467-6750.

    1. Distributor (Northern): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, Telephone 1-800-884-8274, FAX (916) 387-9734.
    2. Distributor (Southern): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805, Telephone 1-800-222-8274.

B. Cal T-001 Model 2 or Model 3, manufacturer and distributor: Hexcel Corporation, 11711 Dublin Boulevard, P.O. Box 2312, Dublin, CA 94568, Telephone (510) 828-4200.

C. Renco Rengard Model Nos. CAM 8-815 and RAM 8-815, manufacturer and distributor: Renco Inc., 1582 Pflugerville Loop Road, P.O. Box 730, Pflugerville, TX 78660-0730, Telephone 1-800-654-8182.

Each TMA shall be individually identified with the manufacturer's name, address, TMA model number, and a specific serial number. The names and numbers shall each be a minimum 13 mm high and located on the left (street) side at the lower front corner. The TMA shall have a message next to the name and model number in 13 mm high letters which states, "The bottom of this TMA shall be _____ mm ± _____ 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.

10-1.26 TEMPORARY PAVEMENT DELINEATION

Temporary pavement delineation shall be furnished, placed, maintained, and removed in conformance with the provisions in Section 12-3.01, "General," of the Standard Specifications and these special provisions. Nothing in these special provisions shall be construed as reducing the minimum standards specified in the Manual of Traffic Controls published by the Department or as relieving the Contractor from his responsibility as provided in Section 7-1.09, "Public Safety," of the Standard Specifications.

GENERAL

Whenever the work causes obliteration of pavement delineation on local roadways, temporary or permanent pavement delineation shall be in place prior to opening the traveled way to public traffic. Laneline or centerline pavement delineation shall be provided at all times for traveled ways open to public traffic.

Work necessary, including required lines or marks, to establish the alignment of temporary pavement delineation shall be performed by the Contractor. Surfaces to receive temporary pavement delineation shall be dry and free of dirt and loose material. Temporary pavement delineation shall not be applied over existing pavement delineation or other temporary pavement delineation. Temporary pavement delineation shall be maintained until superseded or replaced with a new pattern of temporary pavement delineation or permanent pavement delineation.

Temporary pavement markers and removable traffic tape which conflicts with a new traffic pattern or which is applied to the final layer of surfacing or existing pavement to remain in place shall be removed when no longer required for the direction of public traffic, as determined by the Engineer.

TEMPORARY LANELINE AND CENTERLINE DELINEATION

Whenever lanelines and centerlines are obliterated, the minimum laneline and centerline delineation to be provided shall be temporary raised pavement markers placed at longitudinal intervals of not more than 7.3 m. The temporary raised pavement markers shall be the same color as the laneline or centerline the markers replace. Temporary raised pavement markers shall be, at the option of the Contractor, one of the temporary pavement markers listed for short term day/night use (14 days or less) or long term day/night use (6 months or less) in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Temporary raised pavement markers shall be placed in conformance with the manufacturer's instructions and shall be cemented to the surfacing with the adhesive recommended by the manufacturer, except epoxy adhesive shall not be used to place pavement markers in areas where removal of the markers will be required.

Temporary laneline or centerline delineation consisting entirely of temporary raised pavement markers placed on longitudinal intervals of not more than 7.3 m shall be used on lanes open to public traffic for a maximum of 14 days. Prior to the end of the 14 days, the permanent pavement delineation shall be placed. If the permanent pavement delineation is not placed within the 14 days, additional temporary pavement delineation shall be provided at the Contractor's expense. The additional temporary pavement delineation to be provided shall be equivalent to the pattern specified for the permanent pavement delineation for the area, as determined by the Engineer.

Where "no passing" centerline pavement delineation is obliterated, the following "no passing" zone signing shall be installed prior to opening the lanes to public traffic. R63 (DO NOT PASS) signs shall be installed at the beginning and at every 600-m interval within "no passing" zones. The exact location of "no passing" zone signing will be as determined by the Engineer and shall be maintained in place until permanent "no passing" centerline pavement delineation has been applied. The signing for "no passing" zones shall be removed when no longer required for the direction of public traffic. The signing for "no passing" zones shall conform to the provisions in "Construction Area Signs" of these special provisions, except for payment.

Full compensation for furnishing, placing, maintaining, and removing the temporary raised pavement markers used for temporary laneline and centerline delineation (including the signing specified for "no passing" zones) and for providing equivalent patterns of permanent traffic lines for these areas when required shall be considered as included in the contract prices paid for the items of work that obliterated the laneline and centerline pavement delineation and no separate payment will be made therefor.

10-1.27 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.

Portable changeable message signs shall be used during temporary k-rail placement on the freeway and during staged construction traffic shifts as shown on the plans, and at other locations as directed by the Engineer.

Attention is directed to "Maintaining Traffic" of these special provisions regarding the use of the portable changeable message signs.

10-1.28 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.

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

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.

10-1.29 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 and on-site labor to clean up crash cushion debries 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.

10-1.30 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.

ABANDON CULVERT AND REINFORCED CONCRETE BOX

Existing culverts and reinforced concrete box, where shown on the plans to be abandoned, shall be abandoned in place or, at the option of the Contractor, the culverts shall be removed and disposed of. Resulting openings into existing structures that are to remain in place shall be plugged with commercial quality concrete containing not less than 300 kg of cement per cubic meter.

Abandoning culverts and reinforced concrete box in place shall conform to the following:

A. Culverts and reinforced concrete box that intersect the side slopes shall be removed to a depth of not less than one meter measured normal to the plane of the finished side slope, before being abandoned.
B. The reinforced concrete box shall not be backfilled since this facility is temporary and shall be removed in a subsequent stage.
C. The ends of culverts and reinforced concrete box shall be securely closed by a 150 mm thick tight fitting plug or wall of commercial quality concrete.

Culverts and reinforced concrete box shall not be abandoned until their use is no longer required. The Contractor shall notify the Engineer in advance of any intended culvert or reinforced concrete box abandonment.

If the Contractor elects to remove and dispose of a culvert which is specified to be abandoned, as provided herein, backfill specified for the pipe will be measured and paid for in the same manner as if the culvert or has been abandoned in place.

Full compensation for concrete plugs, pipe removal, structure and excavation shall be considered as included in the contract unit price paid for abandon culvert and reinforced concrete box and no additional compensation will be allowed therefor.

ABANDON INLET

Existing concrete drainage inlets, where shown on the plans to be abandoned, shall be abandoned.

The top portion of the inlets shall be removed to a depth of 1.0 m below finished grade.

Removed frames and grates shall be disposed of.

SALVAGE THRIE BEAM BARRIER

Existing single and double thrie beam barrier, where shown on the plans to be salvaged, shall be removed and salvaged.

Salvaged metal beam guard railing materials shall be hauled to Caltrans Maintenance Station, 3161 Jefferson Street, Napa, California and stockpiled. The Contractor shall notify the Caltrans Maintenance Station at (707) 224-8633 at least 3 days in advance of delivering the salvaged metal beam guard rail materials.

Existing concrete anchors or steel foundation tubes shall be completely removed and disposed of. Full compensation for removing and disposing of concrete anchors or steel foundation tubes shall be considered as included in the contract price paid per meter for salvage single or double thrie beam barrier 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 salvage single or double thrie beam barrier and no separate payment will be made therefor.

REMOVE METAL BEAM GUARD RAILING

Existing metal beam guard railing, where shown on the plans to be removed, shall be removed and disposed of.

Existing concrete anchors or steel foundation tubes shall be completely removed and disposed of. Full compensation for removing concrete anchors shall be considered as included in the contract price paid per meter for remove metal beam guard railing and no separate payment will be made therefor.

Full compensation for removing cable anchor assemblies, terminal anchor assemblies or steel foundation tubes shall be considered as included in the contract price paid per meter for remove metal beam guard railing and no separate payment will be made therefor.

REMOVE CHAIN LINK FENCE

Existing chain link fence, including post footings and anchor blocks, where shown on the plans, shall be removed and disposed of.

Full compensation for backfilling and compacting post holes shall be considered as included in the contract price paid per meter for remove chain link fence and no additional compensation will be allowed therefor.

REMOVE 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 TRAFFIC STRIPE AND PAVEMENT MARKING

Thermoplastic and painted traffic stripes and pavement markings to be removed, other than yellow thermoplastic traffic stripes, shall be removed at the locations shown on the plans and at the locations designated by the Engineer.

REMOVE YELLOW TRAFFIC STRIPE AND PAVEMENT MARKING

Traffic stripes and pavement markings to be removed shall be removed at the locations shown on the plans and at the locations designated by the Engineer.

Yellow thermoplastic and yellow painted traffic stripes and pavement markings may contain lead and chromium. Residue produced when yellow thermoplastic and yellow paint are removed may contain heavy metals in concentrations that exceed hazardous waste thresholds established by the California Code of Regulations and may produce toxic fumes when heated.

The removed yellow thermoplastic and yellow paint material shall be disposed of at a Class 1 disposal facility in conformance with the requirements of the disposal facility operator within 90 days after accumulating 100 kg of residue and dust. The Contractor shall make all arrangements with the operator of the disposal facility and perform all testing of the yellow thermoplastic and yellow paint residue required by the operator. The Contractor shall submit the name and location of the facility along with testing requirements to the Engineer not less than 21 days prior to removal of yellow thermoplastic and yellow painted traffic stripes and pavement markings.

The Contractor shall submit the written compliance programs required in Subsection (e)(2), "Compliance Program," of Section 1532.1, "Lead," of the Construction Safety Orders to the Engineer not less than 21 days prior to start of removal operations. The compliance programs shall be prepared by an industrial hygienist certified by the American Board of Industrial Hygiene and shall cover all Contractor or subcontractor employees removing or handling the yellow thermoplastic and yellow paint residue. Inspection reports shall be made in conformance with Section 1532.1, "Lead," and shall be submitted to the Engineer.

Prior to performing any removal, personnel who have no prior lead training, including State personnel, shall complete a safety training class provided by the Contractor, which meets the requirements of Title 8, Section 1532.1. The number of State personnel to be trained shall be 5.

Where grinding or other methods approved by the Engineer are used to remove yellow thermoplastic and yellow painted traffic stripes and pavement markings, the residue, including dust, shall be contained and collected immediately. Sweeping will not be allowed. Collection shall be by High Efficiency Particle Arresting (HEPA) vacuum attachment operated concurrently, or other equally effective method, with removal operations. The Contractor shall submit a removal, storage, and disposal workplan in writing to the Engineer for approval not less than 21 days prior to start of removal operations.

The collected residue shall be stored in properly labeled and covered containers approved by the United States Department of Transportation for transportation and temporary storage. The containers shall be handled in such a manner that no spillage will occur. The containers shall be stored in a secured enclosure at a location within the project limits approved by the Engineer while awaiting test results required by the operators of the disposal facility.

Contractors attention is directed to the Storm Water specifications contained in these special provisions.

Removed yellow thermoplastic and yellow paint material will remain the property of the State.

The removed material shall be transported to the Class 1 disposal facility by a transporter currently registered with the California Department of Toxic Substances Control using current manifesting procedures. The Engineer will obtain the United States Environmental Protection Agency Identification Number and sign all manifests as the generator. The California Board of Equalization Number (State's Generator ID) for this project is HY HQ 36-020676.

The Contractor shall assume that the yellow thermoplastic and yellow paint residue is not regulated under the Federal Resource Conservation and Recovery Act (RCRA). Additional disposal costs for residue regulated under RCRA, as determined by test results, will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

Except as otherwise provided above for possible additional costs to be paid for as extra work, full compensation for submitting the required compliance programs, providing safety training for Contractor and State personnel, making arrangements with the Class 1 disposal facility operator, providing for the temporary storage of the residue within a secured area, testing the residue as required by the disposal facility operator, transportation of the residue to the Class 1 disposal facility, and disposal of the residue, all as specified herein, shall be considered as included in the contract prices paid per meter for remove yellow thermoplastic traffic stripe and pavement marking and remove yellow painted traffic stripe and pavement marking and no additional compensation will be allowed therefor.

Nothing in these special provisions shall relieve the Contractor from the Contractor's responsibilities as provided in Section 7-1.09, "Public Safety," of the Standard Specifications.

REMOVE DRAINAGE FACILITY

Existing culverts, inlets, manholes, headwalls, endwalls, and flared end sections, where any portion of these structures is within one meter of the grading plane in excavation areas, or within 0.3-m of original ground in embankment areas, or where shown on the plans to be removed, shall be completely removed and disposed of.

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.

SALVAGE ROADSIDE SIGN

Attention is directed to the stage construction plans and to the stage of work listed in the sign quantity plans.

Existing roadside sign panels, at those locations shown on the plans to be salvaged, shall be removed at the beginning of the stage indicated in the sign quantity plans and salvaged. Existing wood posts for the roadside signs shall be removed and disposed of.

All temporary signing , as shown in the stage construction plans, shall be in-place for the stage to be constructed prior to removing and salvaging of roadside signs for the same stage.

Salvaged roadside sign panels shall be hauled to the Caltrans Sign Shop, 3401 Regatta Boulevard, Richmond, California, (510) 231-7133 and stockpiled.

Existing roadside signs shall not be removed until replacement signs have been installed or until the existing signs are no longer required for the direction of public traffic, as shown on the plans, unless otherwise directed by the Engineer.

RELOCATE ROADSIDE SIGN

Attention is directed to the stage construction plans and to the stage of work listed in the sign quantity plans.

Existing roadside signs shall be removed at the beginning of the stage indicated in the sign quantity plans and relocated to the new locations shown on the plans.

All temporary signing, as shown in the stage construction plans, shall be in-place for the stage to be constructed prior to removing and salvaging of roadside signs for the same stage.

Each roadside sign shall be removed from its current location at the stage indicated on the plans, stored in a secure, sheltered location, and installed at the new location at the completion of the appropriate contract stage as shown on the plans.

Roadside signs shall be re-installed as shown in the plans within fourteen (14) calendar days of the associated contract staging work being completed. At the time the permanent roadside sign is re-installed, any corresponding temporary construction area sign shall either be covered or removed so as not to conflict with the permanent roadside sign.

Attention is directed to Section 15-2.05, "Reconstruction," of the Standard Specifications. At least five (5) working days before removal, the Contractor shall supply the Engineer with a written list of existing roadside signs and sign materials which may be damaged beyond repair. The Engineer will then confirm the Contractor's list of damaged roadside signs and materials in writing within ten (10) working days. Any roadside signs later found to be damaged beyond repair after removal, storage, and transportation, shall be replaced by the Contractor at his expense in accordance with Section 15-2.05, "Reconstruction," of the Standard Specifications. Roadside signs and materials listed and confirmed by the Engineer as having been damaged beyond repair at the beginning of this contract will be paid for as "Extra Work" in accordance with Section 4-1.03D of the Standard Specifications.

Two holes shall be drilled in each existing post as required to provide the breakaway feature shown on the plans.

OBLITERATE SURFACING

Existing surfacing, when no longer required for the passage of public traffic, shall be obliterated at the locations shown on the plans.

Surfacing shall not be obliterated by the earth cover method.

Obliteration shall consist of rooting, plowing, pulverizing or scarifying the existing surfacing in conformance with the provisions in Section 15-2.02A, "Obliterating Roads and Detours," of the Standard Specifications.

REMOVE BASE AND SURFACING

Existing base and bituminous surfacing shown on the plans to be removed, shall be removed to a depth of at least 150 mm below the grade of the existing surfacing. Resulting holes and depressions shall be backfilled with earthy material selected from excavation to the lines and grade established by the Engineer.

The material removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 15-2.03, "Disposal," of the Standard Specifications.

Removing base and surfacing will be measured by the cubic meter in the same manner specified for roadway excavation in conformance with the provisions in Section 19, "Earthwork," of the Standard Specifications and will be paid for at the contract price per cubic meter for remove base and surfacing.

COLD PLANE ASPHALT CONCRETE PAVEMENT (45 MM & 60 MM MAX)

Existing asphalt concrete pavement shall be cold planed at the locations and to the dimensions shown on the plans.

Planing asphalt concrete pavement shall be performed by the cold planing method. Planing of the asphalt concrete pavement shall not be done by the heater planing method.

Cold planing machines shall be equipped with a cutter head not less than 750 mm in width and shall be operated so that no fumes or smoke will be produced. The cold planing machine shall plane the pavement without requiring the use of a heating device to soften the pavement during or prior to the planing operation.

The depth, width, and shape of the cut shall be as shown on the typical cross sections or as designated by the Engineer. The final cut shall result in a uniform surface conforming to the typical cross sections. The outside lines of the planed area shall be neat and uniform. Planing asphalt concrete pavement operations shall be performed without damage to the surfacing to remain in place.

Planed widths of pavement shall be continuous except for intersections at cross streets where the planing shall be carried around the corners and through the conform lines. Following planing operations, a drop-off of more than 45 mm will not be allowed between adjacent lanes open to public traffic.

Where transverse joints are planed in the pavement at conform lines no drop-off shall remain between the existing pavement and the planed area when the pavement is opened to public traffic. If asphalt concrete has not been placed to the level of existing pavement before the pavement is to be opened to public traffic a temporary asphalt concrete taper shall be constructed. Asphalt concrete for temporary tapers shall be placed to the level of the existing pavement and tapered on a slope of 1:30 (Vertical: Horizontal) or flatter to the level of the planed area.

Asphalt concrete for temporary tapers shall be commercial quality and may be spread and compacted by any method that will produce a smooth riding surface. Temporary asphalt concrete tapers shall be completely removed, including the removal of loose material from the underlying surface, before placing the permanent surfacing. The removed material shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Operations shall be scheduled so that not more than 7 days shall elapse between the time when transverse joints are planed in the pavement at the conform lines and the permanent surfacing is placed at the conform lines.

The material planed from the roadway surface, including material deposited in existing gutters or on the adjacent traveled way, shall be removed and disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications. Removal operations of cold planed material shall be concurrent with planing operations and follow within 15 m of the planer, unless otherwise directed by the Engineer.

Cold plane asphalt concrete pavement will be measured by the square meter for the depth (maximum) designated in the Engineer's Estimate. The quantity to be paid for will be the actual area of surface cold planed for the depth (maximum) designated in the Engineer's Estimate, 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 for the depth (maximum) designated in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in 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.

TEMPORARY DECKING, INVERTED SIPHON

Temporary decking for concrete box #4 at Trancas Street Inverted Siphon (Br. No. 21-0101W) during construction work shall be constructed, monitored, maintained and removed as specified in these special provisions.

Attention is directed to "Maintaining Traffic" of these special provisions.

Temporary deck materials shall include steel girders, steel plates, pipe cover, bolts, nuts and anchors which will be removed after the initial stage of construction as shown on the plans.

Temporary deck materials shall conform to "Steel Structure" of these special provisions.

When temporary decking is no longer needed to cover the concrete box, all temporary decking and connections shall be removed from the concrete box as shown on the plans. All removed materials that are not to be salvaged or used in the reconstruction shall become the property of the Contractor and shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

PAYMENT

The contract lump sum price paid for temporary decking shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in temporary decking, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

REMOVE CONCRETE

Concrete pavement, sidewalk and driveway, curb and gutter, and island paving, where shown on the plans to be removed, shall be removed.

The pay quantities of concrete to be removed will be measured by the cubic meter, measured before and during removal operations.

Concrete removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Where no joint exists between concrete to be removed and concrete to remain in place, the concrete shall be cut on a neat line to a minimum depth of 50 mm with a power driven saw before the concrete is removed.

Where concrete has been removed outside the roadway prism, the backfilled areas shall be graded to drain and blend in with the surrounding terrain.

Concrete to be removed which has portions of the same structure both above and below ground will be considered as concrete above ground for compensation.

REMOVE SOUND WALL

Existing sound wall, where shown on the plans to be removed, shall be removed.

Remove sound wall will be paid for on a lump sum basis.

All sound wall debris 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.

10-1.31 CLEARING AND GRUBBING

Clearing and grubbing shall conform to the provisions in Section 16, "Clearing and Grubbing," of the Standard Specifications and these special provisions.

Vegetation shall be cleared and grubbed only within the excavation and embankment slope lines.

Existing vegetation outside the areas to be cleared and grubbed shall be protected from injury or damage resulting from the Contractor's operations.

Activities controlled by the Contractor, except cleanup or other required work, shall be confined within the graded areas of the roadway.

Nothing herein shall be construed as relieving the Contractor of the Contractor's responsibility for final cleanup of the highway as provided in Section 4-1.02, "Final Cleaning Up," of the Standard Specifications.

10-1.32 WATERING

Developing a water supply and applying watering shall conform to the provisions in Section 17, "Watering," of the Standard Specifications.

10-1.33 EARTHWORK

Earthwork shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications.

10-1.34 HAZARDOUS AND NONHAZARDOUS MATERIAL EXCAVATION

All hazardous material to be excavated as shown on the plans shall be transported to a disposal facility permitted to accept such material.

Attention is directed to "Hazardous and Nonhazardous Material, General" elsewhere in these special provisions.

Attention is directed to the plans that summarizes the location, dimensions, and type of contamination in the areas to be excavated. In addition, the Engineer or his representative will mark the location of soil to be excavated by the Contractor. The Contractor shall contact the Napa County Department of Environmental Management 5 days prior to the start of excavation of the nonhazardous material.

MEASUREMENT AND PAYMENT.--Full compensation for loading, transporting, and disposing of hazardous material, furnishing, installing and removing physical barriers, shall be considered as included in the contract price paid per cubic yard for roadway excavation (Type R) and no additional compensation will be allowed therefor.

10-1.35 HEALTH, SAFETY AND WORK PLAN (HAZARDOUS MATERIAL)

The Contractor shall prepare a detailed Health, Safety and Work Plan for hazardous material excavation for all site personnel in accordance with the DTSC and CAL-OSHA regulations. The Health, Safety and Work Plan shall include a plot plan indicating the exclusion zones, contaminant reduction (decontamination zones) and support zones in accordance with California Code of Regulations (CCR), Title 8, an air monitoring plan, site clean up procedures, and physical barrier; and shall be submitted at least 15 working days prior to beginning any hazardous material excavation work for review and acceptance by the Engineer. Prior to submittal, the Contractor shall have the Health, Safety and Work Plan (hazardous material) approved by a Civil Engineer, registered in the State of California and by a Certified Industrial Hygienist .

The contract lump sum price paid for Health and Safety Plan (hazardous material) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all work involved in preparing and implementing the project specific Health and Safety Plan as specified in these special provisions.

10-1.36 RESTRICTED MATERIAL EXCAVATION

All restricted material to be excavated as shown on the plans shall be transported to a disposal facility permitted to accept such material.

Attention is directed to "Restricted Material, General" elsewhere in these special provisions.

Restricted material shall be transferred directly from the excavation to a transport vehicle, a storage container, or a stockpile location approved by the Engineer. Stockpile locations shall be maintained in accordance with the following requirements:

The material shall be stored on undamaged 60-mil high density polyethylene or an equivalent impermeable barrier unless the stockpiling location is on a paved surface. If the location is on a paved surface the thickness of the barrier can be reduced to 20-mil high density polyethylene or its equivalent. The dimensions of the barrier shall exceed the dimensions of the stockpile at all times. Any seams in the barrier shall be sealed to prevent leakage.

At the end of each day the material shall be covered with undamaged 12-mil polyethylene or an equivalent impermeable barrier to prevent windblown dispersion and precipitation run-off and run-on. When more than one sheet is required to cover the material, the sheets shall be overlapped a minimum of 1.5 feet in a manner that prevents water from flowing onto the material. The cover shall be secured in a manner that keeps it in place at all times. Driven anchors shall not be used except at the perimeter of the stockpile. The cover shall be inspected and maintained in accordance with the requirements of "Water Pollution Control" of these special provisions.

These stockpiling requirements apply to all temporary storage of restricted material outside of an excavation or a transport container including, but not limited to, staging of excavated material next to the excavation prior to pick up by loading equipment, accumulating material for full transport loads, and awaiting test results required by a disposal facility. The removal of stockpiles shall begin within 30 days of accumulating 100 kg of nonhazardous material. After final removal has occurred the Contractor shall be responsible for any cleanup deemed necessary by the Engineer.

MEASUREMENT AND PAYMENT.--Full compensation for loading, transporting, and disposing of restricted material, furnishing, installing and removing physical barriers, shall be considered as included in the contract price paid per cubic meter for roadway excavation (Type R) and no additional compensation will be allowed therefor.

10-1.37 HEALTH & SAFETY PLAN (RESTRICTED MATERIAL)

The Contractor shall prepare a detailed Health & Safety Plan for all site personnel in accordance with the DTSC and CAL-OSHA regulations. The Health & Safety Plan shall include a plot plan indicating the exclusion zones, contaminant reduction (decontamination zones) and support zones in accordance with California Code of Regulations (CCR), Title 8, an air monitoring plan, site clean up procedures; and shall be submitted at least 15 working days prior to beginning any work for review and acceptance by the Engineer. Prior to submittal, the Contractor shall have the Health & Safety Plan approved by a Industrial Hygienist certified in comprehensive practice by the American Board of Industrial Hygiene.

SAFETY.--Prior to performing any work at the locations containing material classified as restricted, all personnel, including State Personnel, shall complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified. The training shall be provided by the Contractor. The Contractor shall provide a certification of completion of the Safety Training Program to all personnel. Any personal protective equipment required by

the Contractor's Health, Safety Plan for personnel working within the exclusion zone will be supplied to State personnel by the Contractor. The number of State personnel requiring the above mentioned safety training program and personal protective equipment will be 5.

The decontamination area shall be located outside of the exclusion zone. Water from decontamination procedures shall be collected and disposed of at an appropriate disposal site by the Contractor. Non-reusable protective equipment, once used by any personnel, including State personnel, shall be collected and disposed of at an appropriate disposal site by the Contractor.

The contract lump sum price paid for Health and Safety Plan shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all work involved in preparing and implementing the project specific Health and Safety Plan including paying the Certified Industrial Hygienist and for providing personal protective equipment, training and medical surveillance as specified in these special provisions.

Surplus excavated material not designated or determined to contain aerially deposited lead, not designated or determined to be hazardous, not designated or determined to be restricted and not designated to be disposed of as specified in "Mandatory Disposal Facility (Non-Hazardous Material)" elsewhere in these special provisions, shall become the property of the Contractor and shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Where a portion of the existing surfacing is to be removed, the outline of the area to be removed shall be cut on a neat line with a power-driven saw to a minimum depth of 50 mm before removing the surfacing. Full compensation for cutting the existing surfacing shall be considered as included in the contract price paid per cubic meter for roadway excavation and no additional compensation will be allowed therefor.

10-1.38 MATERIAL CONTAINING AERIALLY DEPOSITED LEAD

Earthwork involving materials containing aerially deposited lead shall conform to the provisions in "Earthwork" and this section "Material Containing Aerially Deposited Lead" of these special provisions.

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

Type Y material contains aerially deposited lead in average concentrations greater than or equal to 5.0 mg/L Soluble Lead and between 0 - 350 mg/kg (inclusive) Total Lead, as tested using the California Waste Extraction Test. Type Y material exists between 0.0 m and 4.0 m, measured horizontally from the edges of existing pavement, on line C from Station 119+00 to Station 146+00, and from a depth of 0.0 m to 0.61 m below existing grade, or as shown on the plans. These materials shall be placed at the mandatory disposal site(s) for aerially deposited lead as shown on the plans, unless otherwise directed by the Engineer, and covered with a minimum 0.61 m layer of non-hazardous soil or pavement. These materials are hazardous waste regulated by the State of California that may be reused as permitted under the Variance of the Department of Toxic Substances Control. Temporary surplus material may be generated on this project due to the requirements of stage construction. Temporary surplus material shall not be transported outside the project limits. In order to conform to the requirements of these provisions, it may be necessary to stockpile materials for subsequent stages or construct some embankments out of stage or handle temporary surplus material more than once.

LEAD COMPLIANCE PLAN

The Contractor shall prepare a project specific Lead Compliance Plan to prevent or minimize worker exposure to lead while handling material containing aerially deposited lead. Attention is directed to Title 8, California Code of Regulations, Section 1532.1, "Lead," for specific Cal-OSHA requirements when working with lead.

The Lead Compliance Plan shall contain the elements listed in Title 8, California Code of Regulations, Section 1532.1(e)(2)(B). Before submission to the Engineer, the Lead Compliance Plan shall be approved by an Industrial Hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene. The Plan shall be submitted to the Engineer for review and acceptance at least 15 days prior to beginning work in areas containing aerially deposited lead.

The Contractor shall not work in areas containing aerially deposited lead within the project limits, unless authorized in writing by the Engineer, until the Engineer has accepted the Lead Compliance Plan.

Prior to performing work in areas containing aerially deposited lead, personnel who have no prior training or are not current in their training status, including State personnel, shall complete a safety training program provided by the Contractor. The safety training program shall meet the requirements of Title 8, California Code of Regulations, Section 1532.1, "Lead."

Personal protective equipment, training, and washing facilities required by the Contractor's Lead Compliance Plan shall be supplied to State personnel by the Contractor. The number of State personnel will be 5.

The Engineer will notify the Contractor of acceptance or rejection of any submitted or revised Lead Compliance Plan not more than 10 days after submittal of the plan.

The contract lump sum price paid for Lead Compliance Plan shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in preparing the Lead Compliance Plan,

including paying the Certified Industrial Hygienist, and for providing personal protective equipment, training and medical surveillance, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

EXCAVATION AND TRANSPORTATION PLAN

Within 15 days after approval of the contract, the Contractor shall submit 3 copies of the Excavation and Transportation Plan to the Engineer. The Engineer will have 7 days to review the Excavation and Transportation Plan. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the Excavation and Transportation Plan within 7 days of receipt of the Engineer's comments. The Engineer will have 3 days to review the revisions. Upon the Engineer's approval of the Excavation and Transportation Plan, 3 additional copies of the Excavation and Transportation Plan incorporating the required changes shall be submitted to the Engineer. Minor changes or clarifications to the initial submittal may be made and attached as amendments to the Excavation and Transportation Plan. In order to allow construction to proceed, the Engineer may conditionally approve the Excavation and Transportation Plan while minor revisions or amendments to the Plan are being completed.

The Contractor shall prepare a written, project specific Excavation and Transportation Plan establishing the procedures the Contractor will use to comply with requirements for excavating, transporting, and placing (or disposing) of material containing aerially deposited lead. The Excavation and Transportation Plan shall conform to the regulations of the Department of Toxic Substance Control and the California Division of Occupational Safety and Health Administration (Cal-OSHA). The sampling and analysis plans shall meet the requirements for the design and development of the sampling plan, statistical analysis, and reporting of test results contained in USEPA, SW 846, "Test Methods for Evaluating Solid Waste," Volume II: Field Manual Physical/Chemical, Chapter Nine, Section 9.1. The plan shall contain, but not be limited to the following elements:

A. Excavation schedule (by location and date)
B. Temporary locations of stockpiled material
C. Sampling and analysis plans for areas after removal of a stockpile
    1. Location and number of samples
    2. Analytical laboratory
D. Sampling and analysis plan for soil cover
E. Dust control measures
F. Transportation equipment and routes
G. Method for preventing spills and tracking material onto public roads
H. Truck waiting and staging areas
I. Example of Bill of Lading to be carried by trucks transporting Type Y material. The Bill of Lading shall contain: US DOT description including shipping name, hazard class, and ID number; handling codes; quantity of material; volume of material. Copies of the bills of lading shall be provided to the Engineer upon placement of Type Y material in its final location. Trucks carrying Type Y material shall not leave the highway right of way.
J. Spill Contingency Plan for material containing aerially deposited lead

DUST CONTROL

Excavation, transportation, placement, and handling of materials containing aerially deposited lead shall result in no visible dust migration. The Contractor shall have a water truck or tank on the job site at all times while clearing and grubbing and performing earthwork operations in work areas containing aerially deposited lead.

Stockpiles of material containing aerially deposited lead shall not be placed where affected by surface run-on or run-off. Stockpiles shall be covered with plastic sheeting 0.33 mm minimum thickness or 0.3 m of non-hazardous material. Stockpiles shall not be placed in environmentally sensitive areas. Stockpiled material shall not enter storm drains, inlets, or waters of the State.

MATERIAL TRANSPORTATION

Prior to traveling on public roads, loose and extraneous material shall be removed from surfaces outside the cargo areas of the transporting vehicles and the cargo shall be covered with tarpaulins, or other cover, as outlined in the approved Excavation and Transportation Plan. The Contractor shall be responsible for costs due to spillage of material containing lead during transport. The Department will not consider the Contractor a generator of these hazardous materials, and the Contractor will not be obligated for further cleanup, removal, or remedial action for such materials handled or disposed of in conformance with the requirements specified in these special provisions and the appropriate State and Federal laws and regulations and county and municipal ordinances and regulations regarding hazardous waste.

DISPOSAL

Surplus materials whose lead content is not known shall be analyzed for aerially deposited lead by the Contractor prior to removing the materials from within the project limits.

For the purposes of this clause, "unknown" shall mean to be outside of those areas already analyzed and classified by the Engineer, as specified in these special provisions. Within those areas already analyzed and classified by the Engineer, once the Material with Aerially Deposited Lead has been removed from the project site, the remaining material shall be considered to not contain aerially deposited lead.

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.

Sampling, analyses, and reporting of results for surplus materials not previously sampled will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

Materials containing aerially deposited lead shall be disposed of within California. The disposal site shall be operating under a permit issued by the California Environmental Protection Agency (Cal-EPA) Boards.

The Engineer will obtain the Environmental Protection Agency (EPA) Generator Identification Number for hazardous material disposal. The Engineer will sign all hazardous waste manifests. The Contractor shall notify the Engineer five days before the manifests are to be signed.

Sampling, analyzing, transporting, and disposing of materials containing aerially deposited lead excavated outside the pay limits of excavation will be at the Contractor's expense.

MEASUREMENT AND PAYMENT

Quantities of roadway excavation (Type Y) (aerially deposited lead), of the type 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) and structure excavation (aerially deposited lead) involved, and no additional compensation will be allowed therefor.

No payment for stockpiling of material containing aerially deposited lead will be made, unless the stockpiling is ordered by the Engineer.

10-1.39 TEMPORARY ALTERNATIVE EARTH RETAINERS

Attention is directed to "Earthwork" and "Project and Local Dewatering" of these special provisions, the stage construction plans, and Section 7-1.11 "Preservation of Property" of the Standard Specifications.

Temporary alternative earth retainers (retaining structures) shall be constructed at the locations shown on the stage construction plans. The temporary alternative earth retaining structures shall be designed by the Contractor, and shall be designed to support active soil loadings, traffic loadings, and existing loading surcharges due to existing highway and non-highway improvements for the depths of staged construction excavation shown on the plans. The temporary alternative earth retaining structures shall protect all existing highway and non-highway facilities within 25 meters of staged roadway or structural excavation from damage due to settlement of the soil or lateral movement of the soil caused by the staged excavation.

The following types of temporary alternative earth retaining structures are approved for use on this contract as stage construction temporary alternative earth retainers:

1. Interlocking sheet piling.
2. Soldier pile wall.
3. Tie-back wall.

The above temporary alternative earth retaining structures shall be designed with water-tight sheeting to prevent groundwater from passing through the temporary alternative earth retaining structures.

The following type of temporary alternative earth retaining structure shall not be used on this contract as a stage construction temporary alternative earth retainer:

1. Soil Nail Wall.

At least 60 calendar days prior to beginning roadway or structural excavation for each stage of construction, the Contractor shall submit complete working drawings for each temporary alternative earth retaining structure to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. For initial review, 4 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted for final approval and use during construction.

Working drawings shall be 279 mm x 432 mm in size and each drawing and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Kilometer Post. The design firm's name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

The Contractor shall verify the existing ground elevations, as well as the existing water table, at the site before preparing the working drawings. The working drawings shall contain all information required for the proper construction of the temporary alternative earth retaining structures at each location, including existing ground line at face of wall as verified at the site and any required revisions or additions to drainage systems or other facilities. The working drawings shall be supplemented as necessary with calculations for the particular installation. The working drawings and calculations shall be stamped and signed by an engineer who is registered as a Civil Engineer in the State of California. The Contractor shall allow the Engineer 4 weeks to review the drawings after a complete set has been received.

One set of the corrected prints on 90-g/m^2 (minimum) bond paper, 279 mm x 432 mm in size, of all working drawings prepared by the Contractor for each temporary alternative earth retaining structure shall be furnished to the Engineer within 3 weeks after final working drawing approval.

MEASUREMENT

Temporary alternative earth retainers (retaining structures) will not be measured separately.

PAYMENT

Full compensation for the installation, maintenance, and removal of temporary alternative earth retainers (retaining structures) at the locations shown in the stage construction plans, including preparation and submittal of working drawings, shall be considered to be included in the contract unit price paid per cubic meter for roadway excavation, and no additional compensation will be allowed therefor.

10-1.40 TEMPORARY SHEET PILE WALL (GALVANI WINES)

Attention is directed to "Earthwork" and "Project and Local Dewatering" of these special provisions and the stage construction plans.

A temporary interlocking sheet pile wall shall be constructed from "A" Line Stations 139+33 to 139+75 as shown on the stage construction plans, to a depth of 10 meters below the original ground surface. The temporary sheet pile wall shall be designed by the Contractor, and shall be designed to prevent the flow of groundwater through the sheet pile wall.

It is not anticipated that the temporary sheet pile wall support active soil loadings and existing loading surcharges due to existing highway and non-highway improvements, nor is it anticipated that the temporary sheet pile wall protect against lateral movement of the soil, since it is anticipated that a large enough soil wedge will remain between the temporary sheet pile wall and Retaining Wall No. 1 to support the temporary sheet pile wall.

At least 60 calendar days prior to beginning roadway or structural excavation for stage two construction, the Contractor shall submit complete working drawings for the temporary sheet pile wall to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. For initial review, 4 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted for final approval and use during construction.

Working drawings shall be 279 mm x 432 mm in size and each drawing and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Kilometer Post. The design firm's name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

The Contractor shall verify the existing ground elevations at the site before preparing the working drawings. The working drawings shall contain all information required for the proper construction of the temporary sheet pile wall, including existing ground line at face of wall as verified at the site and any required revisions or additions to drainage systems or other facilities. The working drawings shall be supplemented as necessary with calculations for the particular installation. The working drawings and calculations shall be stamped and signed by an engineer who is registered as a Civil Engineer in the State of California. The Contractor shall allow the Engineer 4 weeks to review the drawings after a complete set has been received.

One set of the corrected prints on 90-g/m^2 (minimum) bond paper, 279 mm x 432 mm in size, of all working drawings prepared by the Contractor for the temporary sheet pile wall shall be furnished to the Engineer within 3 weeks after final working drawing approval.

MEASUREMENT

Temporary sheet pile wall (Galvani Wines) will not be measured separately.

PAYMENT

Full compensation for the installation, maintenance, and removal of the temporary sheet pile wall (Galvani Wines), from "A" Line Stations 139+33 to 139+75 to a depth of 10 meters below the original ground surface, including preparation and submittal of working drawings, shall be considered to be included in the contract unit price paid per cubic meter for roadway excavation, and no additional compensation will be allowed therefor.

Settlement at the abutment embankments of Trancas Street Overcrossing (Br. No. 21-0101), North Napa Underpass (Br. No. 21-0102), North Napa Pedestrian Overcrossing (Br. No. 21-0107) shall be monitored after the roadway construction begins. At least 2 weeks prior to ordering the abutment piles the contractor shall submit the settlement measurements to the Engineer .

At the locations and to the limits shown on the plans, material below the bottom of retaining wall footings at Retaining Wall No. 1 (Br. No. 21-RETW1) and Retaining Wall No. 3 (Br. No. 21-RETW3) shall be removed and replaced with Class 2 aggregate base material in conformance with the placing and compacting requirements for structure backfill. The relative compaction shall be not less than 95 percent. Removal of the material will be measured and paid for by the cubic meter as structure excavation (retaining wall) and furnishing, placing, and compacting the replacement material will be measured and paid for by the cubic meter as Class 2 aggregate base.

At the locations and to the limits shown on the plans, material below the bottom of inverted siphon concrete box footings at Trancas Street Inverted Siphon (Br. No. 21-101W) shall be removed and replaced with Class 2 aggregate base material in conformance with the placing and compacting requirements for structure backfill. The relative compaction shall be not less than 95 percent. Removal of the material will be measured and paid for by the cubic meter as structure excavation, inverted siphon. Furnishing, placing, and compacting the replacement material will be measured and paid for by the cubic meter as Class 2 aggregate base.

The geocomposite drain shall conform to the details shown on the plans and the following:

A. Attention is directed to "Engineering Fabrics" under "Materials" of these special provisions.
B. Geocomposite drain shall consist of a manufactured core not less than 6.35 mm thick nor more than 50 mm thick with one or both sides covered with a layer of filter fabric that will provide a drainage void. The drain shall produce a flow rate, through the drainage void, of at least 25 liters per minute per meter of width at a hydraulic gradient of 1.0 and a minimum externally applied pressure of 168 kPa.
C. A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished for the geocomposite drain certifying that the drain produces the required flow rate and complies with these special provisions. The Certificate of Compliance shall be accompanied by a flow capability graph for the geocomposite drain showing flow rates for externally applied pressures and hydraulic gradients. The flow capability graph shall be stamped with the verification of an independent testing laboratory.
D. Filter fabric for the geocomposite drain shall conform to the provisions for fabric for underdrains in Section 88, "Engineering Fabrics," of the Standard Specifications.
E. The manufactured core shall be either a preformed grid of embossed plastic, a mat of random shapes of plastic fibers, a drainage net consisting of a uniform pattern of polymeric strands forming 2 sets of continuous flow channels, or a system of plastic pillars and interconnections forming a semirigid mat.
F. The core material and filter fabric shall be capable of maintaining the drainage void for the entire height of geocomposite drain. Filter fabric shall be integrally bonded to the side of the core material with the drainage void. Core material manufactured from impermeable plastic sheeting having nonconnecting corrugations shall be placed with the corrugations approximately perpendicular to the drainage collection system.
G. The geocomposite drain shall be installed with the drainage void and the filter fabric facing the embankment. The fabric facing the embankment side shall overlap a minimum of 75 mm at all joints and wrap around the exterior edges a minimum of 75 mm beyond the exterior edge. If additional fabric is needed to provide overlap at joints and wrap-around at edges, the added fabric shall overlap the fabric on the geocomposite drain at least 150 mm and be attached thereto.
H. Should the fabric on the geocomposite drain be torn or punctured, the damaged section shall be replaced completely or repaired by placing a piece of fabric that is large enough to cover the damaged area and provide a minimum 150-mm overlap.

I. Plastic pipe shall conform to the provisions for edge drain pipe and edge drain outlets in Section 68-3, "Edge Drains," of the Standard Specifications.

J. Treated permeable base to be placed around the slotted plastic pipe at the bottom of the geocomposite drain shall be cement treated permeable base conforming to the provisions for cement treated permeable base in Section 29, "Treated Permeable Bases," of the Standard Specifications and these special provisions.

K. The treated permeable base shall be enclosed with a high density polyethylene sheet or PVC geomembrane, not less than 250 µm thick, which is bonded with a suitable adhesive to the concrete and geocomposite drain. Surfaces to receive the polyethylene sheet shall be cleaned before applying the adhesive. The treated permeable base shall be compacted with a vibrating shoe type compactor.

If geocomposite drain involved at Trancas Street Overcrossing (Br. No. 21-0101) is not otherwise designated by type, and payment for the geocomposite drain has not otherwise been provided for in the Standard Specifications or these special provisions, the geocomposite drain will be paid for at the contract price per cubic meter for concrete, approach slab (Type N).

If geocomposite drain involved at North Napa Underpass (Br. No. 21-0102) is not otherwise designated by type, and payment for the geocomposite drain has not otherwise been provided for in the Standard Specifications or these special provisions, the geocomposite drain will be paid for at the contract price per cubic meter for concrete, approach slab (Type railroad).

Full compensation for the geocomposite drain at North Napa Pedestrian Overcrossing (Br. No. 21-0107) shall be considered as included in the contract price paid per cubic meter for structural backfill (bridge) and no additional compensation will be allowed therefor.

Full compensation for the geocomposite drain at Retaining Wall No. 1 (Br. No. 21-RETW1), Retaining Wall No. 2 (Br. No. 21-RETW2) and Retaining Wall No. 3 (Br. No. 21-RETW3) shall be considered as included in the contract price paid per cubic meter for structural backfill (retaining wall) and no additional compensation will be allowed therefor.

If structure excavation or structure backfill involved in bridges is not otherwise designated by type, and payment for the structure excavation or structure backfill has not otherwise been provided for in the Standard Specifications or these special provisions, the structure excavation or structure backfill will be paid for at the contract price per cubic meter for structure excavation (bridge) or structure backfill (bridge).

Structure excavation designated as (Type D), for footings at the locations shown on the plans, will be measured and paid for by the cubic meter as structure excavation (Type D) and structure excavation, retaining wall (Type D). Ground water or surface water is expected to be encountered at these locations, but seal course concrete is not shown or specified. Structure excavation for footings at locations not designated on the plans as structure excavation (Type D), and where ground or surface water is encountered, except locations where seal course concrete is shown or specified, will be measured and paid for by the cubic meter as structure excavation (bridge) and structure excavation, inverted siphon.

10-1.41 PROJECT AND LOCAL DEWATERING

Attention is directed to "Order of Work", "Hazardous and Non-hazardous Material, General", "Hazardous and Non-hazardous Material, Excavation", "Earthwork", "Survey of Existing Non-Highway Facilities", "Water Pollution Control", and "Non-Storm Water Discharges" of these special provisions, to the Caltrans "Geotechnical Design Report, Route 29 Interchange Improvements at Trancas Street and Redwood Road, Napa County, California" dated November 20, 2000, to the "Site Investigation Report for Route 29/Trancas Street Interchange, Napa County, Napa, California", dated July 7, 1998, and to the "Final Feasibility Study, Route 29/ Trancas Street Interchange, Napa California" dated March 26, 1999.

Copies of the Caltrans "Geotechnical Design Report, Route 29 Interchange Improvements at Trancas Street and Redwood Road, Napa County, California" dated November 20, 2000, the "Site Investigation Report for Route 29/Trancas Street Interchange, Napa County, Napa, California", dated July 7, 1998, and the "Final Feasibility Study, Route 29/ Trancas Street Interchange, Napa California" dated March 26, 1999 are available for inspection at the office of the District Director of Transportation at District 04 Duty Senior Office, 111 Grand Avenue, Oakland, California 94612, telephone number (510) 286-5209, fax (510) 622-1805, e-mail address Duty_Senior_District04@dot.ca.gov.

Project dewatering work shall consist of installing, maintaining, and removing from the site when no longer required a temporary dewatering systems designed to allow all roadway excavation on this project to be performed with minimal interference by the groundwater. The temporary dewatering system shall consist of wellpoints, trench drains, or other drainage facilities, at the option of the Contractor. Project dewatering work shall also consist of installing, maintaining, and removing from the site when no longer required temporary monitoring wells as shown on the plans and as specified in these special provisions.

Local dewatering shall consist of dewatering for structure excavation, for cofferdam dewatering, and for stockpile dewatering. Project dewatering shall be coordinated with the requirements for local dewatering. With the exception of the Trancas Street OC Pumping Plant, methods and equipment used for project dewatering may be used for local dewatering.

Dewatering may be conducted concurrently from the permanent underdrains, once placed per the contract plans, and groundwater captured in these underdrains may be conducted into the storage box of the pump house and removed from the

pumphouse using the Contractor's equipment. Any damage to the pumphouse or permanent facilities within the pumphouse will be replaced at the Contractor's expense.

The Contractor shall be responsible for designing and constructing all temporary project and local dewatering system(s) which shall conform to Section 19-3.04 of the Standard Specifications, these special provisions, and as directed by the Engineer.

Prior to beginning any project or local dewatering, existing structures shall be monitored for vertical settlement in accordance with "Survey of Existing Non-Highway Facilities" of these special provisions,

Project dewatering for Stage 1 construction shall be performed only after "Hazardous and Non-hazardous Material, Excavation" for locations #1 and #2 has been completed and backfilled.

Project dewatering for Stage 2 construction shall be performed only after "Hazardous and Non-hazardous Material, Excavation" for location #3 has been completed and backfilled.

Prior to beginning roadway excavation for each contract stage, both the project dewatering system and groundwater elevation monitoring wells shall be installed for that contract stage. The project dewatering system shall lower the groundwater level as specified in these special provisions for each stage to be excavated, and roadway excavation or the structure excavation included in that contract stage may begin before the staged dewatering has successfully lowered the groundwater level to the elevations specified in these special provisions, at the option of the Contractor.

Local dewatering for the structure excavations for the Trancas Street OC Pumping Plant and the Trancas Street Inverted Siphon, if commenced prior to beginning the roadway excavation of a later contract stage, shall place all temporary monitoring wells as shown on the table below, if within 75 m of the structure excavation, prior to beginning that structure excavation. Local dewatering shall cease as soon as practical once the temporary dewatering needs are met by the project dewatering system or once the structure excavation and backfilling work is completed. .

Groundwater discharged may contain petroleum hydrocarbons exceeding regulatory threshold levels and shall be handled in accordance with "Non-Storm Water Discharges" of these special provisions.

LOCAL DEWATERING (COFFERDAM)

The Contractor shall prevent the flow of water, including ground water and surface runoff, from entering any cofferdam.

If granular activated charcoal treatment of the groundwater is required for removal of petroleum hydrocarbons per "Non-Storm Water Discharges" of these special provisions, suspended solids shall be removed prior to passing the water through the granular activated charcoal treatment system. Should the Engineer approve in advance in writing the discharge of cofferdam dewatering without first treating the water for petroleum hydrocarbon removal, then suspended solids shall be removed prior to discharging the groundwater into Drainage System No 11 and Napa Creek.

Suspended solids shall be removed to the extent that visible floating products are not apparent within the discharge. Also, the discharge shall be of a purity such that turbidity and apparent color beyond present natural background levels are not apparent within the receiving water body. The turbidity, measured in Nephelometric Turbidity Units (NTU), of the discharge shall not be greater than a 10 percent increase of the background turbidity of the receiving water body.

Groundwater discharged from cofferdam dewatering shall be handled in accordance with "Non-Storm Water Discharges" of these special provisions.

LOCAL DEWATERING (STOCKPILES)

The Contractor shall prevent the flow of water, including ground water and surface runoff, from entering any temporary stockpiles on land.

If granular activated charcoal treatment of the stockpile dewatering is required for removal of petroleum hydrocarbons per "Non-Storm Water Discharges" of these special provisions, suspended solids shall be removed prior to passing the water through the granular activated charcoal treatment system. Should the Engineer approve in advance in writing the discharge of stockpile dewatering without first treating the water for petroleum hydrocarbon removal, then suspended solids shall be removed prior to discharging the water into Drainage System No 11 and Napa Creek.

Suspended solids shall be removed to the extent that visible floating products are not apparent within the discharge. Also, the discharge shall be of a purity such that turbidity and apparent color beyond present natural background levels are not apparent within the receiving water body. The turbidity, measured in Nephelometric Turbidity Units (NTU), of the discharge shall not be greater than a 10 percent increase of the background turbidity of the receiving body water.

Water discharged from stockpile dewatering shall be handled in accordance with "Non-Storm Water Discharges" of these special provisions.

LOCAL DEWATERING (STRUCTURE EXCAVATION)

The Contractor shall prevent the flow of surface runoff from entering any structural excavations.

If granular activated charcoal treatment of the stockpile dewatering is required for removal of petroleum hydrocarbons per "Non-Storm Water Discharges" of these special provisions, suspended solids shall be removed prior to passing the water through the granular activated charcoal treatment system. Should the Engineer approve in advance in writing the discharge

of structural excavation dewatering without first treating the water for petroleum hydrocarbon removal, then suspended solids shall be removed prior to discharging the water into Drainage System No 11 and Napa Creek.

Suspended solids shall be removed to the extent that visible floating products are not apparent within the discharge. Also, the discharge shall be of a purity such that turbidity and apparent color beyond present natural background levels are not apparent within the receiving water body. The turbidity, measured in Nephelometric Turbidity Units (NTU), of the discharge shall not be greater than a 10 percent increase of the background turbidity of the receiving water body.

Water discharged from structural excavation dewatering shall be handled in accordance with "Non-Storm Water Discharges" of these special provisions.

Attention is directed to "Order of Work", "Water Pollution Control", and "Non-Storm Water Discharges" of these special provisions, to the drainage plans, and to Drainage System 11 from the planned connection to an existing manhole near Napa Creek to Drainage Unit 11 (h). For Drainage System 11 from the planned connection to an existing manhole near Napa Creek to Drainage Unit 11 (h), groundwater shall be handled in accordance with "Water Pollution Control" only, and not "Non-Storm Water Discharges" of these special provisions.

LOCAL DEWATERING (SUB-ROADWAY PRISM STRUCTURE EXCAVATION)

The Contractor shall provide a sealed excavation for the Trancas Street OC Pumping Plant only. The Contractor shall prevent the flow of ground water and surface runoff from entering any excavation including, but not limited to, footing excavations, and excavations for retaining walls, non-functioning storm drainage systems, and their appurtenances. Well points and continuous pumping of excavations for dewatering purposes are not allowed. The Contractor may dewater an initial volume of water equivalent to the structure excavation pay limits for a particular excavation. The maximum seepage rate of the sealed excavation, after initial dewatering is complete, shall not exceed twenty-two liters per square meter of the excavation area per eight-hour period. The excavation area shall be measured at the top of the excavation as seen in plan view. A meter that has been approved by the Engineer shall be used to measure all excavation discharges.

The Contractor shall submit to the Engineer, as provided in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications and "Submittals" below, a plan which details the methods and measures that will be used to seal the sides and bottom of excavations, prevent the flow of water into excavations, control seepage within the specified maximum seepage rate, and remove known ground water contaminants. The plan shall, at a minimum, contain a graphic for the dewatering operation showing both a sectional and plan view that details the removal techniques for suspended solids and known ground water contaminants. The graphic shall define the flow path and placement of pipes, hoses, pumps, and other equipment used to convey the discharge. In addition, the Contractor shall provide a drawing that depicts the general position of the dewatering measures relative to the excavations undergoing dewatering and the point of effluent discharge. The written descriptions of the dewatering operation shall include, but are not limited to, an estimate of the discharge volume, flow rate, and frequency; location of discharge; performance capabilities of treatment measures; and the inspection and monitoring procedures related to the discharge.

If the initial dewatering volume exceeds the volume of the structure excavation pay limits or the seepage rate exceeds the specified maximum rate, then the Contractor shall immediately stop all work within the excavation not related to the control of water and submit a plan of corrective measures. The Contractor may not resume operations in that excavation until the plan is approved by the Engineer.

Suspended solids shall be removed to the extent that visible, floating products are not apparent within the discharge. Also, the discharge shall be of a purity such that turbidity and color beyond present natural background levels are not apparent within the receiving water body. The turbidity, measured in Nephelometric Turbidity Units (NTU), of the discharge shall not be greater than a 10 percent increase of the background turbidity of the receiving water body.

Water discharged from sub-roadway prism structure excavation dewatering shall be handled in accordance with "Non-Storm Water Discharges" of these special provisions.

SUBMITTALS

Within 20 calendar days after Approval of the Contract, the Contractor shall submit to the Engineer 3 copies of a temporary dewatering plan which details the methods and measures that will be used for project and local dewatering, collecting, and discharging the groundwater, in accordance with Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications and these special provisions. The temporary dewatering plan need only address the next upcoming stage of construction to be excavated, but shall be coordinated with "Groundwater Handling Plan" required under "Non-storm Water Discharges" of these special provisions and the "Storm Water Pollution Prevention Plan" (SWPPP) required under "Water Pollution Control" of these special provisions. Upon receipt of the temporary dewatering plan from the Contractor, the Engineer shall have 15 calendar days to review and approve the plan. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the groundwater handling plan within 15 calendar days of receipt of the Engineer's comments. The Engineer will have 7 calendar days to review the revisions. Upon the Engineer's approval of the groundwater handling plan, 3 additional copies of the groundwater handling plan, incorporating the required changes, shall be submitted to the Engineer. No excavation for each stage of construction shall begin until the Contractor has received

written approval of the final groundwater handling plan for that stage from the Engineer. Written approval will be either by certified U.S. Mail or by confirmed facsimile transmission, at the option of the Engineer.

MONITORING AND CONTROL OF PROJECT AND LOCAL DEWATERING

Project dewatering shall lower groundwater elevations in the vicinity of all underdrains for each stage to be excavated to 0.5 to 1.5 meters below the invert of the underdrain pipe. At the locations shown on the plans, where the permeable material (Class 3) layer for underdrains exceeds 1.3 meters in thickness, project dewatering shall continue to lower groundwater elevations to 0.5 to 1.5 meters below the invert of the underdrain pipe, and not to the bottom of the underdrain trench.

Local dewatering for structure excavation (Type D) may lower groundwater in the immediate vicinity of the work up to 2 m below the lowest elevation needed for construction.

If the draw down measurements for project or local dewatering exceed the allowable draw down range, wells or other dewatering systems shall be throttled back or well pump raised, or other action in order to allow re-establishment of the water table within the allowable range.

Temporary monitoring wells shall be installed to keep the Engineer informed as to the general groundwater elevations within the staged construction excavations. The temporary monitoring wells shall consist of 150 mm drilled hole, slotted PVC pipe 38 mm in diameter, using medium aquarium sand. The slotted PVC pipe shall be placed in the drilled hole (at the center) from the bottom of the hole to the top. The bottom of the slotted PVC pipe shall be capped and sealed and shall be placed at 150 mm above the bottom of the hole. Casing shall be provided to prevent the hole from caving; this casing shall be removed once the monitoring well is complete and in place. Medium aquarium sand shall be used to fill the hole from bottom of the hole to the top and around the slotted pipe. The locations of the temporary monitoring wells are provided in Table A below.

TABLE A

TEMPORARY MONITORING WELLS

Stage of Construction	Monitoring Well Designation	Monitoring Well Station	Offset (m)	Reference Line	Depth of Well (m)
	MW - 1	134+50	1 Lt	"N"	5
	MW - 2	135+50	1 Lt	"N"	5
	MW - 3	136+50	1 Lt	"N"	5.5
1	MW - 4	137+00	2 R	"A"	8
	MW - 5	137+50	10.2 Lt	"M"	9
	MW - 6	138+00	10.2 R	"O"	9
	MW - 7	138+80	10.2 Lt	"M"	12
	MW - 8	139+40	10.2 Rt	"O"	13
	MW - 9	139+80	10.2 Lt	"M"	15
	MW - 10	140+20	10.2 Rt	"O"	15
2	MW - 11	140+50	10.2 Lt	"M"	15
	MW - 12	141+00	10.2 Lt	"M"	14
	MW - 13	141+00	10.2 Rt	"O"	12
	MW - 14	142+00	10.2 Rt	"O"	13
	MW - 15	142+50	10.2 Lt	"M"	14
3	MW - 16	143+00	10.2 Rt	"O"	8
	MW - 17	143+50	1 Lt	"N"	6
	MW - 18	144+50	1 Lt	"N"	5

During initial dewatering, groundwater elevations in the monitoring wells shall be read and supplied to the Engineer daily, with water level reading recorded in a Microsoft Excel97 or later spreadsheet format. After the water level reading have stabilized at an appropriate elevation, as determined by the Engineer, the time interval between readings may be increased to weekly.

To limit the settlement due to loss of fines during temporary dewatering, the ratio of fines in the discharge from each dewatering well location shall be limited to 5 parts per million (ppm).

Should the Contractor install additional monitoring wells for the temporary dewatering within the project limits, the groundwater drawdown elevations in those wells shall not exceed from those drawdown contours shown on Exhibit F in Appendix C of the Geotechnical Design Report.

MEASUREMENT

Project and local dewatering will not be measured separately.

Temporary monitoring wells shown on the plans, specified in these special provisions, or directed by the Engineer will be measured by the meter in accordance with Section 68-1.04 of the Standard Specifications. Temporary monitoring wells not shown on the plans, not specified in these special provisions, or not directed by the Engineer will not be measured nor paid for.

PAYMENT

Full compensation for project dewatering, except for removing petroleum contamination, shall be considered to be included in the contract unit price paid per cubic meter for roadway excavation, and no additional compensation will be allowed therefor.

Full compensation for local dewatering, except for removing petroleum contamination, shall be considered to be included in the contract unit price paid per cubic meter for the type of excavation involved, and no additional compensation will be allowed therefor.

Payment for removal of petroleum contamination shall be made in accordance with "Non-Storm Water Discharges" of these special provisions.

The contract price paid per meter for temporary monitoring wells shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing and removing and disposing of when no longer required temporary monitoring wells, complete in place, including excavation, casing, slotted plastic pipe, caps, and sand, and covers, as shown on the plans and specified in these special provisions.

10-1.42 NON-STORM WATER DISCHARGES

Attention is directed to "Project and Local Dewatering", "Water Pollution Control", "Restricted Material, Excavation", and "Earthwork" of these special provisions, to the Caltrans "Geotechnical Design Report, Route 29 Interchange Improvements at Trancas Street and Redwood Road, Napa County, California" dated November 20, 2000, to the "Site Investigation Report for Route 29/Trancas Street Interchange, Napa County, Napa, California", dated July 7, 1998, and to the "Final Feasibility Study, Route 29/ Trancas Street Interchange, Napa California" dated March 26, 1999.

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Non-storm water discharges shall conform to the requirements in Section 7-1.01G, "Water Pollution" of the Standard Specifications and these special provisions. These discharges include any discharge of liquid(s) not directly caused by rainfall or rainfall runoff, including construction operations requiring dewatering, and other operations that may result in discharges of liquid residues or liquified debris.

This special provision provides performance guidelines for the control measures that the Contractor chooses to implement for controlling liquid and liquified debris discharges from construction activities.

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.

PERMIT REQUIREMENTS

Non-storm water discharges from the construction operations, addressed within this special provision, shall be handled in accordance with the requirements of the General Construction Activity Storm Water Permit No. CAS000002, Order No. 99-08-DWQ, and the Caltrans Statewide Storm Water Permit No. CAS000003, Order No. 99-06-DWQ, issued by the State Water Resources Control Board. These Permits, hereafter referred to as the "Permit," regulate the storm water and the non-storm water discharges associated with construction activities.

In addition to compliance with the above Permit, compliance with Waste Discharge Requirements (WDRs), Order No. 96-078, NPDES Permit No. CAG912002, titled "General Waste Discharge Requirements for Discharge of Extracted and Treated Groundwater Resulting From the Cleanup of Groundwater Polluted by Fuel Leaks and Other related Wastes at Service Stations and Similar Sites", adopted by the San Francisco Bay Regional Water Quality Control Board (hereafter referred to as the Regional Board) for this project, is also required.

Copies of the permits, the WDRs and the Self Monitoring Program will be available at the Department of Transportation, 111 Grand Avenue, Oakland, California. Please call the Construction Duty Senior, telephone number (510) 286-5209 to reserve a copy of the documents at least 24 hours in advance.

MATERIALS

Materials shall conform to the provisions in Section 6, "Control of Materials," Section 7-1.16, "Contractor's Responsibility for the Work and Materials," and Section 74-2, "Drainage Pump Equipment," of the Standard Specifications and these special provisions.

Nothing in this section, "Non-Storm Water Discharges," will be construed as relieving the Contractor of full responsibility of complying with Section 7-1.16 "Contractor's Responsibility for the Work and Materials," of the Standard Specifications.

EFFLUENT TREATMENT SYSTEM

An effluent treatment system shall be provided to treat all water and groundwater which is discharged from excavations or dewatering operations. The effluent treatment system shall be as shown on the plans and as specified in these special provisions. Effluent shall be considered as the water and any other material discharged from the pumping operations.

The Contractor shall use the effluent treatment system to treat all groundwater prior to discharging into the specified primary disposal system, Drainage System No. 11 leading to Napa Creek.

The groundwater extraction, treatment and discharge system shall be kept completely separate from the storm water collection system until ultimate discharge after treatment.

Effluent discharges from the treatment system shall be made into the new 1050 mm alternative pipe culvert, Drainage System No. 11, installed under this contract. Alternative methods of discharge, such as land discharge spraying to surface grade within the Caltrans right-of-way, or transport and disposal at a facility approved by the Regional Board, shall be used only if discharge into Drainage System No. 11 is not possible, and only with advance written approval by the Engineer.

Maximum total discharge from the effluent treatment system shall not exceed 1780 liters per minute (470 gallons per minute).

Water that does not comply with the requirements of the Permit and the Waste Discharge Requirements (WDRs) shall not be discharged on the site or into Drainage System No 11, the new 1050 mm alternative pipe culvert installed under this contract leading to the Napa Creek outfall. The Contractor shall either treat such water to meet the requirements for discharge or haul such water off site to an appropriately licensed liquid disposal facility.

Holding tanks shall be transportable, totally enclosed, with a minimum holding capacity of 79480 L (21000 gallon) per individual tank and capable of connecting multiple tanks in series. Holding tanks shall have an inlet and outlet capable of receiving and discharging minimum flows, at a rate of 1780 liters per minute (470 gallons per minute). Holding tanks shall be able to accommodate temporary installation of submersible pumps of such capability to discharge water at a rate of 1780 liters per minute (470 gallons per minute). A minimum of 4 tanks shall be provided for use on this project. All tanks shall be of the same make and manufacturer and shall remain on the jobsite until dewatering operations are no longer necessary as determined by the Engineer.

A granulated activated carbon (GAC) system shall be used to treat groundwater contaminated with petroleum hydrocarbons, especially petroleum hydrocarbons of the gasoline and MTBE ranges. The GAC treatment system shall consist of at least two vessels having an inlet and outlet capable of receiving and discharging water at a flow rate of 1780 liters per minute (470 gallons per minute). The GAC treatment system shall be capable of treating total petroleum hydrocarbons at an inflow concentration of 200 µg/L, such that the outflow concentration is less than or equal to an allowable concentration of 50 µg/L. GAC treatment vessels shall be readily capable of removal and replacement or interchange when required. The GAC treatment system shall have appropriate fittings for pipe connections designed to accommodate the flow rate. The Contractor shall throughout the operation have one additional GAC vessel available for transport and use at the site within one hour after being directed by the Engineer.

Sampling ports shall be spigots attached to the piping system and capable of obtaining a representative sample of water at each location of the GAC treatment system, as shown on the plans. The GAC treatment system shall be capable of sustaining temporary fluctuations in water pressure due to monitoring activities.

Pumps shall be capable of being submerged in water and discharging water. Two submersible pumps will be required for this project and shall be capable, at all times, of discharging at a flow rate of 1780 liters per minute (470 gallons per minute). In addition, a third submersible pump shall be provided by the Contractor that is capable of discharging treated effluent from the temporary holding container to the dedicated discharge location.

Plastic piping may be approved for use as determined by the Engineer in writing. If plastic piping is used, it shall conform to the provisions in section 20-5.03E, "Pipe" of the Standard Specifications. The Contractor shall be responsible for providing all piping required to circulate the effluent through the treatment system and all piping required to convey the treated effluent from the temporary holding container to the point of release at the specified primary disposal system, Drainage System No. 11 leading to Napa Creek.

A temporary holding container for visual inspection and turbidity measurements, with a minimum holding capacity of 1514 L (400 gallons), shall be provided just downstream of the filter apparatus. The holding container shall have an inlet and outlet capable of receiving and discharging minimum flows of 1780 liters per minute (470 gallons per minute). The holding container shall be open to the air and sealed on all sides and the bottom to prevent any leakage.

SUBMITTALS

At least 60 calendar days prior to the start of any project or local dewatering, the Contractor shall submit to the Engineer 3 copies of a groundwater handling plan that details methods and measures that will be used for treating and disposing of the contaminated groundwater, in accordance with Section 5-1.02 of the "Plans and Working Drawings" of the Standard Specifications and these Special Provisions. The groundwater handling plan shall be coordinated with temporary dewatering plan(s) required under "Project and Local Dewatering" of these special provisions and the "Storm Water Pollution Prevention Plan" (SWPPP) required under "Water Pollution Control" of these special provisions. Upon receipt of the plan from the Contractor, the Engineer shall have 15 calendar days to review and approve the plan. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the groundwater handling plan within 15 calendar days of receipt of the Engineer's comments. The Engineer will have 7 calendar days to review the revisions. This submission and revision cycle shall continue until the groundwater handling plan meets all the requirements of the Permit and Waste Discharge Requirements (WDRs), as determined by the Engineer. Upon the Engineer's approval of the groundwater handling plan, 3 additional copies of the groundwater handling plan, incorporating the required changes, shall be submitted to the Engineer. No project or local dewatering will be permitted until the Contractor has received written approval of the final groundwater handling plan from the Engineer. Written approval can be either by certified US Mail or by confirmed fax transmission, at the option of the Engineer.

The Contractor shall graphically depict all aspects of the groundwater handling plan as part of the submittal. The graphic shall show both a sectional and plan view of the removal techniques for suspended solids and petroleum hydrocarbons. The graphic shall define the flow path and placement of pipes, hoses, pumps and other equipment used to convey the discharge. The graphic shall depict the general position of such equipment relative to the excavation(s) being dewatered and the point of effluent discharge.

Both the groundwater handling plan and its associated graphic(s) shall be included with the SWPPP document as an attachment.

The groundwater handling plan shall include a spill contingency plan for the management of spills or leaks of any materials or wastes that may impact the water quality of Napa Creek. The contingency plan shall include instructions and procedures for reporting spills, a brief description of how the Contractor intends on responding to any on-site spill caused by the Contractor or one of his subcontractors, a list of spill containment, collection materials and equipment to be maintained onsite, and a brief list of the Contractor's personnel, with 24 hours per day/ 7 days per week recall numbers, who are designated to respond to a spill incident. The Contractor shall have at least one supervisor at the Project Manager or Superintendent level and two laborers, able to respond to a spill on the project site within 2 hours of telephone notification, on a 24 hour per day / 7 day per week basis.

An initial start-up report, and associated Operation and Maintenance Manual, as defined in the Waste Discharge Requirements (WDRs), Order No. 96-078, NPDES Permit No. CAG912002, shall be submitted to the Engineer no later than 45 days after system startup certifying the adequacy of each component of the groundwater treatment facility. The initial start-up report shall be reviewed and approved by a Civil Engineer licensed in the State of California, who shall affix his/her signature and engineering license number to the report.

Regular Self Monitoring Reports, as defined in the Waste Discharge Requirements (WDRs), Order No. 96-078, NPDES Permit No. CAG912002, shall subsequently be submitted to the Engineer every three months in accordance with "Monitoring" below.

Regular granulated activated carbon (GAC) system filter TPH-g cumulative load-up monitoring reports shall be submitted to the Engineer on a monthly basis, for the purpose of monitoring and forecasting the need for GAC filter change outs.

In the event that the Contractor proposes to have the excavation dewatering effluent transported and discharged at a recycling facility, then the Contractor shall submit to the Engineer a plan 14 calendar days in advance of the effluent transport date which details the methods and measures used to dewater the excavations and convey the effluent into transportable tanks or other vessels, as provided in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The Engineer will review and either approve or disapprove the effluent transport to a recycling facility within 7 calendar days. No effluent transportation to a recycling facility shall occur until the Engineer has approved such transportation in writing.

A copy of the dewatering effluent transportation plan shall be included as an attachment to the SWPPP, as specified in "Water Pollution Control" of these special provisions.

MONITORING

Monitoring shall comply with all applicable requirements of the "Self Monitoring Program for Discharges of Extracted and Treated Groundwater Polluted by Fuel Leaks and Other Related Wastes at Service Stations and Similar Sites", which is outlined in the Waste Discharge Requirements, Order No. 96-078, NPDES Permit No. CAG912002.

Once groundwater dewatering and discharge activities have begun, if any component of the apparatus is found to be damaged or adversely affecting the proper performance of the apparatus, the discharge activity shall immediately cease, and such damaged component(s) shall be immediately repaired or replaced. Observations or inspections that revealed the

damaged or defective condition of the dewatering and/or treatment equipment shall be reported to the Engineer within one hour during normal working hours and within four hours at any other time.

Monitoring shall occur daily for the first 7 days of operating GAC treatment system, and then be reduced to a frequency of once every 7 days thereafter. Upon relocation, replacement, interchange, or maintenance of the GAC filters the Contractor shall conduct daily monitoring for the first 7 days of resuming treatment operation, and then reduce the monitoring frequency to once every 7 days thereafter. The Contractor shall collect water samples from each sampling port of the GAC treatment system as depicted in the plans. A total of three samples shall be obtained from each sampling port during each monitoring event The first of the three samples shall be analyzed for total suspended solids (TSS) in accordance with EPA method 160.1. The detection limit for the TSS analysis shall be at a maximum of 1 mg/L. The second sample shall be analyzed for total metals in accordance with EPA method 6010. The detection limit for total metals shall be at a maximum of 100 µg/L. The third sample shall be analyzed for total petroleum hydrocarbons in accordance with EPA method 8015. The detection limit for total petroleum hydrocarbons shall be at a maximum of 50 µg/L. Analytical results for all samples shall be available to the Engineer within 24 hours of delivering the samples to the laboratory. The Contractor shall ensure that the laboratory responsible for the analysis of the samples has been properly certified by the California Department of Health Services for conducting the analyses described under these special provisions.

The Contractor shall conduct weekly monitoring of Napa Creek at the outlet of the existing 1050 mm pipe culvert just downstream of Drainage System No. 11 where effluent from this contract ultimately discharges into Napa Creek. The Contractor shall visually monitor and record both the discharge and the receiving water body, at both the point of discharge and at locations approximately 50 feet upstream and downstream of the discharge point. During monitoring events, the Contractor shall obtain NTU measurements for the discharge turbidity and the receiving water (background) turbidity. The Contractor shall conduct monitoring, at a minimum, one hour prior to discharge, during the first ten minutes of initiating discharge, every four hours during discharge, and upon cessation of discharge. The observations and turbidity measurements shall be recorded daily in a tabular format known as the monitoring report provided within the Conceptual Storm Water Pollution Prevention Plan, as described within "Water Pollution Control" of these special provisions.

The Contractor shall supplement the weekly monitoring of Napa Creek outfall and the groundwater discharge Self Monitoring Program and Reports with photographs. A total of 24 photographs will be taken per week for the above inspections and monitoring, with the number of photographs divided equally among locations. Photographs shall be taken of a content and detail that show both the overall layout or condition, as well as individual components or functions in more detail. All photographs shall include, embedded in the photograph itself, a descriptive title, the date and time taken. The photographs shall be taken in a high-quality 35mm or advanced Advantix photographic format, at the option of the Contractor, and will utilize a commercial photographic development process which provides two 100mm X 150mm (4" X 6") prints and one digitized jpeg image for each photograph taken. Once the photographic format has been chosen, it shall not be changed without advance written approval from the Engineer. Written approval can be either by certified U.S. Mail or by confirmed fax transmittal at the option of the Engineer. One print of each photograph and one or more 3.5" floppy disc containing digitized jpeg images of each photograph, and the original 35mm or advanced photographic format film shall be submitted to the Engineer on a weekly basis, within five working days of the date the photographs were taken. The Contractor shall retain one copy of all photographs for his own field records.

Self Monitoring Reports required by the outlined in the Waste Discharge Requirements, Order No. 96-078, NPDES Permit No. CAG912002 shall be submitted to the Engineer every three months, no later than 15 days following the last day of the each quarter. The reports shall summarize the monitoring data as required by this permit, including information such as source of the sample (influent, effluent, receiving water or groundwater), the constituents, method of analysis used, detection limits in parts per billion (ppb), sample parts (ppb), date sampled, date analyzed, a description of operation and maintenance of the recovery and treatment systems, and whether any changes need to be made to the spill contingency plan.

MAINTENANCE

The Contractor shall be responsible for maintaining all of the equipment and materials outlined in the groundwater handling plan to operational levels necessary to comply with provisions outlined in these special provisions and with the permits issued for this project. If the Contractor or the Engineer identifies a deficiency in the functioning of any equipment or material, the deficiency shall be immediately corrected by the Contractor.

PENALTIES

Penalties assessed against the State for the Contractor's non-compliance with the Permit and the Waste Discharge Requirements (WDRs) shall be borne by the Contractor. The Department will deduct those penalty amounts from any moneys due, or that may become due, the Contractor under the contract. Such deductions shall be cumulative, in addition to any other deductions on the contract, and shall be permanent.

If deficiencies in the equipment or noncompliance with permit requirements remain uncorrected by the Contractor for a period exceeding 72 hours after initial notification of such deficiency or noncompliance, the Engineer may direct State forces or other parties to correct such deficiency or noncompliance. The direct costs incurred by the State for its own forces or for

other parties to correct such deficiency or noncompliance will be deducted from any moneys due, or that may become due, the Contractor under the contract. Such deductions shall be cumulative, in addition to any other deductions on the contract, and shall be permanent.

PAYMENT

The contract lump-sum price paid for non-storm water discharge shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and removing when no longer required the granulated activated carbon (GAC) effluent treatment system and holding tanks, complete in place, including preparing the groundwater handling plan, handling of submittals, effluent treatment systems, maintenance of effluent treatment systems, routing of the groundwater discharge through the effluent treatment system, testing of effluent, monitoring, photographs, reporting, and removal of equipment when no longer required, as shown on the plans, as specified in the Standard Specifications and in these special provisions, and as directed by the Engineer.

Back-flushing of bag filters, change-out of activiated carbon filters, reactivation or disposal of activated carbon filters, cleanout of sediment from holding tanks, and disposal of sediment from holding tanks will be paid for as extra work in accordance with Section 4-1.03D of the Standard Specifications.

10-1.43 SURVEY OF EXISTING NON-HIGHWAY FACILITIES

This work shall consist of performing photo survey, elevation survey and crack monitoring of existing facilities, buildings, and other improvements as specified below which might be damaged by the operations of the Contractor. In addition, this work shall include installing survey hubs in local streets where specified below.

The Contractor shall install a total of 25 survey hubs on the existing curb along California Boulevard, Trancas Street, and Solano Avenue. The Engineer will determine the exact location of the survey hubs at the time of the construction.

The photo survey, elevation survey and crack monitoring shall be conducted at the facilities listed in the table below "Photo and Elevation Survey and Crack Monitoring," or as directed by the Engineer. The pre-construction survey and monitoring shall be performed at least 30 days prior to beginning excavation, demolition activity, pile activity, shoring, installation, or other significant impact work that has a potential to cause damage to existing facilities that occurs within 200 feet of the listed facilities. Additional survey and monitoring shall be performed as the work progresses and as directed by the Engineer. A post construction survey and monitoring shall be performed on the same facilities within 10 days after the completion of excavation, demolition activity, pile activity, shoring installation, or other significant impact work that has a potential to cause damage to existing facilities.

PHOTO AND ELEVATION SURVEY AND CRACK MONITORING (Exterior & Interior)

Address/Description		
3385 California Boulevard	-	Hemphillís Lounge & Card Room
3381 California Boulevard	-	Yoshi Shige Restaurant
3367 California Boulevard	-	All State Insurance
3369 California Boulevard	-	Omega Lending Inc.
3371 - 3373 California Boulevard	-	Liliaís
3285 California Boulevard	-	Gelvani Wines
3265 California Boulevard	-	Humane Society of Napa County

PHOTO AND ELEVATION SURVEY AND CRACK MONITORING (Exterior Only)

Address/Description		
3360 Solano Avenue	-	Chablis Inn (2 Buildings)
3380 Solano Avenue	-	Budget Inn

The Contractor shall submit to the Engineer for approval a complete description of the work to be completed for each of the surveyed locations and existing facilities. The work to be completed shall consist of records of observations, videotapes, and photographs.

The Contractor shall notify the Engineer 48 hours prior to beginning the photo and elevation survey and crack monitoring work.

The scope of the examination for photo survey shall consist of photographic and video recording of the conditions of the facilities specified above.

The photo survey shall show the condition of the facility, including, but not limited to, any and all deficiencies in the facility such as cracks, settlement, leakage, distress and the like. The photo survey shall document the condition of the foundation walls, ceiling, roof, improvements and other building elements on the interiors and exteriors of the said facilities.

The photograph prints shall be in color, and have a printed image size of at least be 5" x 7." All prints shall be on glossy photographic paper. Proof sheets, thumbnail prints, or contact prints are not acceptable. All negative shall be provided in protective sleeves. The negatives shall be indexed to facilitate expeditious reproduction. All photos shall be identified by date, location, orientation, and labeled with a detailed description. All photos shall be submitted in a 3-ring binder and shall include the following: protective photo sleeves, building layout (including layout of each floor as necessary), and a summary sheet indexing all photos.

The digital camera shall be color and shall have a minimum resolution of 1280 x 960 pixels or defined as "megapixel". Digital photo prints shall be on either dye sublimation printer capable of color fusion and continues tone, a color laser printer capable of printing l200xl200 dots per inch (dpi), or a professional graphics color inkjet printer capable of printing 1440x720 dpi and using six separate color reservoirs. All digital prints shall utilize photo quality glossy heavy weight paper (as defined by the printer manufacturer and as approved by the Engineer). All digital prints shall be printed at the highest print mode or print quality available to the approved printer (photo mode or best print quality). The digital prints shall also include the path name (folder and subfolder names) and file name of the picture is location on the photo CD-ROM. All digital photos saved on CD-ROM shall be saved in the JPEG file format. The image quality option of the JPEG file shall be set to high. The JPEG files should be stored in separate folders based on photo location. The CD-ROM shall be submitted to the Engineer as part of the photo survey submittal.

The Contractor shall include a letter of authenticity certifying the that every digital photo image in the photo survey submittal has not been modified using photographic software. Said letter shall be included with every photo survey submittal.

The Contractor shall submit a list of digital photo equipment proposed for use, including digital cameras, photographic software, photo printers and photo quality glossy heavyweight paper. The submittal shall include actual recent samples of digital photos taken with the proposed camera and printed with the proposed printer. The photos shall be printed to the highest quality on the required photo quality glossy heavyweight paper.

The Contractor shall videotape the foundation, floors, walls, ceilings, roof, improvements and all building elements inside and outside the specified facilities as part of the photo survey.

The video recording shall show the condition of the facility, including, but not limited to, any and all deficiencies in the facility such as cracks, settlement, leakage, distress and the like. The video tape recording shall be narrated contemporaneously by the camera operator, documenting the location, orientation, time and date of the scene. The narration may be supplemented by onscreen text either generated by the camera or by other methods approved by the Engineer. The video survey shall be conducted using premium grade VHS color tape and shall be recorded in the Standard Play (SP) mode. All video tape recording shall be made to the highest quality and standards. No more than one facility shall be recorded on a single videotape. The Contractor shall submit the original, unedited video recording to the engineer. Copies of the video shall be professionally made and shall not incur signal degradation during copying.

A written report of the record of observations shall also be submitted with the videotape. The written report shall include the date and time of the recording and the location of the facility in question. The report shall also include a table listing the anomalies with a detailed description, and orientation. The table shall also list the beginning and the ending times of the videocassette counter for each anomaly recorded on the videotape.

Crack monitoring shall be made on all existing cracks in each of the facilities included in this survey and shall be performed concurrent with the photo survey. The gage installation shall be done concurrent with the pre-construction photo survey. Crack monitoring shall be performed using, a calibrated crack monitoring device approved by the Engineer. The crack gage shall be capable of measuring cracks to the nearest millimeter. The location of the crack gauges shall be identified in the pre-construction survey report.

Cracks shall be monitored weekly during the pre-construction photo survey and daily throughout the duration of any work that has a potential to cause damage to the existing facilities. The crack gauge measurements shall be recorded at the same time each day in an effort to eliminate deviations in crack magnitude due to heat fluctuations. A report detailing such readings shall be provided to the Engineer on a weekly basis.

The elevation survey shall be conducted to obtain vertical elevations of existing buildings, foundations and other improvements. A minimum of three points shall be monitored at each facility. Elevation measuring equipment shall be of a type approved by the Engineer. Such equipment shall be capable of measuring changes in elevations to the nearest .005 inch.

The elevation survey shall be performed by a Professional Land Surveyor registered in the State of California or by such a professional surveyor.

Three calendar days prior to beginning any impact work, the Contractor shall document elevations of the required points per facility and shall continue to document each point on a daily basis until the significant impact work begins. During the significant impact work, the Contractor shall document the elevations of the points three times per shift. After the impact work is complete for the specified location, the Contractor shall document the elevations on a daily basis for two days. If there is variation in elevation of a 0.125 inch or more, the impact work shall be halted, and the Engineer shall be immediately notified. If the work is halted due to fluctuations in elevation the Contractor shall modify their operations to eliminate future fluctuations in elevations, at no cost to the State.

Within 20 working days after the completion of any impact work, the Contractor shall submit to the Engineer a report documenting the results of the survey. Each facility shall have a separate report. The report shall be signed by a Professional Land Surveyor in the State of California who performed the survey or in whose authority the survey was made. The report shall include the location of the monitoring points, including the address of the facility surveyed and the building layout. A general layout plan shall be included in the report showing the elevations, dimensions and distances of the monitoring locations.

Survey hubs should be surveyed in x, y, and z directions and they should be surveyed every other week and as directed by the Engineer.

The photographs, videotapes, and reports of all observations shall be prepared in triplicate by the Contractor and the authorized representatives of the State and of the Contractor shall sign every document.

The pre-construction survey records and the documentation specified above shall be submitted to the Engineer prior to commencement of any significant impact work as defined above. The Engineer shall have five working days to review the submittal for adequacy. No work shall take place unless the Engineer approves the pre-construction survey records.

The package of the post-construction survey documents shall be submitted within 10 working days after the impact work has been completed adjacent to each of the specified facilities.

The photo survey package may be submitted in portions based on Stage Construction, if in the opinion of the Engineer, detrimental actions can be avoided in the subsequent stages. The submittal package shall include all records, documents, photos, videotapes, and observations. The Engineer shall have five working days to review the submittal for adequacy.

Records in triplicate of all observations shall be prepared by the Contractor and every document shall be signed by the authorized representatives of the State and of the Contractor. Video tapes and photographs, as deemed advisable by the Engineer will be made by the Contractor and signed in the manner specified above. One signed copy of every document and photograph will be kept on file by the Engineer.

The above referenced records, video tapes, and photographs are intended for use as indisputable evidence in ascertaining the extent of any damage which may occur as a result of the Contractor's operations. The above-referenced records, video tapes, and photographs are for the protection of the adjacent property owners, the Contractor, and the State. These records will be used to determine any damage from the Contractor's operations during the work.

Attention is directed to Sections 7-1.1. "Preservation of Property," and 7-1.12, "Responsibility Damage," of the Standard Specifications. The Contractor will immediately inform the Engineer in writing, of any damage to these and other facilities.

PAYMENT

The contract lump sum price paid for survey of existing non-highway facilities shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in photo survey and elevation survey of existing facilities, crack monitoring, and survey hubs as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The Engineer may order photo surveys, elevation surveys and crack monitoring of existing facilities other than those facilities listed under "Photo and Elevation Survey and Crack Monitoring," of these special provisions. Photo surveys, elevation surveys and crack monitoring of existing facilities other than those facilities listed under "Photo and Elevation Survey and Crack Monitoring," will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

10-1.44 VIBRATION MONITORING

This work shall consist of vibration monitoring as a means of protecting the following properties from excess vibration from construction activities:

1 -	3385 California Boulevard	- Hemphill's Lounge & Card Room
2 -	3381 California Boulevard	- Yoshi Shige Restaurant
3 -	3367 California Boulevard	- All State Insurance
4 -	3369 California Boulevard	- Omega Lending, Inc.
5 -	3371 - 3373 California Boulevard	- Lilia's
6 -	3285 California Boulevard	- Gelvani Wines
7 -	3265 California Boulevard	- Humane Society of Napa County
8-	3250 California Boulevard	- - Napa Barewood (The Woodmill)
9-	3980 Trancas Street	- Orchard Supply Hardware
10-	4000 Trancas Street	- Montgomery Wards

Vibration measurements and recording shall be conducted before and during pile driving, hauling of dirt, placing of base material, compaction, and during paving operations or other significant activity when that activity occurs within 25 m of the above listed properties. Vibration measurements shall be conducted for at least two hours at each location during a typical measurement day.

The baseline vibration monitoring at each site shall be conducted prior to the start of construction activities or when there is a break in the construction activities.

Vibration monitoring instrument shall be furnished and installed by the Contractor and shall be capable of continuous operation with instant monitoring results. The vibration monitoring system shall be capable of measuring peak particle velocity and frequency levels as low as 2.5 mm/sec using a 3-axis geophone. The vibration monitoring system shall undergo certified laboratory calibration conformance at least once a year. At the time of measurement the vibration monitoring system shall have a certificate that is not expired.

The Contractor shall have the instrument in place and functioning properly prior to any construction activities within 25 m of the above listed properties. The vibration monitoring instrument shall be set up in a manner such that an immediate warning is given when particle velocity equal to or exceeding 5 mm per second is produced. Monitoring instrument shall be stationed within 1 m of the exterior of designated building on the side facing the Contractor's work site. When any reading on monitoring instrument equals or exceed 5 mm per second, work shall immediately cease and the Contractor shall immediately take whatever action is necessary to reduce and maintain the monitoring instrument reading below a particle velocity of 5 mm per second.

The results of the measurements shall be tabulated. A report shall be prepared to tabulate the measured vibration levels at three axes and associated frequencies. The report shall also include information such as measurement location, date, and source of vibration. The highest measured vibration levels for each axis and their relationship to the criteria shall also be included in the report. The Contractor shall submit the report no later than 5 working days after each monitoring.

The person who is responsible for the vibration monitoring and analysis shall have the following qualifications:

A. Bachelor of Science or higher degree from a qualified program in engineering, physics or geology offered by an accredited university or college, and five years experience in vibration monitoring and control.
B. Demonstrated substantial and responsible experience in preparing and implementing construction vibration monitoring plans and analyzing vibration impacts in an urban setting.

A technician under the supervision of the qualified person may conduct the actual measurements.

Compliance with this section does not relieve the Contractor of full responsibility for damage caused by Contractor's operations as per Section 7-1.12 "Responsibility for Damage," of the Standard Specifications.

Vibration monitoring will be measured and paid by the unit. Each unit shall consist of an 8 hour day vibration monitoring at a location.

The contract unit price paid for vibration monitoring shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all work involved in vibration monitoring, as specified in these special provisions and as directed by the Engineer.

Additional areas to receive vibration monitoring will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

10-1.45 CONTROLLED LOW STRENGTH MATERIAL

Controlled low strength material shall consist of a workable mixture of aggregate, cementitious materials, and water and shall conform to the provisions for slurry cement backfill in Section 19-3.062, "Slurry Cement Backfill," of the Standard Specifications and these special provisions.

At the option of the Contractor, controlled low strength material may be used as structure backfill for pipe culverts, except that controlled low strength material shall not be used as structure backfill for aluminum and aluminum-coated culverts nor for culverts having a diameter or span greater than 6.1 m.

When controlled low strength material is used for structure backfill, the width of the excavation shown on the plans may be reduced so that the clear distance between the outside of the pipe and the side of the excavation, on each side of the pipe, is a minimum of 300 mm. This minimum may be reduced to 150 mm when the height of cover is less than or equal to 6.1 m or the pipe diameter or span is less than 1050 mm.

Controlled low strength material in new construction shall not be permanently placed higher than the basement soil. For trenches in existing pavements, permanent placement shall be no higher than the bottom of the existing pavement permeable drainage layer. If a drainage layer does not exist, permanent placement in existing pavements shall be no higher than 25 mm below the bottom of the existing asphalt concrete surfacing or no higher than the top of base below the existing portland cement concrete pavement. The minimum height that controlled low strength material shall be placed, relative to the culvert invert, is 0.5 diameter or 0.5 height for rigid culverts and 0.7 diameter or 0.7 height for flexible culverts.

When controlled low strength material is proposed for use, the Contractor shall submit a mix design and test data to the Engineer for approval prior to excavating the trench for which controlled low strength material is proposed for use. The test data and mix design shall provide for the following:

A. A 28-day compressive strength between 345 kPa and 690 kPa for pipe culverts having a height of cover of 6.1 m or less and a minimum 28-day compressive strength of 690 kPa for pipe culverts having a height of cover greater than 6.1 m. Compressive strength shall be determined in conformance with the requirements in ASTM Designation: D 4832.

B. When controlled low strength material is used as structure backfill for pipe culverts, the sections of pipe culvert in contact with the controlled low strength material shall conform to the requirements of Chapter 850 of the Highway Design Manual using the minimum resistivity, pH, chloride content, and sulfate content of the hardened controlled low strength material. Minimum resistivity and pH shall be determined in conformance with the requirements of California Test 643. The chloride content shall be determined in conformance with the requirements of California Test 422 and the sulfate content shall be determined in conformance with the requirements of California Test 417.

C. Cement shall be any type of portland cement conforming to the requirements in ASTM Designation: C 150; or any type of blended hydraulic cement conforming to the requirements in ASTM Designation: C 595M or the physical requirements in ASTM Designation: C 1157M. Testing of cement will not be required.

D. Admixtures may be used in conformance with the provisions in Section 90-4, "Admixtures," of the Standard Specifications. Chemical admixtures containing chlorides as Cl in excess of one percent by mass of admixture, as determined in conformance with the requirements of California Test 415, shall not be used. If an air-entraining admixture is used, the maximum air content shall be limited to 20 percent. Mineral admixtures shall be used at the Contractor's option.

Materials for controlled low strength material shall be thoroughly machine-mixed in a pugmill, rotary drum or other approved mixer. Mixing shall continue until the cementitious material and water are thoroughly dispersed throughout the material. Controlled low strength material shall be placed in the work within 3 hours after introduction of the cement to the aggregates.

When controlled low strength material is to be placed within the traveled way or otherwise to be covered by paving or embankment materials, the material shall achieve a maximum indentation diameter of 76 mm prior to covering and opening to public traffic. Penetration resistance shall be measured in conformance with the requirements in ASTM Designation: D 6024.

Controlled low strength material used as structure backfill for pipe culverts will be considered structure backfill for compensation purposes.

10-1.46 SUBGRADE ENHANCEMENT FABRIC

Subgrade enhancement fabric shall be placed where shown on the plans and locations designated by the Engineer in accordance with these special provisions.

Subgrade enhancement fabric shall be manufactured from one or more of the following materials: polyester, nylon or polypropylene.

Subgrade enhancement fabric shall conform to the following:

	Woven	Non-Woven
Weight, Newton per Square Meter, Min. ASTM Designation: D3776	2.0	2.0
Grab Tensile Strength, Newton, Min. ASTM Designation: D4632	890	801
Modulus (Tensile Strength at 10% Elongation) Newton, Min. ASTM Designation: D4632	490	____
Elongation at Break, Percent, Maximum ASTM Designation: D4632	35 Max.	50 Min.

Subgrade enhancement fabric shall be furnished in an appropriate protective cover which shall protect it from ultraviolet radiation and from abrasion due to shipping and handling, and shall remain in said cover until installation.

Subgrade enhancement fabric shall be accompanied by a Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

The subgrade to receive the fabric, immediately prior to placing, shall conform to the compaction and elevation tolerance specified in Section 25-1.03, "Subgrade," of the Standard Specifications and these special provisions and shall be free of loose or extraneous material and sharp objects that may damage the fabric during installation.

Subgrade enhancement fabric shall be handled and placed in accordance with the manufacturer's recommendation and shall be positioned longitudinally along the alignment, pulled taut to form a tight wrinkle-free mat.

Adjacent borders of the fabric shall be overlapped a minimum of 450 mm.

The amount of subgrade enhancement fabric placed shall be limited to that which can be covered with aggregate subbase material within 72 hours.

Should the fabric be damaged during placing, the damaged section shall be repaired by placing a new piece of fabric over the damaged area. Said piece of fabric shall be large enough to cover the damaged area and provide a minimum 900 mm overlap on all edges.

Damage to the fabric resulting from the Contractor's vehicles, equipment, or operations shall be repaired at the Contractor's expense.

During spreading and compaction of the aggregate subbase material, vehicles or equipment shall not be driven directly on the fabric. A sufficient thickness of material shall be maintained between the fabric and the equipment to prevent damage to the fabric.

The quantity of subgrade enhancement fabric to be paid for will be measured by the square meter of area covered, not including additional fabric for overlap.

The contract price paid per square meter for subgrade enhancement fabric shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in placing the fabric, complete in place as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

10-1.47 EROSION CONTROL (BLANKET)

Erosion control (blanket) shall conform to the details shown on the plans, the provisions in Section 20-3, "Erosion Control," of the Standard Specifications and these special provisions.

Erosion control (blanket) work shall consist of applying seed and commercial fertilizer and installing erosion control blanket to unlined ditches excavation slopes as shown on plans and other areas designated by the Engineer.

MATERIALS

Materials shall conform to the provisions in Section 20-2, "Materials," of the Standard Specifications and these special provisions.

Seed

Seed shall conform to the provisions in Section 20-2.10, "Seed," of the Standard Specifications. Individual seed species shall be measured and mixed in the presence of the Engineer.

Seed not required to be labeled under the California Food and Agricultural Code shall be tested for purity and germination by a seed laboratory certified by the Association of Official Seed Analysts or by a seed technologist certified by the Society of Commercial Seed Technologists.

Seed shall have been tested for purity and germination not more than one year prior to application of seed.

Results from testing seed for purity and germination shall be furnished to the Engineer prior to applying seed.

Seed shall be delivered to the job site in unopened separate containers with the seed tag attached. Containers without a seed tag will not be accepted.

A sample of approximately 30 g of seed will be taken from each seed container by the Engineer.

Non-Legume Seed

Non-legume seed shall consist of the following:

NON-LEGUME SEED (Type 1)

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed (Slope Measurement)
Festuca rubra 'Molate'* (Molate Blue Fescue)	45	20.0
Festuca idahoensis 'Siskiyou'* (Siskiyou Fescue)	45	20.0
Hordeum californicum 'Prostrate'* (Prostrate California Barley)	45	15.0
Nassella pulchra* (Purple Needle Grass)	45	20.0
Achillea millefolium* (White Yarrow)	45	1.0

NON-LEGUME SEED (Type 2)

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed (Slope Measurement)
Festuca rubra 'Molate'* (Molate Blue Fescue)	45	35.0
Festuca idahoensis 'Siskiyou'* (Siskiyou Fescue)	45	35.0
Achillea millefolium* (White Yarrow)	45	1.0

NON-LEGUME SEED (Type 4)

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed (Slope Measurement)
Nassella pulchra* (Purple Needle Grass)	45	30.0
Hordeum californicum 'Prostrate'* (Prostrate California Barley)	45	15.0

*California native species only.

Commercial Fertilizer Erosion Control Blanket

Erosion Control Blanket

Erosion control blanket shall consist of 70 percent straw and 30 percent coconut mats secured in place with wire staples and shall conform to the following:

MATERIALS

Materials shall conform to the provisions in Section 20-2, "Materials," of the Standard Specifications and the following:

Erosion Control Blanket

Erosion control blanket shall consist of one of the following:

A. Straw/coconut blanket shall be machine produced mats of 70 percent straw and 30 percent coconut fiber with a biodegradable sisal, jute or coir top and bottom net. The straw/coconut shall adhere to the netting using biodegradable thread or glue strip. The straw/coconut blanket shall be of consistent thickness, and the straw/coconut shall be evenly distributed over the entire area of the blanket. Straw/coconut blanket shall be furnished in rolled strips with a minimum width of 2 m, minimum length of 25 m (± one meter) and a minimum weight of 0.27 kg/m^2.

B. Coconut blanket shall be machine produced mats of 100 percent coconut fiber with a biodegradable sisal, jute or coir netting on top and bottom. The coconut shall adhere to the netting using biodegradable thread or glue strip. The coconut blanket shall be a consistent thickness, and the coconut shall be evenly distributed over the entire area of the blanket. Coconut blanket shall be furnished in rolled strips with a minimum width of 2 m, minimum length of 25 m (± one meter) and a minimum weight of 0.27 kg/m^2.

Erosion control blanket shall be secured in place with wire staples. Staples for erosion control blankets shall be made of 3.05 mm (11 gauge) minimum steel wire and shall be U shaped with 200 mm legs and a 50-mm crown.

APPLICATION

Erosion control (blanket) materials shall be placed in separate applications as follows:

A. The first application shall consist of applying seed and commercial fertilizer at the following rates and in the following sequence:

1. Legume seed shall be applied by a dry method at the rate of 6 kg per hectare (slope measurement). Legume seed shall not be applied with hydro-seeding equipment.

2. Seed, fiber and compost shall be applied at the rates indicated in the following table. If hydro-seeding equipment is used to apply seed, fiber, compost, the mixture shall be applied within 30 minutes after the seed has been added to the mixture.

Non-Legume Seed (Type 1)

Material	Kilograms Per Hectare (Slope Measurement)
Non-Legume Seed	78
Fiber	320
Compost	940

Non-Legume Seed (Type 2)

Material	Kilograms Per Hectare (Slope Measurement)
Non-Legume Seed	71
Fiber	320
Compost	940

Non-Legume Seed (Type 4)

Material	Kilograms Per Hectare (Slope Measurement)
Non-Legume Seed	45
Fiber	320
Compost	940

B. The second application shall consist of installing the erosion control blanket over the seed and commercial fertilizer application.

C. Erosion control blanket strips shall be placed loosely on the slope ,the unlined ditch or swale with the longitudinal joints parallel to the centerline of the ditch, swale, or slope contour lines. Longitudinal and transverse joints of blankets shall be overlapped according to the manufacturer's recommendations and stapled. Staples shall be driven perpendicular to the slopes, and shall be located and spaced in conformance with the manufacturer's instructions. Ends of the blankets shall be secured in place in conformance with the manufacturer's instructions.

MEASUREMENT AND PAYMENT

The quantity of erosion control (blanket) will be determined by the square meter from actual slope measurement of the area covered by the erosion control blanket.

The contract price paid per square meter for erosion control (blanket) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing erosion control blanket, complete in place, including furnishing and applying pure live seed, compost, fiber, and the materials for the erosion control blanket, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.48 MOVE-IN/MOVE-OUT (EROSION CONTROL)

Move-in/move-out (erosion control) shall include moving onto the project when an erosion control (Type D) area is ready to receive erosion control as determined by the Engineer, setting up all required personnel and equipment for the application of erosion control materials and moving out all personnel and equipment when erosion control in that area is completed.

When areas are ready to receive applications of erosion control (Type D), as determined by the Engineer, the Contractor shall begin erosion control work in that area within 5 working days of the Engineer's notification to perform the erosion control work.

Attention is directed to the requirements of erosion control (Type D) elsewhere in these special provisions.

Quantities of move-in/move-out (erosion control) will be determined as units from actual count as determined by the Engineer. For measurement purposes, a move-in followed by a move-out will be considered as one unit.

The contract unit price paid for move-in/move-out (erosion control) shall include full compensation for furnishing all labor, materials (excluding erosion control materials), tools, equipment, and incidentals and for doing all the work involved in moving in and removing from the project all personnel and equipment necessary for application of erosion control (Type D), as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

No adjustment of compensation will be made for any increase or decrease in the quantities of move-in/move-out (erosion control) required, regardless of the reason for the increase or decrease. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications shall not apply to the item of move-in/move-out (erosion control).

10-1.49 MOVE-IN/MOVE-OUT (TEMPORARY EROSION CONTROL)

Move-in/move-out (temporary erosion control) shall include moving onto the project when an area is ready to receive temporary erosion control as determined by the Engineer, setting up all required personnel and equipment for the application of erosion control materials and moving out all personnel and equipment when temporary erosion control in that area is completed.

When areas are ready to receive applications of temporary erosion control, as determined by the Engineer, the Contractor shall begin erosion control work in that area within 5 working days of the Engineer's notification to perform the temporary erosion control work.

Attention is directed to the requirements of temporary erosion control elsewhere in these special provisions.

Quantities of move-in/move-out (temporary erosion control) will be determined as units from actual count as determined by the Engineer. For measurement purposes, a move-in followed by a move-out will be considered as one unit.

The contract unit price paid for move-in/move-out (temporary erosion control) shall include full compensation for furnishing all labor, materials (excluding temporary erosion control materials), tools, equipment, and incidentals and for doing all the work involved in moving in and removing from the project all personnel and equipment necessary for application of temporary erosion control, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

No adjustment of compensation will be made for any increase or decrease in the quantities of move-in/move-out (temporary erosion control) required, regardless of the reason for the increase or decrease. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications shall not apply to the item of move-in/move-out (temporary erosion control).

10-1.50 EROSION CONTROL (TYPE D)

Erosion control (Type D) shall conform to the provisions in Section 20-3, "Erosion Control," of the Standard Specifications and these special provisions and shall consist of applying erosion control materials to embankment and excavation slopes and other areas disturbed by construction activities.

Erosion control (Type D) shall be applied when an area is ready to receive erosion control as determined by the Engineer and in conformance with the provisions in "Move-in/Move-out (Erosion Control)" of these special provisions.

Prior to installing erosion control materials, soil surface preparation shall conform to the provisions in Section 19-2.05, "Slopes," of the Standard Specifications, except that rills and gullies exceeding 50 mm in depth or width shall be leveled. Vegetative growth, temporary erosion control materials, and other debris shall be removed from areas to receive erosion control.

MATERIALS

Materials shall conform to the provisions in Section 20-2, "Materials," of the Standard Specifications and these special provisions.

Seed

Seed shall conform to the provisions in Section 20-2.10, "Seed," of the Standard Specifications. Individual seed species shall be measured and mixed in the presence of the Engineer.

Seed shall be delivered to the project site in unopened separate containers with the seed tag attached. Containers without a seed tag attached will not be accepted.

A sample of approximately 30 g of seed will be taken from each seed container by the Engineer.

Non-Legume Seed

Non-legume seed shall consist of the following:

NON-LEGUME (ECD Type 1)

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed Per Hectare (Slope Measurement)
Festuca rubra 'Molate'* (Molate Blue Fescue)	45	20.0
Festuca idahoensis 'Siskiyou'* (Siskiyou Fescue)	45	20.0
Hordeum californicum 'Prostrate'* (California Barley Prostrate)	45	15.0
Nassella pulchra* (Purple Needle Grass)	45	20.0
Achillea millefolium (White Yarrow)	45	1.0

*California native species only.

NON-LEGUME (ECD Type 2)

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed Per Hectare (Slope Measurement)
Festuca rubra 'Molate'* (Molate Blue Fescue)	45	35.0
Festuca idahoensis 'Siskiyou'* (Siskiyou Fescue)	45	35.0
Achillea millefolium (White Yarrow)	45	1.0

*California native species only.

NON-LEGUME (ECD Type 3)

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed Per Hectare (Slope Measurement)
Eriogonum fasciculatum* (California Buckwheat)	35	30.0
Salvia mellifera* (Black Sage)	25	20.0
Nassella lepida* (Foothill Needlegrass	45	15.0

*California native species only.

NON-LEGUME (ECD Type 4)

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed Per Hectare (Slope Measurement)
Nassella pulchra* (Purple Needle Grass)	45	30.0
Hordeum californicum 'Prostrate' (California Barley Prostrate)	45	15.0

*California native species only.

NON-LEGUME (ECD Type 5)

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed Per Hectare (Slope Measurement)
Festuca rubra 'Molate'* (Molate Blue Fescue)	45	30.0
Nassella pulchra* (Purple Needle Grass)	45	20.0
Sisyrinchium bellum* (Blue-Eyed Grass)	45	3.0

*California native species only.

Compost

Compost shall be derived from green material consisting of chipped, shredded or ground vegetation or clean processed recycled wood products or a Class A, exceptional quality biosolids composts, as required by the United States Environmental Protection Agency (EPA), 40 CFR, Part 503c regulations or a combination of green material and biosolids compost. The compost shall be processed or completed to reduce weed seeds, pathogens and deleterious material, and shall not contain paint, petroleum products, herbicides, fungicides or other chemical residues that would be harmful to plant or animal life. Other deleterious material, plastic, glass, metal or rocks shall not exceed 0.1 percent by weight or volume. A minimum internal temperature of 57˚C shall be maintained for at least 15 continuous days during the composting process. The compost shall be thoroughly turned a minimum of 5 times during the composting process and shall go through a minimum 90-day curing period after the 15-day thermophilic compost process has been completed. Compost shall be screened through a maximum 9.5-mm screen. The moisture content of the compost shall not exceed 35 percent. Compost products with a higher moisture content may be used provided the weight of the compost is increased to equal the compost with a moisture content of 35 percent. Moist samples of compost on an as received basis shall be dried in an oven at a temperature between 105°C and 115°C until a constant dry weight of the sample is achieved. The percentage of moisture will be determined by dividing the dry weight of the sample by the moist weight of the sample and then multiplying by 100. Compost will be tested for maturity and stability with a Solvita test kit. The compost shall measure a minimum of 6 on the maturity and stability scale.

Stabilizing Emulsion

Stabilizing emulsion shall be in a dry powder form, may be reemulsifiable, and shall be a processed organic adhesive derivative of Plantago ovata used as a soil tackifier.

Stabilizing emulsion shall be in a dry powder form, may be reemulsifiable, and shall be a processed organic adhesive used as a soil tackifier.

APPLICATION

Erosion control materials shall be applied to the areas shown on the plans as Erosion Control (Type D) in 3 separate applications in the sequence specified below. Erosion Control (Type D) shall be applied upon completion of installation of Fiber Rolls.

A. The following mixture in the proportions indicated shall be applied with hydro-seeding equipment within 30 minutes after the seed has been added to the mixture:

SEED MIX 1 ECD

Material	Kilograms Per Hectare (Slope Measurement)
Fiber	320
Non- Legume Seed	76
Compost	940

SEED MIX 2 MEDIAN

Material	Kilograms Per Hectare (Slope Measurement)
Fiber	320
Non- Legume Seed	71
Compost	940

SEED MIX 3 TOP SLOPE

Material	Kilograms Per Hectare (Slope Measurement)
Fiber	320
Non- Legume Seed	65
Compost	940

SEED MIX 4 MID SLOPE

Material	Kilograms Per Hectare (Slope Measurement)
Fiber	320
Non- Legume Seed	45
Compost	940

SEED MIX 5 LOWER SLOPE

Material	Kilograms Per Hectare (Slope Measurement)
Fiber	320
Non- Legume Seed	53
Compost	940

B. The Contractor may dry apply compost at the total of the rates specified in the preceding table and the following table instead of including it as part of the hydro-seeding operations. In areas where the compost is dry applied, all compost for that area shall be applied before the next operation.

C. The following mixture in the proportions indicated shall be applied with hydro-seeding equipment:

Material	Kilograms Per Hectare (Slope Measurement)
Fiber	320
Compost	940
Stabilizing Emulsion (Solids)	140

The ratio of total water to total stabilizing emulsion in the mixture shall be as recommended by the manufacturer.
The proportions of erosion control materials may be changed by the Engineer to meet field conditions.

MEASUREMENT AND PAYMENT

Compost (erosion control) will be measured by the kilogram or tonne, whichever unit is designated in the Engineer's Estimate The weight will be as determined by the Engineer from marked mass and sack count or from scale weighings.

The contract price paid per kilogram or tonne for compost (erosion control) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying compost for erosion control, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.51 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 with manufactured blankets consisting of one material or a combination of materials consisting of wood excelsior, rice or wheat straw, or coconut fibers. Blankets shall measure approximately 2.0 to 2.4 m wide by 20 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. Blankets shall have a photodegradable plastic netting or biodegradeable jute, sisal or coir fiber netting on at least one side. 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 finished roll diameter shall be a minimum of 200 mm and a maximum of 250 mm and shall weigh not less than 0.81 kg/m. Overlapping of more than one blanket may be required to achieve the finished roll diameter. When overlapping is required, blankets shall be longitudinally overlapped 150 mm along the length of the fabric.

B. Fiber rolls shall be pre-manufactured rice or wheat straw, wood excelsior or coconut fiber rolls encapsulated within a photodegradable plastic or biodegradeable jute, sisal or coir fiber netting. Each roll shall be a minimum of 200 mm and a maximum of 250 mm in diameter, 3 m to 6 m in length and shall weigh not less than 1.6 kg/m. 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 19 mm x 38 mm x 450 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 installed approximately parallel to the slope contour. Fiber rolls shall be installed prior to the application of other erosion control materials.

Fiber rolls shall be installed by one of the following methods:

A. Furrows shall be constructed to a depth of 50 mm to 100 mm, and at a sufficient width to hold the fiber rolls. The installed angle of the fiber roll to the slope contour shall create a 2 to 5 percent grade from the center to the edge of the slope. The bedding area for the fiber roll shall be cleared of obstructions including, but not limited to, rocks, clods and debris greater than 25 mm in diameter prior to installation. Fiber rolls shall be installed, overlapped and secured as shown on the plans.

   Stakes shall be installed as shown on the plans. Stakes shall be driven flush or a maximum of 50 mm above the roll.

B. Using rope and notched stakes to restrain the fiber roll against the slope face in conformance with these special provisions. Rope shall be sisal or manila, biodegradable, with a diameter of no less than 6.35 mm. Stakes shall be fir or pine and shall be a minimum of 19 mm x 38 mm x 450 mm in length and shall have a 12 mm x 12 mm notch cut 100 mm from the top. The stakes shall be driven into the slope until the notch is even with the top of the fiber roll. Rope shall be knotted at each stake and laced between the stakes as shown on the plans. After installation of the rope, the stakes shall be driven into the slope such that the rope holds the fiber roll snug to the slope face. Furrows shall not be required. If metal stakes are used instead of wood stakes, the tops shall be bent over so that the rope can be laced and knotted as with the wood stakes.

MEASUREMENT AND PAYMENT

Fiber rolls will be measured by the meter from end to end along the centerline of the installed rolls deducting the widths of overlaps.

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.

10-1.52 IRRIGATION CROSSOVERS

Irrigation crossovers shall conform to the provisions in Section 20-5, "Irrigation Systems," of the Standard Specifications and these special provisions.

Conduits shall be placed in open trenches in conformance with the provisions in Section 20-5.03B, "Conduit for Irrigation Crossovers," of the Standard Specifications.

Conduits shall be corrugated high density polyethylene (CHDPE) pipe. Corrugated high density polyethylene pipe shall conform to the requirements in ASTM Designation: F 405 or F 667, or AASHTO Designation: M 252 or M 294 and shall be Type S. Couplings and fittings shall be as recommended by the pipe manufacturer.

Water line crossovers shall conform to the provisions in Section 20-5.03C, "Water Line Crossovers," of the Standard Specifications.

Sprinkler control crossovers shall conform to the provisions in Section 20-5.027D, "Sprinkler Control Crossovers," of the Standard Specifications.

Installation of pull boxes shall conform to the provisions in Section 20-5.027I, "Conductors, Electrical Conduit and Pull Boxes," of the Standard Specifications. When no conductors are installed in electrical conduits, pull boxes for irrigation crossovers shall be installed on a foundation of compacted soil.

10-2.53 ESTABLISH EXISTING PLANTING

The work performed in connection with establishing existing planting shall conform to the provisions in Section 20, "Erosion Control and Highway Planting," of the Standard Specifications and these special provisions.

Attention is directed to Sections 7-1.01, "Laws to Be Observed," 9-1.06, "Partial Payments," and 9-1.07, "Payment After Acceptance," of the Standard Specifications.

Attention is directed to "Order of Work" and "Cooperation" of these special provisions.

Plans are from the original Highway Planting contract, number 04-120624, and are for reference only. Plans for this project show the limits and areas where establish existing planting is to be performed and will be designated hereinafter in these special provisions as the project limit. The planting shown on the plans may differ from actual field locations and condition.

INITIAL SITE INSPECTION

Within 20 days after starting work, the Contractor shall submit a watering schedule program to the Engineer for approval. Watering shall be performed a minimum of 48 times during the first year of the establishment period and 32 times each subsequent year when directed by the Engineer. If the Engineer determines the submitted watering schedule is unacceptable, the Contractor shall submit a revised watering schedule to the Engineer for approval within 5 working days after receiving notice that previously submitted schedule is unacceptable.

After the watering schedule program has been approved, the Contractor shall submit a bill or invoice of the weekly water application in liters to the Engineer on a monthly basis during the course of establish existing planting work.

Within 28 days after starting work, the Contractor, in the presence of the Engineer, shall check for dead, missing, diseased, or unhealthy plants, for proper placement and adjustment of plant stakes and ties, and the condition of plant basins and depth of mulch in basins. A mulch deficiency in plant basins occurs when mulch is less than 50 mm in depth. A written list of existing plant deficiencies shall be submitted to the Engineer within 7 days after checking the existing facilities. The Engineer will have 5 days to review the plant deficiency list. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the plant deficiency list within 7 days of receipt of the Engineer's comments. The Engineer will have 5 days to review the revisions.

The written list of plant deficiencies shall contain an assessment of the amount of weeds to be removed, and a plan to bring the weeds under control.

The written list of plant deficiencies shall contain a rodent and pest census, and a plan to bring rodents and pests under control, if directed by the Engineer.

Within 28 days after starting work, the Contractor, in the presence of the Engineer, shall check for trash and debris within the project limits. The area within the project limits shall present a neat and clean condition at all times, as directed by the Engineer.

INITIAL SITE WORK

Initial site work shall consist of watering existing plants, correcting existing plant deficiencies, controlling weeds and rodents and other pests, and removing trash and debris.

Initial site work shall begin after the Engineer's written approval of the initial site inspection. Initial site work shall be completed by the Contractor within 20 working days and will be paid for as extra work in conformance with the provisions of Section 4-1.03D, "Extra Work," of the Standard Specifications.

Weeds shall be controlled within the project limits. Weeds shall be:

A. Removed within plant basins, including basin walls, by hand pulling.
B. Removed within an area 1.8 m in diameter, centered at each plant location where plants are planted more than 4.6 m apart and located outside of mulch areas.
C. Reduced in height to between 50 mm and 100 mm in all other areas by mowing, or mechanical whipping to the edges of mulch and erosion control areas.

Rodents and pests shall be brought under control, as directed by the Engineer.

Pesticides for weed, rodent and pest control shall not be used.

Trash and debris shall be removed from within the project limits and disposed of in conformance with the provisions of Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

ROUTINE PLANT ESTABLISHMENT

The Contractor shall be responsible for routine plant establishment. Routine plant establishment shall include, but not be limited to, watering, pruning, and fertilizing plants; pest control; plant basin repair, mulch replacement, and adjustment or removal of plant stakes and ties.

When plants have died or, in the opinion of the Engineer, have deteriorated to a point beyond which the plants will not mature as typical examples of their species due to the Contractor's operation or negligence, the Contractor shall replace the plants when ordered by the Engineer within 10 working days at the Contractor's expense.

Replacement and planting of plants shall conform to the provisions in Section 20-4.05, "Planting," of the Standard Specifications and as shown on the original plans and as specified in these special provisions. The spacing requirements for replaced plants shall be as originally specified or installed.

The size of the replacement plants shall be the same size as originally planted as shown on the plans.

Removed plants shall be disposed of in conformance with the provisions of Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Plants that are readily available nursery stock shall be planted within 15 working days of the date of the Engineer's order.

Plants that are not readily available nursery stock shall be ordered by the Contractor within 7 days from the date of the Engineer's order. The Contractor shall furnish to the Engineer, within 7 days after ordering plants, a copy of the order to the vendors stating that the order has been received and accepted, and the date when the ordered plants will be shipped. Upon receiving the ordered plants, the plants shall be planted within 5 working days.

If the Contractor fails to replace plants that are readily available, or furnish the Engineer with a copy of the order and statement from the vendor, or plant plants as ordered within the times specified above, then the working days following any of those time periods will not be credited as working days as specified under "Working Days" in these special provisions. Crediting of working days will resume when plants have been replaced satisfactorily, as determined by the Engineer.

Erosion control areas as shown on the plans will not require routine plant establishment, except as follows:

A. Erosion control areas shall be mowed to a height between 50 mm and 100 mm. Other than mowing, weed control in erosion control areas will not be required.

When directed by the Engineer, trees, shrubs, and willow cuttings shall be pruned by the Contractor at the Contractor's expense in conformance with the provisions of Section 20-4.055, "Pruning," of the Standard Specifications.

Pruned material shall be disposed of in conformance with the provisions of Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Plant basins shall be kept well formed. Silt shall be removed as often as necessary to provide sufficient containment of water for healthy plant growth.

Fifty mm of mulch shall be applied to existing mulched areas outside of plant basins when directed by the Engineer.

Mulch shall be wood chips.

Plants shall have water applied as often as necessary to maintain healthy plant growth and shall be kept watered in conformance with the provisions in Section 20-4.06, "Watering," of the Standard Specifications. Excessive use of water resulting in runoff will not be allowed.

Water for establishing existing plants will be made available free of charge to the Contractor from any water system or State-owned facility within the limits of work. Electrical energy for irrigation facilities will be furnished free of charge to the Contractor.

Weeds shall be controlled within the project limits. Weeds shall be killed when weeds reach the seed stage of growth or exceed 50 mm in length in planting areas, whichever comes first. Weeds shall be:

A. Removed within an area 1.8 m in diameter, centered at each plant location where plants are planted more than 4.6 m apart and located outside of mulched areas.

Weeds within plant basins, including basin walls, shall be removed by hand pulling before they exceed 100 mm in length, and disposed of on the same day that they are pulled in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Weeds in mulch areas outside of plant basins shall be mowed or mechanically whipped. This work shall be performed a minimum of 14 times each year when directed by the Engineer. Weeds shall be reduced to a height between 50 and 100 mm.

Rodents and other pests shall be controlled to prevent damage to slopes and plants. Damage to slopes and plants by rodents or other pests shall be corrected within 5 working days.

Litter shall include trash and debris. When directed by the Engineer, routine litter control shall be performed. Routine litter control shall be performed 2 times a month.

The Contractor shall be responsible for the routine removal of litter from within the limits of establish existing planting. The Contractor will not be responsible for litter in medians and surfaced areas.

Litter shall be removed and disposed of in conformance with the provisions of Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Additional litter removal and disposal when ordered by the Engineer will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specification.

When ordered by the Engineer, litter as a result of a highway accident shall be removed and disposed of by the Contractor in conformance with the provisions of Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications. Removal and disposal will be paid for as extra work in conformance with the provisions of Section 4-1.03D, "Extra Work," of the Standard Specification.

MEASUREMENT AND PAYMENT

Working days upon which no work will be required in performing establish existing planting and the Contractor is not present or working on the job site will be credited as working days, except when the Contractor fails to adequately perform work as specified in these special provisions.

For the purpose of making partial payments in conformance with the provisions of 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 that will be recognized for progress payment purposes:

Initial Site Work $6,000

After acceptance of the contract in conformance with the provisions of 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 herein above listed for the item will be included for payment in the first estimate made after acceptance of the contract.

The contract lump sum price paid for initial site work shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work shown to be necessary in initial site inspection, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Establish existing planting will be paid for on a lump sum basis. Any working day not credited toward the completion of the contract shall be deleted from the contract and shall reduce the lump sum payment to the Contractor. The lump sum amount to be paid will be computed as the ratio of the total number of credited working days divided by the total number of working days in the contract, multiplied by the contract lump sum bid amount.

The contract lump sum price paid for establish existing planting shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in routine plant establishment, including watering, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Mulch will be paid for in conformance with the provisions of Section 20-4.09, "Measurement," and Section 20-4.10, "Payment," of the Standard Specifications.

40-MM WATER METER

40-mm 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 City of Napa Public Works Department Water Division has established a fee of $9,175 for furnishing and installing a 40 mm 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.

Attention is directed to Section 20-4.06, "Watering," of the Standard Specifications. The Contractor shall make the arrangements for furnishing and applying water until the water meters have been installed by the serving utility.

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.

10-1.54 CONSTRUCT RAILROAD TRACKS

This work shall consist of constructing and maintaining temporary and permanent track, constructing and maintaining temporary and permanent track crossings, surveying existing track beyond the limits of track removal, and removing, when necessary, permanent and temporary track and track crossings in accordance with the details shown on the plans, as specified in these special provisions.

This special provision contains measurements in both English and Metric units. For all railroad work, English units shall govern over metric conversions.

All track work and track-related work shall be done in conformance with the American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual for Railway Engineering (current issue), and to the applicable provisions in the Standard Specifications.

All temporary shoring within the vicinity of the temporary and permanent tracks, as shown on the plans, shall conform Cooper E80 loading requirements.

Attention is directed to "Order of Work" and "Cooperation" of these special provisions regarding staging of the work, advance notification requirements, and coordination of work with the railroad.

Work which interferes with public traffic on existing Route 29 shall only be performed in accordance with the lane closure charts for Route 29 and only during those periods when the Napa Valley Wine Train has no train service scheduled.

All shifts from existing track to temporary track, and from temporary track to new permanent track, shall be performed when the Napa Valley Wine Train has no train service scheduled.

GENERAL

The construction work shall include removing and disposing of existing permanent track, ballast, and roadway pavement, preparing subgrade, surveying existing track in order to establish the correct alignment of new temporary and permanent track, furnishing and placing temporary and permanent track subballast, ballast, ties, rails and all appurtenant track materials needed to complete the track work, planing asphalt concrete pavement to prepare for constructing temporary asphalt concrete track crossing on Route 29, constructing temporary asphalt concrete track crossing on Route 29, constructing permanent precast concrete panel track crossings on California Boulevard and Redwood Road, and removing and disposing of temporary track and track crossing on Route 29 when no longer required.

This work does not include installation or removal of temporary or permanent railroad signals or gates. Installation and removal of temporary or permanent railroad signals or gates will be performed by railroad forces and shall be coordinated as specified in "Order of Work" of these special provisions.

WORKMANSHIP AND SUPERVISION

The contractor and his authorized representative shall keep themselves fully informed of Railroad's rules, regulations and instructions governing the use of signals and flags, for signaling or flagging trains as a protection against accidents, and governing the protection of tracks and property of the Railroad and the traffic moving on such tracks, as set forth herein and as specified in 'Railroad Relations and Insurance," of these special provisions. The contractor and his authorized representative shall observe and comply with, and shall cause all his agents and employees to observe and comply with all special instructions of the Engineer relative to the safe operation of the tracks and property of Railroad and the traffic moving on such tracks, as well as wires, signals and other property, at or in the vicinity of the work.

The Contractor and his authorized representative, his agents and employees shall not use red flags, lights, or other red material which may be mistaken for signals or flags.

All track construction shall be performed under the direction of qualified and competent supervisory personnel, including foreman and gang leaders, experienced in railroad construction.

Track construction materials shall be unloaded and handled in conformance with recommended practices for the materials involved. Any material which has been damaged by unloading or handling, as determined by the Engineer, shall be removed and replaced by the Contractor at his expense.

ROADBED CONSTRUCTION

Earthwork required to construct subgrade for track construction, at the level of the grading plane, shall be as provided in the section entitled "Earthwork' elsewhere in these special provisions.

Relative compaction for a minimum depth of 0.5 foot (152 mm) below the grading plane shall be not less than 90 percent.

Roadbed, grade, bridges and drainage shall be approved by the Engineer prior to any distribution of track construction material.

RAILROAD MATERIALS

Manufactured railroad materials shall be standard products used in railroad construction conforming to the requirements of AREMA or other nationally recognized specifications and to Section 6, "Control of Materials," of the Standard Specifications.

All materials for temporary and permanent track shall be new.

CROSS TIES

Unless otherwise approved, cross ties shall be new and manufactured from the following kind of wood: Western Mixed-Douglas Fir.

Ties shall be made from sound, straight, live timber, and free of any defects that may impair their strength or durability, such as bark, decay, splits, shakes, large or numerous holes or knots, pitch seams, pitch rings, grain with slant greater than one in fifteen, or other imperfections.

Ties shall be of compact wood throughout the top fourth of the tie, where any inch (25.4 mm) of any radius from the pith shall have not less than one-third summer wood in six or more rings of annual growth, or not less than one-half summer wood in fewer rings.

Ties shall be a minimum of 9 feet (2.74 m)in length and shall measure 7" thick x 9" wide (178 mm x 229 mm) on top throughout both sections between 20 inches (508 mm) and 40 inches (1016 mm) from the middle of the tie.

Ties shall be well sawn on all sides and cut square at the ends to the dimensions specified. Ties shall be straight, and opposite faces of ties shall be true and parallel.

Ties will be inspected after treatment at suitable and convenient places satisfactory to the Engineer.

Ties will be rejected when decayed in the slightest degree, except that peck in cypress will be allowed up to the limitations of hole as specified elsewhere in these special provisions. Blue stain will be allowed in any wood.

Large Hole - A large hole is one more than 1/2 inch (12.7 mm) in diameter and 3 inches (76.2 mm) deep within, or more than 1 inch (25.4 mm) in diameter and 3 inches (76.2 mm) deep outside the sections of the tie between 20 inches (508 mm) and 40 inches (1016 mm) from its middle. Numerous holes are any number equaling a large hole in damaging effect.

Large Knot - A large knot is one whose width exceeds 1/4 of the width of the surface on which it appears, but such knot, if sound, may be allowed if it occurs outside the sections of the tie between 20 inches (508 mm) and 40 inches (1016 mm) from its middle. Numerous knots are any number equaling a large knot in damaging effect.

Shake - A shake is a separation of one ring of annular growth from another. A tie containing a shake more than 1/3 the width of the tie in length or more than 1/8 inch (3.2 mm) wide will be rejected.

Split - A split is a break across annular rings. A tie containing a split over 8 inches (203.2 mm) long, or 1/8 inch (3.2 mm) wide or 2 inches (50.8 mm) deep will be rejected.

A tie is not well sawn when its surfaces are cut into with score-marks more than 1/2 inch (12.7 mm) deep or when its surfaces are not even.

Sawn ties will be considered straight: (a) when a straight line along the top from the middle of one end to the middle of the opposite end is nowhere less than 2 inches (50.8 mm) from the edge of the tie; and (b) when a straight line along the side from the middle of one end to the middle of the opposite end is nowhere less than 1.5 inches (38.1 mm) from the edge of the tie.

The top and bottom of the tie will be considered parallel if any difference in the thickness at the sides or ends does not exceed 1/2 inch (12.7 mm). All edges shall be square except that ties having wane will be rejected.

Ties more than 1/4 inch (6.35 mm) narrower in width or 1/4 inch (6.35 mm) thinner in thickness or 1 inch (25.4 mm) shorter in length than sized as specified will be rejected

Ties delivered on right of way shall be unloaded as nearly as practicable at the locations where required, but must not be thrown down high embankments. They must be placed clear of the track and walkways and must not be left in or adjacent to streets or highways, in cuts where they may obstruct the drainage, in places subject to overflow, adjacent to buildings where they may be subject to fire hazard, or where they may be hazardous.

Contractor to supply certification from tie manufacturer that ties furnished comply with these special provisions and have been tested in accordance with the latest AREMA requirements outlined in Volume 1, Chapter 30 (Ties).

Ties not conforming to the special provisions will be rejected and must be removed immediately from state or railroad right of way.

STEEL RAIL

Rail shall be new 136 pounds (61.69 kg) per lineal yard (910 mm), control cooled and shall conform to the dimensions and details as shown on the plans and be equal or superior to the following minimum requirements.

Length - Jointed rails shall be a minimum of 39 feet (11.89 m) in length, except for closure rails.

Drilling - Rail ends shall be drilled in accordance with the plans; however, one additional hole shall be drilled at 6 1/2" (165.1 mm) centers when 36" (914.4 mm) six-hole angle bars are used. Any additional holes in rail will be sufficient cause for rejection. Hole in rail must be drilled to proper size and not punched, slotted or cut with a torch and all chips and burrs shall be removed in accordance with the details shown on the plans before applying joints. A variation of 1/32" (0.79 mm) in size and location of bolt holes will be allowed. Rail Ends - Rail shall be cut with rail saw to a tolerance of 1/32" (0.79 mm)from square. All burrs shall be removed and ends made smooth and beveled. Torch cut rails will be rejected. Battered or mismatched ends must be built up or ground off to conform to minimum tolerance of 1/16" (1.59 mm) on top and gage side to adjoining rail.

Rail End Hardening - The top of ball of each rail end, except heat treated rail, must be hardened for a minimum distance of 2 1/4 (57.15 mm) inches from the end to penetration depth of 1/4 inch (6.35 mm) to Brinell hardness of 341 to 415.

Rail End Chamfer - The top of ball at each end of rail shall be chambered by grinding to an angle 1/16 inch (1.59 mm) inward from rail end to a depth of 1/8 inch (3.2 mm) at rail end.

Continuous Welded Rail - Welding of continuous welded rail shall be in accordance with these special provisions. Rail shall be of the same weight, section and grade within the limits of each individual track.

Angle Bars.--Angle bars used for joining 39 foot (11.89 m) or 78 foot (23.77 m) welded rails shall be new and shall conform to the dimensions and details as shown on the plans. Angle bars used for joining continuous welded rail shall be new and shall have the physical characteristics as shown on the plans with exception that length shall be extended to provide for two (2) additional bolt holes at 6 1/2" (165.1 mm) centers.

Insulated Joints - Insulated joints shall be in accordance with the latest AREMA specifications.

Track Bolts, Nuts Nutlocks --Track bolts, nuts and nutlocks shall be new, of the correct size to properly fit the rails and joint bars furnished in accordance with the details shown on the plans.

Tee Plates - Tie plates shall be new and shall be 8" x 14" (203.2 mm x 355.6 mm) in accordance with the details shown on the plans.

Track Spikes.--Track spikes shall be new 5/8" (15.9 mm) with reinforced throat in accordance with the details shown on the plans and in accordance with the latest revision of the AREMA specifications Volume 1 Chapter 5 Part 2 for "Soft-Steel Track Spikes."

Rail Anchors --Rail anchors shall be new of the one piece type of standard weight normally applied with a spike maul and of a design, size and construction to properly fit base of rail on which being applied and conforming to AREMA requirements.

BALLAST

Ballast -Ballast shall be crushed from rock, copper slag, open-hearth slag or gravel (as specified) composed of hard, strong and durable particles. All boulders which will pass through a 5-inch (127 mm) circular opening before crushing shall be rejected. Approved crush material shall be angular, rough-surfaced, clean and free of sand, loam, clay, flat elongated, soft or disintegrated pieces and other deleterious substances. All particles of the ballast shall have been broken by the crusher and have at least two broken surfaces. The percentage of wear of prepared ballast, tested in accordance with the current ASTM Method of Test, Designation: C535, shall not be greater than 32 percent. The soundness of prepared ballast shall be such that when tested in sodium sulfate in accordance with the current ASTM Method of Test, Designation: C88, the weighted average loss shall not be in excess of 5 percent after five cycles.

The grading of prepared ballast shall be tested with square opening laboratory sieves (ASTM El1) and 100 percent by weight shall pass the 2-inch (50.8 mm) sieve size and zero to five percent passing the 3/8-inch (9.5 mm) sieve size. The percent passing the sieve sizes between the 2-inch (50.8 mm) and 3/8-inch (9.5 mm) shall depend upon the natural breaking pattern which results from natural rock cleavage planes and sharpness of the break. No ballast particles shall measure over 2 1/2 inches (63.5 mm) in any dimension.

Shipment of ballast not conforming to these special provisions shall be rejected at the Contractor's expense; however, ballast not conforming to the above special provisions may be accepted if specifically approved by the Engineer.

Metal Preservative.-Metal preservative shall be a soft grease-type material consisting of petroleum or petroleum based compound with a corrosion inhibitor. The applied film of metal preservative shall be non-drying.

ROAD CROSSING WITH PRECAST CONCRETE PANELS

Road crossings with precast concrete panels shall be in accordance with the plans and the latest AREMA specifications.

CONSTRUCTION, GENERAL

Survey of existing track -- Prior to removing existing permanent track, the Contractor shall survey existing track to be removed and the existing track 300 feet (109 m) beyond the limits of staged track work in order to ensure proper conformance of new track with existing track to remain in place. Prior to removing new temporary track, the Contractor shall survey existing track 300 feet (109 m) beyond the limits of staged track work in order to ensure proper conformance of new track with existing track to remain in place.

Roadbed.--Roadbed section shall conform the dimensions and details as shown on the plans. Contractor shall construct subgrade to within one tenth (0.10) foot (30.5 mm) of the design grade. No track materials shall be placed on the roadbed until the subgrade has been constructed and finished to the grades as defined by the contract drawings and approved by the Engineer.

Cross Ties --Cross ties shall be placed square to the line of rails and shall be spaced in accordance with the details shown on the plans.

Ties must be handled with care and not damaged by puncturing with pick, shovel or other tool. They shall be installed with heart-side down.

Whenever ties are added, cut, drilled, or otherwise altered after treatment, the affected area shall be thoroughly saturated with creosote or heavy oil. Holes caused by withdrawal of spikes shall be fitted with tight fitting soft-wood, treated plugs in accordance with AREMA specifications. Unnecessary alterations to ties after treatment may be grounds for rejection of the tie.

Tie Plates --Tie plates must be placed under each rail at every tie. Plates must be positioned so that the batter of plate will cant rail to gage side and shall be centered on tie and so applied as to obtain proper bearing of rail.

Rail -Continuous welded rail shall be used on structures and at all paved road crossings. The standard gage of track is 4'-8 1/2" (1.435 m) measured between heads of rails at right angles, measured in a plane 5/8 of an inch (15.9 mm) below top of rail. Rail shall be laid to standard gage except that on curves gage will be widened as follows:

From 12degrees - 01" to 14 degrees inclusive:4'-8 5/8" (1.438 m)

Over 14degrees: 4'-8 3/4" (1.441 m)

When laying rail, the line rail is the outer rail on curves and shall first be spiked to line. The gage rail shall then be spiked to proper gage. The track shall be gauged at least every third tie. Unless otherwise specified, rail shall be laid with joints staggered so that joints on one side will not be more than four feet from center of opposite rail.

Rail shall be handled carefully. During loading and unloading of rail, care must be taken not to allow rails to strike together or upon any hard material which might bend or damage them. Bumping or striking the rail during handling or laying will not be permitted. Nicked or gouged rail shall be rejected or repaired as determined by the Engineer.

Continuous welded rail shall be unloaded and placed on ties with rollers or other devices approved by the Engineer, which shall prevent damage to the rails and ties.

Layout plans showing rail types, continuous welded rail lengths and field welds shall be prepared by the contractor and submitted to the Engineer for approval a minimum of 30 working days prior to track construction.

The bottom of the rail, fastener assemblies, and all bearing surfaces of rail, ties and tie plates, shall be broom cleaned before rail is laid.

Rails must be brought squarely together and bolted before spiking. Rails must not be driven into position, but shall be moved with rail tongs, lining bars or crane.

Rail ends and surfaces of rail for the entire joint area shall be cleaned of all dirt, rust or scale and coated with an approved lubricant.

Shimming --When laying jointed rail, each rail shall be carefully placed on the ties with ends square using shims 1/16 inch (1.6 mm) to 5/16 inch (7.9 mm) placed between the ends of adjoining rails to ensure proper opening of joint. Shims to be removed after all joint bolts are tightened. The thickness of the shim to be used will be determined by the following table from temperatures taken on the rails when they are being laid:

39 FOOT (11.89m) RAILS	
Temperature (F)	Thickness of Shim (inches)
Below 6 (-14C)	5/16 (7.9mm)
6-25(-14C to -3C)	_ (6.3mm)
26-45(-3C to 7C)	3/16 (4.7mm)
46-65 (8C to 18C)	1/8 (3.2mm)
66-85 (19C to 29C)	1/16 (1.6mm)
85+ (29C+)	None

The temperature of the rail shall be determined by use of a standard rail thermometer placed for 30 minutes on the web of the rail on the shady side.

Joints --All joint bars must be well oiled and properly applied with full number and correct size of bolts, nuts and spring washers. Joint bolts must be properly tightened before spiking rail and the two center bolts will be tightened in advance of the end bolts.

Bolts shall be placed with nuts alternately on the inside and outside of the rail. Nuts must be placed with the flat side toward the rail.

Track bolts, joint bars and fishing surfaces of rails at joint bars shall be swabbed with oil.

Spiking --Track shall be spiked with not less than six spikes to each tie. Spikes must be placed so there will be not less than two inches (50.8 mm) from the center of the spike to the edge of tie. The number of spikes per tie plate shall be as shown on the plans.

When placing spikes, the two interior opposing holes on the tie plate (each measuring 3 1/8" (79.4 mm) from the edges) must always be used.

Spikes must be started and driven vertically, square with and snug against the rail to a full bearing on the base of the rail. They must not be straightened during driving, but should be withdrawn and replaced with a new spike. The last few blows must be given lightly, so as not to bend or break the spike head. Care must be taken not to strike the rail when driving spikes.

When spiking, care must be taken to see that shoulder of tie plate has full bearing against base of rail on field side.

Rail Anchors --Rail anchors shall be located in accordance with the patterns as illustrated on the plans.

In applying rail anchors, they shall be set with full bearing against the side of tie. Care must be taken to avoid overdriving, as this may fracture or spread the metal, resulting in loss of holding power. Any rail anchor that is fractured or with metal spread will be rejected.

Ballast --When ballast is delivered in railroad cars, the track shall be capable of supporting the cars without damaging rail or the subgrade.

Ballast shall be placed to provide a depth under tie as shown on the plans.

Ballast shall be thoroughly tamped with a distance of not less than 13" (3.30 m) from each side of base of rail along both sides of tie. In tamping ties within the above described limits, simultaneous tamping must be performed under each rail. Tamping is not permitted at the center of the tie.

Pneumatic or electric tamping tools, either hand held or machine mounted, will be used. Hand tamping with shovels or picks will not be permitted unless authorized by the Engineer.

Two tamping tools shall always be used opposite each other on the same tie. Tampers shall be started from a nearly vertical position and worked downward past the bottom of the tie, after which the tool should be slanted downward to force ballast under the tie. Special attention will be given to tamping joint ties.

All ties must be tamped uniformly. Ties found to be improperly tamped shall be retamped.

After the track has been raised, lined and surfaced, the ballast shall be dressed to conform to the section as shown on the plans.

Care must be taken when handling ballast to prevent contamination by dirt or other materials. Contaminated ballast shall be removed and replaced with clean ballast at Contractor's expense.

Alignment and Surface --Track shall be constructed to the alignment and grade prescribed by the Engineer and shall conform to center line and top of rail stakes set at not more than 50 foot (15.24 m) intervals. Deviation from established gage and cross level shall not exceed 1/8" (3.2 mm) and profile grade and horizontal alignment shall not exceed 1/8" in 50 feet and must be acceptable to the Engineer.

Tangent track shall be cross level and superelevation and runoffs shall be provided on all curves in conformance with the plans. The inside rail of track on curves shall be maintained at the prescribed grade and the proper superelevation shall be provided by raising the outer rail.

When raising track, a spot board or other approved device shall be used to maintain grade and a level shall be used to keep track to proper cross level. Jacks shall be placed in the crib ahead of the joint and at the crib midway between joints when raising track, to prevent undue bending of rail or straining the joint connection. Horizontal alignment must be maintained during the raising operation.

No humps or sags in surface will be accepted, nor will irregularities in alignment, either on tangent or curved track, be accepted, that exceeds deviations allowed.

RAIL WELDING

The work specified in this section includes shop welding and field welding of all rails as indicated.

SHOP WELDING

This special provision concerning shop welding applies to track work only.

Continuous welded rails (CWR) shall be shop welded into lengths up to 1,521 feet (463.6 m) by the electric-flash butt welding process. The Contractor shall submit his proposed welding process and procedure to the Engineer for approval a minimum of 30 working days before welding is started. All rails for electric-flash butt welds shall have the scale removed down to bright metal in those end zones, top and bottom of the rails where the welding current-carrying electrodes contact on head and base of rail. All electric-flash butt welds shall be forged to point of refusal to further plastic deformation and have a *minimum* upset of 1/2 inch (12.7 mm) with 5/8 inch (15.8 mm) as standard. If flashing on electric-flash butt welds is interrupted because of malfunction or external reason, with less than 1/2 inch (12.7 mm) of flashing distance remaining before upsetting, rails shall be reclamped in the machine and flashing initiated again.

All rail shall be examined at the welding shop prior to welding. Rails having vertical or horizontal misalignment in the last four feet of the rail in excess of 0.030 inch (0.76 mm) per foot (3.05 m) tangential deviation measured with a straightedge will be rejected. See AREA Bulletin 605, dated February 1967, for diagrams of this and the following rail alignment tolerances.

Alignment of rail in the welding machine shall be done on the head of the rail.

Vertical alignment shall provide for a flat running surface. Any difference of height of the rails shall be in the base.

Horizontal alignment shall be done in such a manner that any difference in the width of heads of rails shall be divided equally on both sides of the head.

Horizontal offsets shall not exceed 0.040 inch (1 mm) in the head and 0.125 inch (3.2 mm) in the base.

Misalignment Tolerance:

(a) Combined vertical offset and crown camber shall not exceed 0.010 inch (0.25 mm) per foot (3.05 m) at 600º F. (316ºC) or less.
(b) Combined vertical offset and dip camber shall not exceed 0.010 inch (0.25 mm) per foot (3.05 m) at 600º F. (316ºC) or less.
(c) Gauge Misalignment Tolerance- Combined horizontal offset and horizontal kink camber shall not exceed 0.040 inch (1 mm) per foot (305 mm) at 600º F or less.

Finishing Tolerance:

(a) A finishing deviation of not more than plus 0.010 inch (0.25 mm) to 0.000 inch (0 mm) of the parent section of the rail head surface will be allowed.
(b) The sides of the rail head shall be finished to plus or minus 0.010 inch (0.25 mm) of the parent section. The bottom of rail base shall be finished to within 0.010 inch (0.25 mm) of the lowest rail.
(c) The web zone (underside of head, web, top of base, both fillets each side) shall be finished to not greater than 1.8 inch (45.7 mm) of parent contour or closer but shall not be deeper than the parent section. Finishing shall eliminate all cracks.

All notches created by offset conditions or twisted rails shall be eliminated by grinding to blend the variations.

All fins on the weld due to grinding drag shall be removed prior to final inspection.

All heavy grinding shall be performed on the hot metal, immediately following welding, to prevent metallurgical damage.

Jagged, notched or badly mismatched end faces shall be preflashed to an even or mated condition before setting up rails for preheating and final flashing to assure that the entire surfaces of rail ends are uniformly flashing immediately preceding upsetting.

A straightening press shall be included in the welding production line to achieve the alignment tolerances as specified elsewhere in this section.

Each completed weld shall have full penetration and complete fusion and be entirely free of cracks.

All shop weld testing shall be carried out by and at the expense of the Contractor and shall be subject to inspection by the Engineer. One hundred percent of the welds shall be magnetic particle tested. The testing shall be done by the dry powder method in accordance with ASTM Designation: E109. All welds giving fault indications shall be cut out and rewelded.

FIELD WELDING

This special provision concerning field welding applies to track work only.

Sections of CWR laid in tracks shall be joined together by field welding. All field welding shall be performed by approved process using preformed, factory-made molds. Alignment, support, and clamping of rails shall be so arranged as to produce welds conforming to the specified tolerances.

The Contractor shall prepare for the Engineer's approval, a detailed procedure specification covering the step by step procedures to be employed in making the field welds. A complete description of each of the following items and any other essential characteristics shall be included in the procedure specification:

(a) Manufacturer's trade name for the welding process.
(b) Method used for cutting and cleaning of the rail ends.
(c) Minimum and maximum spacing between
rail ends.
(d) Method used for maintaining the rails in alignment during welding.
(e) Method used for preheating including time and temperature.
(f) Tapping procedure including the minimum time required to cool the weld under the mold insulation.
(g) Method used, including a description of special tools and equipment for removing the gates and risers and finishing the weld to the final contour.

The Contractor shall qualify the field welding process that he intends to use in track construction. The step by step method of welding used for qualifying shall be performed in strict accordance with the welding procedure these special provisions.

The Contractor shall prepare 2 full scale welds in rail of the same nominal weight to be welded in track construction. One of the qualification welds shall be subject to the slow bend test as outlined in AREA Bulletin 598, Page 434, February 1966, and the other weld shall be longitudinally cross sectioned, macroetched and Brinell hardness tested.

The slow bend specimen shall have a minimum modulus of rupture of at least 100,000 pounds (45360 kg) per square inch (645 mm^2) and a deflection of not less than 3/4 inch (19 mm). The macroetched section shall show no evidence of cracks, lack of fusion or incomplete weld penetration. The total area of internal defects such as porosity and slag inclusions shall not exceed 0.60 square inch (387 mm^2) and the largest single porosity or slag defect shall not exceed 1/8 inch (3.2 mm) in diameter.

The Brinell hardness of the weld measured on the head of the rail in the center of the weld shall be equal to the hardness of the adjoining rail plus or minus 20 Brinell hardness number.

Ten copies of the welding procedure qualification test records shall be submitted to the Engineer (six copies to be forwarded to the Railroad).

Prior to beginning track welding, each crew of the welders, including the welding foreman or supervisor for that crew shall prepare and test a qualification weld. The welding shall be done in accordance with the approved procedure specification and will be witnessed by the Engineer. The qualification weld shall be ultrasonically inspected and shall meet the quality and hardness requirements as specified elsewhere in this section. Ten copies of the welder qualification test record shall be submitted to the Engineer (six copies to be forwarded to the Railroad).

The test record shall contain the names of the welders and welding foreman or supervisor who made the test weld and briefly describe their specific duties. It shall also show the results of the ultrasonic and hardness tests.

The Engineer reserves the night to require a requalification, at the Contractor's expense, of any crew of welders whose work fails to meet the specified requirements.

All welding shall be performed under the direct supervision of an experienced welding foreman or supervisor. In addition, a manufacturer's representative, experienced in boutet welding shall be present at the job side and shall witness a sufficient number of welds to assure that proper procedure is understood by Contractor's personnel.

The ends of the rails to be welded shall be cleaned to remove all grease, oil, dirt, loose scale, and moisture. The cleaned area shall extend at least six inches (1.52 m) back from the rail ends and shall include all of the rail surfaces. The faces of the rail ends shall be arranged at right angles by cutting or grinding and shall be further cleaned to remove all scale and rust.

The ends of the rails to be welded shall be properly gapped and aligned to produce a weld which will conform to the alignment tolerances specified elsewhere in this section.

There shall be no holes within 12 inches (3.05 m) of the rail to be welded.

The rail ends shall be preheated prior to welding to a sufficient temperature and for sufficient time to ensure full fusion of the weld metal to the rail ends without cracking of the rail or weld.

The molds shall be left in place after tapping for sufficient time to permit complete solidification of the molten metal and proper slow cooling to prevent cracking and provide a completed weld with the proper hardness and ductility.

The completed weld shall be finished by mechanically controlled grinding to conform to the requirements specified elsewhere in this section.

Each completed weld shall have full penetration and complete fusion and be entirely free of cracks. The total area of internal defects such as porosity and stag inclusions shall not exceed 0.060 square inch (39 mm^2) and the largest single porosity or slag defect permitted shall not exceed 1/8 inch (3.2 mm) in diameter.

The hardness of the weld measured on the head of the rail in the center of the weld shall be equal to the Brinell hardness of the parent metal with a tolerance of plus or minus 20 Brinell hardness number.

Field welding record shall be provided by the Contractor. The field welding record shall be continuously maintained to record details of field welding as follows:

(a) Date and time
(b) Location by station stating track and rail
(c) Contractor's foreman
(d) Engineer's representative
(e) Manufacturer's representative
(f) Weather, air and rail temperature
(g) Weld trade name
(h) Track condition and anchorage

All weld testing shall be carried out by and at the expense of the Contractor and shall be witnessed by the Engineer. Weld testing shall be ultrasonically inspected as follows:

(a) Ultrasonic inspection of weld shall be performed using pulse echo technique. Inspection shall be accomplished by contact method using angle beams of 45º and 70º to locate lack of bond, slag inclusions, voids, cracks and gas pockets. Search may be conducted from top surface of the rail. The scan is to be conducted in both longitudinal directions of the rail to completely sweep the head, web and base area of the rail.
(b) Transducers shall have active element of at least 1/2" x 1/2" (12.7 mm x 12.7 mm) and no longer than 3/4" x 3/4" (19 mm x 19 mm). The test frequency shall be 2.25 MHz.
(c) Test equipment shall be calibrated to give a 10dB above base line indication from a 1/8" (3.2 mm) flat bottom hole at 8 3/4" (2.19 m) using a 45º transducer. Flat bottom hole to be perpendicular to the sound beam.
(d) A defect reflection of 6 dB from the base area or lower half of web is rejectable. A 10 dB signal from the upper half of the web or the head web area is rejectable.
(e) The test equipment shall be calibrated to give a 6 dB above base line indication from a 1/8" (3.2 mm) flat bottom hole, a 3" (76.2 mm) using the 70º transducer. A defect reflection of 6 dB or greater shall be cause for rejection.
(f) Light scattered porosity is acceptable. Concentrations where four or more returns in one group or more than one group occur in the same area is cause for rejection.

PAYMENT

The lump sum price paid for construct railroad tracks shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing railroad tracks, complete in place, including removing and disposing of existing permanent track, ballast, and roadway pavement, preparing subgrade, surveying existing track in order to establish the correct alignment of new temporary and permanent track, furnishing and placing temporary and permanent track subballast, ballast, ties, rails and all appurtenant track materials needed to complete the track work, planing asphalt concrete pavement to prepare for constructing temporary asphalt concrete track crossings on Route 29 and California Boulevard, constructing temporary asphalt concrete track crossings on Route 29 and California Boulevard, constructing permanent precast concrete panel track crossings on California Boulevard and Redwood Road, and removing and disposing of temporary track and track crossing on Route 29 when no longer required, submittals and material testing, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.55 CLASS 4 AGGREGATE SUBBASE

Aggregate subbase shall be Class 4 and shall conform to the provisions in Section 25, "Aggregate Subbases," of the Standard Specifications and these special provisions.

The restriction that the amount of reclaimed material included in Class 4 aggregate subbase not exceed 50 percent of the total volume of the aggregate used shall not apply. Aggregate for Class 4 aggregate subbase may include reclaimed glass. Aggregate subbase incorporating reclaimed glass shall not be placed at locations where surfacing will not be placed over the aggregate subbase.

The percentage composition by mass of Class 4 aggregate subbase shall conform to the following grading requirements:

Grading Requirements (Percentage Passing)

Sieve Sizes	Operating Range	Contract Compliance
63 mm	100	100
4.75-mm	35-65	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.

10-1.56 CLASS 2 AGGREGATE BASE

Aggregate base for structures work shall be Class 2 and shall conform to the provisions in Section 26, "Aggregate Bases," of the Standard Specifications.

10-1.57 CLASS 3 AGGREGATE BASE

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)

	19 mm Maximum	
Sieve Sizes	Operating Range	Contract Compliance
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

Grading Requirements (Percentage Passing)

	37.5 mm Maximum	
Sieve Sizes	Operating Range	Contract Compliance
50 mm	100	100
37.5 mm	90-100	87-100
19-mm	50-85	45-90
4.75-mm	25-45	20-50
600-µm	10-25	6-29
75-µm	2-11	0-14

Quality Requirements

Tests	Operating Range	Contract Compliance
Sand Equivalent	25 Min.	22 Min.
Resistance (R-value)	--	78 Min.
Durability Index	--	35 Min.

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.

10-1.58 TREATED PERMEABLE BASE

Treated permeable base shall be asphalt treated and shall conform to the provisions in Section 29, "Treated Permeable Bases," of the Standard Specifications.

10-1.59 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 and these special provisions.

Attention is directed to "Order of Work" of these special provisions. The asphalt pavement on the Route 29 freeway lanes and ramps (M-Line, O-Line, A-Line, B-Line, and D-Line), for stages 1 through 3, shall be kept to a temporary grade of 75 mm below finished grade until the end of stage 3. At the end of stage 3, and prior to stage 4, the final lifts of asphalt concrete (Type A) and open-graded asphalt concrete shall be placed. The intent is this requirement is to facilitate attainment of pavement smoothness requirements as specified in these special provisions.

Open graded asphalt concrete shall conform to the provisions in "Open Graded Asphalt Concrete" 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 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.

The asphalt concrete mixture, composed of the proposed aggregate blend and the proposed asphalt binder content as determined by California Test 367, shall have a minimum tensile strength ratio (TSR) of 70 percent as determined by AASHTO Designation: T283.

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 local roads and ramps not covered by Quality Control/ Quality Assurance requirements does not meet the specified surface tolerances, the finished surface shall be brought within tolerance by either (1) abrasive grinding (with fog seal coat applied on the areas which have been ground), (2) removal and replacement, or (3) placing an overlay of asphalt concrete. The method will be selected by the Engineer. The corrective work shall be at the Contractor's expense.

If abrasive grinding is used to bring the finished surface to specified surface tolerances, additional grinding shall be performed as necessary to extend the area ground in each lateral direction so that the lateral limits of grinding are at a constant offset from, and parallel to the nearest lane line or pavement edge, and in each longitudinal direction so that the grinding begins and ends at lines normal to the pavement centerline, within a ground area. Ground areas shall be neat rectangular areas of uniform surface appearance. Abrasive grinding shall conform to the provisions in the first paragraph and the last 4 paragraphs in Section 42-2.02, "Construction," of the Standard Specifications.

In addition to the straightedge requirements in Section 39-10.04, "Compacting," in Section 11-1, "Quality Control / Quality Assurance," of these special provisions, asphalt concrete pavement shall conform to the surface tolerances specified herein.

The top surface of the uppermost layer of asphalt concrete surfacing shall be profiled, in the presence of the Engineer, using a California Profilograph or equivalent in conformance with California Test 526 and as specified in these special provisions. Prior to beginning profiles, the profilograph shall be calibrated in the presence of the Engineer. Profiles shall be made on the traveled way one meter from and parallel to each edge of traveled way and at the approximate location of the planned lane lines.

Pavement so profiled shall conform to the following Profile Index requirements:

A. Pavement on tangent alignment and pavement on horizontal curves having a centerline radius curve of 600 m or more shall have a Profile Index of 80 mm per kilometer or less for each 160 m section profiled.
B. Pavement on horizontal curves having a centerline radius curve of 300 m or more but less than 600 m including the pavement within the superelevation transition of such curves, shall have a Profile Index of 160 mm per kilometer or less for each 160 m section profiled.
C. Pavement shall not have individual deviations in excess of 8 mm, as determined by California Test 526. The location of the profiles for determining deviations shall be designated by the Engineer.

Checking the following areas of pavement surface with the California Profilograph or equivalent will not be required:

A. Pavement on horizontal curves having a centerline radius curve of less than 300 m and pavement within the superelevation transition of such curves.
B. Pavement with a total thickness of 61 mm or less, or pavement with extensive grade correction which does not receive advance leveling operations as specified in Section 39-10.03, "Spreading," in Section 11-1, "Quality Control / Quality Assurance," in these special provisions, or where the edge of asphalt concrete conforms to curbs or gutters with a Profile Index greater than 80 mm per kilometer.
C. Pavement for ramps and connectors with longitudinal profiles of 8 percent or steeper, or with superelevation rates exceeding 10 percent, and sections of city or county streets and roads less than 50 meters in continuous length.
D. Pavement within 15 m of a transverse joint that separates the pavement from an existing pavement not constructed under the contract.
E. Shoulders and miscellaneous areas.

The Contractor shall schedule paving operations such that final rolling of asphalt concrete pavement is completed and initial runs of the profilograph are completed prior to opening new pavement to public traffic. Scheduling of these operations shall conform to the provisions for lane closures in "Maintaining Traffic" of these special provisions. In the event that initial profiles are not made prior to opening the pavement to public traffic, the initial profilograph runs shall be made the next day that traffic control is permitted for the area to be profiled.

The top surface of the uppermost layer of asphalt concrete surfacing that does not meet specified surface tolerances shall be brought within tolerance by abrasive grinding. Areas which have been subject to abrasive grinding shall receive a fog seal coat. Deviations in excess of 8 mm which cannot be brought into specified surface tolerances by abrasive grinding shall be corrected by either (1) removal and replacement or (2) placing an overlay of asphalt concrete. The corrective method for each area shall be selected by the Contractor and shall be as approved by the Engineer prior to beginning the corrective work. Replacement or overlay pavement not meeting specified tolerances shall be corrected by the methods specified above. Corrective work shall be at the Contractor's expense except that flagging costs will be paid for in conformance with the provisions in Section 12-2, "Flagging," of the Standard Specifications.

After abrasive grinding has been completed to reduce individual deviations in excess of 8 mm, additional grinding or corrections to the surface as specified above shall be performed as necessary to reduce the Profile Index of the pavement to the specified Profile Index value required for the area. The Contractor shall run profilograms of areas that have been subject to abrasive grinding or corrective work until the final profilograms indicate the Profile Index of the area is within the specified tolerance.

When abrasive grinding is used to bring the top surface of the uppermost layer of asphalt concrete surfacing within specified surface tolerances, additional abrasive grinding shall be performed as necessary to extend the area ground in each lateral direction so that the lateral limits of grinding are at a constant offset from, and parallel to the nearest lane line or pavement edge, and in each longitudinal direction so that the grinding begins and ends at lines normal to the pavement centerline, within any ground area. Ground areas shall be neat rectangular areas of uniform surface appearance.

Abrasive grinding shall conform to the provisions in the first paragraph and the last 4 paragraphs in Section 42-2.02, "Construction," of the Standard Specifications, except that the grinding residue 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 original of final profilograms that indicate the pavement surface is within the Profile Index specified shall become the property of the State and shall be delivered to the Engineer prior to acceptance of the contract.

Full compensation for performing all profile checks for Profile Index and furnishing final profilograms to the Engineer, for performing corrective work to the pavement surface including abrasive grinding, removing and replacing asphalt concrete or placing asphalt concrete overlay to bring the surface within the tolerance specified shall be considered as included in the contract price paid per tonne for asphalt concrete Type A and no separate payment will be made therefor.

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 drop-off of more than 46 mm will not be allowed at any time between adjacent lanes open to public traffic.

Half-width surfacing operations for local roads shall be conducted in such manner that, at the end of each day's work, the distance between the ends of adjacent surfaced lanes shall not be greater than can be completed in the following day of normal surfacing operations.

Asphalt concrete surfacing shall be placed on existing surfacing, including curve widening, 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.

The aggregate from each separate bin used for asphalt concrete, Type A, except for the bin containing the fine material, shall have a Cleanness Value of 57, minimum, as determined by California Test 227, modified as follows:

A. Tests will be performed on the material retained on the 2.36-mm sieve from each bin and will not be a combined or averaged result.
B. Each test specimen will be prepared by hand shaking for 30 seconds, a single loading of the entire sample on a 305-mm diameter, 4.75-mm sieve, nested on top of a 305-mm diameter, 2.36-mm sieve.
C. Where a coarse aggregate bin contains material which will pass the maximum size specified and be retained on a 9.5-mm sieve, the test specimen mass and volume of wash water specified for 25-mm x 4.75-mm aggregate size will be used.
D. Samples will be obtained from the weigh box area during or immediately after discharge from each bin of the batching plant or immediately prior to mixing with asphalt in the case of continuous mixers.
E. The Cleanness Value of the test sample from each of the bins will be separately computed and reported.

At drier-drum and continuous plants with cold feed control, Cleanness Value test samples will be obtained from the discharge of each coarse aggregate storage. An aggregate sampling device shall be provided which will provide a 25-kg sample of each coarse aggregate.

10-1.60 OPEN GRADED ASPHALT CONCRETE

Open graded asphalt concrete shall conform to the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions. Section 11-1, "Quality Control / Quality Assurance," of these special provisions shall not apply to open graded asphalt concrete.

The aggregate for open graded asphalt concrete shall conform to the 12.5 mm maximum grading specified in Section 39-2.02, "Aggregate," of the Standard Specifications.

10-1.61 ASPHALT CONCRETE (MISCELLANEOUS AREAS)

Surfacing of miscellaneous areas with asphalt concrete shall conform to the provisions for miscellaneous areas in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions.

Asphalt concrete placed in miscellaneous areas may be produced in conformance with the requirements for asphalt concrete placed on the traveled way in Section 11-1, "Quality Control / Quality Assurance," of these special provisions.

The amount of asphalt binder used in asphalt concrete placed in dikes, gutters, gutter flares, overside drains, and aprons at the ends of drainage structures shall be increased one percent by mass of the aggregate over the amount of asphalt binder determined for use in asphalt concrete placed on the traveled way.

The 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.

Asphalt concrete placed in miscellaneous areas will be paid for at the contract price per tonne for asphalt concrete in conformance with the provisions in Section 11-1, "Quality Control / Quality Assurance," of these special provisions. Section 39-11.02, "Statistical Evaluation and Determination of Pay Factor," in Section 11-1, "Quality Control / Quality Assurance," of these special provisions, shall not apply to asphalt concrete placed in miscellaneous areas. Payment for placing asphalt concrete in miscellaneous areas and dikes will be in conformance with the provisions in Section 39-8.02, "Payment," of the Standard Specifications.

10-1.62 PILING

GENERAL

Piling shall conform to the provisions in Section 49, "Piling," of the Standard Specifications, and these special provisions.

Unless otherwise specified, welding of any work performed in conformance with the provisions in Section 49, "Piling," of the Standard Specifications, shall be in conformance with the requirements in AWS D1.1.

Foundation recommendations are included in the "Information Handout" available to the Contractor as provided for in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

Attention is directed to "Welding Quality Control" of these special provisions.

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

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

Difficult pile installation is anticipated due to the presence of dense soils and high ground water.

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

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

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

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

Jetting and Drilling

Jetting or drilling to obtain the specified penetration in conformance with the provisions in Section 49-1.05, "Driving Equipment," of the Standard Specifications shall not be used for driven type piles.

CAST-IN-DRILLED-HOLE CONCRETE PILES (SOUND WALL)

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 fourth paragraph of 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.

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 cement per cubic meter.

Gradations proposed by the Contractor for cast-in-drilled-hole concrete piling shall be within the following percentage passing limits:

Primary Aggregate Nominal Size	Sieve Sizes	Limits of Proposed Gradation
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

The grading requirements for coarse aggregates for cast-in-drilled-hole concrete piling are shown in the following table for each size of coarse aggregate:

	Percentage Passing Primary Aggregate Nominal Sizes					
	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
37.5-mm	100	100				
25-mm	88 - 100	86 - 100				
19-mm	X ± 15	X ± 22	100	100		
12.5-mm			82 - 100	80 - 100	100	100
9.5-mm	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

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:

Grading Limits of Combined Aggregate			
	Percentage Passing		
Sieve Sizes	25-mm Max.	12.5-mm Max.	9.5-mm Max.
37.5-mm	100		
25-mm	90 - 100		
19-mm	55 - 100	100	100
12.5-mm		90 - 100	100
9.5-mm	45 - 75	55 - 86	50 - 100
4.75-mm	35 - 60	45 - 63	45 - 63
2.36-mm	27 - 45	35 - 49	35 - 49
1.18-mm	20 - 35	25 - 37	25 - 37
600-µm	12 - 25	15 - 25	15 - 25
300-µm	5 - 15	5 - 15	5 - 15
150-µm	1 - 8	1 - 8	1 - 8
75-µm	0 - 4	0 - 4	0 - 4

All references in the Standard Specifications to the aggregate grading tables in Section 90-3, "Aggregate Gradings, " of the Standard Specifications, shall also apply to the aggregate grading tables specified herein.

Mineral Slurry

Mineral slurry shall be mixed and thoroughly hydrated in slurry tanks, and slurry shall be sampled from the slurry tanks and tested before placement in the drilled hole.

Slurry shall be recirculated or continuously agitated in the drilled hole to maintain the specified properties.

Recirculation shall include removal of drill cuttings from the slurry before discharging the slurry back into the drilled hole. When recirculation is used, the slurry shall be sampled and tested at least every 2 hours after beginning its use until tests show that the samples taken from the slurry tank and from near the bottom of the hole have consistent specified properties. Subsequently, slurry shall be sampled at least twice per shift as long as the specified properties remain consistent.

Slurry that is not recirculated in the drilled hole shall be sampled and tested at least every 2 hours after beginning its use. The slurry shall be sampled midheight and near the bottom of the hole. Slurry shall be recirculated when tests show that the samples taken from midheight and near the bottom of the hole do not have consistent specified properties.

Slurry shall also be sampled and tested prior to final cleaning of the bottom of the hole and again just prior to placing concrete. Samples shall be taken from midheight and near the bottom of the hole. Cleaning of the bottom of the hole and placement of the concrete shall not start until tests show that the samples taken from midheight and near the bottom of the hole have consistent specified properties.

Mineral slurry shall be tested for conformance to the requirements shown in the following table:

MINERAL SLURRY		
PROPERTY	REQUIREMENT	TEST
Density (kg/m^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 degrees Celsius when tested.		

Any caked slurry on the sides or bottom of hole shall be removed before placing reinforcement. If concrete is not placed immediately after placing reinforcement, the reinforcement shall be removed and cleaned of slurry, the sides of the drilled hole cleaned of caked slurry, and the reinforcement again placed in the hole for concrete placement.

Synthetic Slurry

Synthetic slurries shall be used in conformance with the manufacturer's recommendations and these special provisions. The following synthetic slurries may be used:

PRODUCT	MANUFACTURER
SlurryPro CDP	KB Technologies Ltd. Suite 216 735 Broad Street Chattanooga, TN 37402 (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

Inclusion of a synthetic slurry on the above list may be obtained by meeting the Department's requirements for synthetic slurries. The requirements can be obtained from the Office of Structure Design, P.O. Box 942874, Sacramento, CA 94274-0001.

Synthetic slurries listed may not be appropriate for a given site.

Synthetic slurries shall not be used in holes drilled in primarily soft or very soft cohesive soils as determined by the Engineer.

A manufacturer's representative, as approved by the Engineer, shall provide technical assistance for the use of their product, shall be at the site prior to introduction of the synthetic slurry into a drilled hole, and shall remain at the site until released by the Engineer.

Synthetic slurries shall be sampled and tested at both mid-height and near the bottom of the drilled hole. Samples shall be taken and tested during drilling as necessary to verify the control of the properties of the slurry. Samples shall be taken and tested when drilling is complete, but prior to final cleaning of the bottom of the hole. When samples are in conformance with the requirements shown in the following tables for each slurry product, the bottom of the hole shall be cleaned and any loose or settled material removed. Samples shall be obtained and tested after final cleaning with steel reinforcement in place and just prior to placing concrete.

SlurryPro CDP synthetic slurries shall be tested for conformance to the requirements shown in the following table:

SLURRYPRO CDP 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 degrees Celsius 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 degrees Celsius when tested.		

Shore Pac GCV synthetic slurries shall be tested for conformance to the requirements shown in the following table:

Shore Pac GCV 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 degrees Celsius when tested.		

Water Slurry

At the option of the Contractor water may be used as slurry when casing is used for the entire length of the drilled hole. Water slurry shall be tested for conformance to the requirements shown in the following table:

WATER SLURRY		
PROPERTY	REQUIREMENT	TEST
Density (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 description, details, and supporting calculations as listed below:

A. Requirements for all cast-in-drilled hole concrete piling:

1. Concrete mix design, certified test data, and trial batch reports.
2. Drilling or coring methods and equipment.
3. Proposed method for casing installation and removal when necessary.
4. Plan view drawing of pile showing reinforcement and inspection pipes, if required.
5. Methods for placing, positioning, and supporting bar reinforcement.
6. Methods and equipment for accurately determining the depth of concrete and actual and theoretical volume placed, including effects on volume of concrete when any casings are withdrawn.
7. Methods and equipment for verifying that the bottom of the drilled hole is clean prior to placing concrete.
8. Methods and equipment for preventing upward movement of reinforcement, including the Contractor's means of detecting and measuring upward movement during concrete placement operations.

B. Additional requirements when concrete is placed under slurry:

1. Concrete batching, delivery, and placing systems including time schedules and capacities therefor. Time schedules shall include the time required for each concrete placing operation at each pile.
2. Concrete placing rate calculations. When requested by the Engineer, calculations shall be based on the initial pump pressures or static head on the concrete and losses throughout the placing system, including anticipated head of slurry and concrete to be displaced.
3. Suppliers test reports on the physical and chemical properties of the slurry and any proposed slurry chemical additives including Material Safety Data Sheet.
4. Slurry testing equipment and procedures.
5. Removal and disposal of excavation, slurry, and contaminated concrete, including methods and rates of removal.
6. Slurry agitating, recirculating, and cleaning methods and equipment.

In addition to compressive strength requirements, the consistency of the concrete to be deposited under slurry shall be verified before use by producing a batch to be tested. The test batch shall be produced and delivered to the project under conditions and in time periods similar to those expected during the placement of concrete in the piles. Concrete for the test batch shall be placed in an excavated hole or suitable container of adequate size to allow testing in conformance with California Test 533. Depositing of test batch concrete under slurry will not be required. For piles where the time required for each concrete placing operation, as submitted in the placing plan, will be 2 hours or less, the test batch shall demonstrate that the proposed concrete mix design achieves both the specified nominal penetration and a penetration of at least 50 mm after twice that time has elapsed. For piles where the time required for each concrete placing operation, as submitted in the placing plan, will be more than 2 hours, the test batch shall demonstrate that the proposed concrete mix design achieves both the specified nominal penetration and a penetration of at least 50 mm after that time plus 2 hours has elapsed. The time period shall begin at the start of placement. The concrete shall not be vibrated or agitated during the test period. Upon completion of testing, the concrete shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Concrete deposited under slurry shall not be vibrated until all temporary casing is removed and concrete contaminated with soil, slurry, or other materials is removed. Concrete deposited under slurry shall be vibrated in the upper 2 m of the pile.

The concrete deposited under slurry shall be carefully placed in a compact, monolithic mass and by a method that will prevent washing of the concrete. Placing concrete shall be a continuous operation lasting not more than the time required for each concrete placing operation at each pile, as submitted in the placing plan, unless otherwise approved in writing by the Engineer. The concrete shall be placed with concrete pumps and delivery tube system of adequate number and size to complete the placing of concrete in the time specified. The delivery tube system shall consist of one of the following:

A. A tremie tube or tubes, each of which are at least 250 mm in diameter, fed by one or more concrete pumps.
B. One or more concrete pump tubes, each fed by a single concrete pump.

The delivery tube system shall consist of watertight tubes with sufficient rigidity to keep the ends always in the mass of concrete placed. If only one delivery tube is utilized to place the concrete, the tube shall be placed near the center of the drilled hole. Multiple tubes shall be uniformly spaced in the hole. Internal bracing for the steel reinforcing cage shall accommodate the delivery tube system. Tremies shall not be used for piles without space for a 250-mm tube.

Spillage of concrete into the slurry during concrete placing operations shall not be allowed. Delivery tubes shall be capped with a water tight cap, or plugged above the slurry level with a good quality, tight fitting, moving plug that will expel the slurry from the tube as the tube is charged with concrete. The cap or plug shall be designed to be released as the tube is charged. The pump discharge or tremie tube shall extend to the bottom of the hole before charging the tube with concrete. After charging the delivery tube system with concrete, the flow of concrete through a tube shall be induced by slightly raising the discharge end. During concrete placement, the tip of the delivery tube shall be maintained to prevent reentry of the slurry into the tube. Until at least 3 m of concrete has been placed, the tip of the delivery tube shall be within 150 mm of the bottom of the drilled hole, and then the embedment of the tip shall be maintained at least 3 m below the top surface of the concrete. Rapid raising or lowering of the delivery tube shall not be permitted. If the seal is lost or the delivery tube becomes plugged and must be removed, the tube shall be withdrawn, the tube cleaned, the tip of the tube capped to prevent entrance of the slurry, and the operation restarted by pushing the capped tube 3 m into the concrete and then reinitiating the flow of concrete.

When slurry is used, a fully operational standby concrete pump, adequate to complete the work in the time specified, shall be provided at the site during concrete placement. The slurry level shall be maintained within 300 mm of the top of the drilled hole.

A log of concrete placement for each drilled hole shall be maintained by the Contractor when concrete is deposited under slurry. The log shall show the pile location, tip elevation, dates of excavation and concrete placement, total quantity of concrete deposited, length and tip elevation of any casing, and details of any hole stabilization method and materials used. The log shall include a 215 mm x 280 mm sized graph of the concrete placed versus depth of hole filled. The graph shall be plotted continuously throughout placing of concrete. The depth of drilled hole filled shall be plotted vertically with the pile tip oriented at the bottom and the quantity of concrete shall be plotted horizontally. Readings shall be made at least at each 1.5 m of pile depth, and the time of the reading shall be indicated. The graph shall be labeled with the pile location, tip elevation, cutoff elevation, and the dates of excavation and concrete placement. The log shall be delivered to the Engineer within one working day of completion of placing concrete in the pile.

After placing reinforcement and prior to placing concrete in the drilled hole, if drill cuttings settle out of slurry, the bottom of the drilled hole shall be cleaned. The Contractor shall verify that the bottom of the drilled hole is clean.

If temporary casing is used, concrete placed under slurry shall be maintained at a level at least 1.5 m above the bottom of the casing. The withdrawal of casings shall not cause contamination of the concrete with slurry.

Acceptance Testing and Mitigation

Vertical inspection pipes for acceptance testing shall be provided in all cast-in-drilled-hole concrete piles that are 600 mm in diameter or larger, except when the holes are dry or when the holes are dewatered without the use of temporary casing to control the groundwater.

Inspection pipes shall be Schedule 40 polyvinyl chloride pipe with a nominal inside diameter of 50 mm. Each inspection pipe shall be capped top and bottom and shall have watertight couplers to provide a clean, dry and unobstructed 50-mm diameter clear opening from 1.0 m above the pile cutoff down to the bottom of the reinforcing cage.

Inspection pipes shall be placed around the pile, inside the outermost spiral or hoop reinforcement, and 75 mm clear of the vertical reinforcement, at a uniform spacing not exceeding 840 mm measured along the circle passing through the centers of inspection pipes. A minimum of 2 inspection pipes per pile shall be used. When the vertical reinforcement is not bundled and each bar is not more than 26 mm in diameter, inspection pipes may be placed 50 mm clear of the vertical reinforcement. The inspection pipes shall be placed to provide the maximum diameter circle that passes through the centers of the inspection pipes while maintaining the clear spacing required herein. The pipes shall be installed in straight alignment, parallel to the main reinforcement, and securely fastened in place to prevent misalignment during installation of the reinforcement and placing of concrete in the hole.

The Contractor shall log the location of the inspection pipe couplers with respect to the plane of pile cut off, and these logs shall be delivered to the Engineer upon completion of the placement of concrete in the drilled hole.

After placing concrete and before requesting acceptance tests, each inspection pipe shall be tested by the Contractor in the presence of the Engineer by passing a 48.3-mm diameter rigid cylinder 610 mm long through the complete length of pipe. If the 48.3-mm diameter rigid cylinder fails to pass any of the inspection pipes, the Contractor shall attempt to pass a 32.0-mm diameter rigid cylinder 1.375 m long through the complete length of those pipes in the presence of the Engineer. If an inspection pipe fails to pass the 32.0-mm diameter cylinder, the Contractor shall immediately fill all inspection pipes in the pile with water.

The Contractor shall replace each inspection pipe that does not pass the 32.0-mm diameter cylinder with a 50.8-mm diameter hole cored through the concrete for the entire length of the pile. Cored holes shall be located as close as possible to the inspection pipes they are replacing, no more than 150 mm inside the reinforcement, and coring shall not damage the pile

reinforcement. Cored holes shall be made with a double wall core barrel system utilizing a split tube type inner barrel. Coring with a solid type inner barrel will not be allowed. Coring methods and equipment shall provide intact cores for the entire length of the pile concrete. The coring operation shall be logged by an Engineering Geologist or Civil Engineer licensed in the State of California and experienced in core logging. Coring logs shall include complete descriptions of inclusions and voids encountered during coring, and shall be delivered to the Engineer upon completion. Concrete cores shall be preserved, identified with the exact location the core was recovered from within the pile, and made available for inspection by the Engineer.

Acceptance tests of the concrete will be made by the Engineer, without cost to the Contractor. Acceptance tests will evaluate the homogeneity of the placed concrete. Tests will include gamma-gamma logging. Tests may also include crosshole sonic logging and other means of inspection selected by the Engineer. The Contractor shall not conduct operations within 8.0 m of the gamma-gamma logging operations. The Contractor shall separate reinforcing steel as necessary to allow the Engineer access to the inspection pipes to perform gamma-gamma logging or other acceptance testing. After requesting acceptance tests and providing access to the piling, the Contractor shall allow 3 weeks for the Engineer to conduct these tests and make determination of acceptance if the 48.3-mm diameter cylinder passed all inspection pipes, and 4 weeks if only the 32.0-mm diameter cylinder passed all inspection pipes. Should the Engineer fail to complete these tests within the time allowance, and if in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in inspection, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

All inspection pipes and cored holes in a pile shall be dewatered and filled with grout after notification by the Engineer that the pile is acceptable. Placement and removal of water in the inspection pipes shall be at the Contractors expense. Grout shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. The inspection pipes and holes shall be filled using grout tubes that extend to the bottom of the pipe or hole or into the grout already placed.

If acceptance testing performed by the Engineer determines that a pile does not meet the requirements of the specifications, then that pile will be rejected and all depositing of concrete under slurry or concrete placed using temporary casing for the purpose of controlling groundwater shall be suspended until written changes to the methods of pile construction are approved in writing by the Engineer.

The Contractor shall submit to the Engineer for approval a mitigation plan for repair, supplementation, or replacement for each rejected cast-in-drilled-hole concrete pile, and this plan shall conform to the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. Prior to submitting this mitigation plan, the Engineer will hold a repair feasibility meeting with the Contractor to discuss the feasibility of repairing rejected piling. The Engineer will consider the size of the defect, the location of the defect, and the design information and corrosion protection considerations for the pile. This information will be made available to the Contractor, if appropriate, for the development of the mitigation plan. If the Engineer determines that it is not feasible to repair the rejected pile, the Contractor shall not include repair as a means of mitigation and shall proceed with the submittal of a mitigation plan for replacement or supplementation of the rejected pile.

If the Engineer determines that a rejected pile does not require mitigation due to structural, geotechnical, or corrosion concerns, the Contractor may elect to 1) repair the pile per the approved mitigation plan, or 2) not repair anomalies found during acceptance testing of that pile. For such unrepaired piles, the Contractor shall pay to the State, $400 per cubic meter for the portion of the pile affected by the anomalies. The volume, in cubic meters, of the portion of the pile affected by the anomalies, shall be calculated as the area of the cross-section of the pile affected by each anomaly, in square meters, as determined by the Engineer, multiplied by the distance, in meters, from the top of each anomaly to the specified tip of the pile. If the volume calculated for one anomaly overlaps the volume calculated for additional anomalies within the pile, the calculated volume for the overlap shall only be counted once. In no case shall the amount of the payment to the State for any such pile be less than $400. The Department may deduct the amount from any moneys due, or that may become due the Contractor under the contract.

Pile mitigation plans shall include the following:

A. The designation and location of the pile addressed by the mitigation plan.
B. A review of the structural, geotechnical, and corrosion design requirements of the rejected pile.
C. A step by step description of the mitigation work to be performed, including drawings if necessary.
D. An assessment of how the proposed mitigation work will address the structural, geotechnical, and corrosion design requirements of the rejected pile.
E. Methods for preservation or restoration of existing earthen materials.
F. A list of affected facilities, if any, with methods and equipment for protection of these facilities during mitigation.
G. The State assigned contract number, bridge number, full name of the structure as shown on the contract plans, District-County-Route-Kilometer Post , and the Contractor's (and Subcontractor's if applicable) name on each sheet.
H. A list of materials, with quantity estimates, and personnel, with qualifications, to be used to perform the mitigation work.
I. The seal and signature of an engineer who is licensed as a Civil Engineer by the State of California.

For rejected piles to be repaired, the Contractor shall submit a pile mitigation plan that contains the following additional information:

A. An assessment of the nature and size of the anomalies in the rejected pile.
B. Provisions for access for additional pile testing if required by the Engineer.

For rejected piles to be replaced or supplemented, the Contractor shall submit a pile mitigation plan that contains the following additional information:

A. The proposed location and size of additional piling.
B. Structural details and calculations for any modification to the structure to accommodate the replacement or supplemental piling.

All provisions for cast-in-drilled-hole concrete piling shall apply to replacement piling.

The Contractor shall allow the Engineer 3 weeks to review the mitigation plan after a complete submittal has been received.

Should the Engineer fail to review the complete pile mitigation submittal within the time specified, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the pile mitigation plan, an extension of time commensurate with the delay in completion of the work thus caused will be granted in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

When repairs are performed, the Contractor shall submit a mitigation report to the Engineer within 10 days of completion of the repair. This report shall state exactly what repair work was performed and quantify the success of the repairs relative to the submitted mitigation plan. The mitigation report shall be stamped and signed by an engineer that is licensed as a Civil Engineer by the State of California. The mitigation report shall show the State assigned contract number, bridge number, full name of the structure as shown on the contract plans, District-County-Route-Kilometer Post, and the Contractor (and Subcontractor if applicable) name on each sheet. The Engineer will be the sole judge as to whether a mitigation proposal is acceptable, the mitigation efforts are successful, and to whether additional repairs, removal and replacement, or construction of a supplemental foundation is required.

Redriving

Piles at Trancas Street Overcrossing (Br. No. 21-0101), North Napa Underpass (Br. No. 21-0102), North Napa Pedestrian Overcrossing (Br. No. 21-0107), Retaining Wall No. 1 (Br. No. 21-RETW1) and Retaining Wall No. 2 (Br. No. 21-RETW2) which do not attain the required bearing value when the pile tip has reached the specified tip elevation shall be allowed to stand for a "set period" without driving. The "set period" shall be at least 24 hours unless bearing has been obtained sooner. After the required "set period" has elapsed, 2 piles or 10 percent of such piles in a footing, whichever is greater, shall be redriven. The Engineer will designate which piles are to be redriven. Redriving shall consist of operating the driving hammer at full rated energy on the pile and then measuring the bearing value of the pile.

If the required bearing value has been attained for each pile designated to be redriven, then the remaining piles in that footing shall be considered satisfactory and further driving will not be required. If redriving said designated piles demonstrates that the required bearing value has not been attained, all piles in that footing shall be redriven until the required bearing value has been reached.

Full compensation for redriving and for conforming to the requirements for "set period" and any delays in connection therewith shall be considered as included in the contract unit price paid for driving the piles involved and no separate payment will be made therefor.

MEASUREMENT AND PAYMENT (PILING)

Measurement and payment for the various types and classes of piles shall conform to the provisions in Sections 49-6.01, "Measurement," and 49-6.02, "Payment," of the Standard Specifications and these special provisions.

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

- Timber, steel, and precast prestressed concrete piles, and cast-in-place concrete piles consisting of driven shells filled with concrete, will be paid for at the contract price per meter for furnish piling and the contract unit price for drive pile.

The third paragraph of 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.

Full compensation for reinforcement in the cast-in-drilled-hole concrete piling shall be considered as included in the contract price paid per meter for cast-in-drilled-hole concrete piling and no separate payment will be allowed therefor.

Full compensation for furnishing and placing additional testing reinforcement, for load test anchorages, and for cutting off test piles as specified, 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.

The seventh paragraph of 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 bearing and penetration, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

Full compensation for slurry, depositing concrete under slurry, test batches, inspection pipes, filling inspection holes and pipes with grout, drilling oversized cast-in-drilled-hole concrete piling, filling cave-ins and oversized piles with concrete, and redrilling through concrete, shall be considered as included in the contract prices paid per meter for cast-in-drilled-hole concrete piling of the types and sizes listed in the Engineer's Estimate, and no additional compensation will be allowed therefor.

10-1.63 TIEDOWN ANCHORS

Tiedown anchors at the footings of Retaining Wall No. 2 (Br. No. 21-RETW2), consisting of holes drilled in foundation material, grouted strands, and anchorage assemblies, and testing of installed anchors, shall conform to the details shown on the plans, the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications and these special provisions.

Foundation recommendations are included in the "Information Handout" available to the Contractor in conformance with the provisions in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

Difficult tiedown installation is anticipated due to the presence of dense soil and high ground water.

The Contractor shall determine the bond length necessary to meet acceptance criteria specified herein.

The submittal of reduced prints of corrected original tracings will not be required for tiedown anchor installations.

In fabricating, handling, shipping, and placing tiedown anchors, adequate care shall be taken to avoid damage to the sheathing. All damage to the sheathing caused by handling and fabrication prior to tiedown anchor installation shall be repaired or replaced as determined by the Engineer. Repair procedure for the sheathing shall be included in the working drawings.

The Contractor may submit, for approval by the Engineer and in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, calculations and details for furnishing an alternative number of tiedowns that provides the same vertical component and distribution of the design force as provided by the planned tiedowns. Alternative footing tiedown details shall be furnished, for approval by the Engineer, if the number of tiedowns is changed. Alternative design calculations and details shall be signed by an engineer who is licensed as a Civil Engineer in the State of California.

MATERIALS

Whenever "member" is referred to in Section 50, "Prestressing Concrete," of the Standard Specifications, it shall be considered to mean tiedown anchor.

Structural steel for the tiedowns shall conform to the provisions in Section 55, "Steel Structures," of the Standard Specifications and these special provisions. Structural steel shall consist of the anchorage assembly and the anchorage enclosure. The anchorage assembly and the anchorage enclosure shall be galvanized as indicated on the plans. The provisions of "Welding Quality Control" of these special provisions shall not apply to the anchorage enclosure or to the weld

between the steel tube and the bearing plate of the anchorage assembly for tiedowns. Those provisions shall apply to all other welds of structural steel for tiedowns at retaining walls footings.

The permanent bearing plate of the tiedown anchor shall effectively distribute the design force (T), to the top of concrete footing, such that the concrete bearing stress does not exceed 11 MPa and the bending stress does not exceed 0.55 f_y for steel nor 0.36 f_y for cast steel or cast iron.

Grout shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. Fine aggregate may be added to the grout mixture of portland cement and water used outside of the grouted sheathing in drilled holes which are 200 mm or greater in diameter, but only to the extent that the cement content of the grout is not less than 500 kg per cubic meter of grout. Fine aggregate, if used, shall conform to the provisions in Section 90-2, "Materials," and Section 90-3, "Aggregate Gradings," of the Standard Specifications.

The plastic sheathing for tiedown anchors shall conform to the following: polyvinyl chloride (PVC) sheathing, high density polyethylene (HDPE) sheathing, and polypropylene sheathing.

Corrugated plastic sheathing shall be PVC or HDPE. The width of corrugations, the distance between corrugations, and the height of corrugations of corrugated plastic sheathing shall be approximately the same.

PVC sheathing may be used for corrugated sheathing. PVC sheathing shall conform to ASTM Designation: D 1784, Class 13464-B. Corrugated PVC sheathing shall have a nominal wall thickness of 1.0 mm. HDPE sheathing may be used for corrugated sheathing. HDPE sheathing shall have a density between 940 kg/m^3 and 960 kg/m^3 as measured in accordance with ASTM Designation: D 792, A-2. Corrugated HDPE sheathing shall have a nominal wall thickness of 1.5 mm for sheathing with an outside diameter of 75 mm or greater, and a nominal thickness of 1.0 mm for sheathing with an outside diameter less than 75 mm, with a tolerance of minus 0.25-mm.

HDPE sheathing may be used for the smooth sheathing encapsulating individual strands of strand type tendons. Smooth HDPE sheathing for encapsulating strands shall have a minimum wall thickness of 1.0 mm. Polypropylene sheathing may be used for the smooth plastic sheathing encapsulating individual strands of strand type tendons. Polypropylene sheathing shall have a density between 900 kg/m^3 and 910 kg/m^3. Smooth polypropylene sheathing shall have a minimum wall thickness of 1.0 mm.

The smooth sheathing for the unbonded length of the individual strands shall have sufficient strength to prevent damage during construction operations, shall be watertight, chemically stable without embrittlement or softening, and nonreactive with concrete, steel or corrosion inhibiting grease. Smooth plastic sheathing, including joints, shall be watertight.

The corrugated sheathing, including joints, shall have sufficient strength to prevent damage during construction operations, shall be grout-tight and watertight, chemically stable without embrittlement or softening, and nonreactive with concrete, steel or corrosion inhibiting grease.

The transition between the corrugated plastic sheathing and the anchorage assembly shall be an approved detail that allows stressing to the design force without evidence of distress in the corrugated plastic sheathing.

Additional requirements for tiedowns with strand type tendons are as follows:

A. The individual strands of a tendon, except for the bonded length, shall be fully coated with corrosion inhibiting grease and then encapsulated by a smooth HDPE or polypropylene sheath. The corrosion inhibiting grease shall fill all space between strand wires and shall encapsulate the strand giving an encasement diameter at least 0.12-mm greater than the diameter of the bare strand. The sheath shall be hot melt extruded onto the strand or shall be shop applied by an approved method that assures that all spaces between the sheath and the strand and between the strand wires are filled with corrosion inhibiting grease.
B. The corrosion inhibiting grease shall provide a continuous nonbrittle film of corrosion protection to the prestressing steel and lubrication between the strand and the sheathing, shall resist flow from the sheathing, shall be chemically stable and nonreactive with the prestressing steel, sheathing material and concrete, and shall be organic with appropriate polar, moisture displacing, and corrosion inhibiting additives.
C. The corrosion inhibiting grease shall have the physical properties listed in Table 3.2.1 of the Post Tensioning Manual, Fourth Edition, by the Post Tensioning Institute and as modified below. At least 40 days before use, a sample from the lot to be used and test results shall be provided for the corrosion inhibiting grease.

Test	Requirements	ASTM Designation:
Water Soluble Ions: Nitrates	10 g/kg max.	D 3867
Corrosion Test: 5% Salt Fog @ 38° C. 125 µm coating on 76 mm x 152 mm Q panel Type S, 1000 hrs min.	Grade 7 or better	B 117, D 610
Compatibility with sheathing: Hardness change & volume change of polymer after exposure to grease 40 days at 66° C.	15% max. 10% max.	D 4289, Except use D 792 for density

CONSTRUCTION

Tiedown anchors shall be installed in accordance with the manufacturer's recommendations. In case of a conflict between the manufacturer's recommendations and these special provisions, these special provisions shall prevail.

Water and grout from tiedown anchor construction operations shall not be permitted to fall on public traffic, to flow across shoulders or lanes occupied by public traffic, or to flow into landscaping, gutters or other drainage facilities. Excessive amounts of water shall not be used in any of the drilling and the tiedown anchor installation procedures.

The holes through footings shall be cored by methods that will not shatter or damage the concrete adjacent to the holes.

Tiedown anchor steel shall be protected prior to completion of all grouting against rust, corrosion and physical damage in conformance with the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications. In addition, there shall be no evidence of distress in the plastic sheathing or crushing of the cement grout within the pregrouted sheathing.

The tiedown anchorage assembly shall be protected against rust, corrosion and physical damage, prior to completion of all grouting of enclosure or encasement in concrete.

The tiedown anchor installation method selected by the Contractor shall be sufficient to achieve the loadings specified herein. Holes for tiedown anchors shall be drilled in the foundation to a depth sufficient to provide the necessary bond length beyond the minimum unbonded length shown on the plans.

Tiedown anchorage holes shall be drilled by either the rotary or percussion drilling method.

The top level of tiedowns shall be installed in drilled holes advanced with drill casing. Drill casing shall be removed while filled with grout as the initial grout is being placed.

The diameter of the drilled hole shall be large enough to provide a minimum of 25 mm grout cover within the full-length of the tendon. Centralizers shall be used within the full-length of the tendon.

Pregrouting shall occur at least 48 hours before placing the tendon in the drilled hole.

Prior to installing each anchor assembly into the drilled hole, the anchor assembly shall be clean and free of oil, grease or other extraneous substances, and any damage to the sheathing shall be repaired or replaced.

Grout for all stages of tiedown construction shall be injected at the low end of the void being filled and shall be expelled at the high end until there is no evidence of entrapped air, water or diluted grout. The grout shall be placed using grout tubes, unless another method is approved by the Engineer. The quantity of the grout and the grout pressures shall be recorded.

After placing initial grout, the anchor shall remain undisturbed until the grout has reached a strength sufficient to provide anchorage during testing operations.

Additional requirements for tiedowns with strand type tendons are as follows:

A. trand tendons shall be sheathed with corrugated sheathing. The individual strands within the bonded length shall be separated by spaces so that the entire surface of each strand is bonded in the grout. The maximum spacing of strand spacers shall be 1.50 m. The strand spacers shall be plastic and of a construction and strength that will provide support for the individual strands during construction operations.
B. The tendon is sheathed full length with corrugated sheathing and pregrouted a minimum length of 600 mm before placing the tendon in the hole. After placing the tendon into the drilled hole and before placing initial grout in the drilled hole, the grout shall be injected at the low end of the corrugated sheathing and the grout shall be expelled at the high end until there is no evidence of entrapped air, water or diluted grout.

C. Anchors in holes of 150 mm diameter and smaller shall be initially grouted to within 150 mm of the end of the steel tube. Grout in the unbonded length shall not be placed under pressure. After placing the initial grout, the anchor shall remain undisturbed until the grout has reached a strength sufficient to provide anchorage during testing operations.

D. Anchors in holes of greater than 150 mm diameter shall be initially grouted within the bond length. After placing the initial grout, the anchor shall remain undisturbed until the grout has reached a strength sufficient to provide anchorage during testing operations.

Testing

All tiedowns shall be load tested by either a performance test or a proof test. Load testing shall be performed against the top of concrete footing. The concrete footing shall either attain a compressive strength of 22 MPa or cure for 7 days before loading. Bearing pads shall be kept a minimum of 300 mm away from the edges of the drilled hole. The magnitude of applied test loads shall be determined with a calibrated pressure gauge or a load cell. Movements of the end of the tiedown, relative to an independent fixed reference point, shall be measured and recorded to the nearest 0.025 mm at each load increment during the load tests. The Contractor shall perform the measuring and recording and shall furnish the Engineer copies of the recorded movements.

A minimum of 3 tiedowns shall be performance tested. The Engineer shall determine the location of the tiedowns to be performance tested.

The performance test or proof test shall be conducted by measuring the test load applied to the tiedown and the tiedown end movement during incremental loading and unloading of the anchor in accordance with the loading schedule. The test load shall be held constant for 10 minutes. During the test load hold, the movement of the end of the tendon shall be measured at 1, 2, 3, 4, 5, 6, and 10 minutes. If the total movement between one minute and 10 minutes exceeds one mm, the test load shall be held for an additional 50 minutes. Total movement shall be measured at 15, 20, 25, 30, 45, and 60 minutes. If the test load is held for 60 minutes, a creep curve showing the creep movement between one minute and 60 minutes shall be plotted as a function of the logarithm of time.

LOADING SCHEDULES		
PERFORMANCE TEST		PROOF TEST
	(CONT'D)	
AL	AL	AL
0.25T	0.25T	0.25T
AL	0.50T	0.50T
0.25T	0.75T	0.75T
0.50T	1.00T	1.00T
AL	1.25T	1.25T
0.25T	AL	1.50T (TEST LOAD)
0.50T	0.25T	AL
0.75T	0.50T	
AL	0.75T	
0.25T	1.00T	
0.50T	1.25T	
0.75T	1.50T (TEST LOAD)	
1.00T (CONT'D)	AL	
T = Design force for the anchor shown on the plans		
AL = Alignment load		

For performance and proof tests, each increment of load shall be applied in less than one minute and held for at least one minute but not more than 2 minutes or as specified above. The observation period for the load hold shall start when the pump begins to apply the last increment of load.

The jacking equipment, including the tendon movement measuring system, shall be stable during all phases of the tiedown loading operations.

All tiedowns not performance tested shall be proof tested. If 1.5 times the design force cannot be obtained, the tiedown shall be redesigned and replaced. Tiedown anchors shall not be retested, unless the tiedown bond length is post-grouted after the unacceptable test.

A performance tested tiedown is acceptable if:

A. The measured elastic movement exceeds 0.80 of the theoretical elongation of the unbonded length plus the jacking length at the maximum test load; and
B. The creep movement between one and 10 minutes is less than 1.0 mm.

A proof tested tiedown is acceptable if:

A. The pattern of movements is similar to that of adjacent performance tested tiedowns; and
B. The creep movement between one and 10 minutes is less than 1.0 mm.

Performance tested or proof tested tiedowns which fail to meet acceptance criterion B will be acceptable if the maximum load is held for 60 minutes and the creep curve plotted from the movement data indicates a creep rate of less than 2.0 mm for the last log cycle of time.

Lock-off

After successful testing of the tiedowns, the tiedowns shall be tensioned against the structure and locked off at a load equal to 0.75T. The lock-off force is the load on the jacks which is maintained while the anchor head or anchor nuts on the tiedown are permanently set. Immediately after lock-off, a lift-off test shall be performed to demonstrate that the specified lock-off force was obtained. Adjustments in the shim thickness shall be made if required to maintain the specified lock-off force.

For strand tendons, the permanent wedges shall be fully set in the anchor head while the tendon is stressed to the test load of 1.50 T, and then locked off at the lock-off force by removal of the shims or other appropriate means.

Grouting to the level of secondary grouting to the dimensions shown on the plans shall be completed only after successful testing and lock-off has been completed. At least 24 hours after the secondary grout has set, the remaining void in the steel tube and bearing plate shall be filled with grout. Grout shall be injected at the low end and expelled at the high end until there is no evidence of entrapped air or water. A minimum grout head of 600 mm shall be maintained until the grout has set.

The tiedown anchor head or anchor nuts shall be enclosed with a grouted anchorage enclosure device. After grouting the steel tube, the bearing plate surface shall be cleaned, silicon sealant placed, and the anchorage enclosure bolted in place. After bolting the anchorage enclosure in place the void in the anchorage enclosure shall be filled with grout by injecting grout at the low end of the void and venting at the high end. Any holes in the top of the anchorage enclosure used for grout placement shall be cleaned and sealed with silicon sealant.

MEASUREMENT AND PAYMENT

No payment will be made for tiedowns which do not pass the specified testing requirements.

Tiedown anchors will be measured and paid for by the unit, and the number for payment will be determined by the requirements of the details shown on the plans. No change in the number of tiedown anchors to be paid for will be made because of the use by the Contractor of an alternative number of tiedowns.

The contract unit price paid for tiedown anchor shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the tiedown anchors, including special measures taken to contain grout in the drilled hole, testing, and furnishing and installing anchorage assemblies, complete in place, including repair or replacement of sheathing as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.64 PRESTRESSING CONCRETE

Prestressing concrete shall conform to the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications and these special provisions.

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:

- The coating material shall be on the Department's list of approved coating materials for epoxy-coated strand, available from the Transportation Laboratory.
- The film thickness of the coating after curing shall be 381 µm to 1143 µm.
- 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.
- 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.
- In addition to the requirements in Section 50-1.10, "Samples for Testing," four 1.5-m long samples of coated 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. All visible damage to coatings caused by shipping and handling, or during installation, including cut ends, shall be repaired in conformance with the requirements in ASTM Designation: A 882/A 882M. The patching material shall be furnished by the manufacturer of the epoxy powder and shall be applied in conformance with the manufacturer's written recommendations. The patching material shall be compatible with the original epoxy coating material and shall be inert in concrete.

• All bars in any individual member shall be of the same grade, unless otherwise permitted by the Engineer.

• When bars are to be extended by the use of couplers, the assembled units shall have a tensile strength of not less than the manufacturer's minimum guaranteed ultimate tensile strength of the bars. Failure of any one sample to meet this requirement will be cause for rejection of the heat of bars and lot of couplers. The location of couplers in the member shall be subject to approval by the Engineer.

• Wires shall be straightened if necessary to produce equal stress in all wires or wire groups or parallel lay cables that are to be stressed simultaneously or when necessary to ensure proper positioning in the ducts.

• Where wires are to be button-headed, the buttons shall be cold formed symmetrically about the axes of the wires. The buttons shall develop the minimum guaranteed ultimate tensile strength of the wire. No cold forming process shall be used that causes indentations in the wire. Buttonheads shall not contain wide open splits, more than 2 splits per head, or splits not parallel with the axis of the wire.

• Prestressing steel shall be protected against physical damage and rust or other results of corrosion at all times from manufacture to grouting or encasing in concrete. Prestressing steel that has sustained physical damage at any time shall be rejected. The development of visible rust or other results of corrosion shall be cause for rejection, when ordered by the Engineer.

• Epoxy-coated prestressing steel strand shall be covered with an opaque polyethylene sheeting or other suitable protective material to protect the strand from exposure to sunlight, salt spray, and weather. For stacked coils, the protective covering shall be draped around the perimeter of the stack. The covering shall be adequately secured; however, it should allow for air circulation around the strand to prevent condensation under the covering. Epoxy-coated strand shall not be stored within 300 m of ocean or tidal water for more than 2 months.

• Prestressing steel shall be packaged in containers or shipping forms for the protection of the steel against physical damage and corrosion during shipping and storage. Except for epoxy-coated strand, a corrosion inhibitor which prevents rust or other results of corrosion, shall be placed in the package or form, or shall be incorporated in a corrosion inhibitor carrier type packaging material, or when permitted by the Engineer, may be applied directly to the steel. The corrosion inhibitor shall have no deleterious effect on the steel or concrete or bond strength of steel to concrete. Packaging or forms damaged from any cause shall be immediately replaced or restored to original condition.

• The shipping package or form shall be clearly marked with a statement that the package contains high-strength prestressing steel, and the type of corrosion inhibitor used, including the date packaged.

• Prestressing steel for post-tensioning which is installed in members prior to placing and curing of the concrete, and which is not epoxy-coated, shall be continuously protected against rust or other results of corrosion, until grouted, by means of a corrosion inhibitor placed in the ducts or applied to the steel in the duct. The corrosion inhibitor shall conform to the provisions specified herein.

- When steam curing is used, prestressing steel for post-tensioning shall not be installed until the steam curing is completed.
- Water used for flushing ducts shall contain either quick lime (calcium oxide) or slaked lime (calcium hydroxide) in the amount of 0.01-kg/L. Compressed air used to blow out ducts shall be oil free.
- When prestressing steel for post-tensioning is installed in the ducts after completion of concrete curing, and if stressing and grouting are completed within 10 days after the installation of the prestressing steel, rust which may form during those 10 days will not be cause for rejection of the steel. Prestressing steel installed, tensioned, and grouted in this manner, all within 10 days, will not require the use of a corrosion inhibitor in the duct following installation of the prestressing steel. Prestressing steel installed as above but not grouted within 10 days shall be subject to all the requirements in this section pertaining to corrosion protection and rejection because of rust. The requirements in this section pertaining to tensioning and grouting within 10 days shall not apply to epoxy-coated prestressing steel strand.
- Any time prestressing steel for pretensioning is placed in the stressing bed and is exposed to the elements for more than 36 hours prior to encasement in concrete, adequate measures shall be taken by the Contractor, as approved by the Engineer, to protect the steel from contamination or corrosion.
- After final fabrication of the seven-wire prestressing steel strand, no electric welding of any form shall be performed on the prestressing steel. Whenever electric welding is performed on or near members containing prestressing steel, the welding ground shall be attached directly to the steel being welded.
- Pretensioned prestressing steel shall be cut off flush with the end of the member. For epoxy-coated prestressing steel, only abrasive saws shall be used to cut the steel. The exposed ends of the prestressing steel and a 25-mm strip of adjoining concrete shall be cleaned and painted. Cleaning shall be by wire brushing or abrasive blast cleaning to remove all dirt and residue on the metal or concrete surfaces. Immediately after cleaning, the surfaces shall be covered with one application of unthinned zinc-rich primer (organic vehicle type) conforming to the provisions in Section 91, "Paint," except that 2 applications shall be applied to surfaces which will not be covered by concrete or mortar. Aerosol cans shall not be used. The paint shall be thoroughly mixed at the time of application and shall be worked into any voids in the prestressing tendons.

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

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

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

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

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

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

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

The number of working drawings to be submitted for initial review shall be 8 sets for railroad bridges and 4 sets for other structures.

The details shown on the plans for cast-in-place prestressed box girder bridges are based on a bonded full length draped tendon prestressing system. For these bridges the Contractor may, in conformance with the provisions in Section 5-1.14,

"Cost Reduction Incentive," of the Standard Specifications, propose an alternative prestressing system utilizing bonded partial length tendons provided the proposed system and associated details meet the following requirements:

A. The proposed system and details shall provide moment and shear resistances at least equal to those used for the design of the structure shown on the plans.
B. The concrete strength shall not be less than that shown on the plans.
C. Not less than 35 percent of the total prestressing force at any section shall be provided by full length draped tendons.
D. Anchorage blocks for partial length tendons shall be located so that the blocks will not interfere with the placement of the utility facilities shown on the plans or of any future utilities to be placed through openings shown on the plans.
E. Temporary prestressing tendons, if used, shall be detensioned, and the temporary ducts shall be filled with grout before completion of the work. Temporary tendons shall be either removed or fully encased in grout before completion of the work.
F. All details of the proposed system, including supporting checked calculations, shall be included in the drawings submitted in conformance with the provisions in Section 50-1.02, "Drawings," of the Standard Specifications.

Moments and shears for loads used in the design shown on the plans will be made available to the Contractor upon written request to the Engineer.

10-1.65 CONCRETE STRUCTURES

Portland cement concrete structures shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Junction structures for Drainage System No. 11 shall conform to the provisions in Section 51-1.02, "Minor Concrete," and Section 70-1.02H, "Precast Concrete Structures," of the Standard Specifications and these special provisions.

Reinforcing bars for junction structures for Drainage System No. 11 shall be low-alloy steel deformed bars conforming to the requirements in ASTM Designation: A 706/A 706M or of ASTM Designation: A 615/A 615M, Grade 60.

MEASUREMENT AND PAYMENT

The lower box portion of the Junction Structures for Drainage System No. 11 will be measured and paid for by the cubic meter of minor concrete (minor structure) as provided in Section 51-1.22, "Measurement," and Section 51-1.23, "Payment", of the Standard Specifications. No deduction in pay quantities for minor concrete (minor structure) for manholes will be made for the volume of structural concrete occupied by pipe collars or pipe openings.

The upper structure of the Junction Structures for Drainage System No. 11 will be measured and paid for by the linear meter of reinforced concrete pipe riser as provided in Section 70-1.04, "Measurement," and Section 70-1.05, "Payment," of the Standard Specifications.

The frame and cover of the Junction Structure for Drainage System No. 11 shall be measured and paid for by the kilogram for miscellaneous iron and steel as provided in Section 75-1.06, "Measurement," and Section 75-1.07, "Payment," of the Standard Specifications.

10-1.66 REINFORCED CONCRETE BOX CULVERTS

Reinforced concrete box culvert shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications. Reinforced concrete box culverts, if not designated on the plans, may be furnished and installed, at the option of the Contractor, as precast units conforming the provisions in the section "Precast Concrete Box Culverts" of these special provisions, as shown on the plans, and as directed by the Engineer.

10-1.67 PRECAST CONCRETE BOX CULVERTS

If the Contractor elects to use the "Precast Concrete Box Culvert" alternative where permitted on the plans, the precast concrete box culvert shall conform to the details shown on the plans and the following:

A. Earthwork, including sand bedding, shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications.
B. Reinforcement shall conform to the requirements in welded wire fabric of ASTM Designation: A 185 or A 497, at the Contractor's option.
C. A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be provided to the Engineer for each precast member shipment. The certificate shall be signed by the manufacturer's quality control representative and shall state that all materials and workmanship comply in all respects with the specification requirements and all approved submittals.

D. The dry cast method of construction will be permitted when designated on the working drawings. When the dry cast method is used, the results shall be equal in all respects to those obtained by conformance with the provisions in Section 51 and adequate arrangements shall be made and carried out for curing, finishing and protecting the concrete. External vibrators shall be used and the forms shall be sufficiently rigid to resist displacement or damage. The dry casting forms may be removed at any time after consolidating the concrete providing no slumping of the concrete occurs.
E. Working drawings shall be submitted to the Engineer for approval in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. Working drawings shall show the construction method, precast unit dimensions, configuration of the reinforcement (including splice type and location), and height of earth cover.
F. The Contractor shall select the allowable combination of concrete dimensions and reinforcement, where more than one allowable combination of concrete dimensions and reinforcement for precast concrete box culvert is shown on the plans.
G. Concrete for precast units shall be sampled and tested by the precast manufacturer for compressive strength at least once every production shift and not less often than once daily. Test result records shall be available to the Engineer at all times during regular work shifts.
H. Each precast unit shall be clearly marked by indentation, waterproof paint, or other approved means. Markings shall include the State contract number, date of manufacture, name or trademark of the manufacturer, and design earth cover. Each precast unit shall be clearly marked by indentation on either the inner or outer surface during the process of manufacture so that the location of the top will be evident immediately after the forms are stripped. In addition, the word "top" shall be lettered with waterproof paint on the inside and outside surfaces of the top of each precast unit.
I. Manufacturing tolerances for precast concrete box culvert sections shall conform to the requirements in Section 11, "Permissible Variations," of AASHTO Specification: M 259M.
J. The ends of the precast members shall be so formed that the sections can be laid together to make a continuous line of box sections with a smooth interior free of appreciable irregularities in the flow line.
K. Handling devices or holes will be permitted in each member for the purpose of handling and laying. Cored and handling holes shall be plugged and sealed so the members meet all the requirements in the specification.
L. Splices in circumferential reinforcement shall be made by lapping. Welded connections at splices for the outside apron of steel will be allowed only in the splice area shown on the plans. The wall reinforcement on the inside of the box may be lapped and welded at any location or connected by welding at the corners to the slab reinforcement at the inside of the box.
M. The exposure of spacers, standoffs or the ends of longitudinals used to position the reinforcement shall not be a cause for rejection. Spacers or standoffs shall not be welded to circumferential reinforcement. Spacers or standoffs may be welded to longitudinal reinforcement.
N. Laying of precast concrete box culvert shall conform to the provisions for laying reinforced concrete pipe in Section 65-1.07, "Laying Pipe," of the Standard Specifications and these special provisions.
O. Joints shall conform to the requirements for cement mortar or resilient material joints in Section 65-1.06, "Joints," of the Standard Specifications. An external sealing band conforming to ASTM Designation: C 877 may be used in lieu of the joint material in said Section 65-1.06.

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.

Shotcrete shall not be used as an alternative construction method for reinforced concrete members unless otherwise specified.

Neoprene strip shall be furnished and installed at abutment backwall joint protection of Trancas Street Overcrossing (Br. No. 21-0101) in conformance with the details shown on the plans, the provisions in the Standard Specifications, and these special provisions.

Furnishing and installing neoprene strip shall conform to the requirements for strip waterstops as provided in Section 51-1.145, "Strip Waterstops," of the Standard Specifications, except that the protective board will not be required.

Materials for access opening covers in soffits of new cast-in-place concrete box girder bridges shall conform to the provisions for materials in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

Plastic pipe located at vertical drains used behind retaining walls, including horizontal or sloping drains down slopes and across sidewalk areas shall be polyvinyl chloride (PVC) plastic pipe, Schedule 80, conforming to the provisions for pipe for edge drains and edge drain outlets in Section 68-3.02, "Materials," of the Standard Specifications. The vertical drain pipe shall be rigidly supported in place during backfilling operations.

Vertical, horizontal, radial, or normal dimensions shown on the Typical Section in the plans, are for zero percent cross-slope. At the Contractor's option, the Typical Section of superelevated concrete box girder structures with (1) sloping exterior girders, (2) a straight uninterrupted cross slope between edges of deck, and (3) a single profile grade line, may be rotated around the profile grade line in superelevation areas. The horizontal distances between the profile grade line and the edges of deck shall remain unchanged. The planned girder widths and slab thicknesses shall remain unchanged and the interior girder stems shall remain vertical at the planned locations.

FALSEWORK

Falsework shall be designed and constructed in conformance with the requirements in Section 51-1.06, "Falsework," of the Standard Specifications and these special provisions.

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

51-1.06A Falsework Design and Drawings

- 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 " 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.
- Attention is directed to Section 5-1.02, "Plans and Working Drawings."
- For falsework over railroads, approval by the Engineer of the falsework drawings will be contingent upon the drawings being satisfactory to the railroad company involved.
- Except for placement of foundation pads and piles, the construction of any unit of falsework shall not start until the Engineer has reviewed and approved the drawings for that unit.
- Except as otherwise provided in the special provisions, the Contractor shall allow 3 weeks after complete drawings and all support data are submitted, for the review of any falsework plan.
- 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.
- Should the Engineer fail to complete the review within the time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in falsework plan review, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays."
- The Contractor may revise approved falsework drawings provided sufficient time is allowed for the Engineer's review and approval before construction is started on the revised portions. The additional time will not be more than that which was originally allowed.
- 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.
- The falsework drawings shall include a superstructure placing diagram showing the concrete placing sequence and construction joint locations. When a schedule for placing concrete is shown on the contract plans, no deviation will be permitted.
- The maximum length of falsework spans used to support T-beam girder bridges shall not exceed 4.3 m plus 8.5 times the depth of the T-beam girder.

- When footing type foundations are to be used, the Contractor shall determine the bearing value of the soil and shall show the values assumed in the design of the falsework on the falsework drawings.
- When pile type foundations are to be used, the falsework drawings shall show the maximum horizontal distance that the top of a falsework pile may be pulled in order to position the falsework pile under its cap. The falsework plans shall also show the maximum allowed deviation of the top of the pile, in its final position, from a vertical line through the point of fixity of the pile.
- 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.
- Anticipated total settlements of falsework and forms shall be shown on the falsework drawings. These should include falsework footing settlement and joint take-up. Anticipated settlements shall not exceed 25 mm. Falsework supporting deck slabs and overhangs on girder bridges shall be designed so that there will be no differential settlement between the girders and the deck forms during placement of deck concrete.
- Falsework footings shall be designed to carry the load imposed upon the footings without exceeding the estimated soil bearing values and anticipated settlements.
- Foundations for individual steel towers where the maximum leg load exceeds 130 kN shall be designed and constructed to provide uniform settlement under all legs of each tower under all loading conditions.
- The support systems for form panels supporting concrete deck slabs and overhangs on girder bridges shall also be considered to be falsework and designed as such.
- Temporary bracing shall be provided, as necessary, to withstand all imposed loads during erection, construction, and removal of any falsework. The falsework drawings shall show provisions for the temporary bracing, or methods to be used to conform to this requirement during each phase of erection and removal. Wind loads shall be included in the design of the bracing or methods.
- The falsework design calculations shall show the stresses and deflections in load supporting members.
- The design of falsework will not be approved unless it is based on the use of loads and conditions which are no less severe than those described in Section 51-1.06A(1), "Design Loads," and based on the use of stresses and deflections which are no greater than those described in Section 51-1.06A(2), "Design Stresses, Loadings, and Deflections." The Contractor is responsible for the proper evaluation of the falsework materials and design of the falsework to safely carry the actual loads imposed.

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

51-1.06A(1) Design Loads

- 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.
- Dead loads shall include the loads due to the mass of concrete, reinforcing steel, forms, and falsework. The loads due to the mass of concrete, reinforcing steel, and forms shall be assumed to be not less than 25 kN/m^3 for normal concrete and not less than 20 kN/m^3 for lightweight concrete.
- Live loads shall consist of the actual load of any equipment to be supported by falsework applied as concentrated loads at the points of contact, and a uniform load of not less than 960 N/m^2 applied over the area supported, plus 1100 N/m applied at the outside edge of deck overhangs.
- The assumed horizontal load to be resisted by the falsework bracing system shall be the sum of the actual horizontal loads due to equipment, construction sequence, or other causes, and an allowance for wind, but in no case shall the assumed horizontal load to be resisted in any direction be less than 2 percent of the total dead load. The falsework shall be designed so that it will have sufficient rigidity to resist the assumed horizontal load without considering the load due to the concrete.
- The minimum horizontal load to be allowed for wind on heavy-duty steel shoring or steel pipe column falsework having a vertical load carrying capacity exceeding 130 kN per leg or column shall be the sum of the products of the wind impact area, shape factor, and applicable wind pressure value for each height zone. The wind impact area is the total projected area of all the elements in the tower face or falsework bent normal to the direction of the applied wind. The shape factor shall be taken as 2.2 for heavy-duty shoring and 1.0 for pipe column falsework. Wind pressure values shall be determined from the following table:

Height Zone (Meters above ground)	Wind Pressure Value (Pa)	
	Shores or Columns Adjacent to Traffic	At Other Locations
0-9	960	720
9-15	1200	960
15-30	1440	1200
over 30	1675	1440

• The minimum horizontal load to be allowed for wind on all other types of falsework, including falsework supported on heavy-duty shoring or pipe column falsework, shall be the sum of the products of the wind impact area and applicable wind pressure value for each height zone. The wind impact area is the gross projected area of the falsework and any unrestrained portion of the permanent structure, excluding the areas between falsework bents or towers where diagonal bracing is not used. Wind pressure values shall be determined from the following table:

Height Zone (Meters above ground)	Wind Pressure Value (Pa)	
	For Members Over and Bents Adjacent to Traffic Opening	At Other Locations
0 to 9	2.0 Q	1.5 Q
9 to 15	2.5 Q	2.0 Q
15 to 30	3.0 Q	2.5 Q
Over 30	3.5 Q	3.0 Q

Q = 48 + 31.4 W; but shall not be more than 479 Pa.

W = width of the falsework system, in meters, measured in the direction of the wind force being considered.

• The entire superstructure cross-section, except railing, shall be considered to be placed at one time except as provided herein. Girder stems and connected bottom slabs, if placed more than 5 days prior to the top slab, may be considered to be self supporting between falsework posts at the time the top slab is placed provided that the distance between falsework posts does not exceed 4 times the depth of the portion of the girder placed in the first pour.

• 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.

• If the concrete is to be prestressed, the falsework shall be designed to support any increased or readjusted loads caused by the prestressing forces.

Section 51-1.06A(2), "Design Stresses, Loadings, and Deflections," of the Standard Specifications is amended to read:

51-1.06A(2) Design Stresses, Loadings, and Deflections

• The maximum allowable design stresses and loadings listed in this Section 51-1.06A(2), are based on the use of undamaged, high-quality materials, and such stresses and loadings shall be reduced by the Contractor if lesser quality materials are to be used.

• The maximum allowable stresses, loadings, and deflections used in the design of the falsework shall be as follows:

Timber:

Compression perpendicular to the grain	3.1 MPa
Compression parallel to the grain	$3310 \div (L/d)^2$ MPa; not to exceed 11 MPa
Flexural stress	12.4 MPa; 10.3 MPa for members with a nominal depth of 205 mm or less
Horizontal shear	1.0 MPa
Axial tension	8.3 MPa
Deflection due to concrete loading only	0.0042 of the span, irrespective of deflection compensated for by camber strips
Modulus of elasticity (E)	11×10^3 MPa
Timber piles	400 kN

L = unsupported length (mm).

d = least dimension of a square or rectangular column, or the width of a square of equivalent cross-sectional area for round columns (mm).

• Timber connections shall be designed in conformance with the procedures, stresses, and loads permitted in the Falsework Manual as published by the Department of Transportation.

Steel:

• For identified grades of steel, design stresses, except stresses due to flexural compression, shall not exceed those specified in the Manual of Steel Construction as published by the AISC.

• When the grade of steel cannot be positively identified, design stresses, except stresses due to flexural compression, shall not exceed either those specified in the AISC Manual for ASTM Designation: A 36/A 36M steel or the following:

Tension, axial and flexural	152 MPa
Compression, axial	$110\,300\text{-}2.62(L/r)^2$ kPa; except L/r shall not exceed 120
Shear on gross section of web of rolled shapes	100 MPa
Web crippling for rolled shapes	186 MPa

• For all grades of steel, design stresses and deflections shall not exceed the following:

Compression, flexural	$\frac{83\,000}{Ld/bt}$	MPa, but not to exceed 152 MPa for unidentified steel or steel conforming to the requirements in ASTM Designation: A 36/A 36M nor $0.6F_y$ for other identified steel
Deflection due to concrete loading only	0.0042 of the span, irrespective of deflection compensated for by camber strips	

• In the foregoing formulas, L is the unsupported length; d is the least dimension of rectangular columns, or the width of a square of equivalent cross-sectional area for round columns, or the depth of beams; b is the width and t is the thickness of the compression flange; and r is the radius of gyration of the member. All dimensions are expressed in millimeters. F_y is the specified minimum yield stress, in MPa, for the grade of steel used.

• The modulus of elasticity (E) used for steel shall be 20.7×10^4 MPa.

Manufactured Assemblies:

• The maximum loadings and deflections used on jacks, brackets, columns, joists, and other manufactured devices shall not exceed the manufacturer's recommendations except that the dead load deflection of the joists used at locations other than under deck slabs between girders shall not exceed 0.0042 of their spans. If requested by the Engineer, the Contractor shall furnish engineering data from the manufacturer verifying the manufacturer's recommendations, or shall perform tests as necessary to demonstrate the adequacy of the devices proposed for use.

Welding and Nondestructive Testing

Welding of steel members, except for when fillet welds are used where load demands are less than or equal to 175 N/mm for each 3 mm of fillet weld, shall conform to AWS D1.1 or other recognized welding standard. The welding standard to be utilized shall be specified by the Contractor on the working drawings.

Splices made by field welding of steel beams at the project site shall undergo nondestructive testing (NDT). At the option of the Contractor, either ultrasonic testing (UT) or radiographic testing (RT) shall be used as the method of NDT for each field weld and any repair made to a previously welded splice in a steel beam. Testing shall be performed at locations selected by the Contractor. The length of a splice weld where NDT is to be performed, shall be a cumulative weld length equal to 25 percent of the original splice weld length. The cover pass shall be ground smooth at the locations to be tested. The acceptance criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional NDT shall be performed on the repaired sections. The NDT method chosen shall be used for an entire splice evaluation including any required repairs.

For all field welded splices and previously welded splices, the Contractor shall furnish to the Engineer a letter of certification which certifies that all welding and NDT, including visual inspection, are in conformance with the specifications and the welding standard shown on the approved working drawings. The letter of certification shall be signed by an engineer who is registered as a Civil Engineer in the State of California and shall be provided prior to placing any concrete for which the falsework is being erected to support.

Section 51-1.06A(3), "Special Locations," of the Standard Specifications is amended to read:

51-1.06A(3) Special Locations

• In addition to the minimum requirements specified in this Section 51-1.06A, falsework over or adjacent to roadways or railroads which are open to traffic shall be designed and constructed so that the falsework will be stable if subjected to impact by vehicles. Falsework posts which support members that cross over a roadway or railroad shall be considered as adjacent to roadways or railroads. Other falsework posts shall be considered as adjacent to roadways or railroads only if they are located in the row of falsework posts nearest to the roadway or railroad, and the horizontal distance from the traffic side of the falsework to the edge of pavement, or to a point 3 m from the centerline of track, is less than the total height of the falsework and forms. The Contractor shall provide any additional features for the work needed to ensure that falsework will be stable if subjected to impact by vehicles and to comply with the provisions in Section 7-1.09, "Public Safety." The falsework design at these locations shall include, but not be limited to, the following minimum provisions:

The vertical load used for the design of falsework posts and towers, but not footings, which support the portion of the falsework over openings, shall be the greater of the following:

(1) 150 percent of the design load calculated in conformance with the provisions for design load previously specified but not including any increased or readjusted loads caused by the prestressing forces, or
(2) the increased or readjusted loads caused by the prestressing forces.

Falsework posts adjacent to roadways or railroads shall consist of either steel with a minimum section modulus about each axis of 156×10^3 mm^3, or sound timbers with a minimum section modulus about each axis of 4.1×10^6 mm^3.

Each falsework post adjacent to roadways or railroads shall be mechanically connected to its supporting footing at its base, or otherwise laterally restrained, so as to withstand a force of not less than 9 kN applied at the base of the post in any direction except toward the roadway or railroad track. The posts also shall be mechanically connected to the falsework cap or stringer. The mechanical connection shall be capable of resisting a load in any horizontal direction of not less than 4.5 kN.

For falsework spans over roadways, all exterior falsework stringers, and stringers adjacent to the ends of discontinuous caps, the stringer or stringers over points of minimum vertical clearance and every fifth remaining stringer, shall be mechanically connected to the falsework cap or framing. The mechanical connections shall be capable of resisting a load in any direction, including uplift on the stringer, of not less than 2.2 kN. The connections shall be installed before traffic is allowed to pass beneath the span. For falsework spans over railroads, all falsework stringers shall be so connected to caps.

When timber members are used to brace falsework bents which are located adjacent to roadways or railroads, all connections for the timber bracing shall be of the bolted type using 16-mm diameter or larger bolts.

The falsework shall be located so that falsework footings or piles are at least 75 mm clear of railing posts and barriers, and all other falsework members are at least 0.3-m clear of railing members and barriers.

Falsework bents within 6 m of the center line of a railroad track shall be sheathed solid in the area between 1 m and 5 m above the track elevation on the side facing the track. Sheathing shall consist of plywood not less than 16-mm thick or lumber not less than 19-mm thick. Bracing on these bents shall be adequate so that the bent will resist the required assumed horizontal load or 22 kN, whichever is greater.

The dimensions of the clear openings to be provided through falsework for roadways shall be as specified in "Maintaining Traffic," of the special provisions.

The dimensions of clear openings to be provided through the falsework for railroads shall be as specified in "Railroad Relations and Insurance," of the special provisions.

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

51-1.06B Falsework Construction

- The falsework shall be constructed to substantially conform to the falsework drawings. The materials used in the falsework construction shall be of the quality necessary to sustain the stresses required by the falsework design. When manufactured assemblies are used in falsework, the Contractor shall furnish to the Engineer a letter of certification which certifies that all components of these manufactured assemblies are used in conformance with the manufacturer's recommendations. The workmanship used in falsework construction shall be of such quality that the falsework will support the loads imposed on the falsework without excessive settlement or take-up beyond that shown on the falsework drawings.
- Falsework shall be founded on a solid footing safe against undermining, protected from softening, and capable of supporting the loads imposed on the falsework. When requested by the Engineer, the Contractor shall demonstrate by suitable load tests that the soil bearing values assumed for the design of the falsework do not exceed the supporting capacity of the soil.
- When falsework is supported on piles, the piles shall be driven and the actual bearing value assessed in conformance with the provisions in Section 49, "Piling."
- For falsework piles with a calculated loading capacity greater than 900 kN, the Contractor shall conduct dynamic monitoring of pile driving and conduct penetration and bearing analyses based on a wave equation analysis. These analyses shall be signed by an engineer who is registered as a Civil Engineer in the State of California and submitted to the Engineer prior to completion of falsework erection.
- When falsework is over or adjacent to roadways or railroads, all details of the falsework system which contribute to horizontal stability and resistance to impact, except for bolts in bracing, shall be installed at the time each element of the falsework is erected and shall remain in place until the falsework is removed.
- Prior to the placement of falsework members above the stringers, the final bracing system for the falsework shall be installed.
- Temporary railing (Type K), conforming to the provisions in Section 12-3, "Traffic-Handling Equipment and Devices," shall be installed on both sides of all vehicular openings through falsework and, when ordered by the Engineer, at all other falsework less than 3.6 m from the edge of a traffic lane. Temporary railings shall begin approximately 46 m in advance of the falsework and shall extend past the falsework, in the direction of adjacent traffic flow. For 2-way traffic openings, the temporary railing shall extend at least 18 m past the falsework, in the direction of adjacent traffic flow. The location and length of railing and the type of flare to be used shall be as ordered by the Engineer. The clear vehicular opening between temporary railings shall be not less than that specified in the special provisions.
- The installation of temporary railing shall be complete before falsework erection is begun. Temporary railing at falsework shall not be removed until the removal is approved by the Engineer.
- Temporary railing (Type K) installed as specified above will be measured and paid for as provided in Section 12-4, "Measurement and Payment," except that when the Engineer's Estimate does not include a contract item for temporary railing (Type K), full compensation for furnishing, placing, maintaining, repairing, replacing, and removing the temporary railing at falsework locations as specified in this Section 51-1.06B, shall be considered as included in the contract prices paid for the various items of work requiring falsework, and no separate payment will be made therefor.
- Camber strips shall be used where directed by the Engineer to compensate for falsework deflection, vertical alignment, and anticipated structure deflection. The Engineer will furnish to the Contractor the amount of camber to be used in constructing the falsework.
- The Contractor shall provide tell-tales attached to the soffit forms and readable from the ground in enough systematically placed locations to determine the total settlement of the entire portion of the structure where concrete is being placed.

- Deck slab forms between girders shall be constructed with no allowance for settlement relative to the girders.
- Dead loads, other than those due to forms and reinforcing steel, shall not be applied to any falsework until authorized by the Engineer.
- Should unanticipated events occur, including settlements that deviate by more than ±10 mm from those indicated on the falsework drawings, which in the opinion of the Engineer would prevent obtaining a structure conforming to the requirements of these specifications, the placing of concrete shall be discontinued until corrective measures satisfactory to the Engineer are provided. In the event satisfactory measures are not provided prior to initial set of the concrete in the affected area, the placing of concrete shall be discontinued at a location determined by the Engineer. All unacceptable concrete shall be removed.

Section 51-1.06C, "Removing Falsework," of the Standard Specifications is amended to read:

51-1.06C Removing Falsework

- Falsework supporting any span of a simple span bridge shall not be released before 10 days after the last concrete, excluding concrete above the bridge deck, has been placed. Unless otherwise permitted by the Engineer, falsework supporting any span of a continuous or rigid frame bridge shall not be released before 10 days after the last concrete, excluding concrete above the bridge deck, has been placed in that span and in the adjacent portions of each adjoining span for a length equal to at least one-half the length of the span where falsework is to be released.
- Falsework for cast-in-place prestressed portions of structures shall not be released until after the prestressing steel has been tensioned.
- Falsework supporting any span of a continuous or rigid frame bridge shall not be removed until all required prestressing has been completed in that span and in the adjacent portions of each adjoining span for a length equal to at least one-half the length of the span where falsework is to be released.
- Falsework for arch bridges shall be removed uniformly and gradually, beginning at the crown and working toward the springing, to permit the arch to take its load slowly and evenly. Falsework for adjacent arch spans shall be struck simultaneously.
- Falsework supporting overhangs, deck slabs between girders, and girder stems which slope 45 degrees or more off vertical shall not be released before 7 days after the deck concrete has been placed.
- Falsework supporting the sides of the girder stems which slope less than 45 degrees off vertical may be removed prior to placing deck slab concrete, providing a reshoring system is installed. The reshoring system shall consist of lateral supports which are designed to resist all rotational forces acting on the stem, including those caused by the placement of deck slab concrete. The lateral supports shall be installed immediately after each form panel is removed and prior to the release of supports for the adjacent form panel.
- Falsework for bent caps which will support steel or precast concrete girders shall not be released before 7 days after the cap concrete has been placed. Girders shall not be erected onto the bent caps until the concrete in the cap has attained a compressive strength of 18 MPa or 80 percent of the specified strength, whichever is higher.
- Unless otherwise specified, removing falsework supporting any span of structural members subject to bending, shall conform to the requirements for removing falsework supporting any span of a simple span bridge.
- In addition to the above requirements, no falsework for bridge spans shall be released until the supported concrete has attained a compressive strength of 18 MPa or 80 percent of the specified strength, whichever is higher.
- Falsework for box culverts and other structures with decks lower than the roadway pavement and with span lengths of 4.25 m or less shall not be released until the last placed concrete has attained a compressive strength of 11 MPa, provided that curing of the concrete is not interrupted. Falsework removal for other box culverts shall conform to the requirements for release of bridge falsework.
- Falsework for arch culverts shall not be released before 40 hours after the supported concrete has been placed.
- 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.
- All falsework materials shall be completely removed. Falsework piling shall be removed at least 0.6-m below the surface of the original ground or original streambed. When falsework piling is driven within the limits of ditch or channel excavation areas, the falsework piling within those areas shall be removed to at least 0.6-m below the bottom and side slopes of the excavated areas.
- All debris and refuse resulting from the work shall be removed and the premises left in a neat and presentable condition.

In addition to the provisions in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications, the time to be provided for the Engineer's review of the working drawings for specific structures, or portions thereof, shall be as follows:

Structure	Total Review Time - Weeks
Trancas Street Overcrossing (Br. No. 21-0101)	5
North Napa Underpass (Br. No. 21-0102)	5
North Napa Pedestrian Overcrossing) (Br. No. 21-0107)	5

Temporary crash cushion modules, as shown on the plans and conforming to the provisions in "Temporary Crash Cushion Module" of these special provisions, shall be installed at the approach end of temporary railings which are located less than 4.6 m from the edge of a traffic lane. For 2-way traffic openings, temporary crash cushion modules shall be installed at the departing end of temporary railings which are located less than 1.8 m from the edge of a traffic lane.

COST REDUCTION INCENTIVE PROPOSALS FOR CAST-IN-PLACE PRESTRESSED BOX GIRDER BRIDGES

Except as provided herein, cast-in-place prestressed box girder bridges shall be constructed in conformance with the details shown on the plans and the provisions in Section 50, "Prestressing Concrete," and Section 51, "Concrete Structures," of the Standard Specifications.

If the Contractor submits cost reduction incentive proposals for cast-in-place prestressed box girder bridges, the proposals shall be in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications and these special provisions.

The Engineer may reject any proposal which, in the Engineer's judgment, may not produce a structure which is at least equivalent to the planned structure.

At the time the cost reduction incentive proposal (CRIP) is submitted to the Engineer, the Contractor shall also submit 4 sets of the proposed revisions to the contract plans, design calculations, and calculations from an independent checker for all changes involved in the proposal, including revisions in camber, predicted deck profile at each construction stage, and falsework requirements to the Office of Structure Design, Documents Unit, P.O. Box 942874, Sacramento, CA 94274-0001 (1801 30th Street, Sacramento, CA 95816), telephone (916) 227-8230. When notified in writing by the Engineer, the Contractor shall submit 12 sets of the CRIP plan revisions and calculations to the Office of Structure Design for final approval and use during construction. The calculations shall verify that all requirements are satisfied. The CRIP plans and calculations shall be signed by an engineer who is registered as a Civil Engineer in the State of California.

The CRIP plans shall be either 279 mm x 432 mm, or 559 mm x 864 mm in size. Each CRIP plan sheet and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Kilometer Post. Each CRIP plan sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

Within 3 weeks after final approval of the CRIP plan sheets, one set of the corrected good quality prints on 75-g/m^2 (minimum) bond paper, 559 mm x 864 mm in size, of all CRIP plan sheets prepared by the Contractor for each CRIP shall be furnished to the Office of Structure Design, Documents Unit.

Each CRIP shall be submitted prior to completion of 25 percent of the contract working days and sufficiently in advance of the start of the work that is proposed to be revised by the CRIP to allow time for review by the Engineer and correction by the Contractor of the CRIP plans and calculations without delaying the work. The Contractor shall allow a minimum of 12 weeks for the review of a CRIP. In the event that several CRIPs are submitted simultaneously, or an additional CRIP is submitted for review before the review of a previously submitted CRIP has been completed, the Contractor shall designate the sequence in which the CRIPs are to be reviewed. In this event, the time to be provided for the review of any proposal in the sequence shall be not less than the review time specified herein for that proposal, plus 2 weeks for each CRIP of higher priority which is still under review.

Should the review not be complete by the date specified in the Contractor's CRIP, or such other date as the Engineer and Contractor may subsequently have agreed to in writing and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in review of CRIP plans and calculations, an extension of time commensurate with the delay in completion of the work thus caused will be granted as provided in Section 8-1.07, "Liquidated Damages," of the Standard Specifications except that the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications shall not apply.

Permits and approvals required of the State have been obtained for the structures shown on the plans. Proposals which result in a deviation in configuration may require new permits or approvals. The Contractor shall be responsible for obtaining the new permits and approvals before the Engineer will reach a decision on the proposal. Delays in obtaining permits and approvals will not be reason for granting an extension of contract time.

All proposed modifications shall be designed in conformance with the bridge design specifications and procedures currently employed by the Department. The proposal shall include all related, dependent or incidental changes to the structure and other work affected by the proposal. The proposal will be considered only when all aspects of the design changes are included for the entire structure. Changes, such as but not limited to, additional reinforcement and changes in location of reinforcement, necessary to implement the CRIP after approval by the Engineer, shall be made at the Contractor's expense.

Modifications may be proposed in (1) the thickness of girder stems and deck slabs, (2) the number of girders, (3) the deck overhang dimensions as specified herein, (4) the amount and location of reinforcing steel, (5) the amount and location of prestressing force in the superstructure, and (6) the number of hinges, except that the number of hinges shall not be increased. The strength of the concrete used may be increased but the strength employed for design or analysis shall not exceed 42 MPa.

Modifications proposed to the minimum amount of prestressing force which must be provided by full length draped tendons are subject to the provisions in "Prestressing Concrete" of these special provisions.

No modifications will be permitted in (1) the foundation type, (2) the span lengths or (3) the exterior dimensions of columns or bridge superstructure, except that the overhang dimension from face of exterior girder to the outside edge of roadway deck may be uniformly increased or decreased by 25 percent on each side of the box girder section. Fixed connections at the tops and bottoms of columns shown on the plans shall not be eliminated.

The Contractor shall be responsible for determining construction camber and obtaining the final profile grade as shown on the plans.

The Contractor shall reimburse the State for the actual cost of investigating CRIPs for cast-in-place prestressed box girder bridges submitted by the Contractor. The Department will deduct this cost from any moneys due, or that may become due the Contractor under the contract, regardless of whether or not the proposal is approved or rejected.

SLIDING BEARINGS

Sliding bearings consisting of elastomeric bearing pads lubricated with grease and covered with sheet metal shall conform to the following requirements:

A. Grease shall conform to the requirements of Military Specification: MIL-S-8660. A uniform film of grease shall be applied to the upper surface of the pads prior to placing the sheet metal.
B. Sheet metal shall be commercial quality galvanized sheet steel. The sheet metal shall be smooth and free of kinks, bends, or burrs.
C. Construction methods and procedures shall prevent grout or concrete seepage into the sliding bearing assembly.

ELASTOMERIC BEARING PADS

Elastomeric bearing pads shall conform to the provisions in Section 51-1.12H, "Elastomeric Bearing Pads," of the Standard Specifications and these special provisions, except that elastomeric bearing pads for the North Napa Underpass (Br. No. 21-0102) railroad underpass shall conform to the details shown on the plans and to the requirements of Chapter 8, Part 18, of the AREA Manual for Railway Engineering.

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

ACCESS GATES

Access gates for Retaining Wall No. 1 (Br. No. 21-RETW1) shall conform to the details shown on the plans and these special provisions.

Timber members shall be tongue and groove Douglas fir sub-flooring free of knotholes. The location of knots of adjoining boards shall be staggered. The construction of the gate shall be with the tongue placed in the up position. The tongue of the top board and the groove of the bottom board shall be removed.

Timber members, steel frames, channels, anchorage devices, mounting hardware, gate rollers, corrugated steel pipe, nylon washers, and neoprene tubing shall be of commercial quality.

Gate rollers shall be rigid casters with self-lubricating bearings and hard rubber wheels.

All metal parts and hardware shall be hot-dip galvanized.

Timber surfaces of the access gates shall be primed and then stained with 2 coats of stain to match the adjacent retaining wall. Primer and stain shall be of the top grade primer and stain from an established manufacturer. An established manufacturer is one who has manufactured industrial paints and stains to meet custom specifications for at least 10 years.

MEASUREMENT AND PAYMENT

Measurement and payment for concrete in structures shall conform to the provisions in Section 51-1.22, "Measurement," and Section 51-1.23, "Payment," of the Standard Specifications and these special provisions.

Full compensation for furnishing and installing access opening covers in soffits of new cast-in-place box girder bridges shall be considered as included in the contract price paid per cubic meter for structural concrete, bridge and no separate payment will be made therefor.

Full compensation for furnishing and installing plastic pipe located at vertical drains used behind retaining walls, including horizontal or sloping drains, shall be considered as included in the contract price paid per cubic meter for the various items of concrete work involved and no separate payment will be made therefor.

Full compensation for furnishing and installing access gate at Retaining Wall No. 1 (Br. No. 21-RETW1) shall be considered as included in the contract price paid per cubic meter for structural concrete, retaining wall and no separate payment will be allowed therefor.

10-1.68 STRUCTURE APPROACH SLABS (Type N) and (Type Railroad)

This work shall consist of constructing reinforced concrete approach slabs, structure approach drainage system, and treated permeable base at structure approaches in conformance with the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

GENERAL

Attention is directed to the section "Engineering Fabrics" of these special provisions.

STRUCTURE APPROACH DRAINAGE SYSTEM

Geocomposite Drain

Geocomposite drain shall consist of a manufactured core not less than 6.35 mm thick nor more than 50 mm thick with one or both sides covered with a layer of filter fabric that will provide a drainage void. The drain shall produce a flow rate, through the drainage void, of at least 25 liters per minute per meter of width at a hydraulic gradient of 1.0 and a minimum externally applied pressure of 168 kPa.

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished for the geocomposite drain certifying that the drain produces the required flow rate and complies with these special provisions. The Certificate of Compliance shall be accompanied by a flow capability graph for the geocomposite drain showing flow rates and the externally applied pressures and hydraulic gradients. The flow capability graph shall be stamped with the verification of an independent testing laboratory.

Filter fabric for the geocomposite drain shall conform to the provisions for fabric for underdrains in Section 88, "Engineering Fabrics," of the Standard Specifications.

The manufactured core shall be either a preformed grid of embossed plastic, a mat of random shapes of plastic fibers, a drainage net consisting of a uniform pattern of polymeric strands forming 2 sets of continuous flow channels, or a system of plastic pillars and interconnections forming a semirigid mat.

The core material and filter fabric shall be capable of maintaining the drainage void for the entire height of geocomposite drain. Filter fabric shall be integrally bonded to the side of the core material with the drainage void. Core material manufactured from impermeable plastic sheeting having nonconnecting corrugations shall be placed with the corrugations approximately perpendicular to the drainage collection system.

The geocomposite drain shall be installed with the drainage void and the filter fabric facing the embankment. The fabric facing the embankment side shall overlap a minimum of 75 mm at all joints and wrap around the exterior edges a minimum of 75 mm beyond the exterior edge. If additional fabric is needed to provide overlap at joints and wrap-around at edges, the added fabric shall overlap the fabric on the geocomposite drain at least 150 mm and be attached thereto.

Should the fabric on the geocomposite drain be torn or punctured, the damaged section shall be replaced completely or repaired by placing a piece of fabric that is large enough to cover the damaged area and provide a 150-mm overlap.

Plastic Pipe

Plastic pipe shall conform to the provisions for pipe for edge drains and edge drain outlets in Section 68-3, "Edge Drains," of the Standard Specifications.

Drainage Pads

Concrete for use in drainage pads shall be minor concrete, except the concrete shall contain not less than 300 kilograms of cement per cubic meter.

Treated Permeable Base At Bottom Of Geocomposite Drains

Treated permeable base to be placed around the slotted plastic pipe at the bottom of geocomposite drains shall conform to the provisions in "Treated Permeable Base Under Approach Slabs." If asphalt treated permeable base is used, it shall be placed at a temperature of not less than 82°C nor more than 110°C.

The filter fabric to be placed over the treated permeable base at the bottom of geocomposite drains shall conform to the provisions for filter fabric for edge drains in Section 88, "Engineering Fabrics," of the Standard Specifications.

ENGINEERING FABRICS

Filter fabric to be placed between the structure approach embankment material and the treated permeable base shall conform to the provisions for filter fabric for edge drains in Section 88, "Engineering Fabrics," of the Standard Specifications and these special provisions.

The subgrade to receive the filter fabric, immediately prior to placing, shall conform to the compaction and elevation tolerance specified for the material involved.

Filter fabric shall be aligned, handled, and placed in a wrinkle-free manner in conformance with the manufacturer's recommendations.

Adjacent borders of the filter fabric shall be overlapped from 300 to 450 mm or stitched. The preceding roll shall overlap the following roll in the direction the material is being spread or shall be stitched. When the fabric is joined by stitching, it shall be stitched with yarn of a contrasting color. The size and composition of the yarn shall be as recommended by the fabric manufacturer. The stitches shall number 5 to 7 per 25 mm of seam.

Equipment or vehicles shall not be operated or driven directly on the filter fabric.

TREATED PERMEABLE BASE UNDER APPROACH SLAB

Treated permeable base under structure approach slabs shall consist of constructing either an asphalt treated permeable base or a cement treated permeable base in accordance with Section 29, "Treated Permeable Bases," of the Standard Specifications and these special provisions.

The type of treatment, asphalt or cement, to be used shall be at the option of the Contractor.

Not less than 30 days prior to the start of placing the treated permeable base, the Contractor shall notify the Engineer, in writing, which type of treated permeable base will be furnished. Once the Contractor has notified the Engineer of the selection, the type to be furnished shall not be changed without a prior written request to do so and approval thereof in writing by the Engineer.

Asphalt treated permeable base shall be placed at a temperature of not less than 93°C nor more than 121°C. Material stored in excess of 2 hours shall not be used in the work.

Asphalt treated permeable base material may be spread in one layer. The base material shall be compacted with a vibrating shoe type compactor or rolled with a roller weighing not less than 1.3 tonnes nor more than 4.5 tonnes. Rolling shall begin as soon as the mixture has cooled sufficiently to support the weight of the rolling equipment without undue displacement.

Cement treated permeable base material may be spread in one layer. The base material shall be compacted with either a vibrating shoe type compactor or with a steel-drum roller weighing not less than 1.3 tonnes nor more than 4.5 tonnes. Compaction shall follow within one-half hour after the spreading operation and shall consist of 2-complete coverages of the treated material.

APPROACH SLABS

Concrete for use in approach slabs shall contain not less than 400 kilograms of cement per cubic meter.

Miscellaneous steel parts shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

Structure approach slabs shall be cured for not less than 5 days prior to opening to public traffic, unless, at the option of the Contractor, the structure approach slabs are constructed using concrete with a non-chloride Type C chemical admixture conforming to these special provisions.

Portland cement for use in concrete using a non-chloride Type C chemical admixture shall be Type II Modified, Type II Prestress, or Type III. Type II Modified and Type III cement shall conform to the provisions in Section 90-2.01, "Portland Cement," of the Standard Specifications. Type II Prestress cement shall conform to the requirements of Type II Modified cement, except the mortar containing the portland cement to be used and Ottawa sand, when tested in conformance with California Test 527, shall not contract in air more than 0.053-percent.

The non-chloride Type C chemical admixture, approved by the Engineer, shall conform to the requirements in ASTM Designation: C 494 and Section 90-4, "Admixtures," of the Standard Specifications.

The concrete with non-chloride Type C chemical admixture shall be prequalified prior to placement in conformance with the provisions for prequalification of concrete specified by compressive strength in Section 90-9.01, "General," of the Standard Specifications and the following:

A. Immediately after fabrication of the 5 test cylinders, the cylinders shall be stored in a temperature medium of 21 ± 1.5°C until the cylinders are tested.
B. The 6-hour average strength of the 5 test cylinders shall not be less than 5.85 MPa. No more than 2 test cylinders shall have a strength of less than 5.5 MPa.

The top surface of approach slabs shall be finished in conformance with the provisions in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications. Edges of slabs shall be edger finished.

Approach slabs shall be cured with pigmented curing compound (1) in conformance with the provisions for curing structures in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications.

Structure approach slabs constructed using concrete with a non-chloride Type C chemical admixture shall be cured for not less than 6 hours prior to opening to public traffic. The curing period shall be considered to begin at the start of discharge of the last truck load of concrete to be used in the slab.

If the ambient temperature is below 18°C during the curing period for approach slabs using concrete with a non-chloride Type C chemical admixture, an insulating layer or blanket shall 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

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 at Trancas Street Overcrossing (Br. No. 21-0101) shall conform to the requirements for Type A and AL seals in Section 51-1.12F(3), "Materials and Installation," of the Standard Specifications. The sealant may be mixed by hand-held power-driven agitators and placed by hand methods. Immediately prior to placing the seal, the joint shall be thoroughly cleaned, including abrasive blast cleaning of the concrete surfaces, so that all foreign material and concrete spillage are removed from all joint surfaces. Joint surfaces shall be dry at the time the seal is placed.

MEASUREMENT AND PAYMENT

Structural concrete, approach slab (Type N)and structural concrete, approach slab (Type railroad) will be measured and paid for in conformance with the provisions in Section 51-1.22, "Measurement," and Section 51-1.23, "Payment," of the Standard Specifications and these special provisions.

Full compensation for the structure approach drainage system including geocomposite drain, plastic pipe, drainage pads, treated permeable base, filter fabric, miscellaneous metal, pourable seals, shall be considered as included in the contract price paid per cubic meter for structural concrete, approach slab of the type shown in the Engineer's Estimate and no additional compensation will be allowed therefor.

10-1.69 SOUND WALL

DESCRIPTION

This work shall consist of constructing sound walls of masonry block. Sound walls shall be supported on concrete barriers, piles and pile caps as shown on the plans.

The Contractor shall submit 2 sets of elevation and plan layout drawings to the Engineer, as provided in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The drawings shall be to scale and shall show the proposed top and bottom elevation lines. The top and bottom elevation lines shown on the plans are minimum and shall be fully

contained in the proposed layout drawings. The drawings shall include, within the limits shown on the plans, the panel sizes, pile spacing, footing steps, aesthetic features, locations of expansion joints, and access gates. The Contractor shall allow 2 weeks after complete drawings are submitted for review.

SOUND WALL (MASONRY BLOCK)

Sound wall (masonry block), consisting of a reinforced hollow unit masonry block stem, shall be constructed in conformance with the provisions in Sections 19, "Earthwork," 52, "Reinforcement," and 90, "Portland Cement Concrete," of the Standard Specifications and these special provisions.

Sound wall masonry unit stems shall be constructed with joints of portland cement mortar. Wall stems shall be constructed with hand laid block. Wall stems shall not be constructed with preassembled panels.

Concrete masonry units shall be hollow, load bearing, conforming to the requirements in ASTM Designation: C 90, medium weight classification, Type II. Standard or open end units may be used. Open end units, if used, shall not reduce the spacing of the bar reinforcement as shown on the plans.

The masonry units shall be nominal size and texture and of uniform color. The color of sound wall block 'B' shall closely conform to Color No. 36440, a light grey, of Federal Standard. The color of cap block 'A' shall closely conform to Color No. 36251, a dark grey, of Federal Standard. The Contractor can view block samples at Caltrans, District 4, 111 Grand Avenue, Oakland, CA 94623 in the Office of Landscape Architecture during business hours.

Expansion joint filler shall conform to the requirements in ASTM Designation: D 1751 or ASTM Designation: D 2000 2AA-805.

Portland cement mortar shall be colored to match the units. Coloring shall be chemically inert, fade resistant mineral oxide or synthetic type.

Portland cement for wall stems shall conform to the provisions in Section 90-2.01, "Portland Cement," of the Standard Specifications.

Hydrated lime shall conform to the requirements in ASTM Designation: C 207, Type S.

Mortar sand shall be commercial quality.

Mortar for laying masonry units shall consist, by volume, of one part portland cement, 0 to 0.5 part hydrated lime, and 2.25 to 3 parts mortar sand. Sufficient water shall be added to make a workable mortar. Each batch of mortar shall be accurately measured and thoroughly mixed. Mortar shall be freshly mixed as required. Mortar shall not be retempered more than one hour after mixing.

Prepackaged mortar materials and mortar containing admixtures may be used when approved in writing by the Engineer, provided the mortar shall not contain more than 0.05 percent soluble chlorides when tested in conformance with California Test 422 nor more than 0.25 percent soluble sulfates, as SO_4, when tested in conformance with California Test 417.

Prior to laying masonry units using prepackaged mortar materials or mortar containing admixtures, the Contractor shall submit to the Engineer the proposed sources of the materials together with test data from an independent testing laboratory for mortar tested in conformance with California Test 551. The test data shall be from specimens having a moist cure, except, the sample shall not be immersed in lime water. The average 28-day compressive strength of the mortar shall be not less than 17.2 MPa.

Aggregate for grout used to fill masonry units shall consist of fine aggregate and coarse aggregate conforming to the provisions in Section 90-2.02, "Aggregates," of the Standard Specifications. At least 20 percent of the aggregate shall be coarse aggregate. The Contractor shall determine the grading except that 100 percent of the combined grading shall pass the 12.5-mm sieve.

At the option of the Contractor, grout for filling masonry units may be proportioned either by volume or mass. Grout shall contain only enough water to cause the grout to flow and fill the voids without segregation. The maximum amount of free water shall not exceed 0.7 times the weight of the cement for regular strength masonry. The maximum amount of free water shall not exceed 0.6 times the mass of the cement for high strength masonry.

Grout proportioned by volume for regular strength masonry shall consist of at least one part portland cement and 4.5 parts aggregate. Grout proportioned by volume for high strength masonry shall consist of at least one part portland cement and 3.5 parts aggregate. Aggregate volumes shall be based on a loose, air-dry condition.

Grout proportioned by mass for regular strength masonry shall contain not less than 325 kilograms of portland cement per cubic meter. Grout proportioned by mass for high strength masonry shall contain not less than 400 kilograms of portland cement per cubic meter.

Reinforced concrete masonry unit wall stems shall be constructed with portland cement mortar joints in conformance with the following:

A. Concrete masonry unit construction shall be true and plumb in the lateral direction and shall conform to the grade shown on the plans in the longitudinal direction. Bond beam units or recesses for horizontal reinforcement shall be provided.

B. Mortar joints shall be approximately 10 mm wide. Walls and cross webs forming cells to be filled with grout shall be full bedded in mortar to prevent leakage of grout. All head and bed joints shall be solidly filled with mortar for a distance in from the face of the wall or unit not less than the thickness of the longitudinal face shells. Head joints shall be shoved tight.
C. Mortared joints around cells to be filled shall be placed so as to preserve the unobstructed vertical continuity of the grout filling. Any overhanging mortar or other obstruction or debris shall be removed from the inside of such cells.
D. Reinforcement shall be securely held in position at top and bottom with either wire ties or spacing devices and at intervals not exceeding 192 bar diameters prior to placing any grout. Wire shall be 16-gage (1.57 mm) or heavier. Wooden, aluminum, or plastic spacing devices shall not be used.
E. Splices in vertical reinforcement shall be made only at the locations shown on the plans.
F. Only those cells containing reinforcement shall be filled solidly with grout. All grout in the cells shall be consolidated at the time of placement by vibrating, and reconsolidated after excess moisture has been absorbed, but before plasticity is lost. Grout shall not be sliced with a trowel.
G. Walls shall be constructed in 1.2-m maximum height lifts. Grouting of each lift shall be completed before beginning masonry unit construction for the next lift. The top course of each lift shall consist of a bond beam.
H. A construction joint shall be constructed at the top of the top course to permit placement of the mortar cap. The mix design for the mortar cap shall be as approved by the Engineer.
I. Construction joints shall be made when the placing of grout, in grout filled cells, is stopped for more than one hour. The construction joint shall be approximately 12 mm below the top of the last course filled with grout.
J. Bond beams shall be continuous. The top of unfilled cells under horizontal bond beams shall be covered with metal or plastic lath.
K. When fresh masonry joins masonry that is partially or totally set, the contact surface shall be cleaned, roughened, and lightly wetted.
L. Surfaces of concrete on which the masonry walls are to be constructed shall be roughened and cleaned, exposing the aggregate, and shall be flushed with water and allowed to dry to a surface dry condition immediately prior to laying the masonry units.
M. Where cutting of masonry units is necessary, all cuts shall be made with a masonry saw to neat and true lines. Masonry units with cracking or chipping of the finished exposed surfaces will not be acceptable.
N. Masonry shall be protected in the same manner specified for concrete structures in Section 90-8, "Protecting Concrete," of the Standard Specifications and these special provisions.
O. During erection, all cells shall be kept dry in inclement weather by covering partially completed walls. The covering shall be waterproof fabric, plastic or paper sheeting, or other approved material. Wooden boards and planks shall not be used as covering materials. The covering shall extend down each side of masonry walls approximately 0.6-m.
P. Splashes, stains or spots on the exposed faces of the wall shall be removed.

ACCESS GATES

Access gates shall conform to the details shown on the plans and these special provisions.

Timber members shall be tongue and groove Douglas fir sub-flooring free of knotholes. The location of knots of adjoining boards shall be staggered. The construction of the gate shall be with the tongue placed in the up position. The tongue of the top board and the groove of the bottom board shall be removed.

Timber members, steel frames, channels, anchorage devices, mounting hardware, gate rollers, corrugated steel pipe, nylon washers, and neoprene tubing shall be of commercial quality.

The 25-mm round ladder rungs with non-skid surface shall consist of No. 25 deformed, diamond pattern, bar reinforcing steel of commercial quality.

Gate rollers shall be rigid casters with self-lubricating bearings and hard rubber wheels.

All metal parts and hardware shall be hot-dip galvanized.

Timber surfaces of the access gates shall be primed and then stained with 2 coats of stain to match the adjacent sound wall. Primer and stain shall be of the top grade primer and stain from an established manufacturer. An established manufacturer is one who has manufactured industrial paints and stains to meet custom specifications for at least 10 years.

Where the back side of the masonry wall is to be split faced, or rough surface blocks, the bond beam above the gate opening upon which the upper gate guide is to be mounted shall have smooth sided blocks.

MEASUREMENT AND PAYMENT

Sound walls and sound walls (barrier) of the types designated in the Engineer's Estimate will be measured by the square meter of wall projected on a vertical plane from the top of the pile cap to the upper elevation line or for walls supported on barriers from the top of the barrier to the upper elevation line and length of wall (including the access gates).

The contract prices paid per square meter for sound wall and sound wall (barrier) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the sound wall, complete in place, including anchorages, access gates and painting of access gates, ladders, excavation, backfill and reinforcement, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer. Retaining walls, Concrete barrier, pile cap and CIDH piles will be measured and paid for as separate items of work.

Concrete pile caps for Sound wall No. 1 (Br. No. 21-SNDW1) will be measured and paid for as concrete barrier Type 27SV(mod). Concrete pile caps for Sound wall No. 2 (Br. No. 21-SNDW2) and Retaining Wall NO. 2 (Br. No. 21-RETW2) will be measured and paid for as minor concrete (minor structure).

CIDH piles for Sound wall No. 1 (Br. No. 21-SNDW1), Sound wall No. 2 (Br. No. 21-SNDW2) and Retaining Wall NO. 2 (Br. No. 21-RETW2) will be measured and paid for as cast-in-drilled-hole concrete piling (sound wall).

10-1.70 ARCHITECTURAL SURFACE (TEXTURED CONCRETE)

Architectural texture for concrete surfaces shall conform to the details shown on the plans and the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

ARCHITECTURAL SURFACE (TEXTURED CONCRETE)

Architectural textures for concrete surfaces shall conform to the details shown on the plans and the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions:

Architectural textures listed below are required at concrete surfaces shown on the plans:

A. Fractured rib texture
B. Fractured rib with decorative grapevine pattern texture
C. Chiseled limestone texture
D. Split face texture

The fractured rib texture shall be an architectural texture simulating the appearance of straight ribs of concrete with a fractured concrete texture imparted to the raised surface between the ribs. Grooves between ribs shall be continuous with no apparent curves or discontinuities. Variation of the groove from straightness shall not exceed 6 mm for each 3 m of groove. The architectural texture shall have random shadow patterns. Broken concrete at adjoining ribs and groups of ribs shall have a random pattern. The architectural texture shall not have secondary patterns imparted by shadows or repetitive fractured surfaces.

The decorative grapevine pattern texture shall simulate a formed relief constructed to the shapes shown on the plans. Corners at the intersection of plane surfaces shall be sharp and crisp without easing or rounding. A Class 1 surface finish shall be applied to the grapevine pattern recess area.

The chiseled limestone texture shall simulate the pattern, relief and dimensions as shown on the plans. The architectural texture shall not have a secondary patterns imparted by shadows or repetitive fractured surfaces.

TEST PANEL

A test panel at least 1.25 m x 1.25 m in size shall be successfully completed at a location approved by the Engineer before beginning work on architectural textures. The test panel shall be constructed and finished with the materials, tools, equipment and methods to be used in constructing the architectural texture. If ordered by the Engineer, additional test panels shall be constructed and finished until the specified finish, texture and color are obtained, as determined by the Engineer.

The test panel approved by the Engineer shall be used as the standard of comparison in determining acceptability of architectural texture for concrete surfaces.

FORM LINERS

Form liners shall be used for textured concrete surfaces and shall be installed in conformance with the manufacturer's recommendations, unless other methods of forming textured concrete surfaces are approved by the Engineer. Form liners shall be manufactured from an elastomeric material or a semi-elastomeric polyurethane material by a manufacturer of commercially available concrete form liners. No substitution of other types of formliner material will be allowed. Form liners shall leave crisp, sharp definition of the architectural surface. Recurring textural configurations exhibited by repeating, recognizable shadow patterns shall be prevented by proper casting of form liner patterns. Textured concrete surfaces with such recurring textural configurations shall be reworked to remove such patterns as approved by the Engineer or the concrete shall be replaced.

Form liners shall have the following properties:

Description	ASTM Designation:	Range
Elastomeric material		
Shore A hardness	D 2240	20 to 65
Tensile strength (MPa)	D 412	0.9 to 6.2
Semi-elastomeric polyurethane		
Shore D hardness	D 2240	55 to 65
Tensile strength (MPa)	D 2370	18 minimum

Cuts and tears in form liners shall be sealed and repaired in conformance with the manufacturer's recommendations. Form liners that are delaminated from the form shall not be used. Form liners with deformations to the manufactured surface caused by improper storage practices or any other reason shall not be used.

Form liners shall extend the full length of texturing with transverse joints at 2.5 m minimum spacing. Small pieces of form liners shall not be used. Grooves shall be aligned straight and true. Grooves shall match at joints between form liners. Joints in the direction of grooves in grooved patterns shall be located only in the depressed portion of the textured concrete. Adjoining liners shall be butted together without distortion, open cracks or offsets at the joints. Joints between liners shall be cleaned before each use to remove any mortar in the joint.

Adhesives shall be compatible with the form liner material and with concrete. Adhesives shall be approved by the liner manufacturer. Adhesives shall not cause swelling of the liner material.

RELEASING FORM LINERS

Products and application procedures for form release agents shall be approved by the form liner manufacturer. Release agents shall not cause swelling of the liner material or delamination from the forms. Release agents shall not stain the concrete or react with the liner material. For reliefs simulating fractured concrete or wood grain surfaces the application method shall include the scrubbing method using a natural bristle scrub brush in the direction of grooves or grain The release agent shall coat the liner with a thin film. Following application of form release agent, the liner surfaces shall be cleaned of excess amounts of agent using compressed air. Buildup of form release agent caused by the reuse of a liner shall be removed at least every 5 uses.

Form liners shall release without leaving particles or pieces of liner material on the concrete and without pulling or breaking concrete from the textured surface. The concrete surfaces exposed by removing forms shall be protected from damage.

ABRASIVE BLASTING

The architectural texture shall be abrasive blasted with fine abrasive to remove the sheen without exposing coarse aggregate.

CURING

Concrete surfaces with architectural texture shall be cured only by the forms-in-place or water methods. Seals and curing compounds shall not be used.

MEASUREMENT AND PAYMENT

Architectural texture will be measured and paid for by the square meter except split face architectural texture on concrete barrier and fractured rib architectural texture on Trancas Street Pumping Plant.

The contract price paid per square meter for architectural texture of the types listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work

involved in architectural texture, complete in place, including test panels, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for split face architectural texture on concrete barrier shall be considered as included in the contract price paid per meter for the types of concrete barrier involved and no separate payment will be made therefor.

Full compensation for fractured rib architectural texture on Trancas Street Pumping Plant shall be considered as included in the contract price paid per cubic meter for structural concrete (pumping plant) and no additional compensation will be allowed therefor.

10-1.71 SEALING JOINTS

Joints in concrete bridge decks and joints between concrete structures and concrete approach slabs shall be sealed in conformance with the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

Where polyurethane seals are shown on the plans, a silicone sealant conforming to the provisions in Section 51-1.12F, "Sealed Joints," of the Standard Specifications may be used.

When ordered by the Engineer, a joint seal larger than called for by the Movement Rating shown on the plans shall be furnished and installed. Payment to the Contractor for furnishing the larger seal and for saw cutting the increment of additional depth of groove required will be determined as provided in Section 4-1.03, "Changes," of the Standard Specifications.

10-1.72 JOINT SEAL ASSEMBLIES (MAXIMUM MOVEMENT RATING, 100 mm)

Joint seal assemblies shall conform to the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

All metal parts of the joint seal assembly shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications. Bolts, nuts, and washers shall conform to the requirements in ASTM Designation: A 325 or A 325M.

At the Contractor's option, cleaning and painting of all new metal surfaces of the joint seal assembly, except stainless steel and anchorages embedded in concrete, may be substituted for galvanizing. Cleaning and painting shall be in conformance with the provisions in Section 59-2, "Painting Structural Steel," and Section 91, "Paint," of the Standard Specifications, and these special provisions.

Certification in conformance with the requirements in SSPC-QP 1, SSPC-QP 2, and SSPC-QP 3 of the "SSPC: The Society for Protective Coatings" will not be required for cleaning and painting joint seal assemblies.

Whenever the Standard Specifications refer to "Steel Structures Painting Council," the reference shall be replaced with "SSPC: The Society for Protective Coatings."

CLEANING

Exposed new metal surfaces shall be dry blast cleaned in conformance with the requirements in Surface Preparation Specification No. 10, "Near White Blast Cleaning," of the "SSPC: The Society for Protective Coatings." Blast cleaning shall leave surfaces with a dense, uniform, angular anchor pattern of not less than 40 µm nor more than 86 µm as measured in conformance with the requirements in ASTM Designation: D 4417.

Mineral and slag abrasives used for blast cleaning steel shall conform to the requirements in Abrasive Specification No. 1, "Mineral and Slag Abrasives," of the "SSPC: The Society for Protective Coatings" and shall not contain hazardous material. Mineral and slag abrasives shall comply with the requirements for Class A, Grade 2 to 3 as defined therein.

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications and a Material Safety Data Sheet shall be furnished prior to use for each shipment of blast cleaning material for steel.

PAINTING

Blast cleaned surfaces shall receive a single undercoat, and a final coat where specified, consisting of a waterborne inorganic zinc coating conforming to the requirements in AASHTO Designation M 300, Type II, except that: 1) the first 3 sentences of Section 4.7, "Primer Field Performance Requirements," and the entire Section 4.7.1 shall not apply, and 2) zinc dust shall be Type II in conformance with the requirements in ASTM Designation: D 520. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory.

The color of the final application of inorganic zinc coating shall match Federal Standard 595B No. 36373.

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to the provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

Inorganic zinc coating shall not be applied when the atmospheric or surface temperature is less than 7°C or more than 29°C, nor when the relative humidity exceeds 85 percent.

The single undercoat of inorganic zinc coating shall be applied to the required dry film thickness in 2 or more applications within 4 hours after blast cleaning.

The total dry film thickness of all applications of the inorganic zinc undercoat, including the surfaces of outside existing members within the grip under bolt heads, nuts and washers, shall be not less than 100 µm nor more than 200 µm.

Areas where mudcracking occurs in the inorganic zinc coating shall be blast cleaned and repainted with inorganic zinc coating to the specified thickness.

Dry spray, or overspray, as defined in the Steel Structures Painting Manual, Volume 1, "Good Painting Practice," of the "SSPC: The Society for Protective Coatings," shall be removed prior to application of subsequent coats or final acceptance. Removal of dry spray shall be by screening or other methods that minimize polishing of the inorganic zinc surface. The dry film thickness of the coating after removal of dry spray shall be in conformance with the provisions for applying the single undercoat, as specified herein.

The inorganic zinc coating shall be tested for adhesion and cure. The locations of the tests will be determined by the Engineer. The sequence of the testing operations shall be determined by the Contractor. The testing for adhesion and cure will be performed no sooner than 72 hours after application of the single undercoat of inorganic zinc coating. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to determine the location of the tests and to test the inorganic zinc coating cure. The inorganic zinc coating shall pass the following tests:

Adhesion

1. The inorganic zinc coating shall have a minimum adhesion to steel of 4 MPa when measured at no more than 6 locations per span on each girder using a self-aligning adhesion tester in conformance with the requirements in ASTM Designation: D 4541. The Contractor, at the Contractor's expense, shall: (1) verify compliance with the adhesion requirements, (2) furnish test results to the Engineer, and (3) repair the coating after testing.

Cure

1. The inorganic zinc coating, when properly cured, shall exhibit a solid, hard, and polished metal surface when firmly scraped with the knurled edge of a quarter. Inorganic zinc coating that is powdery, soft, or does not exhibit a polished metal surface, as determined by the Engineer, shall be repaired by the Contractor, at the Contractor's expense, by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

Finish coats will not be required on joint seal assemblies.

Sheet neoprene shall conform to the provisions for neoprene in Section 51-1.14, "Waterstops," of the Standard Specifications. The sheet neoprene shall be fabricated to fit the joint seal assembly accurately.

Metal parts of the joint seal assembly shall be pre-assembled before installation to verify the geometry of the completed seal.

The bridge deck surface shall conform to the provisions in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications prior to placing and anchoring the joint seal assembly.

The assembly shall be placed in a blocked out recess in the concrete deck surface. The depth and width of the recess shall permit the installation of the assembly anchorage components or anchorage bearing surface to the lines and grades shown on the plans.

Sheet neoprene shall be installed at such time and in such manner that the sheet neoprene will not be damaged by construction operations. The joint shall be cleaned of all dirt, debris and other foreign material immediately prior to installation of the sheet neoprene.

ALTERNATIVE JOINT SEAL ASSEMBLY

At the Contractor's option, an alternative joint seal assembly may be furnished and installed provided: (1) that the quality of the alternative and its suitability for the intended application are at least equal to that of the joint seal assembly shown on the plans, (2) that acceptable working drawings and a Certificate of Compliance are furnished as specified herein and (3) that the alternative conforms to the following requirements:

A. The determination as to the quality and suitability of a joint seal assembly will be made in the same manner as provided in Section 6-1.05, "Trade Names and Alternatives," of the Standard Specifications. The factors to be considered will include: the ability of the assembly to resist the intrusion of foreign material and water throughout the full range of movement for the application, and the ability to function without distress to any component.
B. Joint seal assemblies will not be considered for approval unless it can be proven that the assembly has had at least one year of satisfactory service under conditions similar to this application.

C. The Contractor shall submit complete working drawings for each joint seal assembly to the Division of Structure Design (DSD) in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The working drawings shall show complete details of the joint seal assembly and anchorage components and the method of installation to be followed, including concrete blockout details and additions or rearrangements of the reinforcing steel from that shown on the plans. For initial review, 5 sets of working drawings shall be submitted. After review, between 6 and 12 sets of working drawings, as requested by the Engineer, shall be submitted to DSD for final approval and use during construction.

D. The working drawings shall be supplemented with calculations for each proposed joint seal assembly, as requested by the Engineer. Working drawings shall be either 279 mm x 432 mm or 559 mm x 864 mm in size. Each drawing and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Kilometer Post. The design firm's name, address, and telephone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

E. Calculations, when requested, and working drawings, shall be stamped and signed by an engineer who is registered as a Civil Engineer. The Contractor shall allow the Engineer 4 weeks to review the drawings after a complete set has been received.

F. Within 3 weeks after final working drawing approval, one set of the corrected good quality prints on 75 g/m^2 (minimum) bond paper (559 mm x 864 mm in size) of all working drawings prepared by the Contractor for each joint seal assembly shall be furnished to OSD.

G. Each shipment of joint seal materials shall be accompanied by a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall state that the materials and fabrication involved comply in all respects to the specifications and data submitted in obtaining the approval.

H. The elastomer portion of the joint seal assembly shall be neoprene conforming to the requirements in Table 1 of ASTM Designation: D 2628 and the following, except that no recovery tests or compression-deflection tests will be required:

Property	Requirement	ASTM Test Method
Hardness, Type A Durometer, points	55-70	D 2240 (Modified)
Compression set, 70 hours at 100°C, maximum, percent	40	D 395 Method B (Modified)

I. All metal parts of an alternative joint seal assembly shall conform to the requirements above for the joint seal assembly shown on the plans. At the Contractor's option, metal parts may conform to the requirements in ASTM Designation: A 572/A 572M.

J. The assembly and its components shall be designed to support the AASHTO HS20-44 loading with 100 percent impact. The tire contact area used to distribute the tire loads shall be 244 mm, measured normal to the longitudinal axis of the assembly, by 508 mm wide. The assembly shall provide a smooth riding joint without slapping of components or wheel tire rumble.

K. The Movement Rating of the assembly shall be measured normal to the longitudinal axis of the assembly. The dimensions for positioning the assembly within the Movement Rating during installation shall be measured normal to the longitudinal axis, disregarding any skew of the deck expansion joint.

L. The assembly shall have cast-in-place anchorage components forming a mechanical connection between the joint components and the concrete deck.

M. The maximum depth and width of the recess shall be such that the primary reinforcement to provide the necessary strength of the structural members is outside the recess. The maximum depth of the recess at abutments shall be 250 mm. The maximum width of the recess on each side of the expansion joint shall be 300 mm.

N. All reinforcement other than the primary reinforcement shall continue through the recess construction joint into the recess and engage the anchorage components of the assembly.

O. Horizontal angle points and vertical corners at curbs in assemblies shall consist of either pre-molded sections or standard sections of the joint seal assembly that have been specially miter cut or bent to fit the structure.

P. The elastomer portion of the assembly shall be installed in conformance with the manufacturer's recommendations at such time and in such a manner that the elastomer portion will not be damaged by construction operations. The joint and blockout shall be cleaned of all dirt, debris, and other foreign material immediately prior to the installation of the elastomer.

Full compensation for additional materials or work required because of the application of the optional cleaning and painting or the use of an alternative type joint seal assembly, shall be considered as included in the contract price paid per meter for the joint seal assembly involved and no additional compensation will be allowed therefor.

10-1.73 REINFORCEMENT

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

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

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

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

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

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

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

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

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

Individual hoops, made continuous with butt welded splices, which are substituted for spiral reinforcement, shall conform to the requirements for "Ultimate Butt Splices" of these special provisions.

Bar reinforcing steel (epoxy coated) will be measured and paid for as bar reinforcing steel (bridge).

Full compensation for straight thread rebar coupler shall be considered as included in the contract price paid per kilogram for bar reinforcing steel, inverted siphon and no separate payment will be allowed therefor.

ULTIMATE BUTT SPLICES

Ultimate butt splices shall be either welded or mechanical splices, shall be used at the locations shown on the plans, and shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

General Requirements

The Contractor shall designate in writing an ultimate butt splicing Quality Control Manager (QCM). The QCM shall be responsible directly to the Contractor for 1) the quality of all 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 ultimate butt 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.

The length of any type of ultimate mechanical butt splice shall not exceed 10 times the bar diameter of the larger bar to be spliced.

All ultimate prejob, production, and job control 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 prior to shipment with weatherproof markings that do not interfere with the Engineer's tamper-proof markings or seals. Any splice that shows signs of tampering will be rejected.

A minimum of one control bar shall be removed from the same bar as, and adjacent to, all ultimate prejob, production, and job control 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 prior to 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.

Shorter length sample splice and control bars may be furnished if approved in writing by the Engineer.

Each sample splice and its associated control bar shall be identified and marked as a set. Each set shall be identified as representing a prejob, production, or job control 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 "Prejob Test Requirements for Ultimate Butt Splices" specified herein, or the bars shall be replaced in kind. These bars shall be repaired or replaced such that no splices are located in the "No Splice Zone" shown on the plans.

Section 52-1.08E, "Job Control Tests," of the Standard Specifications shall not apply.

The provisions for total slip shall not apply to any ultimate splices that are welded or that are used on hoops.

The independent qualified testing laboratory used to perform the testing of all ultimate butt sample splices and control bars 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.
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/A 370M 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.

Ultimate Butt Splice Test Criteria

Ultimate prejob, production, and job control sample splices shall be tensile tested in conformance with the requirements described in ASTM Designation: A 370/A 370M and California Test 670.

Ultimate prejob and production 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 has achieved at least 95 percent of the ultimate tensile strength of the control bar associated with the sample. In addition, necking of the bar shall be visibly 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 of each control bar shall be determined by tensile testing the bar to rupture and shall be determined for all control bars, 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.

Testing to determine the minimum tensile strength, in conformance with the provisions in the ninth paragraph of Section 52-1.08, "Splicing," of the Standard Specifications, will not be required.

Prejob Test Requirements for Ultimate Butt Splices

Prior to use in the work, all ultimate butt splices shall conform to the following prejob test requirements:

A. Eight prejob sample splices for each bar size of each splice type including ultimate mechanical butt splices, ultimate complete joint penetration butt welded splices, and ultimate resistance butt welded splices, that will be used in the work, shall be fabricated by the Contractor. For deformation-dependent types of couplers, 8 sample prejob splices shall also be fabricated for each reinforcing bar size and deformation pattern that will be used in the work.
B. The sample splices shall be fabricated using the same splice materials, position, operators, location, and equipment, and following the same procedures as will be used to make the splices in the work.
C. At the option of the Contractor, operator qualification tests may be performed simultaneously with the preparation of prejob sample splices.
D. If different diameters of hoops are shown on the plans, prejob sample splices, as described above, will only be required for the smallest hoop diameter. In addition, these splices shall be fabricated using the same radius as shown on the plans for these hoops.
E. Unless otherwise directed in writing by the Engineer, 4 prejob sample splices and control bar sets shall be shipped to the Transportation Laboratory and the remaining 4 sets shall be tested by the Contractor's independent qualified testing laboratory.
F. Each group of 4 sets from a prejob test shall be securely bundled together and identified by location and contract number with weatherproof markings prior to shipment. Bundles containing fewer than 4 sets will not be tested by the Transportation Laboratory, nor shall they be tested by the independent laboratory.
G. All 8 sample splices from each prejob test shall conform to the provisions in "Ultimate Butt Splice Test Criteria" specified herein.
H. Prior to performing any tensile tests on prejob test sample splices, one of the 4 samples shall be tested for, and shall conform to, the provisions for total slip. Should this sample not meet these requirements, one retest, in which the 3 remaining samples are tested for total slip, will be allowed. All 3 of these remaining samples tested shall conform to the aforementioned slip requirements.
I. For each bundle of 4 sets, a Prejob Test Report shall be prepared by the independent testing laboratory performing the testing. The report shall 1) be signed by an engineer who represents the laboratory and is registered as a Civil Engineer in the State of California; 2) include, as a minimum, the following information for each set: contract number, bridge number, bar size, type of splice, length of mechanical splice, physical condition of test sample splice and control bar, any notable defects, limits of affected zone, total measured slip, location of visible necking area, ultimate strength of each splice, ultimate strength and 95 percent of this ultimate strength for each control bar, and a comparison between 95 percent of the ultimate strength of each control bar and the ultimate strength of its associated splice; and 3) be submitted to the QCM for review and approval, and then to the Engineer.
J. Test results for each bundle of 4 sets will be reported in writing to the Contractor within 10 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.
K. Should the Engineer fail to provide the test results within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in providing the test results, 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.

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 4 sets of sample splices and control bars removed from each lot of completed splices, except when quality assurance tests are performed.

A lot of ultimate butt splices is defined as 1) 150, or fraction thereof, of the same type of ultimate mechanical butt splices used for each bar size and each bar deformation pattern that is used in the work or 2) 150, or fraction thereof, of ultimate complete joint penetration butt welded splices, or ultimate 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.

After all splices in a lot have been completed, the QCM shall notify the Engineer in writing that all couplers in this lot conform to the specifications and are ready for testing. The sample splices will either be selected by the Engineer at the job site or a fabrication facility, provided the facility is located within an 80-km radius of the jobsite.

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 or QCM 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, in the presence of either the Engineer or the Engineer's authorized representative.

The Engineer or the Engineer's authorized representative will be at the independent qualified testing laboratory within a maximum of 5 working days after receiving written notification that the samples are at the laboratory and ready for testing. Should the Engineer or the Engineer's authorized representative fail to be at the laboratory within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of this action, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

A sample splice or control bar from any set will be rejected if any tamper-proof marking or seal is disturbed prior to testing.

The 4 sets from each production test shall be securely bundled together and identified with a completed sample identification card prior to 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.

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 set: contract number, bridge number, lot number and location, bar size, type of splice, length of mechanical splice, physical condition of test sample splice and control bar, any notable defects, limits of affected zone, total measured slip, location of visible necking area, ultimate strength of each splice, ultimate strength and 95 percent of this ultimate strength for each control bar, and a comparison between 95 percent of the ultimate strength of each control bar and the ultimate strength of its associated splice.

The QCM must review, approve, and forward each Production Test Report to the Engineer for review before any splices represented by the report are encased in concrete. The Engineer shall 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 prior to receiving notification from the Engineer, it is expressly understood that the Contractor will not be relieved of the Contractor's responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Any material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase any splices pending notification by the Engineer, and should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Prior to performing any tensile tests on production test sample splices, one of the 4 samples shall be tested for, and shall conform to, the provisions for total slip. Should this sample not meet these 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 these requirements, all splices in the lot represented by this production test will be rejected.

If 3 or more sample splices from any production test conform to the provisions in "Ultimate Butt Splice Test Criteria" specified herein, all splices in the lot represented by this production test will be considered acceptable.

Should only 2 sample splices from any production test conform to the provisions in "Ultimate Butt Splice Test Criteria" specified herein, 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 any production test conforms to the provisions in "Ultimate Butt Splice Test Criteria" specified herein, all splices in the lot represented by this production test will be rejected.

If a production test for any lot fails, the Contractor will be required to repair or replace all reinforcing bars from which sample splices were removed, complete in place, before the Engineer selects any additional splices from this lot for further testing.

Whenever any lot of ultimate butt splices is rejected, additional ultimate butt 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 correcting these 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. Should the Engineer not provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of this action, 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.

Production tests will not be required on any repaired splice from a lot, regardless of the type of prequalified ultimate mechanical butt splice used to make the repair.

Should an additional production test be required, the Engineer may select any repaired splice for use in the additional production test.

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 additional production tests, or portion thereof, performed thereafter, the Contractor shall concurrently prepare 4 additional ultimate job control sample splices along with associated control bars. These ultimate job control samples shall be prepared in the same manner as specified herein for ultimate prejob sample splices and control bars.

Each time 4 additional ultimate job control sample splices are prepared, 2 of these job control 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 "Production Test Requirements for Ultimate Butt Splices" specified herein.

The 2 remaining job control sample splice and associated control bar sets, along with the 2 remaining production sample splice and associated control bar sets shall be shipped, unless otherwise directed in writing by the Engineer, 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 prior to 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 "Production Test Requirements for Ultimate Butt Splices" specified herein.

Test results for each bundle of 4 sets will be reported in writing to the Contractor within 3 working days after receipt of the bundle by 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 any splices prior to receiving notification from the Engineer, it is expressly understood that the Contractor will not be relieved of the Contractor's responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Any material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase any splices pending notification by the Engineer, and should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

MEASUREMENT AND PAYMENT

Measurement and payment for reinforcement in structures shall conform to the provisions in Section 52-1.10, "Measurement," and Section 52-1.11, "Payment," of the Standard Specifications and these special provisions.

Full compensation for conforming to the provisions of "Ultimate Butt Splices," of these special provisions shall be considered as included in the contract prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

10-1.74 WATERPROOFING AND COVER

Membrane waterproofing and protective cover shall be furnished and applied to the surface of the deck of the North Napa Underpass (Br. No. 21-0102) railroad underpass in conformance with the details shown on the plans and the requirements of the AREA Manual for Railway Engineering (AREA Manual) and these special provisions.

The waterproofing membrane shall be butyl rubber secured with an approved adhesive. At the option of the Contractor and subject to the requirements for butyl rubber, ethylene-propylene-diene-monomer (EPDM) may be substituted for butyl rubber.

The butyl rubber membrane, adhesive, splicing cement, butyl gum splicing tape, anti-bonding paper, and fibered aluminum roof coating shall conform to the requirements of the AREA Manual, Chapter 29, Part 2, "Membrane Waterproofing."

Butyl rubber membrane shall be 1.52 mm thick, minimum.

The protective cover over the membrane waterproofing shall be 2 layers of asphaltic panels applied with adhesive and sealing compound to a total thickness not less than 20 mm. Sealing compound for joints and edges shall be compatible with the membrane, the adhesive used to fasten the membrane to the deck, splicing cement, and the protective cover panels. All materials shall conform to the requirements of AREA Manual, Chapter 29, and the following:

A. The individual panels shall be 9.5 mm thick. Panels shall be installed in sizes not less than 1.22 m by 2.44 m, except as cut for closures.
B. Panels shall be shipped and stored on smooth, flat surfaces.
C. When panels are shipped with an inert material between the sheets to prevent sticking, all inert material shall be removed from the panel before installation.

Membrane waterproofing shall not be applied to any surface until the Contractor is prepared to follow its application with the placing of the protective cover within a sufficiently short time that the membrane will not be damaged by workers or equipment, exposure to weathering or from any other cause.

Concrete surfaces to receive the seal shall be swept or air blown clean of all dirt, dust, gravel, loose concrete particles, and other extraneous materials. Projections or depressions on the surface on which the membrane is to be applied that may cause injury to the membrane shall be removed or filled as directed by the Engineer.

There shall be no depressions or pockets in horizontal surfaces of the finished waterproofing. The membrane shall be carefully turned into drainage fittings. Special care shall be taken to make the waterproofing effective along the sides and ends of girders and decks and at stiffeners, gussets, expansion joints, offsets in ballast retainers, and other discontinuities.

The Contractor shall be responsible for preventing damage to the membrane waterproofing by workers or equipment.

Construction of butyl membrane waterproofing shall conform to the following:

A. The surface shall be dry at the time of application and the membrane shall not be applied when the atmospheric temperature is below 1°C.
B. Butyl rubber membrane shall be fastened to the surface to be waterproofed by adhesive material.
C. The adhesive shall be applied by squeegee to the entire deck surfaces to be waterproofed at a rate of not less than 0.41-liters per square meter of deck surface.
D. Membrane sheets shall first be positioned and drawn tight without stretching. Half of the membrane shall then be uniformly rolled in a direction away from the starting edge or subsequent splice. Adhesive shall then be applied to the exposed deck area. Adhesive shall be allowed to dry to a tack free condition. The membrane shall then be unrolled and pressed firmly and uniformly in place, using care to avoid trapping of air. The same procedure shall be repeated for the remaining half of the membrane sheet. Wrinkles and buckles shall be avoided. Each succeeding sheet shall be positioned to fit the previously installed sheet and spliced.
E. Splices shall be tongue-and-groove type conforming to the details in Figure 2, Type No. 3 of AREA Manual, Chapter 29. All seam, lap, and splice areas shall be cleaned with heptane, hexane, toluene, trichloroethylene or white gasoline, using a clean cloth, mop, or similar synthetic cleaning device. Splicing cement shall be spread continuously on the seam, lap, and splice areas at a uniform rate of not less than 0.54-liter per square meter based on both mating surfaces. After cement has dried to a tack free condition, apply butyl gum splicing tape to cemented area of membrane, extending tape to at least 4 mm beyond edges of splice and lap areas. Roll or press the tape firmly into place so as to obtain full contact. Bridging and wrinkles shall be avoided. Corner splices shall be reinforced with 2 continuous layers of rubber membrane over one layer of butyl tape.
F. All projections, such as pipes, conduits or sleeves, passing through the butyl rubber membrane waterproofing shall be flashed with prefabricated or field-fabricated boots or fitted coverings as necessary to provide watertight construction. Butyl gum tape shall be used between layers of rubber membrane.
G. Holes in the membrane sheeting shall be patched with a minimum overlap of 100 mm and in accordance with manufacturer's instructions.
H. At transverse expansion joints in the bridge deck, a 260-mm wide galvanized 15-mm thick steel plate covered by a 560-mm wide galvanized 1.52-mm thick sheet metal plate shall be laid and centered on the joint prior to laying the membrane across the joint.

Construction of asphaltic protective cover shall conform to the following:

A. The surface of the membrane applied to the deck shall be thoroughly cleaned of dirt and other deleterious material before the protective cover is placed.
B. Panels shall be laid with 2 superimposed layers. Joints in the second layer shall be offset from the joints in the first layer by approximately 1/2 the width of panel.
C. Panels shall be laid in a coating of adhesive. The adhesive shall be applied by squeegee at a rate of not less than 0.41-liter per square meter of deck surface. As successive panels are laid, the edges and ends of adjacent panels already laid shall be thoroughly coated with a sealing compound. Panels shall be laid tightly against those previously laid so that the sealing compound will completely fill the joints and be squeezed out at the top. After all of the panels have been laid, any void between panels shall be filled with the sealing compound.

D. Where edges or protrusions of asphaltic panels are exposed to prolonged sunlight exposure, exposed areas shall be coated with fibered aluminum roof coating.

Retainer-buffers and headers, including anchor bolt assemblies, shall be furnished and installed where shown on the plans. Timbers shall be No. 1 structural grade Douglas fir pressure treated with creosote oil or a salt preservative. Steel bolts, plates, and sheet metal shall be commercial quality, hot-dip galvanized.

The pourable seal between the steel plate 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.

Membrane waterproofing and asphaltic protective cover panels will be paid for at the contract price per square meter for waterproofing and cover. The quantity of waterproofing and cover will be computed from measurements, along the slopes including timber retainers and headers, of the actual areas placed.

The contract price paid per square meter for waterproofing and cover shall include full compensation for furnishing all labor, materials (including galvanized sheet metal, timber retainers and headers, pourable seals, steel bolts, plates and flashing plates), tools, equipment, and incidentals, and for doing all the work involved in furnishing and applying membrane waterproofing and protective cover, complete in place, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

10-1.75 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 Quality Control" of these special provisions.

The following substitutions of high-strength steel fasteners shall be made:

METRIC SIZE SHOWN ON THE PLANS	IMPERIAL SIZE TO BE SUBSTITUTED
ASTM Designation: A 325M (Nominal bolt diameter and thread pitch (mm))	ASTM Designation: A 325 (Nominal bolt diameter (inch))
M16 x 2	5/8
M20 x 2.5	3/4
M22 x 2.5	7/8
M24 x 3	1
M27 x 3	1 1/8
M30 x 3.5	1 1/4
M36 x 4	1 1/2

10-1.76 SIGN STRUCTURES

Sign structures and foundations for overhead signs shall conform to the provisions in Section 56-1, "Overhead Sign Structures," of the Standard Specifications and these special provisions.

Before commencing fabrication of sign structures, the Contractor shall submit 2 sets of working drawings to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings." The working drawings shall include sign panel dimensions, span lengths, post heights, anchorage layouts, proposed splice locations, a snugging and tensioning pattern for anchor bolts and high strength bolted connections, and details for permanent steel anchor bolt templates. The working drawings shall be supplemented with a written quality control program that includes methods, equipment, and personnel necessary to satisfy the requirements specified herein and in the special provisions.

Working drawings shall be 559 mm x 864 mm or 279 mm x 432 mm in size and each drawing and calculation sheet shall include the State assigned designations for the contract number, sign structure type and reference as shown on the contract plans, District-County-Route-Kilometer Post, and contract number.

The Engineer shall have 20 working days to review the sign structure working drawings after a complete submittal has been received. No fabrication or installation of sign structures shall be performed until the working drawings are approved in writing by the Engineer.

Should the Engineer fail to complete the review within the time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the sign structure working drawings, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays."

The third paragraph of Section 56-1.01, "Description," of the Standard Specifications shall not apply.

A permanent steel template shall be used to maintain the proper anchor bolt spacing.

One top nut, one leveling nut, and 2 washers shall be provided for the upper threaded portion of each anchor bolt.

Section 56-1.03, "Fabrication," of the Standard Specifications is amended by adding the following 2 paragraphs after the third paragraph:

- Surfaces of base plates which are to come in contact with concrete, grout, or washers and leveling nuts shall be flat to within 3 mm tolerance in 305 mm, and to within 5 mm tolerance overall. Faying surfaces of plates in high-strength bolted connections including flange surfaces of field splices, chord joints, and frame junctures, and contact surfaces of plates used for breakaway slip base assemblies shall be flat to within 2 mm tolerance in 305 mm, and within 3 mm tolerance overall.
- Thermally cut holes made in tubular members of sign supports, other than holes in base and flange plates, shall initially be made a minimum of 2 mm undersized, and then be mechanically enlarged by reaming or grinding to the final required size and shape. All edges shall have a surface roughness of not greater than 6.35 μm. Round holes may be drilled to the exact final diameter. No holes shall be made in members unless the holes are shown on the plans or are approved in writing by the Engineer.

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

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

Steel members used for overhead sign structures shall receive nondestructive testing (NDT) in conformance with AWS D1.1 and the following:

A.

Weld Location	Weld Type	Minimum Required NDT
Welds for butt joint welds in tubular sections, nontubular sections, and posts	CJP groove weld with backing ring	100% UT or RT
Longitudinal seam welds*	PJP groove weld	25% MT
	CJP groove weld	100% UT or RT
Welds for base plate, flange plate, or end cap to post or mast arm	CJP groove weld	25% UT or RT
	Fillet weld	25% MT
* Longitudinal seam welds shall have 60% minimum penetration, except that within 150 mm of any circumferential weld, longitudinal seam welds shall be CJP groove welds.		

B. A written procedure approved by the engineer shall be used when performing UT on material less than 8 mm thick. Contoured shoes shall be used when performing UT on round tubular sections under 1270 mm in diameter.
C. When less than 100 percent of a weld is specified for NDT, and if defects are found during this inspection, additional NDT shall be performed. This additional NDT shall be performed on 25 percent of the total weld for all similar welds, as determined by the Engineer, produced for sign structures in the project. If any portion of the additional weld inspected is found defective, 100 percent of all similar welds produced for sign structures in the project, as determined by the Engineer, shall be tested.

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

All ferrous metal parts of tubular sign structures shall be galvanized and shall not be painted.

Full compensation for furnishing anchor bolt templates and for testing of welds shall be considered as included in the contract price paid per kilogram for furnish sign structure and no additional compensation will be allowed therefor.

10-1.77 ROADSIDE SIGNS

Roadside signs (one post, two post, and strap and saddle bracket method) shall be installed at the locations shown on the plans or where designated by the Engineer and in conformance with the provisions in Section 56-2, "Roadside Signs," of the Standard Specifications and these special provisions.

Wood posts shall be pressure treated after fabrication in conformance with the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling," of the Standard Specifications with creosote, creosote coal tar solution, creosote petroleum solution (50-50), pentachlorophenol in hydrocarbon solvent, copper naphthenate, ammoniacal copper arsenate, or ammoniacal copper zinc arsenate. In addition to the preservatives listed above, Southern yellow pine may also be pressure treated with chromated copper arsenate. When other than one of the creosote processes is used, blocks shall have a minimum retention of 6.4 kg/m^3, and need not be incised.

Type N marker panels mounted on a post with a roadside sign shall be considered to be sign panels and will not be paid for as markers.

10-1.78 ALTERNATIVE PIPE CULVERTS

Attention is directed to "Order of Work" of these special provisions regarding installation of Drainage System No. 11 on this contract.

450 mm, 600 mm, 900 mm, 1050 mm, and 1500 mm alternative pipe culverts shall conform to the provisions in Section 62, "Alternative Culverts," of the Standard Specifications and these special provisions.

Attention is directed to the stage construction and temporary drainage plans. This project is being constructed in stages which will significantly impact the installation of the drainage systems on this contract. Multiple mobilizations are anticipated.

Alternative pipe culverts specified with watertight joints shall be wrapped in filter fabric as shown on the plans. Filter fabric shall conform to the provisions for underdrains in Section 88-1.03, "Filter Fabric," of the Standard Specifications except, the ASTM Designation of D3776 for weight in the table in the first paragraph is amended to read ASTM Designation: D5261.

Full compensation for furnishing and placing filter fabric around watertight joints shall be considered as included in the contract price paid per meter for alternative pipe culvert of the size shown in the Engineer's Estimate and no additional compensation will be allowed therefor.

SPIRAL RIB PIPE

Spiral rib pipe shall conform to the provisions in "Corrugated Metal Pipe" of these special provisions, except for profile and fabrication requirements.

Spiral rib pipe shall, at the option of the Contractor, consist of either (1) three rectangular ribs spaced midway between seams with ribs 19 m wide by 19 mm high at a maximum rib pitch of 191 mm, (2) two rectangular ribs and one half-circle rib equally spaced between seams with ribs 19 m wide by 25 mm high at a maximum rib pitch of 292 mm. The half-circle rib diameter shall be spaced midway between the rectangular ribs or (3) two rectangular ribs equally spaced between seams with ribs 19 mm wide by 25 mm high at a maximum rib pitch of 213 mm. Rib pitch measured at right angles to the direction of the ribs may vary ±13 mm.

Corrugated steel spiral rib pipe shall be fabricated by a continuous helical lock seam fabricated in conformance with the provisions in Section 66-3.03C(1), "Fabrication by Continuous Lock Seam," of the Standard Specifications.

Coupling bands for spiral rib pipe shall conform to the provisions in Section 66-1.07, "Coupling Bands," of the Standard Specifications. A coupling band shown on the plans or approved by the Engineer in conformance with the provisions in Section 61-1.02, "Performance Requirements for Culvert and Drainage Pipe Joints," of the Standard Specifications, for use

on a pipe corrugation of 68 mm x 13 mm for corrugated metal pipe may be used on spiral rib pipe having 68 mm x 13 mm rerolled annular ends. The width of band (W) for hat bands for pipe sizes larger than 1200 mm in diameter shall be 95 mm.

Concrete backfill for alternative culverts shall be constructed in conformance with the provisions in Section 66-1.045, "Concrete Backfill," of the Standard Specifications and will be measured and paid for in conformance with the provisions in Section 66-4, "Measurement and Payment," of the Standard Specifications and the following:

A. The quantity of concrete backfill to be paid for, regardless of the kind of culvert and wall thickness of the culvert installed, will be based on the dimensions shown on the plans and the installation of reinforced concrete pipe with the least wall thickness shown in AASHTO Designation: M 170M for the Class of pipe designated.

10-1.79 SAND BACKFILL

Sand used to fill the void between the 1050 mm alternative pipe culvert and the 1500 mm welded steel casing pipe shall conform to the details on the plans and these special provisions, and shall be backfilled by any method acceptable to the Engineer that completely fills the pipe. Sand backfill material shall be clean, free draining, and free from roots and other deleterious substances. The flowline of the 1050 mm alternative pipe shall be maintained using spacers within the 1500 mm welded steel pipe casing, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

The quantity for sand backfill required for the installation of the 1050 mm alternative pipe will be measured and paid for by the cubic meter for sand backfill. The price for sand backfill shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, including spacers needed to maintain the flowline of the 1050 mm alternative pipe, as shown on the plans, and as specified in these special provisions, and as directed by the Engineer.

10-1.80 PLASTIC PIPE

Plastic pipe shall conform to the provisions in Section 64, "Plastic Pipe," of the Standard Specifications and these special provisions.

Plastic pipe shall be smooth interior wall type.

Attention is directed to the stage construction plans. This project is being constructed in stages which will significantly impact the installation of the drainage systems on this contract. Multiple mobilizations are anticipated.

10-1.81 150 mm PLASTIC PIPE SUPPLY LINE

150 mm plastic pipe supply lines shall be constructed in conformance with the details on the plans and with the provisions in Section 20-2.15B(1), "Plastic Pipe Supply Line," of the Standard Specifications and these special provisions. The plastic pipe supply lines shall be schedule 40.

The contract price paid per meter for 150 mm plastic pipe supply line shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing or constructing plastic pipe supply lines, complete in place, including fittings, watertight flexible couplings, and removable plugs, as shown on the plans, as specified in the Standard Specifications, and these special provisions, and as directed by the Engineer.

10-1.82 REINFORCED CONCRETE PIPE

300 mm, 375 mm, 450 mm, 600 mm, and 750 mm reinforced concrete pipe shall conform to the provisions in Section 65, "Reinforced Concrete Pipe," of the Standard Specifications and these special provisions.

Attention is directed to the stage construction and temporary drainage plans. This project is being constructed in stages which will significantly impact the installation of the drainage systems on this contract. Multiple mobilizations are anticipated.

Reinforced concrete pipe shall be constructed with Type II cement. Non-reinforced concrete pipe may not be substituted for reinforced concrete pipe. Circular reinforced concrete pipe adjacent to or placed within any cut slopes shall be specified with circular reinforcement.

Where embankment will not be placed over the top of the pipe, a relative compaction of not less than 85 percent shall be required below the pipe spring line for pipe installed using Method 1 backfill in trench, as shown on Standard Plan A62D. Where the pipe is to be placed under the traveled way, a relative compaction of not less than 90 percent shall be required unless the minimum distance between the top of the pipe and the pavement surface is the greater of 1.2 m or one half of the outside diameter of the pipe.

Except as otherwise designated by classification on the plans or in the specifications, joints for culvert and drainage pipes shall conform to the plans or specifications for standard joints.

When reinforced concrete pipe is installed in conformance with the details shown on Revised Standard Plan A62DA, the fifth paragraph of Section 19-3.04, "Water Control and Foundation Treatment," of the Standard Specifications shall not apply.

When solid rock or other unyielding material is encountered at the planned elevation of the bottom of the bedding, the material below the bottom of the bedding shall be removed to a depth of 1/50 of the height of the embankment over the top of the culvert, but not less than 150 mm nor more than 300 mm. The resulting trench below the bottom of the bedding shall be backfilled with structure backfill material in conformance with the provisions in Section 19-3.06, "Structure Backfill," of the Standard Specifications.

The excavation and backfill below the planned elevation of the bottom of the bedding will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

The Outer Bedding shown on Revised Standard Plan A62DA shall not be compacted prior to placement of the pipe.

10-1.83 JACKED 300 MM TEMPORARY CULVERT

The jacked 300 mm temporary culvert shall be reinforced concrete pipe, Class IV, and shall conform to Section 65, "Reinforced Concrete Pipe," of the Standard Specifications.

10-1.84 CORRUGATED METAL PIPE

300 mm, 450 mm, and 450 mm slotted corrugated steel culverts shall conform to the provisions in Section 66, "Corrugated Metal Pipe," of the Standard Specifications and these special provisions.

Attention is directed to the stage construction and temporary drainage plans. This project is being constructed in stages which will significantly impact the installation of the drainage systems on this contract. Multiple mobilizations are anticipated.

Asphaltic mastic coating or polymeric sheet coating substituted for bituminous coating shall be placed on the outside and inside surfaces of the pipe.

Corrugated steel pipe shall be fabricated from zinc-coated steel sheet.

10-1.85 ALTERNATIVE PIPE UNDERDRAIN

200 mm Alternative pipe underdrains shall conform to the provisions in Section 68-1, "Underdrains," of the Standard Specifications for the kind of alternative pipe underdrain installed.

Attention is directed to the stage construction plans. This project is being constructed in stages which will significantly impact the installation of the drainage systems on this contract. Multiple mobilizations are anticipated.

10-1.86 EDGE DRAIN

80 mm plastic pipe edge drains shall conform to the provisions in Section 68-3, "Edge Drains," of the Standard Specifications and these special provisions.

Attention is directed to the stage construction plans. This project is being constructed in stages which will significantly impact the installation of the drainage systems on this contract. Multiple mobilizations are anticipated.

10-1.87 305 MM DUCTILE IRON PIPE WATER MAIN INSIDE BRIDGE (CITY OF NAPA)

This item shall consist of furnishing and placing 305 mm (12 inch) DIP water main within the bridge as shown on the Plans, including placement of 305 mm (12 inch) DIP carrier pipe between the bridge abutments as shown. Included in this item is pressure testing and disinfecting, furnishing and placing all required fittings, providing concrete supports, and making all required connections as indicated on the Plans for a complete installation.

Unless otherwise indicated or approved, 305 mm (12 inch) DIP water main on bridge pipe and fittings shall be AWWA C151, Class 350 cement mortar lined Ductile Iron Pipe (DIP) or AWWA C153 with segmented restraint system and rubber ring gasketed joints. The restraint system shall be ductile iron locking segments inserted through slots in the bell face in order to provide a positive axial lock between the bell interior surface and a retainer weldment on the spigot end of the pipe. The manufacturer shall be U.S. Pipe TR Flex or equal. Mortar lining shall conform to AWWA C104. Fittings shall conform to AWWA C110 or AWWA C153. Asphaltic outside coating and inside lining shall be in accordance with AWWA C151.

To provide for seismic movement of the pipe, each end shall be equipped with a seismic expansion assembly as manufactured by EBBA Iron, FLEX-TEND, or equal. The joint shall have a double ball deflection, 610 mm (24-inch) total movement and flanged ends.

MEASUREMENT

305 mm DIP water main inside bridge shall measured by the linear meter in accordance with Section 66-4.01 of the Caltrans Standard Specifications.

PAYMENT

The contract unit price paid per meter for 305 mm DIP water main inside bridge shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in 305 mm DIP water main inside bridge, including pressure testing and disinfection, complete in place, as shown on the plans, as specified in the Caltrans and City of Napa Standard Specifications and these special provisions, and directed by the Engineer.

10-1.88 305 MM & 203 MM DUCTILE IRON PIPE WATER MAIN (BURIED; CITY OF NAPA)

This item shall consist of furnishing and placing buried 305 mm (12 inch) DIP and 203 mm (8 inch) DIP water main pipe at the locations shown on the plans, including placement of the steel casing beneath the approach slabs. Included in this item is trenching, backfill, furnishing and placing all required fittings, and making all required connections to existing water mains at the locations indicated on the plans. Also included are all required elbows, tees, crosses, reducers, valves, thrust blocking, and all associated items necessary for the buried water main installation, complete in place.

The water main pipe and its placement, along with the necessary fittings and their installation shall conform to the details shown and these special provisions. Unless otherwise indicated or approved, buried water main pipe and fittings shall be AWWA C151, Class 350 cement mortar lined Ductile Iron Pipe (DIP) with restrained rubber ring gasketed joints. Mortar lining shall conform to AWWA C104. Fittings shall conform to AWWA C110 or AWWA C153. Earth cover from the top of the pipe to finished pavement surface shall be a minimum of 600 mm (24 inches) and a maximum of 1200 mm (48 inches) unless otherwise shown on the plans or approved by the Engineer. All buried DIP, valves, and associated fittings shall be encased in loose polyethylene material with a minimum thickness of at least 8 mil in accordance with AWWA C105. All nuts, bolts, and other metal surfaces shall be coated with bitumastic coating.

Steel casing for the 305 mm (12-inch) DIP water line extending into the bridge superstructure shall be furnished and installed in conformance with the details shown on the plans and as specified in these special provisions. Steel casing shall conform to ASTM Designation: A 53. The casing shall be of 508 mm (20-inch) nominal diameter, Grade B, with a minimum wall thickness of 10 mm (0.375 inch) with coal tar exterior coating. Field welding of steel casing shall conform to AWWA Designation: C 206.

Where the casing passes through abutment diaphragms the openings shall be formed or shall consist of pipe sleeves. Where the casing passes through openings in the abutment concrete, the casing shall be wrapped with 2 layers of 15-pound asphalt-felt building paper, securely taped or wired in place. The space around the casing through bridge abutment walls shall be filled with Portland cement mortar conforming to the provisions in Section 51-1.135, "Mortar," of the Standard Specifications.

Casing portions that will be exposed to soil shall be coated with coal tar enamel, and the exterior wrapped with polyethylene tape or tubing.

MEASUREMENT

305 mm DIP water main (Buried) and 203 mm DIP water main (Buried) shall measured by the linear meter in accordance with Section 66-4.01 of the Caltrans Standard Specifications.

PAYMENT

The contract unit price paid per meter for 305 mm DIP water main (Buried) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in 305 mm DIP water main (Buried), including pressure testing and disinfection, complete in place, as shown on the plans, as specified in the Caltrans and City of Napa Standard Specifications and these special provisions, and directed by the Engineer.

The contract unit price paid per meter for 203 mm DIP water main (Buried) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in 203 mm DIP water main (Buried), including pressure testing and disinfection, complete in place, as shown on the plans, as specified in the Caltrans and City of Napa Standard Specifications and these special provisions, and directed by the Engineer.

10-1.89 305 MM BUTTERFLY VALVE (CITY OF NAPA)

Butterfly valves shall be rubber seated and be manufactured in accordance with AWWA Specification C504. Manufacturers shall be B.I.F., Clow Corporation, Dresser Manufacturing, Henry Pratt Company, American-Darling Valves Company, Kennedy Valve Manufacturing Company, Mueller Company, or equal. All valves shall be short body, Class 150, with direct bury type operators. The operators shall conform to AWWA Specification C504, Section 11, Manual Operators, and shall be designed to hold the valves in an intermediate position between fully open and fully closed without creeping or fluttering. Each operating mechanism shall be removable for inspection and-repair.

Manual valve operators shall be of the worm gear or travelling nut type and fully enclosed. Adjustable stops sha11 be provided to stop valves in the fully opened and the fully closed position. An arrow and either the word open or closed shall be cast on the 2" wrench nuts, to conform with AWWA C500, Section 19, to indicate the direction to turn. Valves shall open

with a counter-clockwise rotation of the operating nut. Operator components shall, at the extreme operator position, withstand without damage an input torque 300-ft. lbs. for operating nuts

All valves shall be wrapped with polyethylene tube. The adjoining polyethylene tube shall overlap a minimum of 305 mm (12 inches) and shall be secured in place with adhesive tape prior to backfill.

Polyethylene material that is damaged during installation shall be repaired using polyethylene sheet placed over damaged or torn area and secured in place with 2 inches wide adhesive tape. All seams shall be taped to prevent the entry of moisture.

The Contractor shall submit for approval complete shop drawings of all butterfly valves and operators to be furnished.

MEASUREMENT

305 mm butterfly valve and valve box shall measured by the unit.

PAYMENT

The contract unit price paid for 305 mm butterfly valve and valve box shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in 305 mm Butterfly valve and Valve Box, including excavation and backfill, pressure testing and disinfection, complete in place, as shown on the plans, as specified in the Caltrans and City of Napa Standard Specifications and these special provisions, and directed by the Engineer.

10-1.90 FIRE HYDRANT (CITY OF NAPA)

This item shall consist of furnishing and installing fire hydrants at the locations as shown on the Plans and as directed by the Engineer. Contractor shall furnish and install a new hydrant, bury, lead pipe, gate valve, valve box, and tee at the indicated locations. Materials and workmanship shall conform, to City of Napa Standard Plans and these special provisions.

Fire hydrants shall conform to AWWA Specification C502, with mechanical joint inlets, and shall be Mueller Company "A-423 Centurion", American Darling "B-62-B", or Kennedy "Guardian" hydrants. Furnish with (2) 2-1/2-inch and (1) 4-1/2-inch outlets, with standard left opening, maximum 60 foot-pound torque operating nuts. Plug all drain outlets.

MEASUREMENT

Fire Hydrants shall measured by the unit.

PAYMENT

The contract unit price paid for Fire Hydrant shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in Fire Hydrant, including excavation and backfill, and pressure testing, complete in place, as shown on the plans, as specified in the Caltrans and City of Napa Standard Specifications and these special provisions, and directed by the Engineer.

10-1.91 WATER SERVICE (CITY OF NAPA)

This item shall consist of furnishing and installing domestic, commercial, and fire water services at the locations as shown on the plans and as directed by the Engineer. Contractor shall furnish and install a complete water service from the water main to the meter location, including connection to the existing water service as necessary, at the indicated locations. Materials and workmanship shall conform, to City of Napa Standard Plans and these special provisions.

MEASUREMENT

Water service shall measured by the unit.

PAYMENT

The contract unit price paid for water service shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in water service, including excavation and backfill, pressure testing and disinfection, complete in place, as shown on the plans and City of Napa Standard Plans, as specified in the Caltrans and City of Napa Standard Specifications and these special provisions, and directed by the Engineer.

10-1.92 TIE-IN TO EXISTING 305 MM & 203 MM WATER MAIN (CITY OF NAPA)

The Contractor shall be responsible for connections to existing waterlines at the following locations:

1. Existing 12-inch main located in Trancas Street (two locations).
2. Existing 8-inch main located in California Boulevard (two locations).
3. Existing 8-inch main located on Permanente Way.

The Contractor will be responsible for traffic control, excavation, shoring and backfill for a 4-feet by 8-feet area at the following location:

1. Existing 12-inch main located on Trancas Street at New California Boulevard. (City forces will complete the hot tap and contractor will make the final tie-in.).

MEASUREMENT

Tie into existing water main shall measured by the unit.

PAYMENT

The contract unit price paid for tie into existing water main shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in Tie into existing water main, including excavation and backfill, pressure testing and disinfection, complete in place, as shown on the plans, as specified in the Caltrans and City of Napa Standard Specifications and these special provisions, and directed by the Engineer.

10-1.93 305 MM FLEXIBLE EXPANSION JOINT (CITY OF NAPA)

To provide for seismic movement of the pipe inside the bridge structure, each end shall be equipped with a seismic expansion assembly as manufactured by EBBA Iron, FLEX-TEND, or equal. The joint shall have a double ball deflection, 24-inch total movement and mechanical joint ends.

Prior to installation, remove the protective end covers from the flexible expansion joints. Clean the interior of all dirt and other foreign materials. The Engineer will conduct in the field an inspection of the lining and coating for compliance with the holiday free criteria. Field repairs shall be performed on scratches and damaged areas.

MEASUREMENT

305 mm Flexible Expansion Joints shall measured by the unit.

PAYMENT

The contract unit price paid for 305 mm Flexible Expansion Joint shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in Flexible Expansion Joint, including excavation and backfill, pressure testing and disinfection, complete in place, as shown on the plans, as specified in the Caltrans and City of Napa Standard Specifications and these special provisions, and directed by the Engineer.

10-1.94 PERMEABLE MATERIAL

Permeable material shall conform with the details shown on the plans, and to the provisions in Section 68-1, "Underdrains," of the Standard Specifications, and these special provisions.

Class 3 permeable material shall conform to the following grading requirements:

Grading Requirements

Sieve Sizes	Percentage Passing
37.5-mm	100
25-mm	88-100
19-mm	52-85
9.5-mm	15-38
4.75-mm	0-16
2.36-mm	0-6

Class 3 permeable material shall have a Durability Index of not less than 40.

At least 90 percent by mass of Class 3 permeable material shall be crushed particles as determined by California Test 205.

Filter fabric for use with permeable material shall conform to the provisions for filter fabric for underdrains in Section 88, "Engineering Fabrics," of the Standard Specifications and the following:

A. The subgrade and trench to receive the filter fabric, immediately prior to placing, shall conform to the compaction and elevation tolerance specified for the material involved.
B. Filter fabric shall be handled and placed in conformance with the manufacturer's recommendations.
C. The fabric shall be aligned and placed in a wrinkle-free manner.

D. Within 72 hours after the filter fabric has been placed, the fabric shall be covered with the planned thickness of overlying material as shown on the plans.

10-1.95 MISCELLANEOUS FACILITIES

300 mm alternative flared end sections, and 900 mm reinforced concrete pipe risers shall conform to the provisions in Section 70, "Miscellaneous Facilities," of the Standard Specifications.

10-1.96 WELDED STEEL PIPE

Welded steel pipe shall conform to the provisions in Section 70, "Miscellaneous Facilities," of the Standard Specifications and these special provisions.

The exterior of the pipe shall be double coated and double wrapped in conformance with the requirements in AWWA Designation: C 203.

The double 1800 mm welded steel pipe siphons shall be 6.35 mm (0.25 inches) thick.

Prior to performing any work on the double 1800 mm welded steel pipe siphons, or the inlet or outlet structures, the Contractor shall prepare and submit to the Engineer for review and approval, details for temporary connections to the siphon, and any temporary bulkhead details needed to maintain a watertight system. No work shall be performed on the siphons before the plans are approved by the Engineer in writing. The 1800 mm welded steel pipe siphon used for stage drainage shall remain watertight during the various stages of construction. The other 1800 mm welded steel pipe not in use shall be protected from any damage and maintained clean.

The double 450 mm welded steel drainage pipes through the Trancas Street Overcrossing Bridge and the 300 mm welded steel drainage pipes specified behind retaining walls and under the roadway shall be 3.43 mm (0.135 inches) thick.

1500 mm welded steel pipe casing under railroad shall be 21.44 mm (0.844 inches) thick.

10-1.97 WELDED STEEL PIPE CASING (BRIDGE)

Welded steel pipe casings for future utility openings under approach slabs shall be of the size shown and shall conform to the provisions in Section 70, "Miscellaneous Facilities," of the Standard Specifications and these special provisions.

Unless otherwise shown on the project plans, casings shall be installed at each abutment, and casings shall be extended to the greater of: (1) 1.5 m beyond the approach slab, (2) 1.5 m beyond the end of the adjacent wingwall or (3) 6 m beyond the abutment.

WORKING DRAWINGS

Working drawings for temporary support of casing pipe at the abutments shall be submitted for approval in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings" of the Standard Specifications.

MATERIALS

Casing pipe

Casing pipe shall be welded steel pipe conforming to the provisions in Section 70-1.02B, "Welded Steel Pipe," of the Standard Specifications, except that the pipe shall be treated in accordance with the following requirements, prior to shipping. Exterior surfaces of welded steel pipe shall be cleaned and coated in conformance with the requirements in ANSI/AWWA C213 or at the option of the Contractor, cleaned, primed, and coated in accordance with specifications of ANSI/AWWA C214.

Pipe wrapping tape

Wrapping tapes for pipe in contact with the ground shall be a pressure sensitive polyvinyl chloride or polyethylene tape having thickness of 1.27 mm, minimum.

Epoxy adhesive

Epoxy adhesive shall conform to the provisions in Section 95-1, "General," of the Standard Specifications and at the option of the Contractor, shall conform to the provisions in Section 95-2.03, "Epoxy Resin Adhesive for Bonding New Concrete to Old Concrete," or in Section 95-2.04, "Rapid Set Epoxy Adhesive for Pavement Markers," or in Section 95-2.05, "Standard Set Epoxy Adhesive for Pavement Markers," of the Standard Specifications.

CONSTRUCTION

If a blockout is provided in the bridge abutment wall for casing pipe, the space between the casing pipe and bridge abutment wall shall be filled with portland cement mortar conforming to the provisions in Section 51-1.135, "Mortar," of the Standard Specifications.

Openings for utilities through bridge superstructure concrete shall either be formed or shall consist of pipe sleeves.

Wrapping and coating pipe

Damaged coating on steel pipe casing in contact with earth shall be wrapped as follows:

A. Pipe to be wrapped shall be thoroughly cleaned and primed as recommended by the tape manufacturer.
B. Tapes shall be tightly applied with 1/2 uniform lap, free from wrinkles and voids to provide not less than 2.5 mm thickness.
C. Field joints and fittings for wrapped pipe shall be covered by double wrapping 1.27 mm thick tape. Wrapping at joints shall extend a minimum of 150 mm over adjacent pipe coverings. Width of tape for wrapping fittings shall not exceed 50 mm. Adequate tension shall be applied so tape will conform closely to contours of joint.

Where a welded steel pipe casing passes through the abutment wall, the welded steel pipe casing shall be additionally wrapped with 2 layers of No. 15 asphalt-felt building paper, securely taped or wired in place.

MEASUREMENT AND PAYMENT

Measurement and payment for welded steel pipe casing for each size listed in the Engineers Estimate shall conform to the provisions in Sections 70-1.04, "Measurement," and 70-1.05, "Payment," of the Standard Specifications.

Full compensation for furnishing and installing steel cover plates, mortar and building paper, and other fittings, casing, shall be considered as included in the contract prices paid per meter for the sizes of welded steel pipe casing involved and no additional compensation will be allowed therefor.

10-1.98 KNIFE GATE VALVE

600 mm Knife Gate Valve shall be furnished and installed in accordance with the details shown on the plans, as specified in these special provisions, and as directed by the Engineer.

The knife gate valves shall be watertight for a standard operating pressure of 690 kPa.

The knife gate valves shall be complete with all necessary hardware and parts required for installation and operation, including but not limited to, a bonnetless valve body, replaceable seats, wafer type gate, AWWA Nut, spur gear reducer, solid steel extensions, brackets, stem, nuts, bolts and adapters.

The valve body shall be manufactured of cast iron conforming to the specifications of ASTM Designation: A 126, Class B. The stainless steel wafer type gates shall conform to the specifications of ASTM Designation: A240 T-316. The gates will be of sufficient thickness to provide against permanent deformation at 1.2 times the rated working pressure. The spur gear reducer shall withstand submergence at 6 meters for 72 hours, and, provide a closing torque reduction of 3.6. The stem shall be ASTM A276 T-304 and shall have single pitch threads. The stem nut shall be acid resistant bronze. The valves shall be connected to the 600 mm, standard flanged welded steel pipes according to the manufacturers recommendations.

The contract unit price paid for the knife gate valves shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in furnishing and installing the gate valves, complete in place, as shown on the plans, including wall fitting, 600 mm welded steel pipe extension connected to valve, and pipe support, as specified in the Standard Specifications, and these special provisions, and as directed by the Engineer.

10-1.99 AUTOMATIC DRAINAGE GATE

Heavy duty automatic drainage gates shall conform to the provisions in Section 70, "Miscellaneous Facilities," of the Standard Specifications and these special provisions.

The gates shall be designed to operate under 15 m of head face pressure measured from the center of the gate cover to the highest water level. The gate shall provide a free outflow, but shall prevent backflow. The gate shall be attached to the required pipe size or anchored to a concrete wall.

The gate shall be complete with cover, spigot-back seat, or flat-back seat or flange-back seat, gate links, bushings, bolts and nuts.

The gate cover and spigot-back seat, or flat-back seat or flangeback seat and pivot lugs and gate links shall be manufactured of cast steel or steel conforming to the requirements in ASTM Designation: A 27, Grade 65-35 or A 36/A 36M, respectively. The bushings shall be manufactured of commercial quality bronze. The assembly bolts, or anchor bolts when required, and nuts shall conform to the requirements in ASTM Designation: A 307, Grade A. The gate links, bolts and nuts shall be galvanized in conformance with the requirements in ASTM Designation: A 153.

The gate cover shall be ribbed or domed with ample section to withstand the face pressure. The seating surfaces of the cover and spigot-back seat or flat-back seat or flange-back seat shall be machined or ground to fit together within a tolerance of not more than 0.10-mm throughout the circumference of the seating surfaces.

The gate cover shall be hinged from the spigot-back seat, or flat-back seat or flange-back seat by 2 supporting links, one on each side of the gate, pivotally connected at the top of the seat and at the bottom to the cover above its center of gravity. Bushings of suitable length and diameter shall be provided at the 4 hinge points.

The gate shall be assembled in the shop and parts shall be given a shop coat of commercial quality asphaltic paint furnished by the manufacturer.

The cover of the gate, when installed, shall fit tight against the seat when there is no pressure on the cover face.

The cover shall be equipped with an eye bolt at the bottom for opening the gate under pressure.

Wall thimbles shall be provided and shall be heavy one piece casting of the "E" type. The thimbles shall be 300 mm in length. The front flange of the thimble shall be machined to a plane and shall be drilled and tapped to mate the gate frame. The vertical center line shall be clearly shown at the top and bottom by permanent marks on the machined face. The word "top" shall be stamped in the machined face near the top center line. The surfaces to be cast into the concrete shall be free of all foreign material at time of installation. Galvanized steel fasteners shall be provided for attaching the gate. Mastic shall be provided to form a seal between the front face of the thimble and the back of the gate frame.

Gates and thimbles shall be approved by the Engineer prior to installation and per manufacturers recommendation.

Full compensation for wall thimbles shall be considered as included in the contract unit price paid for the various size of automatic drainage gates and no additional compensation will be allowed therefor.

10-1.100 SLIDE HEADGATE

Slide headgates shall conform to the provisions in Section 70, "Miscellaneous Facilities," of the Standard Specifications and these special provisions.

The headgates shall be complete with slides, frames, guides, wedging devices, stems, stem guides, wall brackets, stem covers, lifting devices, and fasteners.

The headgate slide, frame with guides, stem guide, wall brackets, lift pedestal, limit nut, lift housing and crank shall be one piece castings and shall be manufactured of cast steel or cast iron conforming to the specifications of ASTM Designation: A 27, Grade 65-35; or A 126, Class B, respectively. The frame guide rails may be manufactured separately of steel and fastened to the frame. Guide rails, if manufactured separately, shall be manufactured of steel conforming to the specifications of ASTM Designation: A 36, and galvanized conforming to ASTM Designation: A 123.

The frame shall be flangeback or flatback. The frame shall be provided with cast-on pads which shall be machined, drilled and tapped for the mounting of wedging devices. The back of the frame shall be machined to a plane and drilled to mate the wall thimble. Guides shall be of such length as to retain at least one half of the vertical height of the slide when it is fully open. A groove running the full length of the guide rail shall be accurately machined to receive the slide tongue, with a nominal clearance of 1.59 mm. The frame and guides shall be capable of withstanding the face and wedging pressure. The front flange, if frame is flangeback, shall be drilled to allow through projection of studs to the wall thimble.

The headgate slide shall be ribbed or domed of ample section to withstand the face pressure. The seating surfaces of the slide and frame shall be machined or ground to fit together within a tolerance of not more than 0.10-mm throughout the circumference and shall be manufactured of bronze conforming to the specifications of ASTM Designation: B 21, Alloy 482. The slide shall have cast-on pads which shall be machined, drilled and tapped for mounting of wedging devices. The slide shall have fully machined tongues running the full length of each side to properly engage the guide rail grooves. The slide shall have a square nut pocket cast integrally with the slide and a thrust nut shall be provided to attach the slide to the stem. The thrust nut shall be manufactured of bronze conforming to the specifications of ASTM Designation: B 584, Alloy 844 or 865, and shall be threaded and provided with a means of locking it to the stem after installation.

Wedging devices shall be designed to wedge the seating faces of the slide against those on the frame when gate is fully closed. All wedge bearing surfaces and contact faces shall be machined to give maximum contact and wedging action. Wedges shall be fully adjustable but once set shall not rotate or move from the desired position. The quantity and location of the wedging devices shall be as recommended by the manufacturer and approved by the Engineer.

A sufficient length of stem shall be supplied to move the cover from the fully closed position to the fully opened position. The stem shall be manufactured from round bar stock of cold-finished steel conforming to the specifications of ASTM Designation: A 108, Type 12L14. The stem shall be threaded for use as a rising stem and threads shall be smooth and free of burrs. The diameter of the stem shall be a minimum of 51 mm.

The crank operated gear lift shall have a pedestal base which shall be adaptable for anchoring to a concrete wall. The lift shall be furnished with a flanged bronze lift nut with a ball bearing design wherein the ball races are mounted above and below the lift nut, and shall be enclosed in a cast iron housing. The lift shall be equipped with grease fittings for lubrication of the bearings. The gear ratio for the lift shall be recommended by the manufacturer. Bevel and spur gears shall be steel, and be driven by a steel pinion shaft with bronze bearings. A threaded cast iron limit nut shall be furnished and located on

the stem so as to prevent overclosing. The cast iron crank shall be fitted with a rotation hand grip and shall be removable. A tamper resistant, padlockable input shaft cover shall also be furnished.

A standard weight galvanized steel stem cover shall be provided. The cover shall be of a length sufficient to contain and protect the stem when the gate is fully open. Both the interior and exterior of the stem cover shall be galvanized. The stem cover shall be threaded at both ends. The top shall be closed with a standard galvanized pipe cap and the bottom shall be screwed into a cast iron housing mounted on top of the lift. The stem cover diameter shall be as recommended by the manufacturer.

All anchor bolts, fasteners and assembly hardware shall be steel conforming to ASTM Designation: A 307, and galvanized conforming to ASTM Designation: A 153.

The headgate shall be assembled in the shop and cast iron parts, with the exception of machined surfaces, shall be given a shop coat of commercial quality asphaltic paint furnished by the manufacturer. Machined surfaces shall be coated with a water-tight resistant rust preventive compound.

A wall thimble shall be provided and shall be a heavy one piece casting of the "E" type. The length of thimble shall be 300 mm. The front flange shall be machined to a plane and shall be drilled and tapped to mate the gate frame. The vertical center line shall be clearly shown at the top and bottom by permanent marks on the machined face. The word "top" shall be stamped in the machined face near the top center line. The surfaces to be cast into the concrete shall be free of all foreign material at time of installation. Galvanized steel fasteners shall be provided for attaching the gate. Mastic shall be provided to form a seal between the front face of the thimble and the back of the gate frame. Gate and thimble shall be approved by the Engineer prior to installation.

The contract unit price paid for slide headgate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in furnishing and installing the slide headgates, complete in place, including enclosed crank gear pedestal lift and thimble, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.101 CITY MANHOLE

City of Napa storm drain manholes shall be constructed as shown on the plans and shall conform to the provisions of the "Minor Structures" in Section 51, "Concrete Structures", of the Standard Specifications and these special provisions.

Portland cement concrete shall conform to the provisions in Section 90-10, "Minor Concrete", of the Standard Specifications, or may be produced from commercial quality aggregates and cement containing not less than 325 kg of cement per cubic meter.

Metal frames and covers for use with minor structures will be paid for by pound as provided in the Section 75, "Miscellaneous Metal", of the Standard Specifications.

The contract unit price paid for city manhole shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in city manhole, including bar reinforcing steel, structure excavation and structure backfill, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and directed by the Engineer.

10-1.102 DRAINAGE PULL BOXES

Drainage pull boxes shall be constructed in conformance with the provisions in Section 86-2.07, "Traffic Pull Boxes," of the Standard Specifications and these special provisions. These pull boxes shall be No. 5(T). Pull Box Covers shall be marked with "Caltrans". Grout shall not be placed in the bottom of the drainage pull boxes and the drain hole shall be omitted.

The contract unit price paid for drainage pull boxes shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in furnishing and installing the drainage pull boxes, complete in place, as shown on the plans, as specified in the Standard Specifications, and these special provisions, and as directed by the Engineer.

10-1.103 SLOPE PAVING

Slopes under the ends of bridges, where shown on the plans, shall be paved in conformance with the provisions in Section 72-6, "Slope Paving," of the Standard Specifications and these special provisions.

The location of construction joints shall be subject to the approval of the Engineer. Placement of slope paving shall be scheduled so that the work, including placement, finishing, and application of curing, is completed in any section bounded by permissible construction joints on the same day that the work is started in that section.

Masonry block veneer units shall be in the size and color as shown on the plans, and shall conform to the requirements in ASTM Designation: C 90, lightweight or medium weight classification, Type II.

Masonry block veneer units shall be constructed with joints of portland cement mortar. Joints shall be 10 mm wide between units.

Samples of the color and texture of the masonry block veneer specified are available for review by prospective bidders at the office of the Department of Transportation District 4 – Office of Landscape Architecture, 111 Grand Avenue, Oakland, California. Masonry block units closely conforming to the color specified are available through commercial masonry sources.

The contract unit price paid per square meter for masonry block veneer shall include full compensation for furnishing all labor, materials (including mortar cement), tools, equipment, and incidentals, and for doing all the work involved in constructing masonry block veneer on the slope paving, complete in place, as shown on the plans, as specified in the Standard Specifications and under these special provisions, and as directed by the Engineer.

10-1.104 MISCELLANEOUS CONCRETE CONSTRUCTION

Concrete curbs, sidewalks, island paving, curb ramps (wheelchair ramps), driveway approaches and minor concrete (textured paving, stamped concrete, and broom finish) shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications and these special provisions.

If the Contractor elects to use the curing compound method for curing concrete for minor concrete (textured paving and broom finish), the curing compound shall be curing compound (6) conforming to the provisions in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications.

The curing compound shall be applied in a manner that will provide a complete coating of all exposed faces of the concrete surface.

Aggregate for minor concrete (textured paving and broom finish) 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

Samples of the colors specified for minor concrete (textured paving and broom finish) are available for review by prospective bidders at the office of the Department of Transportation District 4- Office of Landscape Architecture, 111 Grand Avenue, Oakland, California. Portland cement concrete closely conforming to the colors specified are available through commercial concrete sources.

A sample of sufficient size, of each type and color of the minor concrete (textured paving and broom finish), to demonstrate the texture of the paving, including color hardener, curing and finishing compounds, for both grouted and ungrouted finishes, shall be submitted to the Engineer for written approval.

Minor concrete (textured paving and broom finish) shall not be placed on the project prior to approval by the Engineer of the samples prepared and submitted by the Contractor. In the event more than one sample of each type and color of minor concrete (textured paving and broom finish) to be placed is required by the Engineer, each additional sample will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

Welded wire fabric, of the size and type shown on the plans and conforming to the provisions in Section 52, "Reinforcement," of the Standard Specifications, shall be placed in the minor concrete (textured paving and broom finish) areas as shown on the plans.

Aggregate base shall be Class 2 and shall conform to the provisions in Section 26, "Aggregate Bases," of the Standard Specifications.

The respective pattern types and colors of concrete for minor concrete (textured paving and broom finish) 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.

Site conditions within the minor concrete (textured paving and broom finish) areas may vary. The Contractor shall be responsible for site preparation of minor concrete (textured paving and broom finish) 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 concrete area and adjusting pullboxes to grade

Gaps between the cured concrete and existing asphalt concrete surfacing shall be filled with asphalt concrete. Asphalt concrete shall conform to the provisions under "Asphalt Concrete" of these special provisions.

Floor color hardener shall be applied to the plastic surface of the concrete by the "dry-shake" method using a minimum of 30 kg of hardener per 10 m^2. Hardener shall be applied in 2 applications, shall be wood-floated after each application, and

shall be trowelled only after the final floating. The resultant color of the floor hardener shall closely conform to the colors specified on the plans for the respective areas.

The forming tools for the minor concrete (textured paving and broom finish) shall be applied to form the patterned surfaces while the concrete is still in the plastic stage of set.

Minor concrete (textured paving and broom finish) areas shall be cured by the curing compound method. The curing compound shall be curing compound (6) conforming to the provisions in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications.

The contract price paid per square meter for minor concrete (textured paving and broom finish) shall include full compensation for furnishing all labor, materials (including welded wire fabric, color, sleeving asphalt concrete, where required, and aggregate base), tools, equipment, and incidentals, and for doing all the work involved in constructing minor concrete (textured paving and broom finish), including site preparation , complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.105 MINOR CONCRETE (GUTTER)

The gutter behind the retaining wall shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications and these special provisions.

Minor concrete (gutter) will be measured and paid for by the linear meter.

The contract price paid per linear meter for minor concrete (gutter) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the gutter, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.106. PUMPING PLANT EQUIPMENT

GENERAL

DESCRIPTION.--The work shall consist of furnishing and installing pumping plant equipment in accordance with these special provisions, the details shown on the plans and the provisions in Section 74, "Pumping Plant Equipment," of the Standard Specifications. In addition, the Contractor's attention is directed to Order of Work, of these special provisions, regarding responsibility for maintaining drainage pumping capacity of the drainage area and Section 74-1.055, of the Standard Specifications, regarding use of the pumping equipment prior to acceptance of work.

Earthwork, foundations, sheet metal, electrical, and all other work incidental and necessary to the proper installation and operation of the mechanical work shall conform to the requirements for similar type work elsewhere in these special provisions.

All electrical components of mechanical work and their installation shall conform to the National Electrical Code; the California Administrative Codes, Title 24, Part 3, "Basic Electrical Regulations," and Title 8, Chapter 4, "Electrical Safety Orders".

PAINTING.--All field supplied paint shall be as specified in Section 74-1.06, "Painting," of the Standard Specifications.

CERTIFICATION.--Certification required for drainage pumps shall be delivered to the Engineer in triplicate before pump installation.

SUBMITTALS.--Submittals shall be as specified in Section 74 of the Standard Specifications. In addition, submittals shall include the following information:

1. Descriptive Data.--Five (5) bound identified copies of the complete description and performance data covering materials and equipment specified herein shall be submitted for approval. Submittals shall be approved prior to installation and shall include, but not necessarily be limited to, the following:

   Drainage pump, including motor and pump base
   Flexible expansion coupling
   Flap valve
   Pressure gage
   Pumphouse door

2. Manuals.--Before completion of project, 3 bound identified copies of operation and maintenance instructions and parts lists for equipment furnished shall be delivered to the Engineer at the jobsite. Manuals that are inadequate or incomplete will be returned and the Contractor shall resubmit adequate and complete manuals. Manuals shall be included for the following equipment:

   Drainage pump

3. Warranties and Guarantees.--Manufacturer's warranties and guarantees furnished for materials or equipment used in the work shall be delivered to the Engineer at the jobsite prior to acceptance of the contract.

TESTING.--Testing of the completed drainage pumping equipment shall be in accordance with Section 74-1.07, "Tests," of the Standard Specifications, and as described elsewhere in these special provisions.

All electrical equipment shall conform to the standards of the NEMA and shall be listed by a recognized independent testing laboratory. In addition the requirements of the plans, these specifications and the special provisions, all materials and workmanship shall conform to the requirements of the National Electrical Code:4, Subchapter 5, "Electrical Safety Orders," and Subchapter 7, "General Industry Safety Orders"; California code of Regulations, Title 19, Chapter 1, Public Safety." Regulations of State Fire Marshal; California Code of Regulations, Title 24, Part 3, "California Electrical Code", of General Order No. 95, of the Public Utilities Commission; and any local ordinances which may apply.

The seventh paragraph of Section 74-1.04, "Data to be Furnished," of the Standard Specifications shall not apply.

The uncoated or primed only drainage pumping equipment and all uncoated metal and damaged surface of coated metal shall be painted with 2 applications of unthinned zinc-rich primer (organic vehicle type) conforming to the provisions in Section 91, "Paint," one application of wash primer, and 2 finish applications of industrial quality gray gloss enamel. Aerosol cans shall not be used.

Electrical equipment and enclosures not supplied with a factory painted finish shall be cleaned, lightly sanded, and painted before installation with 2 applications of gray gloss industrial quality enamel which matches the surrounding pumping equipment color.

The drainage pumping equipment shall be tested to demonstrate satisfactory operation throughout the full pumping range of the installed pumping equipment. Testing shall be volumetric or other approved method and shall show that the installed pumping equipment delivers a minimum of 97% of the factory certified performance curve for a corresponding head and flow rate without overloading the motor (when supplied with the rated nameplate voltage) to more than the actual full load nameplate amperage, regardless of head. To determine compliance with this requirement, the maximum motor current will be calculated by converting the current measured at the test horsepower to the current that would be drawn (at the same terminal voltage) at the maximum horsepower certified for this range of heads, and converting this current tot he current hat would be drawn at the rated nameplate voltage.

For the purpose of making the test, all pipes discharging into the storage box shall be blocked at their entrance to the storage box. All debris shall be removed from within the pump plant, storage box, debris sump and pump sump before testing. The blocking of these pipes shall be removed after testing.

Drainage pumping equipment shall consist of pumps, pumping apparatus, motors, pipe, joints and fittings, bracing, hardware, storage cabinet, supply fan, duct work, pump house door, and tools.

Pump house door shall be as specified in the special provisions.

Steel pipe shall be furnished with flanged joints. Flanges shall be either threaded or welded to the piping. Threaded flanges shall be ductile iron conforming to ANSI/AWWA Standard: C115/A21.15. Flanges for welding shall be slip-on type steel hub flanges conforming to ANSI/AWWA Standard: C207, Class D. If steel flanges are welded to pipe, the completed assembly shall be hot-dip galvanized after fabrication.

All flange bolts and nuts shall be non-magnetic stainless steel.

Ductile iron pipe shall conform to ANSI/AWWA Standard: C151/A21.51. The pipe and fittings shall be of the size shown on the plans. Each length of pipe shall be marked with "DI" or "Ductile" and the Class.

Ductile iron pipe shall be furnished with mechanical joints conforming to ANSI/AWWA Standard: C111/A21.11. A standard bituminous coating shall be applied to the inside and outside of all pipe and fittings.

Fittings shall be ductile iron and conform to ANSI/AWWA Standard: C110/A21.10, or to ANSI Standard: B16.1, Class 125, and shall be of the size shown on the plans.

All pumping plant metal work shall conform to the provisions in Section 75-1.04, "Pumping Plant Metal Work."

10-1.107 DRAINAGE PUMPING EQUIPMENT

DRAINAGE PUMP.--(STORMWATER) Drainage pump shall be a submersible type, close coupled, submersible motor wastewater pump. Pump casing, bracket, and volute shall be gray cast iron construction. All external nuts and bolts shall be non magnetic stainless steel. The impeller shall be bronze or ductile iron, dual-vane, non-clogging type and shall be

capable of passing 100-mm solids, sludge and fibrous materials. The impeller shall be dynamically balanced and factory certified to not exceed 73g-mm/kg of rotating mass at 900 RPM (sync.). Balancing of impeller shall not weaken or deform the impeller. The drainage pump shall include replaceable bronze impeller or ductile iron impeller (Grade 60-40-18), and bronze casing wear rings, the pump shaft shall be supported by roller bearings.

DRAINAGE PUMP (GROUNDWATER).--Drainage pump shall be a submersible type, close coupled submersible type close coupled, submersible motor waste water pump. Pump casing, bracket, and volute shall be gray cast iron construction. All external nuts and bolts shall be non-magnetic stainless steel. The impeller shall be dual-vane, non-clogging type and shall be capable of passing 75 mm solids, sludge and fibrous materials. The impeller shall be dynamically balanced and factory certified to not exceed 54g-mm/kg of rotating mass at 1200 (sync.) Balancing of impeller shall not weaken or deform the impeller. The drainage pump shall include a replaceable bronze or ductile iron impeller (Grade 60-40-18), and bronze casing wear rings. The pump shaft shall be supported by roller bearings.

PUMP MOTOR.--The pump motor shall be a 3-phase NEMA Design B, oil filled or continuous duty in air, induction motor. Motor shall be housed in a cast iron casing and shall have moisture resistant NEMA Class F insulation. Motor shall have built-in thermal overload protection. Horsepower, voltage, and rpm shall be a shown on the plans. The pump motor shall be a standard efficiency motor.

The motor shall be have portable Type SO cord, or cords, of sufficient length to reach from the pump to the junction box or motor starter enclosure without splicing as shown on the plans. Cords shall be sealed into the motor with epoxy by the pump manufacturer. A second set of motor nameplates, supplied by the manufacturer, shall be provided to the Engineer.

The stormwater drainage pump shall be foot mounted, with the discharge pipe bolted directly to the pump discharge flange. The foot mounted base shall be specifically designed by the pump manufacturer to allow proper operation of the pump at the pumping conditions specified and shall be designed to support the assembled weight of the pump and motor.

The groundwater drainage pump shall be rail mounted.

The complete groundwater and stormwater pump and pump motor assemblies shall be factory painted with approved manufacturer recommended coatings systems compatible with intended application of the drainage pumping equipment.

Two submittals shall be submitted for approval.. The first submittal shall be the pump manufacturer's standard or representative performance data for the pump being proposed. It shall show that the pump meets the specified performance points and does not develop more the 95% of the motor nameplate power, anywhere on the pumping curve.

The second submittal shall be the pump manufacturer's factory certified test data for each approved pump. Each pump supplied shall be factory tested as an assembled pumping unit, and certified capable of pumping water under test according to the flow rates at the total heads indicated on the plans. Testing shall be done in accordance with the Hydraulics Institute, Centrifugal Pump Test Standard. The certified test shall show that the pump does not develop more than 100% nor less than 97% of the motor nameplate power, at the point the pump requires the maximum power. The pumping unit shall be defined as the actual driver, and actual pump and impeller combination supplied.

Documentation of the factory certified test shall include:

a record of the actual test points used to generate the pump curve.
a pump performance curve showing flow rate verses total dynamic head.
the points specified in the contract documents plotted on the submitted curve.
the power and efficiency curves from cutoff head down to 6.10 meters (Groundwater) and to 8.65 meters (Stormwater).
the rpm of the actual driver.
the actual impeller diameter.

The pump and motor shall be shipped in a condition capable of being in storage before final installation. If the Contractor elects to store the drainage pumping equipment before final installation, the Contractor shall maintain the pump in accordance with the manufacturer's recommended storage and warrantee requirements.

The complete pump and motor assembly shall be factory coated with an approved manufacturer recommended coating system compatible with the intended application of the drainage pumping equipment.

FLAP VALVE.--Flap valve shall be the type and size shown on the plans and shall be iron body with bronze mating surfaces and pipe flange frames.

FASTENERS.--All fasteners, including expansion anchors, nuts, bolts and washers, shall be stainless steel unless otherwise noted.

PUMPHOUSE DOOR.--The pumphouse door shall be a 914 mm x 2134 mm x 44 mm flush type, vertically stiffened, hollow metal door, and metal frame. The door shall be formed of 1.5 mm nominal thickness, galvanized face sheets, turned over and fully covering all vertical edges. Seams shall be continuously welded. The door shall have 1.5 mm nominal thickness, or thicker, steel stiffener channels along hinge and lock edges. End channels (top and bottom) shall be fully flush and continuously closed. The door shall have continuous one piece, full length, vertical steel rib stiffeners spaced not to exceed 150 mm apart, with insulation between. The door shall also be reinforced around the hinges and lockset. The bottom end shall have moisture vents to drain condensation. The door and frame shall be factory prepared and reinforced to receive hardware. All parts of the door shall be securely welded together. Exterior welds shall be ground flush.

The door frame shall be formed of 1.9 mm nominal thickness, pressed sheet steel 140 mm x 51 mm in section with mitered, full welded corners and at least 3 standard casting anchors on each side supplied by manufacturer. The frame shall have adequate metal housing closures at hinges and latch to prevent intrusion of concrete or grout. Exterior welds shall be ground flush. The threshold shall be the rectangular or half saddle, bumper type for outswing doors, and securely anchored to the floor.

Pumphouse door hardware shall consist of the following: Hinges shall be 1 1/2 pair, non-removable pins, full mortise butt hinges . Hinges shall be industrial, heavy weight quality, stainless steel or brass, 5 knuckle, concealed ball bearing. Latch shall be non-locking, knob type passage latch, brass or stainless steel, heavy duty, corrosion resistant, and designed in accordance with ANSI A 156.2, Grade 1. The door lock cover shall be fabricated and installed as shown on the plans and as directed by the Engineer. Pad lock will be furnished by others after acceptance of pumphouse.

The door frame shall be set true and plumb and shall be adequately braced to prevent distortion when the concrete is placed. All doors shall fit correctly in their frames, shall swing freely and shall close properly.

The hollow metal door and frame shall be factory painted with an approved coating suitable for exterior applications.

After installation, the door and frame shall be cleaned and painted with 2 finish applications of commercial quality gray gloss enamel.

If the Contractor desires to lock the pumphouse during construction, he shall furnish his own lock for the door until acceptance of the pumphouse.

ACCESS DOOR.--Access door shall be double leaf, size as shown on the plans. The frame shall be extruded aluminum with a continuous concrete anchor flange, and shall include an NPS 1-1/2 drainage coupling. A bituminous coating shall be applied to frame exterior. Drainage coupling shall be pumped and shall discharge in the sump. Door leafs shall be 6.35 mm aluminum diamond plate, reinforced to support an AASHTO H-20 wheel load. Door leafs shall open to 90 degrees and automatically lock with a hold-arm and release handle. Door leafs shall open with the use of compression springs for easy operation. Door leafs shall lock with watertight stainless steel slam locks, and shall include removable turn handles. Door leafs shall close flush with frame. Lifting handles, hinges, fastening hardware shall be stainless steel ore other corrosion-resistant material.

DIMENSIONS AND LOCATIONS.--Dimensions and locations of pumping equipment shown on the plans are approximate. Contractor shall submit detailed drawings showing installation details of pumps and associated hardware. If pumps selected by the Contractor require revisions to pump plant metal work or other construction details, the Contractor shall submit detailed drawings of these revisions for approval. No additional compensation shall be made for revisions resulting from Contractor's pump selection.

10-1.108 PUMPING PLANT ELECTRICAL EQUIPMENT

PART 1.-GENERAL

Scope.--Work covered by this section shall include furnishing all labor, materials, equipment and services required to construct and install the complete electrical system, including earthwork, in accordance with the details shown on the plans, the provisions of Section 74, "Pumping Plant Equipment," and Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and as specified in this section, and the work of installing and wiring motors and controls as specified under "Pumping Plant Equipment" of these special provisions.

Related Work.--Earthwork, foundations, sheet metal, painting, mechanical and such other work incidental to and necessary for the proper installation and operation of the electrical work shall be done in accordance with the requirements specified for similar work elsewhere in these special provisions or in the Standard Specifications.

Pumping plant electrical equipment consists of control and power and metering equipment, conduit, insulated wire and cable, lights, and floor covering but does not include pump motors.

All pulling of conductors shall be done with special care to avoid injury to sheath or insulation. An inert lubricant listed by a recognized independent testing laboratory shall be used whenever pulling conductors through conduit.

Splices shall be made by soldering or by the use of pressure connectors. Soldering of joints, where necessary, shall be by the use of hot irons. Open flame soldering shall not be permitted. All splices in underground pull boxes shall be made watertight. Conductor splices shall be wrapped with rubber splicing tape and then coated with Scotchkote or other equivalent electrical coating. Products to be utilized for watertight splices shall be submitted for approval.

All conductors shall be marked as shown on the approved working drawings and plans at each termination by either (1) adhesive backed paper or cloth wrap-around markers with clear, heat shrinkable tubing sealed over either type of marker, or (2) pre-printed, white heat shrinkable tubing.

SERVICE.--The Contractor shall furnish all material and perform all work necessary to complete the service installation or shall reimburse the serving utility therefore, all in accordance with the requirements of the serving utility.

The service installation shall conform to the requirements of the Serving Utility, in addition to the requirements of the plans and special provisions, and the Contractor shall submit complete service details to the Serving Utility for approval prior to starting any work thereon.

The Contractor shall make all necessary arrangements with the Serving Utility in providing for metering equipment and/or for obtaining service. The Engineer will sign an application for service at such time as the Contractor may request, but the Contractor shall pay for all permits, fees, and other charges and for energy used until the time of acceptance of the contract.

SUBMITTALS.--Submittals shall be as specified in section 74-1.04, "Data to be Furnished," of the Standard Specifications. All dimensions illustrated on working drawings and all units of measurement shall be shown in the International System of Units (metric system). In addition, the proposed ladder logic diagram and user manual(s) including complete software and programming instructions for the programmable logic controller and operator panel shall be submitted for approval.

OPERATION AND MAINTENANCE MANUALS.--Prior to the completion of the contract, 3 identified copies of the operation and maintenance instructions with parts lists for the equipment specified herein shall be delivered to the Engineer at the jobsite. The instructions and parts lists shall be in a bound manual form and shall be complete and adequate for the equipment installed. Inadequate or incomplete material will be returned. The Contractor shall resubmit adequate and complete manuals at no expense to the State.

Manuals shall be submitted for the following equipment:

Programmable logic controller (PLC)
Operator panel

TRAINING.--Training of State personnel in programming, connection, operation, trouble shooting, and maintenance of the PLC and operator panel shall be provided. The training period shall be for a minimum of eight hours and shall be conducted for not more that six State personnel at the job site or at a site mutually agreed upon by the Contractor and the Engineer. The trainer shall be an authorized representative of the PLC manufacturer, shall have complete knowledge of PLC and operator panel installation and operation, and shall be qualified as a trainer.

All trainees shall be supplied with books, manuals, programmer or personal computer, software, and such other training material, guides and equipment, not mentioned, but required for a complete and thorough training course. Training shall include hands-on experience in programming techniques and operation.

MANUFACTURER'S SOFTWARE TECHNICAL SUPPORT.--The manufacturer of the PLC and operator panel shall provide technical assistance and guidance in the operation, maintenance and trouble shooting of operational problems of the PLC for one year following the acceptance of the contract. The technical support shall be provided at no additional cost to the State.

Technical support shall be provided at the facility site by an authorized representative of the PLC manufacturer and by a toll free telephone service to the manufacturer.

TESTING.--After the electrical system installation work has been completed, the electrical system shall be tested in the presence of the Engineer to demonstrate that the electrical system functions properly. The testing shall include all the functions of the PLC and operator panel. The Contractor shall make necessary repairs, replacements, adjustments and retests at his expense.

WARRANTIES, GUARANTIES AND INSTRUCTION SHEETS.--Manufacturer's warranties and guaranties furnished for materials used in the work and instruction sheets and parts lists supplied with materials shall be delivered to the Engineer prior to acceptance of the project.

DESCRIPTION OF OPERATION.--Automatic operation of the drainage pumps shall be controlled by the trapped air level monitoring system, the Power Transfer Switch (PTS) auxiliary contact, and the PLC. The monitoring system shall measure the water pressure and convert it to a 4-20 mA signal, which shall then be scaled to provide the depth of the water in the sump. The PLC shall output a signal to the operator panel to display the current water level and shall determine which pump to turn on. The normally-open PTS auxiliary contact will only influence the control scheme if it becomes closed (when switched to "standby" position).

Either pump No. 1 or pump No. 2 shall start when the water level rises to the "Start lead pump" elevation and continue to run until the water level falls to the "Stop lead pump" elevation as shown on the plans. The remaining pump shall start when the water level rises to the "Start lag pump" elevation and continue to run until the water level falls to the "Stop lag pump" elevation as shown on the plans. Pump No. 1 and pump No. 2 shall alternate with each lead pump call. Should the PLC call for both pumps to operate at the same time for any reason (such as when power is restored after an interruption and the water level is above the "Start lag pump" elevation), there shall be a programmed time delay of ten seconds between the starting of each pump. There shall also be a ten second backspin time delay to prevent immediate restart of a pump after a pump shut off as part of the PLC programming.

Pilot light PL3 and indicating light IL1 shall be energized whenever control power is present. If the PLC calls for any pump to start, the pump demand pilot light PL4 shall be activated. If the water level reaches the "high water" elevation, the high water pilot light PL5 shall be energized. When motor current is sensed by a current switch, the PLC shall activate the corresponding pilot light and time meter of the pump and indicating light IL2.

A seal failure indication on a seal failure relay shall be treated as an alarm indication only and in no way affect the control operation of a pump.

The phase failure relay shall provide sensing for voltage unbalance or failure. Whenever an abnormal condition occurs for more than 5 seconds, the PLC shall deactivate all outputs until the condition returns to normal except when the PTS is switched to "standby".

EXCAVATING AND BACKFILLING.--Excavating and backfilling shall conform to Section 86-2.01, "Excavating and Backfilling," in the Standard Specifications.

FOUNDATIONS.--Foundations shall conform to Section 86-2.03, "Foundations," in the Standard Specifications.

PART 2.-PRODUCTS

Conduit.--

Conduit shall conform to Section 86-2.05, "Conduit," in the Standard Specifications and as specified in these special provisions.

Unless otherwise shown, all conduit shall be threaded, hot-dip galvanized inside and outside, rigid steel conduit with threaded steel or malleable iron fittings.

Conductors.--

Conductors shall conform to Section 86-2.08, "Conductors," in the Standard Specifications and as specified in these special provisions.

Conductors shall be stranded copper. Unless otherwise shown, conductor types shall be as follows: (1) conductors across hinges of control panel enclosures shall be MTW, (2) all other conductors shall be THHN in dry locations and XHHW in wet locations.

Service Pedestal.--

Service pedestal shall consist of an underground pull section, metering compartment and service disconnect switch rated for 480/277-V, 400-A, 3-phase, 4-wire service. Pedestal shall be a pad-mounted, NEMA Type 3R enclosure with separate provisions to padlock access to the service disconnect switch and metering compartment. Exterior shall be 2.66 mm (12-gage) sheet steel and interior mounting panel shall be 1.90 mm (14-gage) sheet steel. All screws, latches, hinge pins and similar hardware shall be stainless steel. Enclosure finish shall be baked enamel or baked thermosetting polyester finish.

Pull section and metering compartment shall be sized and arranged to comply with the Serving Utility's requirements. Instrument transformers and kWH meter shall be provided and installed by the Utility and the enclosure arrangement shall be approved by the Utility before submitting shop drawings to the Engineer for approval.

The Service Disconnect (SD) shall be a three-pole, 600-V, 400-A frame, 400-A trip, molded case circuit breaker with adjustable AC magnetic trip set at 3000 A. The interrupting capacity of the breaker shall be 30 000 A RMS (symmetrical) at 480 V(ac). A nameplate with the inscription "MAIN" shall be installed above the circuit breaker handle.

Motor Control Center (MCC).--

Motor control center shall consist of enclosed vertical sections joined together to form a rigid, free standing assembly. The construction of the MCC shall meet the requirements set forth by Underwriters' Laboratories UL 845 and NEMA ICS-2-322 and be UL listed. The MCC shall be in accordance with NEMA standards for Type 1 gasketed enclosure.

The MCC shall be suitable for operation with 480/277-V(ac), 3-phase 4-wire plus ground, 60 Hz service. MCC shall have a minimum fault interrupting capacity of 25 000 A (symmetrical) at 480 V(ac).

Vertical sections shall support the vertical buses, combination starter units, covers, and doors, and shall be designed to allow for easy rearrangement of units. Vertical sections shall have structural supporting members formed of a minimum 2.66 mm thick hot rolled steel. Each section shall be maximum 2286 mm high and shall have 4.55 mm thick steel, 76 mm high removable lifting angle and two 38 mm high base channels. Base channels shall be provided with holes to permit bolting the motor control center to the floor.

Vertical sections, except control section, shall be designed to accommodate plug-on units in front-of-board construction. Vertical sections housing plug-on units shall be 508 mm wide and shall be 381 mm deep, control section shall be 762 mm wide and shall be 381 mm deep. Removable blank plates shall cover all unused unit mounting spaces. Blank plates shall be flanged on all four sides and shall be mounted with captive screws.

Vertical sections shall be mounted with both horizontal and vertical wireways. Sufficient clearances shall be provided in the horizontal wireway so that no restriction is encountered in running wires from the vertical to horizontal wireway.

Horizontal wireways shall be provided in the top and bottom of each vertical section and shall be arranged to provide full length of continuity throughout the entire assembly. The top horizontal wireway shall have a cross sectional area of not less than 12 903 mm^2 with openings between sections of not less than 7420 mm^2. The bottom horizontal wireway shall extend through the length and depth of the vertical sections and shall also be provided with an opening of not less than 7420 mm^2 to allow for full length continuity throughout the entire assembly. The bottom horizontal wireway shall have a cross sectional area of not less than 5968 mm^2. Covers for all wireways shall be equipped with captive screws.

A vertical wire trough shall be located on the right hand side of each vertical section and shall extend from the top horizontal wireway to the bottom of the available unit mounting space. Each vertical wire trough shall have a cross sectional area of not less than 12 258 mm^2. A separately hinged door having captive type screws shall cover the vertical wire trough to provide easy access to control wiring without disturbing control units.

Reusable wire ties shall be furnished in each vertical wire trough for the purpose of grouping and securely holding wires in place. All wireways shall be isolated from the bus bars.

Main three-conductor horizontal bus and power terminal block for connection shall be provided. Horizontal bus bars shall be rated 600-A continuous and be mounted edgewise and supported by insulated bus supports of high strength glass reinforced alkyd material.

For distribution of power from the main horizontal bus to each unit compartment, a three-phase vertical bus shall be provided. The main vertical buses shall be made of aluminum and the entire length shall be electrolytically plated. The rating of the vertical buses shall be minimum 300-A continuous current rating and shall be in accordance with UL, ANSI, and NEMA standards.

Each unit shall have a door securely mounted with concealed type hinges which shall allow the door to swing open a minimum of 112 degrees. Doors shall be fastened to the structure so that they may remain in place when a unit is withdrawn and may be closed to cover the unit space when the unit has been temporarily removed. Doors shall be held closed with captive screws which engage self-aligning cage nuts. Each starter unit door shall house an external low-profile overload reset button for resetting the overload relay.

Each plug-on unit shall be supported and guided by tilt and lift-out removable pan.

An external operator handle shall be supplied for each switch or circuit breaker. The operator handle shall be color coded to display red in the "ON" position and black in the "OFF" position. The operator handle shall have a conventional up-down motion and shall be designed so that the down position will indicated the unit is "OFF". For safety it shall be possible to lock this handle in the "OFF" position with up to three padlocks. The operator handle shall be interlocked with the unit door to prevent switching to the "ON" position while the unit door is open. A defeater mechanism shall be provided for the purpose of defeating this interlock.

A schematic diagram of the power system and a ladder diagram of the control system under transparent protective cover shall be provided with the MCC.

The MCC wiring shall be NEMA Class 2, Type B-T wiring.

A shelf (either slide out or fold up type) capable of supporting a portable computer shall be installed at approximately 1300 mm high inside the control section of the MCC.

Standby Power Receptacle (SPR).--

600-V(ac), 200-A, 3-wire, 4-pole circuit breaking, weather resistant, rain tight receptacle with male interior assembly complete with an AJ back box angle adapter with a screw on dust cover and chain or self-closing, spring actuated cover. The receptacle shall be compatible with the plug of the State portable standby generator. The plug of the generator is

Crouse-Hinds, Catalog No. AP20468-S22 with female interior assembly. Standby power receptacle shall be Crouse-Hinds, Catalog No. AREA 20427-S22 or equal.

Power Switch (PS).--

Three-pole, 600-V, 400-A frame, 400-A trip, molded case circuit breaker with adjustable AC magnetic trip set at 3000 A mounted in the MCC where shown on the plans. The interrupting capacity of the breaker shall be minimum 30 000 A RMS (symmetrical) at 480 V(ac). Breaker shall be equipped with means to padlock in the "OFF" position.

Power Transfer Switch (PTS).--

Two 3-pole, 600-V(ac), 400-A frame, molded case switches with one (1) permanently affixed manual operating handle with mechanical interlock to prevent simultaneous "ON" for both switches mounted in the MCC where shown on the plans. Each molded case switch shall have an auxiliary normally-open contact rated 10 A at 120 V(ac). Nameplates ("UTILITY" and "STANDBY") or other positive means of identification of the switch position shall be installed on the exterior of the MCC. The interrupting capacity of the switches shall be minimum 35 000 A RMS (symmetrical) at 480 V(ac).

Groundwater Disconnect (GD).--

Three-pole, 600-V(ac), 50-A trip, molded case circuit breaker mounted in the MCC where shown on the plans. The interrupting capacity of the breaker shall be minimum 25 000 A RMS (symmetrical) at 480 V(ac).

Spare Circuit Breaker (SCB).--

Three-pole, 600-V(ac), 80-A trip, molded case circuit breaker mounted in the MCC where shown on the plans. The interrupting capacity of the breaker shall be minimum 25 000 A RMS (symmetrical) at 480 V(ac).

Phase Failure Relay (PFR).--

480-V(ac), socket mounted, adjustable, automatic reset, voltage sensing phase failure relay with single-pole, double-throw, 5-ampere, 120-V contacts. Relay shall be capable of sensing phase loss, phase unbalance and phase reversal and shall have a LED indicating the relay is energized. Relay shall be mounted in the MCC where shown on the plans.

Motor Starters (ST1 and ST2).--

NEMA Size 4, NEMA rated, 3-pole, line-voltage combination starter and motor circuit protector mounted in the MCC where shown on the plans. Starter shall have 120-V(ac) coil, double-break silver contacts and 3 manual-reset, non-adjustable thermal overloads set to trip between 115 and 125 percent of full load motor current as quoted on the nameplate by the motor manufacturer. Overload reset shall be externally operable. Starter shall have one normally-closed and one normally-open auxiliary contacts. The pilot lights, selector switch and time meter shall be as specified elsewhere in these special provisions.

Light Disconnect (LD).--

Two-pole, 600-V(ac), 30-A trip, molded case circuit breaker mounted in the MCC where shown on the plans. The interrupting capacity of the breaker shall be 25 000 A RMS (symmetrical) at 480 V(ac).

Light Transformer (LT).--

Double-wound, 10-kVA, 60-Hz, surface-mounted, dry type transformer with 480-V primary, 120/240-V secondary. Transformer shall be mounted in the MCC where shown on the plans.

Panel LP.--

Indoor type, surface-mounted box and cover, factory assembled, single-phase, 3-wire, 120/240-V(ac) panelboard with 2-pole, 50-A main circuit breaker, insulated neutral and molded case circuit breakers as shown on the plans. Panel shall be mounted in the MCC where shown on the plans.

Trapped Air Level Monitoring System.--

Trapped air level monitoring system shall consist of an air compressor, three-way solenoid valve, pressure transducer, polyethylene sensing tube and a compression bell. The system shall operate based on the output of the pressure transducer which is connected to a trapped air column. The air column pressure changes in accordance with the water level. The compression bell, which is submerged in the water, shall provide sufficient air volume to maintain the desired accuracy. The system shall operate over a range of 0 to 20 m of water with an accuracy of ±10 mm for an ambient condition ranging from 0 to 93°C. The transducer shall provide a 4 to 20 mA output signal to the PLC to determine the water level. The air compressor shall operate at 120 V(ac) and be constructed of an aluminum piston with Teflon-sleeved cylinder for long

service life. Compressor motor shall be approximately a 37-W, shaded pole motor with integral overload protection. Compressor shall have a capacity 0.0184 m^3/min at 345 kPa and capable of initializing against a 1724 kPa head. The direct acting, three-way, plastic bodied solenoid valve operating at 120 V(ac) with compression connections for air shall isolate the pressure transducer during the purge cycle of the air column.

Programmable Logic Controller (PLC).--

The programmable logic controller shall include a power supply and a central processing unit (CPU) that operates at 120 V(ac), 60 Hz.

The controller shall be capable of operating in the following environmental conditions:

1. Operating temperature: Between 0 and 60°C.

2. Humidity: 15 to 95% non-condensing.

3. Vibration: 57 to 150 Hz, constant. acceleration. 2 g.

4. Shock: 15 g, semisinusoidal 11 ms.

5. Noise immunity: 1500 V, NEMA showering arc.

The PLC shall be programmable with a ladder logic diagram consisting of relay symbols and function blocks. The program shall be stored in a non-volatile memory without the need for battery back-up. The PLC shall be equipped with two computer link modules that will allow the PLC to communicate with a portable computer for programming and monitoring and an external operator panel. The PLC shall have the capability to function as a remote terminal unit (RTU) capable of communicating with a remote SCADA computer. Communication mode shall be either thru a dial up telephone line or thru a radio modem. RTU protocols shall be a common industry standard such as Modbus. PLC shall incorporate password security protection against unauthorized caller from changing the operation of the PLC. PLC shall be capable of initiating communication with a host computer or a telephone pager upon sensing any alarm conditions. Communication with the host computer shall report all alarms and status changes since the last communication upon establishing communication with the host. Configuration for phone number to call, baud rate (9600 to 56 000), password, communication protocol and pump plant identification shall be accomplished with a portable computer. Software for configuration shall have a pull down menu and user friendly interface to enable simple setup by the user without using programming code or statement. The PLC shall be furnished with a 56K telephone dial up modem.

In addition to the requirements listed under "Description of Operation", the PLC ladder logic program shall include the following provisions:

1. The PLC shall be programmed to purge the air column every eight hours for ten seconds in duration.
2. The operational sequence of the PLC shall be capable of being manually tested by using the operator panel. During this manual test, the PLC shall not attempt to start the next pump automatically due to a "pump not running" signal.
3. Alarms shall include power failure, intrusion, high water, pump failure and pump seal failure. Power failure alarm shall occur when the utility power fails, as indicated by the phase failure relay, and when the water level in the storage box is at 150 mm below the "Start lead pump" elevation or higher. Intrusion alarm shall occur whenever the door switch (DS) is opened and the intrusion defeat switch (IDS) is not deactivated within 30 seconds. The intrusion alarm shall be set when the user activates the IDS and closes the pump plant door within 30 seconds. High water alarm shall be activated when the water level is at the "high water" level as shown on the plans or higher. Pump failure alarm shall occur when the PLC sends a signal to turn on any pump and no feedback signal from the corresponding current switch appears after 10 seconds. Pump seal failure shall occur when the seal failure relay senses moisture in the oil reservoir of the pump motor.

The Contractor shall furnish a copy of all programming software and a disk copy of the ladder logic program to the Engineer. In addition, a two meter length cable to link the PLC to a portable computer serial port shall be supplied by the Contractor to the Engineer.

INPUTS AND OUTPUTS (I/O).--

The inputs and outputs (I/O) shall be the digital and analog type as shown on the plans. Terminal strip for I/O shall have a marking strip under a clear plastic cover inscribed with the wire identification. Each I/O shall have LED indicator to show when each input or output is activated. Each I/O shall operate at the voltage level of the connected devices and shall be optically isolated from the PLC. Analog output shall have the current or voltage level output required by the connected equipment.

Provide at least 10 percent of the I/O count as spares.

Operator panel.--

Operator panel shall be NEMA Type 4 or 12 panel mounted on the MCC door and shall be powered by the PLC. The panel shall be connected to the PLC with a communication cable as required. Operator panel shall support the native protocol of the PLC and shall be the same brand as the PLC. The panel shall include a message area capable of displaying a minimum of eight alpha numeric characters, "up-down" push buttons, "enter" push button, "exit" push button, LED event status lights and at least four user-defined push buttons. The message area shall display description of variable and the value of the variable by scrolling between the two. Time between each scroll shall be between five and eight seconds. Variables to display shall include all pumps' set points, alarms, timers, etc. Water level in the sump measured to hundredths of a meter or foot (XX.XX) shall be displayed at all times unless a pre-programmed user-defined push button is pressed. The LED event status lights shall be illuminated if the monitored condition exists and, in the case of an alarm condition, shall blink on and off until acknowledged.

The user-defined push buttons shall be programmable to perform actions as follows:

One user-defined push button shall be labeled "WET WELL LEVEL". Pushing the button shall cause the display to show the current water level in the sump. From this point, the user shall be able to open a menu directory to examine or change set points. When the "change set point" option is selected, it shall cause the message area to display each pumps' "Start" and "Stop" levels and the "Alarm" levels. Multiple display shall scroll upon successive pushes of the button. Password protection shall be built-in to allow set point changes. Upon entering change mode, a timer shall allow the user to change set point within a window of five minutes. At the end of the five minute window the PLC shall return to the run mode. User shall be prompted to each change by a blinking numerical display that stops when the new set point is accepted.

The next user-defined push button shall be labeled "LEVEL TEST/PURGE". Pushing this button once shall allow the user to test the output of the PLC by bypassing the trapped air level monitoring system signal and vary the water level input to the PLC via the operator panel's "up-down" push buttons. The "up-down" push buttons shall increment the signal level by 0.05 m with each push. This shall allow the operator to test all the pumps' "Start" and "Stop" levels and the "Alarm" levels. This test mode shall continue for at least three minutes and shall be canceled automatically within five minutes. Pushing the button twice shall manually activate the solenoid valve and air compressor for ten seconds such that the compression bell and air lines are purged of water.

Another user-defined push button shall be labeled "METRIC/ENGLISH". Pushing the button shall toggle the variable between English and Metric units. All values in the registry shall change including the display. The display shall show the water level in the chosen measuring unit with either "FT" or "M" showing at the end of the display line.

The last user-defined push button shall be labeled "ALARM RESET". The user shall be able to acknowledge any blinking alarm condition by pressing this button. If the alarm condition is still present, the LED event status light will remain illuminated.

Operator panel shall display all alarms as defined elsewhere in these special provisions or as shown on the plans. Operator panel shall be driven by the PLC or be programmable by a portable computer.

The Contractor shall furnished the State with all programming software and the connecting cable when the later applies.

Portable computer (PC).--

The Contractor shall furnish to the Engineer a portable computer set up with Microsoft Office 97 running under MS Windows NT. Portable computer shall also serve as an interfacing and programming device for the PLC and the operator panel and shall have the programming software for these devices installed. Portable computer shall have a 300 MHz processor, minimum of 6.0 GB of hard drive space, 64 MB EDO RAM, 56 KB modem, internal 24X CD ROM drive, one 89 mm drive, 381 mm XGA TFT active matrix LCD display and a lithium ion battery. A spare battery shall be supplied with the portable computer. The portable computer shall be Dell Inspiron 7000, Compact Armada 1750, Sony Notebook PCG-F270, or equal. The portable computer shall be furnished with a nylon carrying case.

Direct Current Power Supply.--

Direct current power supply shall be rated for 115-V(ac) input and direct current voltage and current outputs as required by the equipment installed. The power supply shall be panel or channel mounted, convection cooled, completely protected and short circuit proof with an adjustment range of ±5 percent (minimum) and shall be operable at temperatures between 0°C to 50°C.

Uninterruptable Power Supply (UPS).--

1.4 kVA, 120-V(ac), 60 Hz input line voltage, output voltage of 120-V ±3.5 V at 60 Hz sine wave. Total harmonic distortion shall not exceed 7 percent. Power transfer to UPS shall occur at approximately 102 V and return to utility power

shall occur when the measured voltage is above 110 V. Transfer time shall not be more than 10 milliseconds, with 4 milliseconds being typical. UPS shall be equipped with sealed maintenance free battery that requires no more than 16 hours to recharge and provides 5 minutes of back-up time at full load or 15 minutes at half load. UPS shall have four NEMA 5-15R output receptacles. UPS shall be capable of operating at 40°C ambient temperature and 95 percent noncondensing humidity. UPS shall fit within the area of the MCC section where shown on the plans.

Seal Failure Relays (SFR1 and SFR2).--

Seal failure relay shall be as shown on the plans and as recommended by the pump manufacturer. The seal failure relay, complete with separate pump leak indicator light, sensor probe continuity test push-button and test indicator light, shall be a factory assembled unit mounted inside the MCC where shown on the plans. Relay shall include one normally-open and one normally-closed contact rated at 120-V(ac).

Current Switches (CS1 thru CS4).--

Self-powered, solid-state, alternative current sensing switch mounted in each motor starter and elsewhere where shown on the plans. Switch shall have a single-pole, normally-open contact rated one-ampere at 240 V(ac). Current sensing level shall be chosen between a low range of one to 15 A and a high range of 15 to 300 A. Switch shall have a thru-hole of 14 mm minimum diameter for sensing the alternative current.

Time Meters (TM1 and TM2).--

120-V, 60-Hz, non-resettable running time meter with 0 to 99,999.9 hours range. Meter shall be mounted on the MCC door where shown on the plans.

Selector Switches (SS1 and SS2).--

30.5 mm, NEMA Type 4, single-pole, 2-position maintained, 10-A, 120-V rotary switch mounted on the MCC door where shown on the plans. Switch contacts shall have an inductive pilot duty rating of 60 A (make), 6 A (break) and 10 A (continuous) at 120-V and 35 percent power factor. Selector switch shall have legend plate marked "HAND-AUTO".

Pilot Lights (PL1 thru PL7).--

30.5 mm, NEMA Type 4, panel mounted, 120-V(ac), high visibility light emitting diode (LED) type lamp with colored plastic lens and screw cap. Lights shall be mounted on MCC door where shown on the plans.

Control Relays (CR1 thru CR3).--

120-V(ac), general purpose relay with 3-pole, double-throw, 10-A contacts. Relay shall be enclosed in a clear plastic with 11-pin plug base. Socket for the relay shall be barrier type, 11-contacts relay socket with 10-A contacts and screw terminals.

Terminal Blocks (TB).--

30-A, 600-V, NEMA rated, molded plastic with two or more terminals and two or more mounting holes in each cast block or channel mounted type (DIN rail). The molded plastic shall have a high resistance to heat, moisture, mechanical shock and electric potential and shall have a smooth even finish. Terminal blocks shall have tubular, high-pressure clamp connectors.

Each terminal block or row of blocks shall have a molded marking strip attached with screws or a computer printed plastic label securely fastened to the blocks. The identifying numbers of the terminating conductors, as shown on the plans or on the approved submittal drawings, shall be engraved in the marking strip or permanently printed on the plastic label. The marking strip shall be laminated phenolic plastic with white core and black front and back.

Coils.--

All coils of relays, starters and other operating equipment shall have magnet coils wound for an operating range having a mean equal to the actual voltage to be applied.

Indicating Lights (IL1 and IL2).--

Cast-metal, vapor-tight, fluorescent lighting fixture with colored, shatterproof, polycarbonate plastic globe, metal guard and twin tube 18-W, 120-V fluorescent lamp with integral ballast. The indicating lights shall be installed on the Area Light pole as shown on the plans.

Room Light.--

Surface mounted fluorescent fixture with two, F48T12SPEC30 lamps and -20°C ballast. Fixture housing shall be white, ABS slow burning thermoplastic. Housing shall have neoprene gasket around the perimeter and stainless steel lens latches. Lens shall be hi-impact clear acrylic. Fixture shall be suitable for wet locations.

Sump Light (SL).--

Weatherproof, die-cast non-ferrous metal, chrome-finish, two lamp fixture with porcelain socket, adjustable swivel arm, 150-W PAR-38 flood lamps, mounting flange, gasket and cast ferrous metal outlet box.

Area Light.--

Area light shall be Type 15 Lighting Standard as shown in the Standard Plans. Luminaire shall be 200-W, 120-V, high pressure sodium fixture with integral ballast and photoelectric cell. Luminaire shall be as specified in section 86-6.01, "High Pressure Sodium Luminaires," in the Standard Specifications.

Entry Light.--

Outdoor, wall mounted, 50-W, 120-V high pressure sodium luminaire with integral ballast and photocell.

Light Switch (LS).--

20-A, 120/277-V(ac), specification grade switch suitable for wiring with stranded conductors in a cast metal box.

Duplex Plug Receptacles (DP1 and DP2).--

DP1 shall be 15-A, 3-wire, 125-V grounding type duplex receptacle outlet suitable for wiring with stranded conductors in a cast metal box. Outlet shall be combination of a twist lock outlet and parallel blade outlet.

DP2 shall be 15-A, 3-wire, 125-V computer power strip with built-in surge protector mounted inside the MCC where shown on the plans.

Intrusion Defeat Switch (IDS).--

Same as Selector Switch mounted on the MCC door where shown on the plans, except with legend plate marked "OFF-ON."

Door Switch (DS).--

Magnetic door switch shall consist of two-section, high security, magnetically balanced type, long life reed switch. Switch cannot be defeated by an externally applied magnet and shall be compatible with the material of the door at the pump house. Magnetic door switch shall be provided with a connector for Size 16 conduit.

Junction and Outlet Boxes.--

All boxes shall be cast ferrous metal box with hubs and gasketed cover. Weatherproof switches and receptacles shall have hinged flaps to cover switches and receptacles.

Underground Pull Boxes.--

Concrete type and shall be as shown on sheet ES-8 of the Standard Plans.

Pull Ropes.--

Pull ropes shall be nylon or polypropylene with a minimum tensile strength of 2205 N.

Cabinet Sealing Bushings.--

Cabinet sealing bushings shall be malleable iron fitting with hot-dip galvanized finish. Bushing shall include a factory drilled neoprene gasket sized for the type and size of conductors installed. Bushing shall be designed to prevent moisture from entering cabinet and be supplied with two zinc plated locknuts.

Nameplates.--

Nameplates shall be laminated phenolic plastic with white core and black front and back. Nameplate inscription shall be in capital letters etched through the outer layer of the nameplate material.

Warning Plates.--

Warning plates shall be laminated phenolic plastic with white core and red front and back. Warning plate inscription shall be in 6 mm high capital letters etched through the outer layer of the warning plate material.

Each pump motor starter shall have a warning plate with the inscription "WARNING: MOTOR DISCONNECT DOES NOT OPEN CONTROL CIRCUIT".

A warning plate with 13 mm high capital letters shall be installed above the standby power receptacle with the inscription "480 VOLTS ONLY"

EXECUTION.--In addition to the requirements of Section 74, "Pumping Plant Equipment," of the Standard Specifications, the execution of the work shall conform to the following requirements:

Service.--Installation of service(s) shall be in accordance with the requirements of the Serving Utility.

Conduits.--Do not install any conduits behind ladders or within 380 mm of the center line of the ladder.

Motor control center.--MCC shall be mounted on channel and anchored to the concrete slab with expansion anchors and bolts. The MCC shall be shimmed as required to make each section level. The Contractor shall provide the Engineer with an order of work for installation of the MCC.

Conductors.--Feeder and branch circuit ungrounded conductors shall be color coded by continuously colored insulation, except conductors No. 6 AWG or larger may be color coded by colored tape at each connection and where accessible. Ungrounded conductor color coding shall be as follows:

SYSTEM	COLOR CODE
120/240 V-Single phase	Black, blue
480/277 V-Three phase	Brown, orange, yellow

Panel LP.--Where "Space" is indicated on the plans, branch connectors, mounting brackets, and other hardware shall be furnished and installed for future breaker.

A typewritten directory under transparent protective cover shall be provided and set in metal frame inside the cabinet door. Directory panel designation for each circuit breaker shall include complete information concerning equipment controlled including area designated on the plans.

Component mounting.--Components in the MCC shall be mounted where shown on the plans.

Current Switches CS3 and CS4.--Current switches CS3 and CS4 shall require the wire to be wrapped around the sensing coil multiple times to sense the current.

Pull boxes.--Pull boxes shall be installed as specified in Section 86-2.06C, "Installation and Use," of the Standard Specifications.

Nameplates.--Inscriptions on nameplates shall be as shown on the plans. Nameplates shall be mounted with self-tapping cadmium plated screws or nickel plated bolts except the nameplates mounted on the back of an enclosure cover shall be attached with a strong adhesive.

Supporting devices.--Hangers, brackets, supports, and electrical equipment shall be secured to surfaces by means of expansion shields and machine screws or standard preset inserts on concrete or solid masonry; machine screws or bolts on metal surfaces; and wood screws on wood construction.

Supporting devices shall be corrosion resistant.

PAYMENT.--Full compensation for foundation, excavating and backfilling shall be considered as included in the contract lump sum price paid for pumping plant electrical equipment and no separate payment will be allowed therefor.

Full compensation for the training and manufacturer's software technical service support shall be considered as included in the contract lump sum price paid for pumping plant electrical equipment and no separate payment will be allowed therefor.

10-1.109 GROUNDWATER PUMP CONTROL STATION

PART 1.-GENERAL

SUMMARY.--

Scope.--This work shall consist of furnishing and installing groundwater pump station control equipment in accordance with the details shown on the plans and these special provisions.

Related Work.--Thermal and moisture protection for submersible pump motor shall conform to the requirements as specified under "Pumping Plant Equipment" of these special provisions.

PART 2.-PRODUCTS

Pump control panel, PCP.--

Pump control panel shall be a pad-mount, single exterior hinged door, dust-tight NEMA Type 4 enclosure, sized as required, containing a fixed interior electrical mounting panel and hinged interior deadfront panel. The enclosure shall be made of 1.90 mm steel minimum with all seams continuously welded. A rolled up lip shall be provided around three sides of the hinged door and around all sides of the enclosure opening. The door shall be provided with a neoprene gasket that is attached with an oil-resistant adhesive. The door shall be maintained closed with door clamps. Security shall be provided by a hasp and staple for padlocking.

The enclosure shall be factory prewired in conformance with NEMA Class 2, Type B-T wiring. All wires entering or leaving the enclosure shall terminate on terminal blocks. Control wiring shall be 7 strand No. 14 MTW except for hinge wiring, which shall be 19 strand No. 14 MTW. Wires shall be neatly trained and bundled, and wiring troughs shall be provided in the enclosure as necessary. Wiring shall be arranged so that any piece of apparatus may be removed without disconnecting any wiring except the leads to that piece of apparatus.

A wiring diagram encased between two heat-fused laminated plastic sheets shall be provided with brass mounting eyelets and attached to the inside of the enclosure.

Main breaker, MB.--

Main breaker shall be 3-pole, 480-V(ac), molded case circuit breaker with 50-A trip, and interrupting capacity of 18 000 A (symmetrical) at 480 V.

Pump disconnects, PD1 and PD2.--

Pump disconnects shall be 3-pole, 480-V(ac), 30-A trip molded case circuit breaker. The interrupting capacity of the breaker shall be 18 000 A (symmetrical) at 480 V.

Starter, GS1 and GS2.--

Starters shall be NEMA Size 1, NEMA rated, 3-pole, 480-V starter with 120-V coil. Starter shall have double-break silver contacts and 3 manual-reset, non-adjustable thermal overloads set to trip between 115 and 125 percent of full load motor current as quoted on the nameplate by the motor manufacturer. Overload reset shall be externally operable. Starter shall have one normally-closed and one normally-open auxiliary contacts.

Trapped air level monitoring system.--

Trapped air level monitoring system shall be the same as specified under "Pumping Plant Electrical Equipment" elsewhere in these special provisions.

Programmable logic controller, PLC.--

Programmable logic controller shall be the same as specified under "Pumping Plant Electrical Equipment" elsewhere in these special provisions. The PLC shall be of the same manufacturer and model as the one inside the pumping plant.

Alarms shall include power failure, high water, pump failure, and pump seal failure. Power failure alarm shall occur when the utility power fails and when the water level in the pumping station is at 150 mm below the "Start lead pump" elevation or higher. High water alarm shall be activated when the water level is at the "high water" level as shown on the plans or higher. Pump failure alarm shall occur when the controller sends a signal to turn on any pump and no feedback signal from the corresponding current switch appears after 10 seconds. Pump seal failure shall occur when the seal failure relay senses moisture in the oil reservoir of the pump motor.

Operator panel.--

Operator panel shall be the same as specified under "Pumping Plant Electrical Equipment" elsewhere in these special provisions mounted on the pump control panel interior hinged door. The operator panel shall be of the same manufacturer and model as the one inside the drainage pumping plant.

Direct Current power supply.--

Direct current power supply shall the same as specified under "Pumping Plant Electrical Equipment" elsewhere in these special provisions.

Back-up power supply.--

The back-up power supply system shall consist of a battery, battery charger and all components necessary to automatically switch the PLC and operator panel from utility power to battery power upon sensing utility power failure after a preset time delay. The battery shall be maintenance free type and have a minimum 15 A·h capacity. The battery charger shall automatically recharge the battery within 24 hours when required and maintain battery voltage at the preset level during normal power conditions.

Control transformer, CT.--

Control transformer, CT, shall be double-wound, dry-type 2.0 kVA, 60 Hz, transformer with 480-V primary and 120-V secondary.

Control disconnect, CD1.--

Control disconnect, CD1, shall be 2-pole, 480-V(ac), 15-A trip molded case circuit breaker. The interrupting capacity of the breaker shall be 18 000 A (symmetrical) at 480 V.

Control transformer overload, CTO.--

Control transformer overload, CTO, shall be single-pole, 120-V(ac), 25-A trip molded case circuit breaker. The interrupting capacity of the breaker shall be 10 000 A (symmetrical) at 120 V.

Control disconnect, CD2.--

Control disconnect, CD2, shall be the same as CTO except the trip shall be 15-A.

Light disconnect, GLD.--

Light disconnect, GLD, shall be the same as CD2.

Fuse, F1.--

Fuse shall be two, 6-A, dual element, 600-V fuses with 2-pole, 600-V barrier type fuse base. Four spare fuses shall be supplied to the Engineer.

Control relays, CR1 thru CR3.--

Control relays shall be the same as specified under "Pumping Plant Electrical Equipment" elsewhere in these special provisions.

Time meters, TM1 and TM2.--

Time meters shall be the same as specified under "Pumping Plant Electrical Equipment" elsewhere in these special provisions.

Seal failure relays, SFR1 and SFR2.--

Seal failure relays shall be the same as specified under "Pumping Plant Electrical Equipment" elsewhere in these special provisions.

Terminal block, TB.--

Terminal block shall be the same as specified under "Pumping Plant Electrical Equipment" elsewhere in these special provisions.

Ground bar.--

Ground bar shall be 100-A copper ground bar with circuit tabs.

Alarm test, AT.--

Alarm test shall be a 30.5 mm heavy duty oil-tight pushbutton with one normally open momentary contact. The contact shall have an inductive pilot duty rating of 60 A (make), 6 A (break) and 10 A (continuous) at 120 V and 35 percent power factor.

Selector switches, SS1 and SS2.--

Selector switches shall be the same as specified under "Pumping Plant Electrical Equipment" elsewhere in these special provisions.

Alarm light, AL.--

Alarm light shall be fluorescent, weatherproof light fixture for use with threaded rigid conduit. Light fixture shall have a red polycarbonate globe approximately 220 mm in length. Lamp shall be 18-W, 120-V standard compact fluorescent lamp, complete with ballast and screw-on type base.

Pilot Lights (PL1 thru PL4 and PL6 and PL7).--

Pilot lights shall be the same as specified under "Pumping Plant Electrical Equipment" elsewhere in these special provisions.

Current Switches (CS1 and CS2).--

Current switches shall be the same as specified under "Pumping Plant Electrical Equipment" elsewhere in these special provisions.

Ground fault circuit interrupter (GFCI) receptacle.--

Ground fault circuit interrupter receptacle shall be NEMA Type 5-20R, feed-through type, ivory color, 3-wire, 20-A, 125-V(ac), grounding type, specification grade, duplex receptacle with ground fault interruption. Receptacle shall detect and trip at current leakage of 5 mA and shall have front mounted test and reset buttons.

FABRICATION.--

Component mounting.--The following electrical components shall be mounted on the fixed interior electrical mounting panel of the Pump Control Panel: Main breaker, MB; Pump disconnects, PD1 and PD2; Starters, GS1 and GS2; Current switches CS1 and CS2; Control transformer, CT; Control disconnects CD1 and CD2; Light disconnect GLD; Control transformer overload, CTO; Programmable Logic Controller, PLC; DC Power supply; Control relays, CR1 thru CR3; Seal failure relays, SFR1 and SFR2; Solenoid valve, SV; Air compressor, AC; Pressure transducer, PT; Fuse F1; Ground bar and Terminal blocks, TB. Spacers shall be installed with all breakers (MB, PD1, PD2, CD1, CD2, GLD, CTO) so that they are externally operable with the hinged interior deadfront panel closed.

The following electrical components shall be mounted on the hinged interior deadfront panel of the Pump Control Panel: Operator panel; Time meters, TM1 and TM2; Alarm test, AT; Selector switches, SS1 and SS2; Pilot lights, PL1 thru PL4 and PL6 and PL7; and GFCI receptacle.

The following equipment shall be mounted on top of the Pump Control Panel enclosure: Alarm light, AL.

PART 3.-EXECUTION

INSTALLATION.--

General.--The groundwater pump control station shall be installed on a concrete pad and oriented as shown on the plans.

All bolts and fasteners shall be galvanized.

All concrete around conduit penetrations shall be finished smooth and sloped in a way to avoid standing water around the conduit.

OPERATION.--

Automatic operation of the groundwater pumps shall be the same as for the drainage pumps specified under "Pumping Plant Electrical Equipment" elsewhere in these special provisions except Power Transfer Switch (PTS) and Phase Failure Relay (PFR) shall have no influence on the groundwater pump station.

In addition to the aforementioned alternation requirement, the PLC shall be programmed to alternate the groundwater pumps based on continuous run time. If one pump operates for 30 minutes without stopping, the PLC shall turn off that pump and start the other pump. This sequence shall continue until one pump turns off automatically in less than 30 minutes.

Pilot light PL3 shall be energized whenever control power is present. If the PLC calls for any pump to start, the pump demand pilot light PL4 shall be activated. If the water level reaches the "high water" elevation, the alarm light AL shall be energized. When motor current is sensed by a current switch, the PLC shall activate the corresponding pilot light and time meter of the pump.

A seal failure indication on a seal failure relay shall be treated as an alarm indication only and in no way affect the control operation of a pump.

PAYMENT.--Full compensation for the groundwater pump control station shall be considered as included in the contract lump sum price paid for pumping plant electrical equipment and no separate payment will be allowed therefor.

10-1.110 MISCELLANEOUS IRON AND STEEL

Miscellaneous iron and steel, including frames and grates and manhole frames and covers, shall conform to the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

Manhole frame and covers designated on the plans as City Manhole Frame and Cover shall be Phoenix Iron Works, Type P-1090, or approved equal by the City of Napa Public Works Department. Manholes shall be 0.6 meter diameter, Traffic Type Non-rocking manhole frame and covers with "Storm Sewer" or "Storm Drain" markings and grid pattern.

Pressure manhole frame and covers designated on the plans as Pressure Manhole Frame and Cover shall be Phoenix Iron Works, Type P-1002, or approved equal by the City of Napa Public Works Department. Manholes shall be 0.6 meter diameter, heavy duty pressure type bolted manhole frame and covers with "Storm Sewer" or "Storm Drain" markings and grid pattern.

10-1.111 MISCELLANEOUS METAL (BRIDGE)

Miscellaneous metal (bridge) shall conform to the provisions for miscellaneous bridge metal in Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

Miscellaneous metal (bridge) shall consist of the miscellaneous bridge metal items listed in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

Self-tapping screws shall be hex-head, stainless steel or monel metal, installed in holes drilled to fit the self-tapping screws.

For drainage piping NPS 8 or smaller, which is: (1) enclosed in a box girder cell and exposed for a length not greater than 6 m, or (2) encased in concrete, the Contractor shall have the option of substituting polyvinyl chloride (PVC) plastic pipe, with the same diameter and minimum bend radius as shown on the plans, for welded steel pipe. The support spacing for PVC plastic pipe shall be 2.5 m, maximum. The PVC plastic pipe shall be Schedule 40 conforming to the requirements of ASTM Designation: D 1785. If PVC plastic pipe is substituted for welded steel pipe, the quantity of drainage piping will be computed on the basis of the dimensions and details shown on the plans and no change in the quantities to be paid for will be made because of the use of PVC plastic pipe.

10-1.112 PUMPING PLANT METAL WORK

Pumping plant metal work shall conform to the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

The Contractor shall provide one heavy duty galvanized steel safety padlock hasp assembly with vertical staple of 3-mm diameter rod, minimum; and a slotted leaf at least 150 mm in length, securely attached to door and frame.

10-1.113 INVERTED SIPHON METAL WORK

Inverted siphon metal work shall conform to the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

The rolled steel girder materials for the permanent decking on concrete box #4 shall conform to "Steel Structure" of these special provisions.

Knife gate valve shall conform to "Knife Gate Valve" of these special provisions.

Automatic drainage gate shall conform to "Automatic Drainage Gate" of these special provisions.

Slide headgate shall conform to "Slide Headgate" of these special provisions.

The 1200 mm diameter manhole slab type frame with 1200 mm and 600 mm double covers, as shown on the plans, shall be non-rocking, watertight, and capable of withstanding 140 kPa of pressure. The manhole frame shall be cast into the top slab of the cast-in-place manhole structure. The outer cover shall be bolted to the frame with a neoprene "O" Ring seal . The inner cover shall be bolted to the outer cover and shall have a neoprene "O" Ring seal between the two covers.

10-1.114 CHAIN LINK FENCE (TYPE CL-1.8)

Chain link fence shall be Type (CL-1.8) and shall conform to the provisions in Section 80, "Fences," of the Standard Specifications.

10-1.115 1.2 M CHAIN LINK WALK GATE

1.2 meter 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 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.

10-1.116 MARKERS AND DELINEATORS

Object markers (Type K-1) and delineators (Class 1) 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.

10-1.117 METAL BEAM GUARD RAILING

Metal beam guard railing shall be constructed in conformance with the provisions in Section 83-1, "Railings," of the Standard Specifications and these special provisions.

Attention is directed to "Order of Work" of these special provisions.

Line posts and blocks shall be wood.

Delete the ninth and eleventh paragraphs in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications.

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

Wood posts and blocks shall be pressure treated after fabrication in conformance with the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling," of the Standard Specifications with creosote, creosote coal tar solution, creosote petroleum solution (50-50), pentachlorophenol in hydrocarbon solvent, copper naphthenate, ammoniacal copper arsenate, or ammoniacal copper zinc arsenate. In addition to the preservatives listed above, Southern yellow pine may also be pressure treated with chromated copper arsenate. When other than one of the creosote processes is used, blocks shall have a minimum retention of 6.4 Kg/m^3, and need not be incised.

TERMINAL SYSTEM (TYPE SRT)

Terminal system (Type SRT) shall be furnished and installed as shown on the plans and in conformance with these special provisions.

Terminal system (Type SRT) shall be a SRT-350 Slotted Rail Terminal (8 post system) as manufactured by Trinity Industries, Inc., and shall include all the items detailed for terminal system (Type SRT) shown on the plans.

The 5 mm x 44 mm x 75 mm plate washer shown on the elevation view and in Section D-D at Wood Post No. 1 shall be omitted.

Arrangements have been made to insure that any successful bidder can obtain the SRT-350 Slotted Rail Terminal (8 post system) from the manufacturer, Trinity Industries, Inc., P.O. Box 99, 950 West 400S, Centerville, UT 84014, Telephone 1-800-772-7976. The price quoted by the manufacturer for the SRT-350 Slotted Rail Terminal (8 post system), FOB Centerville, Utah is $845.00, not including sales tax.

The above price will be firm for orders placed on or before July 31, 2002, provided delivery is accepted within 90 days after the order is placed.

The Contractor shall provide the Engineer with a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance shall certify that terminal systems (Type SRT) conform to the contract plans and specifications, conform to the prequalified design and material requirements and were manufactured in conformance with the approved quality control program.

The terminal system (Type SRT) shall be installed in conformance with the manufacturer's installation instructions and these requirements. The steel foundation tubes with soil plates attached, shall be, at the Contractor's option, either driven, with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 100 mm thick and each layer shall be moistened and thoroughly compacted. Wood terminal posts shall be inserted into the steel foundation tubes by hand. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 65°C or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

Surplus excavated material remaining after the terminal system (Type SRT) has been constructed shall be disposed of in a uniform manner along the adjacent roadway where designated by the Engineer.

10-1.118 CHAIN LINK RAILING (TYPE 7)

Chain link railing (Type 7) shall conform to the provisions in Section 83-l, "Railings," of the Standard Specifications and these special provisions.

The chain link fabric shall be 9-gage (3.76 mm), Type IV, Class B, bonded vinyl coated fabric, conforming to the requirements in AASHTO Designation: M 181.

The strength of the bond between the coating material and steel of the bonded vinyl coated chain link fabric shall be equal to or greater than the cohesive strength of the polyvinyl chloride (PVC) coating material.

10-1.119 METAL BRIDGE RAILING

Tubular handrailing shall conform to the provisions in Section 83-1, "Railings," of the Standard Specifications.

10-1.120 CABLE RAILING

Cable railing shall conform to the provisions in Section 83-1, "Railings," of the Standard Specifications.

10-1.121 CONCRETE BARRIER

Concrete barriers shall conform to the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

Type 25A modified) concrete barriers will be measured and paid for as concrete barrier (Type 25 modified).

Type 26A modified concrete barriers will be measured and paid for as concrete barrier (Type 26 modified).

Architectural surface (textured concrete)

Architectural textures for concrete barrier surfaces shall conform to the details shown on the plans and the provisions in Section 51, "Concrete Structures," of the Standard Specifications and "Architectural Surface (Textured Concrete)" of these special provisions.

10-1.122 THRIE BEAM BARRIER

Single and double thrie beam barrier shall conform to the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

Attention is directed to "Order of Work" of these special provisions.

10-1.123 CRASH CUSHION, SAND FILLED

Sand filled crash cushions shall be furnished and installed as shown on the plans and in conformance with these special provisions.

A sand filled crash cushion shall consist of a grouping of sand filled modules.

Crash cushions shall be installed at the following locations:

At median metal beam guard rail array M Line 148+34 (Rt) & 148+63 (Rt).

At the Contractor's option, modules for use in sand filled crash cushions shall be either Energite III Inertial Modules, Fitch Inertial Modules or TrafFix Sand Barrels manufactured after March 31, 1997, or equal:

Energite III 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.

A. Distributor (Northern): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, Telephone 1-800-884-8274, FAX 1-916-387-9734
B. Distributor (Southern): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805, Telephone 1-800-222-8274, FAX 1-714-937-1070.

Fitch Inertial Modules, manufactured by Roadway Safety Service, Inc., 1050 North Rand Road, Wauconda, IL 60084, Telephone 1-800-426-0839, FAX 1-847-487-9820.

A. Distributor (Northern): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, Telephone 1-800-884-8274, FAX 1-916-387-9734
B. Distributor (Southern): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805, Telephone 1-800-222-8274, FAX 1-714-937-1070.

TrafFix Sand Barrels, manufactured by TrafFix Devices, Inc., 220 Calle Pintoresco,
San Clemente, CA 92672, Telephone (949) 361–5663, FAX (949) 361–9205.

A. Russ Enterprises, Inc., 1533 Berger Drive, San Jose, CA 95112, Telephone (408) 287–4303, FAX (408) 287–1929.
B. Statewide Safety, P.O. Box 1440, Pismo Beach, CA 93448, Telephone 1-800-559-7080, FAX (805) 929-5786.

Modules contained in the 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 exterior components of the modules shall be formulated or processed to resist deterioration from ambient ultraviolet rays. The modules shall exhibit good workmanship free from structural flaws and objectionable surface defects.

The Contractor shall provide the Engineer with a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance shall certify that the crash cushions comply with the contract plans and specifications, conform to the prequalified design and material requirements, and were manufactured in conformance with the approved quality control program.

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.

Module cylinders 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.

Lids shall be securely attached as recommended by the manufacturer.

Sand filled crash cushions, regardless of the number of modules required in each sand filled crash cushion, will be measured and paid for by the unit as crash cushion, sand filled. The quantity to be paid for will be determined from actual count of the units in place in the completed work.

The contract unit price paid for crash cushion, sand filled shall include full compensation for furnishing all labor, materials (including sand and marker panels), tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing crash cushions, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.124 THERMOPLASTIC TRAFFIC STRIPE AND PAVEMENT MARKING

Thermoplastic traffic stripes (traffic lines) and pavement markings shall be applied in conformance with the provisions in Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

Where striping joins existing striping, as shown on the plans, the Contractor shall begin and end the transition from the existing striping pattern into or from the new striping pattern a sufficient distance to ensure continuity of the striping pattern.

Thermoplastic material shall conform to the requirements in State Specification 8010-19A.

Thermoplastic material for traffic stripes shall be applied at a minimum thickness of 2.0 mm.

10-1.125 PAINT TRAFFIC STRIPE (2-COAT) 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.

10-1.126 PAVEMENT MARKERS

Pavement markers shall be placed in conformance with the provisions in Section 85, "Pavement Markers," of the Standard Specifications and these special provisions.

Attention is directed to "Traffic Control System For Lane Closure" of these special provisions regarding the use of moving lane closures during placement of pavement markers with bituminous adhesive.

Retroreflective pavement markers shall comply with the specific intensity provisions for reflectance after abrading the lens surface in conformance with the "Steel Wool Abrasion Procedure" specified for pavement markers placed in pavement recesses in Section 85-1.05, "Retroreflective Pavement Markers," of the Standard Specifications.

Retroreflective pavement markers placed in pavement recesses will be measured and paid for as pavement marker (retroreflective-recessed).

SECTION 10-2. MAINTAIN EXISTING PLANTS

10-2.01 GENERAL

Maintain existing plants work shall consist of performing an initial inspection of existing planted areas and maintaining existing planted areas, in conformance with the provisions in Section 20, "Erosion Control and Highway Planting," of the Standard Specifications and these special provisions.

The maintain existing plants period shall be not less than 620 working days.

PROGRESS INSPECTIONS

Progress inspections will be performed by the Engineer at designated stages during the life of the contract.

The requirements for progress inspections will not preclude additional inspections by the Engineer at other times during the life of the contract.

The Contractor shall notify the Engineer, in writing, at least 4 working days prior to completion of the work for each stage and shall allow a minimum of 3 working days for the inspection.

Progress inspections will be performed at the following stages of work:

A. Before maintain existing plants work begins and after completion of the initial inspection of existing planted areas.
B. At intervals of one month during the maintain existing plants period.

COST BREAK-DOWN

The Contractor shall furnish the Engineer a cost break-down for the contract lump sum items of maintain existing plants.

Cost break-downs shall be completed and furnished in the format shown in the samples of the cost break-downs included in this section. Unit descriptions of work shown in the samples are the minimum to be submitted. Additional unit descriptions of work may be designated by the Contractor. If the Contractor elects to designate additional unit descriptions of work, the quantity, value and amount for those units shall be completed in the same manner as for the unit descriptions shown in the samples. The units and quantities given in the samples are to show the manner of preparing the cost break-downs to be furnished by the Contractor.

The Contractor shall determine the quantities required to complete the work shown on the plans. The quantities and their values shall be included in the cost break-downs submitted to the Engineer for approval. The Contractor shall be responsible for the accuracy of the quantities and values used in the cost break-downs submitted for approval.

No adjustment in compensation will be made in the contract lump sum prices paid for maintain existing plants due to differences between the quantities shown in the cost break-downs furnished by the Contractor and the quantities required to complete the work as shown on the plans and as specified in these special provisions.

The sum of the amounts for the units of work listed in each cost break-down maintain existing plants work shall be equal to the contract lump sum price bid for the work. Overhead and profit shall be included in each individual unit listed in each cost break-down. Cost break-downs shall be submitted to the Engineer for approval within 20 working days after the contract has been approved. Cost break-downs shall be approved, in writing, by the Engineer before a partial payment for the items of maintain existing plants will be made.

Approved cost break-downs will be used to determine partial payments during the progress of the work and as the basis of calculating the adjustment in compensation for the items of maintain existing plants due to changes ordered by the Engineer. When an ordered change increases or decreases the quantities of an approved cost break-down, 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.

MAINTAIN EXISTING PLANTS COST BREAK-DOWN

Contract No. 04-120614

UNIT DESCRIPTION	UNIT	APPROXIMATE QUANTITY	VALUE	AMOUNT
INITIAL INSPECTION OF EXISTING PLANTED AREAS	LS	Lump sum		
MAINTAIN EXISTING PLANTED AREAS	LS	Lump sum		

TOTAL _____

10-2.02 EXISTING HIGHWAY PLANTING

In addition to the provisions in Section 20 of the Standard Specifications, work performed in connection with existing highway planting shall be in conformance with the provisions in Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

Replacement planting shall conform to the requirements specified under "Preservation of Property" of these special provisions.

INITIAL INSPECTION OF EXISTING PLANTED AREAS

Existing planted areas and temporary fence (Type ESA) to be maintained shall be inspected for deficiencies by the Contractor in the presence of the Engineer. Deficiencies requiring corrective action shall include missing or damaged fence material; weeds; dead, diseased, or unhealthy plants; missing plant stakes and tree ties; inadequate plant basins or foliage protectors; and any other deficiencies needing corrective action to promote healthy plant life, as determined by the Engineer. The inspection shall be completed within 10 working days after the start of work.

When directed by the Engineer, deficiencies found during the inspection shall be corrected within 10 working days after the inspection. Correction of deficiencies, as directed by the Engineer, will be paid for as extra work in conformance with the provisions in Section 4-1.03D, "Extra Work," of the Standard Specifications.

When directed by the Engineer, existing plants shall be pruned and the work will be paid for as extra work in conformance with the provisions in Section 4-l.03D, "Extra Work," of the Standard Specifications.

Full compensation for initial inspection of existing planted areas shall be considered as included in the contract lump sum price paid for maintain existing plants and no separate payment will be made.

MAINTAIN EXISTING PLANTED AREAS

Maintain existing planted areas work shall consist of watering, weeding, clearing trash and debris, controlling rodents, and maintaining temporary fence (Type ESA) for the life of the maintain existing plants period, as shown on the plans.

Existing plants shall be watered in conformance with the provisions in Section 20-4.06, "Watering," of the Standard Specifications.

The Contractor shall submit a watering schedule program to the Engineer for approval not less than 15 working days after the completion of the existing plant initial inspection. If the Engineer determines the submitted watering schedule is unacceptable, the Contractor shall submit a revised watering schedule to the Engineer for approval within 5 working days after receiving notice that previously submitted schedule is unacceptable.

The Contractor shall submit a list of the weekly water application in liters to the Engineer on a monthly basis.

After initial deficiencies have been corrected as directed by the Engineer, the Contractor shall continue to maintain existing planted areas including temporary fence (Type ESA) as often as necessary to maintain the area in a neat appearance. Maintain existing planted area work shall include the following and any other work needed to promote healthy plant growth and maintain the area in a neat appearance, as determined by the Engineer.

A. Weed growth shall be killed before the weeds within mulched areas, or within an area 2 m in diameter centered at each plant location outside of mulch areas, reach the seed stage of growth or exceed 305 mm in length.
B. Weeds within plant basins, including basin walls and within an area 1.2 m in diameter centered at each plant location, shall be controlled by hand pulling.
C. Weeds within existing mulched areas, or within an area 2 m in diameter centered at each plant location outside of mulch areas, shall be controlled by mowing. Limits of mowing shall extend from the limits of weeds to be killed out to 2 m beyond the outer limits of the existing mulch areas or plant basins outside of mulched areas. Weeds shall be mowed to a height of 50mm to 100 mm
D. Weeds within erosion control areas shall be controlled by mowing. When weeds have reached a height of 450 mm, the area shall be mowed to a height of 50 mm to 100 mm.
E. Trash, debris and weeds shall be removed from existing planted and mulched areas. Weeds shall be killed prior to removal. Trash, debris and weed removal in existing mulched areas shall extend 2 m beyond the outer limits of mulched areas, and a 2 m diameter area centered at each existing plant location outside of existing mulched areas.
F. Existing plant basins shall be kept well formed and free of silt. If existing plant basins require repairs, and the plant basins contain mulch, the mulch shall be replaced after the plant basins have been repaired.
G. Rodents and other pests shall be controlled.
H. Pesticides for maintaining existing planted areas shall not be used on this project.
I. Stakes and fabric for temporary fence (Type ESA) shall be maintained in an upright manner, free from holes or tears.

When no longer required for the work, as determined by the Engineer, temporary fence (Type ESA) shall be removed. Holes caused by the removal of temporary fence (Type ESA) shall be backfilled in conformance with the provisions in Section 15-1.02, "Preservation of Property," of the Standard Specifications.

During the course of maintain existing plants, if plants become restricted by foliage protectors, the tops of foliage protectors shall be removed. Foliage protectors shall be completely removed, including the support stakes, within 15 working days prior to prior to acceptance of the contract.

Removed trash, debris, weeds, pruned and fence materials shall be removed and disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

At the Contractor's option, removed prunings may be reduced to chips. Chipped materials shall be spread within the highway right of way where designated by the Engineer.

If after completion of the initial inspection and correction of deficiencies, the Engineer determines that existing plants show signs of failure to grow, or are so injured or damaged as to render the plants unsuitable for the purpose intended, the existing plants shall be replaced. Removal, disposal and replacement of the existing plants shall be in conformance with the provisions in "Preservation of Property" of these special provisions.

At the option of the Contractor, plants of a larger container size than those originally specified may be used for replacement plants during the first 125 working days of the maintain existing plants period. The use of plants of a larger container size than those originally specified for replacement plants shall be at the Contractor's expense.

After 125 working days of the maintain existing plants period have been completed, replacement of plants shall be No. one size for seedlings, pot and liner size plants; and other plant replacement plants shall be the same size as originally specified.

The final inspection for maintain existing plants, shall be performed in conformance with the provisions in Section 5-1.13, "Final Inspection," of the Standard Specifications and shall be completed a minimum of 20 working days before the estimated completion of the maintain existing plants period.

During the maintain existing plants period, if plants become restricted by foliage protectors, the tops of foliage protectors shall be removed. Foliage protectors shall be completely removed, including the support stakes, within 15 working days prior to completion of the maintain existing plants period.

Full compensation for maintain existing planted areas shall be considered as included in the contract lump sum price paid for maintain existing plants and no separate payment will be made.

SECTION 10-3. SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

10-3.01 DESCRIPTION

Traffic signals, lighting, sign illumination, electric service (irrigation), 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. Ramp metering system.
2. Traffic monitoring station
3. Telephone demarcation station

Lighting equipment is included in the following structures:

A. Trancas Street Overcrossing (Bridge No. 21-101)
B. North Napa Pedestrian Overcrossing (Bridge No. 21-107)

Attention is directed to "Order of Work" of these special provisions. Electrical work shall be performed in conformance with the stages of construction shown on the plans. Nonconflicting work in subsequent stages may proceed concurrently with work in preceding stages, provided satisfactory progress is maintained in the preceding stages of construction.

In addition to the order of work shown in the stage construction plans, the signal and lighting work at Location 1, as shown in the electrical plans, shall be installed and fully operational during Stage 2 of this contract.

Traffic signal work shall be performed at the following locations:

A. Redwood Road and Solano Avenue (Location 1).
B. Route 29 Southbound ramps and Trancas Street (Location 2).
C. Route 29 Northbound ramps and Trancas Street (Location 3).

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 30 days after the contract has been approved. The cost break-down shall be approved, in writing, by the Engineer before any partial payment for the items of electrical work will be made.

The cost breakdown shall include the following items in addition to those listed in the Standard Specifications:

A. Pedestrian Overcrossing lighting fixtures

10-3.03 MAINTAINING EXISTING AND TEMPORARY ELECTRICAL SYSTEMS

Traffic signal system shutdowns shall be limited to periods between the hours of 9:00 a.m. and 3:00 p.m.

10-3.04 FOUNDATIONS

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

Where the plans refer to the side tenon detail at the end of the signal mast arm, the applicable tip tenon detail may be substituted.

The sign mounting hardware shall be installed at the locations shown on the plans.

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 CONDUIT

Conduit to be installed underground shall be Type 1 or Type 3 unless otherwise specified. 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 those locations where conduit is required to be installed under pavement and existing underground facilities require special precautions in conformance with the provisions in "Obstructions" of these special provisions, conduit shall be placed by the "Trenching in Pavement Method" in conformance with the provisions in Section 86-2.05C, "Installation," of the Standard Specifications.

At other locations where conduit is required to be installed under pavement and if a delay to vehicles will not exceed 5 minutes, conduit may be installed by the "Trenching in Pavement Method."

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.

10-3.07 PULL BOXES

Grout shall not be placed in the bottom of new or existing pull boxes.

Pull boxes for circuits labeled "CITY CIRCUIT" on the plans shall not have the "CALTRANS" cover marking. The covers shall be marked "CITY" and their associated circuitry.

10-3.08 CONDUCTORS AND WIRING

Splices shall be insulated by "Method B".

The minimum insulation thickness, at any point, for Type USE, RHH or RHW wire shall be 1.0 mm for conductor sizes No. 14 to No. 10, inclusive, and 1.3 mm for No. 8 to No. 2, inclusive. The minimum insulation thickness, at any point, for Type THW and TW wires shall be 0.69 mm for conductor sizes No. 14 to No. 10, inclusive, 1.02 mm for No. 8, and 1.37 mm for No. 6 to No. 2, inclusive.

SIGNAL INTERCONNECT CABLE.

Signal Interconnect Cable (SIC) shall be the 6-pair type.

Signal conductors for ramp meters shall be color coded as follows:

Phase	Base	Stripe	Band Symbols
1	Re, Ye, Brn	None	1
2	Re, Ye, Brn	Black	2
3	Re, Ye, Brn	Purple	3
4	Re, Ye, Brn	Orange	4

Signal cable shall not be used.

10-3.09 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.

10-3.10 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.

Type H service shall consist of a conduit and conductors with length and size as required by the serving utility company.

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, and for a Type III-C series shall be 460 mm minimum.

10-3.11 NUMBERING ELECTRICAL EQUIPMENT (STATE SYSTEM)

The placement of numbers on electrical equipment will be done by others.

10-3.12 NUMBERING ELECTRICAL EQUIPMENT (CITY SYSTEM)

The numbers and edge sealer shall be placed on the equipment where designated by the Engineer.

Where new numbers are to be placed on existing or relocated equipment, the existing numbers shall be removed.

Reflective numbers shall be applied to a clean surface. Only the edges of the numbers shall be-treated with edge sealer.

Where shown on the plans, 2-digit, self-adhesive equipment numbers shall be placed for all electroliers and pedestrian overcrossing lighting fixtures. On electroliers and pedestrian overcrossing lighting fixtures, the numbers shall be placed as shown on the plans.

10-3.13 STATE-FURNISHED CONTROLLER ASSEMBLIES

The Model 170 controller assemblies, including controller unit, completely wired controller cabinet and inductive loop detector sensor units, but without anchor bolts, will be State-furnished as provided under "Materials" of these special provisions.

The Contractor shall construct each controller cabinet foundation as shown on the plans for Model 332 and 334 cabinets (including furnishing and installing anchor bolts), shall install the controller cabinet on the foundation, and shall make field wiring connections to the terminal blocks in the controller cabinet.

A listing of field conductor terminations, in each State-furnished controller cabinet, will be furnished free of charge to the Contractor at the site of the work.

State forces will maintain controller assemblies. The Contractor's responsibility for controller assemblies shall be limited to conforming to the provisions in Section 6-1.02, "State-Furnished Materials," of the Standard Specifications.

10-3.14 TELEPHONE DEMARCATION CABINET

The Contractor shall furnish and install all cable assemblies, punch block, and connecting blocks inside the TDC, except those that are provided by the telephone company (TELCO), as shown on the plans and as directed by the Engineer.

Ground rod shall meet the requirements of NEC Article 250-84.

Padlockable drawer latch shall be padlock hasp.

Backboard C shall be secured by a retaining screw.

Duplex outlet and GFCI duplex outlet shall be separately connected to the main circuit breaker.

The bottom plate for TDC shall be 3.2 mm aluminum.

10-3.15 VEHICLE SIGNAL FACES AND SIGNAL HEADS

LED modules for vehicular traffic signal units (except programmed visibility type) will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

10-3.16 PEDESTRIAN SIGNALS

LED modules for Type A pedestrian signals will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

10-3.17 DETECTORS

Loop detector sensor units will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

At the Contractor's option, where a Type A or a Type B loop is designated as mainline loops for traffic monitoring stations as shown on the plans, a Type E loop may be substituted. All loops in a single lane shall be of the same type per location.

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.

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.

Where one ramp metering demand (D) detector consists of a sequence of 3 loops in a single lane, all 3 loops in each lane shall be connected in series.

10-3.18 LUMINAIRES

Ballasts shall be the lag or lead regulator.

10-3.19 PEDESTRIAN OVERCROSSING FIXTURES

Fluorescent lighting fixtures for installation in the top railing of a pedestrian overcrossing chain link sidewalk railing shall conform to the details shown on the plans and these special provisions.

If the design of the fixtures deviates in any way from the details shown on the plans, the design shall be submitted to the Engineer for review before fabrication of the fixtures. If deemed necessary by the Engineer, one complete prototype fixture shall be delivered to the Engineer for review at least 30 days before fabrication of the fixtures to be used in the work. The prototype fixture will be returned to the Contractor, and if permitted by the Engineer, the fixture may be installed in the work.

The shell of the fixture shall consist of a top section and a door section of extruded 6063-T5 aluminum alloy (each with a nominal 3-mm wall thickness), 2 cast-end sections of 319 aluminum alloy, and an internal wireway cover of 505-H32 aluminum alloy, as detailed on the plans.

The top section and the door section shall be joined together on one side by a continuous hinge formed as part of the 2 extrusions and shall overlay to permit locking on the other side. The hinge shall be treated with a suitable silicone grease that will prevent the entrance of water by capillary action.

Fasteners requiring a special socket wrench, as detailed on the plans, shall be provided on the overlap to secure the door section in the closed position. Two special socket wrenches that operate the fasteners shall be furnished to the Engineer.

The top section of the shell shall have a fin with 5-mm holes spaced uniformly on 300-mm centers to permit the use of 3.76-mm (9-gage) tie wires to support the chain link fence fabric.

The end sections shall fit on the ends of the fixture and shall be welded to the top section only. Each end section shall have an open extension with an outside diameter equal to that of Size 35, Type 1, conduit. A 75-mm sleeve shall be provided with each end section for securing the fixture to the top rail as shown on the plans.

The wireway cover (with 5-mm hemmed ends up) complete with terminal blocks and circuit conductors shall be inserted before welding the end sections and shall provide clearance at both ends for conductors. The cover shall be fastened by at least two 6-mm, No. 4 self-threading sheet metal screws with binding head and blunt point. Blind rivets of equivalent strength may be substituted.

The lens units in the door section shall be formed of 38-mm methyl methacrylate rod, cut and fire glazed to provide a clear finish or of cast units providing equivalent tolerances and finish. Units shall conform to the dimensions shown on the plans.

The lenses shall be secured to the door section with an extruded lens retainer of 6063-T5 aluminum alloy conforming to the lens shape. The lens retainers shall fit the full length of the lens on both sides. Lens retainers which are continuous for the full length of the 3 lenses will be permitted. "Zee" bars of 5052-H32 or 5005-H14 aluminum alloy, 1.6 mm, minimum thickness, may be substituted for the extruded lens retainer, if approved by the Engineer.

One or more bronze sash chains or other satisfactory devices shall be provided to prevent the door from opening to such an extent that the hinge will be damaged.

Each fixture shall contain an F48T12/CW, rapid start fluorescent lamp with recessed, double-contact bases installed on the back side of the door directly behind the lenses.

Lampholders shall be listed by the UL for outdoor use, shall be provided with heat resistant, circular cross section, neoprene sealing gasket, silver-coated contacts and waterproofed lead entrance for use with a 1500-mA, rapid start, fluorescent lamp. One lampholder for each lamp shall be of the spring-loaded type.

The distance between the faces of the lampholder for each lamp shall be designed to provide a compression of at least 2.5 mm on the spring type lampholder when the lamp is in place. The lamp shall have positive mechanical and electrical contact when the lamp is in place. The socket on the spring type lampholder shall have sufficient travel to permit installation of the lamp. Springs shall not be a part of the current carrying circuit.

The ballast shall be 34.3 mm long (maximum) and shall be the high power factor type with weatherproof leads for operation of one 1220-mm rapid-start lamp. Ballasts shall be listed by the UL for outdoor operation on 110-V(ac) to 125-V(ac), 60 Hz circuits and shall be rated at 1500 mA.

Circuit conductors entering the fixture shall be terminated on molded, phenolic, barrier-type, 3-pole terminal blocks rated at 15 A, 600 V(ac) and shall have integral-type white waterproof marking strips labeled "Line 1", "Neutral" and "Line 2". Current carrying parts of the terminal blocks shall be insulated from the fixture with integral plugs or strips to provide an insulating value in excess of the line to ground flash-over voltage. The terminal blocks shall be attached to the wireway cover in the top section. If the Contractor elects to use sectionalized terminal blocks, each section shall be provided with an integral barrier on each side and shall be capable of rigid mounting and alignment.

The electrical system of the pedestrian overcrossing shall be effectively grounded by a No. 8 copper wire installed in the conduit from fixture to fixture, from the end fixture to conduit fitting on the end post and from conduit fitting on the end post to the grounding bushing in the nearest pull box.

The ground wire shall be secured to the inside of the telescoping sleeve end casting where conductors are carried and to the inside of the Type LB conduit fitting on the end post by means of a connecting lug and a No. 8, self-threading, pan-screw.

The lamp, with lampholders, ballast and fixture wires, shall be attached to the door section. The terminal blocks shall be attached to the top section or wireway cover.

Three No. 10, solid copper circuit conductors shall be installed between terminal blocks as part of each completed fixture.

Conductors from ballast to lampholders shall be No. 16 minimum size, stranded copper wire.

Conductors in the fixture, except ballast leads and entrance line conductors, shall be UL listed appliance wiring material (AWM).

Splicing of lampholder conductors to secondary ballast leads shall be done by use of mechanically secure connectors.

Sufficient slack shall be provided in the conductors between the ballast and the terminal blocks to allow the fixture door to be fully opened.

Exposed surfaces of the fixture shall be clean, uniform in appearance and free from defects such as improper fit, dents, deep scratches and abrasions, burrs, roughness, off-square ends, holes off center or jagged, surface irregularities and other significant defects.

Screws for attaching components to the fixture shell such as lens retainers, "Zee" bars, ballast and lampholders shall be tapped into the shell from inside only with the ends of screws ground even with the outside surface of the fixture. No screwheads, nuts or other fasteners shall be removable from the outside.

Defective parts of the fixture, as determined by the Engineer before or after the fixture is installed, shall be removed and replaced at the Contractor's expense.

The fixture shall be completely fabricated and assembled in the shop and shall be ready for installation before shipment to the project.

10-3.20 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.

Salvaged city electrical equipment shall be hauled to the City of Napa, 770 Jackson Street, Napa, CA 94559, (707) 257-9588 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.

10-3.21 PAYMENT

The contract lump sum price or prices paid for signal and lighting shall include highway lighting at intersections in connection with signals only.

Other roadway lighting on the project shall be considered as included in the contract lump sum price paid for lighting and sign illumination or lighting (city street).

The contract lump sum price paid for signal and lighting (stage construction) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in signal and lighting (stage construction), as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

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.

Full compensation for railroad preemption system shall be considered as included in the contract lump sum price paid for signal and lighting at said location and no additional compensation will be allowed therefor.

Full compensation for electrical service (irrigation) shall be considered as included in the contract lump sum price paid for lighting and sign illumination and no separate payment will be made therefor.

SECTION 11. MODIFIED STANDARD SPECIFICATION SECTIONS

SECTION 11-1. QUALITY CONTROL / QUALITY ASSURANCE

Asphalt concrete shall conform to the provisions in this Section 11-1, "Quality Control / Quality Assurance," and the section entitled "Asphalt Concrete" in Section 10-1, "General," of these special provisions. Section 39, "Asphalt Concrete," of the Standard Specifications shall not apply to Type A and Type B asphalt concrete.

SECTION 39: ASPHALT CONCRETE

39-1 GENERAL

39-1.01 DESCRIPTION

This work shall consist of furnishing and mixing aggregate and asphalt binder at a central mixing plant, transporting, spreading and compacting the mixture, and furnishing and placing pavement reinforcing fabric, in conformance with this Section 11-1, "Quality Control / Quality Assurance," and with "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

The Contractor shall be responsible for controlling the quality of the asphalt concrete product entering the work, including aggregate, asphalt binder, additives, and asphalt concrete mixture; for controlling the quality of the work performed, including mix design, and mixing, transporting, spreading, and compacting the asphalt concrete; for controlling the quality of the finished roadway surface; and for developing, implementing, and maintaining a quality control program.

The Contractor shall be responsible for the inspection, sampling, and testing required to control the quality of the asphalt concrete and the work performed.

The inspection, sampling, and testing required to control the quality of the workmanship and the asphalt concrete shall conform to this Section 11-1. Sampling shall be in conformance with the requirements of this Section 11-1 and with California Test 125. Testing shall be performed using California Tests unless otherwise directed by the Engineer or this Section 11-1.

Asphalt concrete is designated as Type A or Type B. The type of asphalt concrete will be shown on the plans or specified in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

39-2 MATERIALS

39-2.01 ASPHALTS

Asphalt binder to be mixed with aggregate shall be steam-refined paving asphalt conforming to the provisions in Section 92, "Asphalts," of the Standard Specifications. Asphalt binder shall be Grade AR-4000 unless the grade is designated in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

Liquid asphalt for prime coat shall conform to the provisions in Section 93, "Liquid Asphalts," of the Standard Specifications and shall be the grade designated by the contract item or conform to the provisions in "Asphalt Concrete," in Section 10-1, "General," of these special provisions.

Asphalt emulsion for paint binder (tack coat) shall conform to the provisions in Section 94, "Asphaltic Emulsions," of the Standard Specifications for the rapid-setting or slow-setting type and grade approved by the Engineer.

Paving asphalt to be used as a binder for pavement reinforcing fabric shall be a steam-refined paving asphalt conforming to the provisions in Section 92, "Asphalts," of the Standard Specifications, and shall be Grade AR-4000, unless otherwise ordered by the Engineer or designated in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

39-2.02 AGGREGATE

Aggregate and combined aggregate shall conform to the quality and gradation provisions in this Section 11-1, "Quality Control / Quality Assurance," for the asphalt concrete types and sizes conforming to the provisions in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

Aggregates shall be clean and free from decomposed or organic materials and other deleterious substances. Coarse aggregate is material retained on the 4.75-mm sieve, fine aggregate is material passing the 4.75-mm sieve, and supplemental fine aggregate is added fine material passing the 600-µm sieve, including, but not limited to, cement and stored fines from dust collectors.

The target value for the percent passing each designated sieve size for the aggregate blend used in the proposed asphalt concrete mix design shall fall within the "Target Value Limits" of the following table:

Table 39-1 - AGGREGATE GRADATION
Type A and Type B Asphalt Concrete
Percentage Passing

19-mm Maximum, Coarse		19-mm Maximum, Medium	
Sieve Sizes	Target Value Limits	Sieve Sizes	Target Value Limits
25-mm	100	25-mm	100
19-mm	90-100	19-mm	90-100
9.5-mm	60-75	9.5-mm	65-80
4.75-mm	45-50	4.75-mm	49-54
2.36-mm	32-36	2.36-mm	36-40
600-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 prior to the addition of the asphalt binder:

Table 39-2 - AGGREGATE QUALITY REQUIREMENTS

Quality	California Test	Asphalt Concrete	
		Type A	Type B
Percent of Crushed Particles	205		
Coarse Aggregate (Min.)		90%	25%
Fine Aggregate (Passing 4.75-mm, Retained on 2.36-mm) (Min.)		70%	20%
Los Angeles Rattler	211		
Loss at 100 Rev. (Max.)		12%	
Loss at 500 Rev. (Max.)		45%	50%
Sand Equivalent (Min.)[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 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.)	367[1, 2]	37	35	37	35
Percent air voids (Mix Design)	367[1]	3-5[3]	3-5[3]	4-6[4]	4-6[4]
(Start-Up Production Evaluation)		Design Value ±1.0			
Swell [5] (mm) (Max)	305	0.76	0.76	0.76	0.76

Notes:

1. Reported value shall be the average of 3 tests from a single split sample.
2. If the range of stability for the 3 briquettes is more than 12 points, the briquettes shall be discarded and new samples shall be fabricated.
3. Modify California Test 367, paragraph C5, to "most nearly 4%."
4. Modify California Test 367, paragraph C5, to "most nearly 5%."
5. Measured at Mix Design only.

During production and placement, the asphalt concrete mixture shall conform to the requirements of Table 39-4, "Minimum Process Control Requirements," and Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. Changes in cold feed or hot bin proportions to conform to the aggregate grading requirements shall not be considered changes in the mix design.

Whenever asphalt concrete production has been suspended for longer than 30 days, the Contractor, on the first day of resumption of production, shall sample and test the asphalt concrete to demonstrate conformance with the requirements of Table 39-3, "Asphalt Concrete Mixture Requirements," Table 39-4, "Minimum Process Control Requirements," and Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1.

The target value for asphalt content may be changed by as much as ± 0.2 percent during the production start-up evaluation specified in Section 39-10.02A, "Production Start-Up Evaluation," of this Section 11-1 or after production start-up evaluation and before the first day of regular production with the Engineer's approval. The Contractor shall demonstrate that asphalt concrete that has been produced through the plant using the modified target value for asphalt content is in conformance with this Section 11-1 by submitting test results for samples obtained from the first 500 tonnes of production. Stability and percent air voids shall be determined using 3 briquettes constructed from a single sample taken from 4 locations across the mat in conformance with the requirements of California Test 125.

Changes from one mix design to another shall not be made during the progress of the work, unless approved by the Engineer. Changes in asphalt content, other than those allowed during the start-up evaluation process, or in aggregate grading target values shall be considered to be a change in the asphalt concrete mixture and shall require a new mix design proposal. Changes in the asphalt content or aggregate grading target values approved by the Engineer will not be applied retroactively for acceptance or payment.

39-2.04 PAVEMENT REINFORCING FABRIC

Pavement reinforcing fabric shall conform to the provisions in Section 88, "Engineering Fabrics," of the Standard Specifications.

39-3 ASPHALT CONCRETE MIX DESIGN PROPOSAL AND REVIEW

39-3.01 CONTRACTOR MIX DESIGN PROPOSAL

The Contractor shall submit for the Engineer's review a proposed asphalt concrete mix design for each asphalt concrete mixture to be used at least 14 days prior to production of that asphalt concrete mixture. The asphalt concrete mix design shall be prepared by a laboratory (or laboratories) whose proficiency has been reviewed and qualified in conformance with the Department's Quality Assurance Program. Aggregate quality and asphalt concrete mix design test results shall be no more than one year old when production of the asphalt concrete mixture starts. For projects of more than one year's duration, asphalt concrete may be produced using the asphalt concrete mix design that was reviewed and accepted at the start of the project provided the asphalt concrete mixture continues to conform to the provisions of this Section 11-1, "Quality Control / Quality Assurance."

The Contractor shall submit a mix design letter that indicates the target values proposed for gradation, asphalt content, and percent air voids. This submittal shall include test results for aggregate and asphalt mixture quality; plots of the combined gradings showing the production tolerances; plots of unit weight, stability, and percent air voids versus asphalt content for the asphalt contents considered in the design process. In addition, this submittal shall include test results for

stability, percent air voids, and swell for 3 briquettes constructed using the submitted aggregate and asphalt blended at the proposed target values for each asphalt concrete mixture to be used.

The Contractor shall submit the following for each asphalt concrete mixture proposed:

A. Aggregate and mineral filler:

1. Target values for percent passing each sieve size for the aggregate blend;
2. Results of tests for aggregate quality requirements;
3. Source of each aggregate to be used including producer, location, and California Mine Identification number;
4. Percentage of each aggregate stockpile, cold feed or hot bin to be used;
5. Gradation of each aggregate stockpile, cold feed or hot bin to be used; and
6. Samples that are representative of the aggregate to be used. Minimum sample sizes shall be as follows:

60 kg of each coarse aggregate;
40 kg of each fine aggregate; and
5 kg of each supplemental fine aggregate.

B. Asphalt binder:

1. Asphalt binder source and target value;
2. Four one-liter samples of the asphalt binder;
3. Results of the asphalt binder quality tests conforming to the provisions in Section 92, "Asphalts," of the Standard Specifications; and
4. Material Safety Data Sheets.

C. Antistrip additives**,** when applicable:

1. A 5-kg sample of the dry additive or a one-liter sample of the liquid antistrip additive, including name of product, manufacturer, manufacturer's designation and proposed rate, location, and method of addition; and
2. Material Safety Data Sheets.

The proposed asphalt concrete mix design submittal will be considered complete only when the mix design letter, test results, plots, and samples have been received by the Engineer.

39-3.02 ENGINEER REVIEW OF ASPHALT CONCRETE MIX DESIGN

The Engineer will review the proposed aggregate and asphalt concrete mixture for conformance with this Section 11-1, "Quality Control / Quality Assurance." The proposed asphalt concrete mixture will be reviewed at the proposed target values for aggregate grading and asphalt content. The Engineer will have 14 days to review each submittal of a proposed mix design. Production of asphalt concrete shall not begin until written notification has been received from the Engineer that the aggregates and proposed mix design meet the quality requirements of this Section 11-1.

The Engineer will reject a proposed asphalt concrete mixture that, during review, fails to meet the quality requirements of Table 39-2, "Aggregate Quality Requirements," and Table 39-3, "Asphalt Concrete Mixture Requirements," of this Section 11-1. The Contractor shall resubmit a mix design letter providing new test results, plots, and material samples.

Disagreements in mix design review shall be resolved in conformance with Section 39-6, "Dispute Resolution," of this Section 11-1. The Contractor shall use a mix design on the project only after the Engineer concurs that the aggregate and asphalt concrete represented by the proposed mix design conforms to the provisions of this Section 11-1.

The Engineer will review one proposed asphalt concrete mix design for each asphalt concrete type and aggregate size from each plant proposed for use on this project at the State's expense. Costs for additional reviews due to failure to conform to the quality requirements of this Section 11-1 and for reviewing other proposed asphalt concrete mix designs will be deducted from moneys due or to become due the Contractor. The cost for each review will be $1,500. Costs for reviewing changes in a mix design that are initiated by the Engineer will be waived. Contractor's retesting due to errors in the Engineer's testing will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. Costs for reviewing mix designs not used in this project will be deducted from moneys due or to become due the Contractor.

39-4 CONTRACTOR QUALITY CONTROL

39-4.01 GENERAL

The Contractor shall be responsible for the quality of the asphalt concrete entering into the work and of the work performed. In addition, the Contractor shall be responsible for the quality of asphalt concrete or ingredients procured from subcontractors or vendors. A quality control system shall be established, maintained, and modified, if needed, that will provide assurance that materials and completed work conform to contract requirements.

At least 14 days prior to the start of production of asphalt concrete, the Contractor shall submit a written Quality Control Plan. At the request of the Engineer or the Contractor, the Contractor shall discuss the Quality Control Plan with the Engineer.

39-4.02 QUALITY CONTROL PLAN

The Quality Control Plan shall describe the organization and procedures that will be used to administer the quality control system including the procedures used to control the production process, the procedures used to determine when changes to the production process are needed, and the procedures proposed to be used to implement the required changes. The Quality Control Plan shall meet the minimum standards set forth in the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete," available as specified in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

Asphalt concrete production and placement shall not begin until the Quality Control Plan has been approved by the Engineer. Approval of the Quality Control Plan does not imply a warranty by the Engineer that adherence to the plan will result in production of asphalt concrete that complies with this Section 11-1. It shall remain the responsibility of the Contractor to demonstrate such compliance.

The Quality Control Plan shall include the name and qualifications of a Quality Control Manager. The Quality Control Manager shall be responsible for the administration of the Quality Control Plan, including compliance with the plan and plan modifications. The Quality Control Manager shall be responsible to the Contractor, shall have the authority to make decisions concerning quality of the work or product, and shall be available to the project within less than 3 hours during paving. Except in cases of emergency and with the approval of the Engineer, the Quality Control Manager cannot be a foreman, member of the production or paving crew, an inspector or tester on this project during pavement production and placement.

The Quality Control Plan shall identify personnel, equipment and documentation required for a complete inspection, sampling and testing program. The Quality Control Plan shall include, but not be limited to, a list of inspectors, samplers and testers, their duties, their certifications if required, and their experience if no certification is required. It shall also list the name and location of laboratories that shall be providing information to the Engineer, the testers who conducted the tests and their certifications and the name of the Laboratory Quality Control Manager responsible for oversight of the testing program. It shall also show examples of the test result forms (if different from those in the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete"), the roadway and plant inspection forms, the Quality Control Manager's daily summary form, and the compliance charts. It shall include the method by which random sampling shall be determined, a list of the testing and sampling equipment to be used and the current calibration dates and calibration charts, and copies of nuclear gauge licenses.

The Quality Control Plan shall include the name and certification of a testing consultant to be an Independent Third Party in dispute resolution. By mutual agreement during dispute resolution, the Independent Third Party may be a District Independent Assurance Sampler and Tester, the testing consultant or both. The proficiency of the testing consultant shall be reviewed and certified in conformance with the requirements of the Department's Quality Assurance Program before the test consultant participates in dispute resolution. Attention is directed to Section 39-6, "Dispute Resolution," of this Section 11-1.

The Quality Control Plan may be modified as work progresses. A supplement shall be submitted whenever there are changes to quality control procedures or personnel. Asphalt concrete production and placement shall not resume or continue until revisions to the Quality Control Plan or quality control personnel have been approved by the Engineer.

39-4.03 CONTRACTOR QUALITY CONTROL INSPECTION, SAMPLING, AND TESTING

The Contractor shall perform process and quality control sampling and testing, provide inspection, and exercise management control to ensure that asphalt concrete production and placement conforms to the provisions of this Section 11-1. Staffing for process and quality control shall meet the minimum requirements outlined in the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete."

Process and quality control, sampling, testing, and inspection shall be provided during the asphalt concrete work. Sampling, testing, and inspection shall be performed at a rate sufficient to ensure that asphalt concrete conforms to the provisions of this Section 11-1.

A roadway inspector shall be provided while asphalt concrete paving operations are in progress. The roadway inspector shall ensure that asphalt concrete placement conforms to industry standards and to the spreading, compacting, and finishing requirements of this Section 11-1, "Quality Control / Quality Assurance." Plant inspection shall be performed as necessary to maintain control of the asphalt concrete production.

Minimum sampling and testing requirements for process and quality control are specified in Table 39-4, "Minimum Process Control Requirements," and Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. Sampling shall be statistically based and random.

During production start-up evaluation, the Contractor shall sample and test in conformance with the provisions in Section 39-10.02A, "Production Start-Up Evaluation," of this Section 11-1.

A testing laboratory and personnel shall be provided for the performance of process and quality control testing. The Engineer shall have unrestricted access to mix design, sampling, and testing.

The proficiency of testing laboratories and sampling and testing personnel shall be reviewed, qualified, and certified by the Department's Independent Assurance Sampler and Tester before providing services to the project. Inspectors shall meet the standards set forth in the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete."

39-4.04 CONTRACTOR PROCESS CONTROL

Process control sampling and testing shall be performed and control shall be exercised to ensure that asphalt concrete production conforms with this Section 11-1.

Minimum process control sampling and testing shall be performed in compliance with the following:

Table 39-4 - MINIMUM PROCESS CONTROL REQUIREMENTS

Quality Characteristic	Action Limit	California Test	Minimum Sampling and Testing Frequency	Point of Sampling ‡	Reporting Time Allowance
Sand Equivalent (Min)	47 (Type A) 42 (Type B)	217	One sample per 2500 tonnes	Batch plant - from hot bins. Drum plant - from cold feed.	24 hours
		(Reported value shall be the average of 3)[1]	Not less than one sample per 2 days		
Stability	37 (Type A) 35 (Type B)	366[2]	See Note 4	Mat behind paver	48 hours
		(Reported value shall be the average of 3)[1,3,5]	Not less than one sample per 5 days		

Notes:

‡ In conformance with the requirements of California Test 125.

1. Samples used for the 3 tests to be averaged shall be from a single split sample.
2. Reheat for sample preparation shall be 2 hours maximum.
   Do not place sample or briquette in oven for 15-hour cure.
3. Briquettes shall be fabricated from a single, combined sample obtained from at least 4 locations across the mat behind the paver in conformance with the requirements of California Test 125.
   If the range of stability for the three briquettes is more than 12 points, the samples shall be discarded and new samples shall be obtained before the end of the following shift of paving and tested in conformance with the requirements of Table 39-3, "Asphalt Concrete Mixture Requirements."
4. Asphalt concrete will be sampled and tested each of the first 5 days of production and may be decreased to one for each 5 days thereafter unless stability falls below the action limit.
   When stability falls below the action limit, sampling will be increased to one sample for each of the first 5 days of production and may be decreased to one for each 5 days thereafter.
   The sequence of the first 5 test results shall not be broken by more than 7 days of suspended operations.
5. During production start-up evaluation, a correlation factor for cured vs. uncured specimens shall be established in conformance with the requirements of Section 39-10.02A, "Production Start-Up Evaluation."

The process control test results shall be plotted on specification compliance charts indicating the action limits for the quality characteristic. When one test result falls below the action limit for an individual measurement, the Contractor shall notify the Engineer, take corrective action, and sample and test within the next 500 tonnes of production. When 2 consecutive test results for an individual characteristic fall below the action limit, the asphalt concrete represented by the 2 tests shall be considered not in compliance. When 2 consecutive test results for an individual characteristic fall below the action limit, the Contractor shall suspend production, notify the Engineer, and take corrective action. With the approval of the Engineer, up to 1000 tonnes of asphalt concrete may be placed to demonstrate that the asphalt concrete is once again in compliance with the provisions of this Section 11-1. Production shall begin only after the Engineer has received test results confirming compliance.

Asphalt concrete that has 2 consecutive stability test results less than or equal to 26 for Type A asphalt concrete or less than or equal to 24 for Type B asphalt concrete shall be removed at the Contractor's expense. Asphalt concrete placed to demonstrate compliance that does not meet the provisions of this Section 11-1 shall be removed at the Contractor's expense.

39-4.05 CONTRACTOR QUALITY CONTROL

Quality control, sampling, testing, and inspection shall be provided during asphalt concrete work. Sampling, testing, and inspection shall be performed at a rate sufficient to ensure that the asphalt concrete product conforms to the requirements in this Section 11-1. Sampling for testing to be reported to the Engineer shall be performed at the minimum frequency specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1, "Quality Control / Quality Assurance."

Quality control samples of aggregates and asphalt concrete mixture shall be obtained and split. One split portion of each sample shall be used for quality control testing and the other portion shall be reserved for possible retest during dispute resolution, in conformance with Section 39-6, "Dispute Resolution," of this Section 11-1. Quality control samples shall be stored in a location listed in the Quality Control Plan until disposal has been approved by the Engineer.

The Contractor shall obtain a one-liter sample of the asphalt binder in conformance with Section 39-7.01C, "Asphalt Binder Storage," of this Section 11-1 for each day of asphalt concrete production. The sample containers shall be labeled as shown in the "Manual for Quality Control and Quality Assurance for Asphalt Concrete" and shall be sent by the Contractor to the Transportation Laboratory on a weekly basis, except for modified asphalts that shall be shipped daily. A copy of the transmittal form shall be attached to the daily report of inspection.

When test results for a single quality characteristic deviate beyond the limits specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1 the Contractor shall take corrective action and shall bring the asphalt concrete within the specification limits. The corrective action taken shall be documented in the records of inspection in conformance with Section 39-4.06B, "Records of Inspection and Testing," of this Section 11-1. When a single quality characteristic deviates 3 consecutive times beyond the limits specified in Table 39-9, "Minimum Quality Control Test Requirements," of this Section 11-1, the Contractor shall suspend production, shall notify the Engineer, and shall take corrective action. With the approval of the Engineer, up to 1000 tonnes of asphalt concrete may be placed and the requirements of Section 39-10.02A, "Production Start-Up Evaluation," of this Section 11-1 shall be used to demonstrate that the asphalt concrete is once again in compliance with this Section 11-1. Production of asphalt concrete shall start only after the Engineer has received test results confirming compliance. When an individual quality characteristic deviates 3 consecutive times beyond the specification limits and production of asphalt concrete has been suspended, the lot shall be terminated.

If an ignition oven is used for asphalt content in conformance with the requirements of California Test 382, gradations of the remaining aggregates shall be provided for each 5000 tonnes of production. Testing of the aggregates shall be in conformance with the requirements of California Test 202, Sections F and G, "Sieve Analysis of Fine and Coarse Aggregates." Test results from these gradings shall be provided prior to completion of the project. Gradings from the aggregates recovered from the ignition oven will not be used in the statistical analysis for quality or for pay. Payment for these gradings will be made as extra work as provided in Section 4-1.03D of the Standard Specifications at the rate of $150 per test result for the cost of the additional testing.

39-4.06 CHARTS AND RECORDS

The Contractor shall record sampling and testing results for both process control and for quality control on forms as provided in the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete" or on forms approved by the Engineer. Complete testing records shall be maintained and posted in the Contractor's laboratory. Models of forms that are different from those in the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete," locations of postings, and times and means of submissions shall be provided in the Quality Control Plan.

For every 5000 tonnes of asphalt concrete produced, the Contractor shall provide an electronic copy of the process and quality control test results using the Department's statistical evaluation program "ACPay" available as specified in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

Compliance charts and inspection and testing records, except stability test results used for process control, shall be submitted within 24 hours after completion of that shift of asphalt concrete production. If the record is incomplete or in error, a copy of the record will be returned with the deficiencies noted by the Engineer. The Contractor shall correct

deficiencies and return the updated record by the start of the following working day. When errors or omissions in the inspection or testing records repeatedly occur, asphalt concrete production and placement shall be suspended and the procedures by which the records are produced shall be corrected before production and placement will be restarted.

39-4.06A Compliance Charts

The Contractor shall develop and maintain time linear specification compliance charts. The compliance charts shall identify the project, test number, test parameter, applicable upper and lower specification limits, and test results.

Compliance charts shall be kept current and shall be posted at a location designated in the Quality Control Plan. Compliance charts shall be updated each day of asphalt concrete production, and up-to-date copies shall be included in the submittals to the Engineer of each day's test results.

39-4.06B Records of Inspection and Testing

For each day of asphalt concrete production, the Contractor shall prepare an "Asphalt Concrete Construction Daily Record of Inspection," on forms provided in the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete." A form shall be submitted for inspection at the plant and at the roadway.

For each day of asphalt concrete production, the Contractor shall prepare an "Asphalt Concrete Inspection and Testing Summary" on a form provided in the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete." Plant and roadway inspection forms documenting the day's plant production and roadway placement shall be completed. Deviations from the specifications or the Contractor's regular practice shall be listed and explained. Individual inspection forms shall be signed by the inspector and initialed by the Quality Control Manager and attached to the summary at submittal. Test forms documenting test results shall be complete, signed by the tester, checked and initialed by the Quality Control Manager, and attached to the summary at submittal. Sampling and testing data and calculations that support a test result shall be made available to the Engineer within 48 hours when requested.

The "Asphalt Concrete Inspection and Testing Summary" shall include the following certification signed by the Quality Control Manager:

> It is hereby certified that the information contained in this record is accurate, and that information, tests or calculations documented herein comply with the requirements of the contract and the standards set forth in the testing procedures. Exceptions to this certification are documented as a part of this record.

39-5 ENGINEER QUALITY ASSURANCE

39-5.01 GENERAL

The Engineer will assure conformance to contract specifications by review of the Contractor's mix design proposal, by inspection of the Contractor's procedures, by oversight of the Contractor's quality control inspection and records, by splitting and testing samples with the Contractor during evaluation of the plant production start-up and the nuclear density test strip, and by independent verification sampling and testing of the asphalt concrete and aggregates during asphalt concrete production.

The Contractor may witness assurance sampling and testing. However, the Engineer will not be required to notify the Contractor of anticipated sampling schedules or locations and will not delay sampling or testing if the Contractor is unable to attend. The Contractor shall not use samples taken for assurance testing for testing and submittal as a quality control test result.

The Engineer will provide the Contractor with copies of the assurance test results not more than 2 working days after receipt of the results. Sampling and testing data and calculations that support a test result shall be made available to the Contractor within 48 hours when requested.

The Engineer may test the asphalt, aggregates or asphalt concrete mixture to determine conformance with this Section 11-1, "Quality Control / Quality Assurance," whenever an asphalt concrete mixture or ingredient appears defective or inconsistent or whenever a test result indicates a change in the characteristics of the asphalt concrete mixture or an ingredient. Asphalt, aggregates or asphalt concrete that does not conform with this Section 11-1 will be rejected in conformance with Section 39-11, "Acceptance of Work," of this Section 11-1.

The Contractor, when directed by the Engineer, shall obtain representative samples of the asphalt concrete mixture or ingredients that appear defective or inconsistent. The samples shall be split into 4 portions. The Contractor shall retain 1 portion for testing if the Contractor chooses and 3 portions shall be delivered to the Engineer. The asphalt concrete or ingredient need not be sampled if the Contractor elects to remove and replace the asphalt concrete, at the Contractor's expense, or if the Contractor uses a method of correcting the situation that has been approved by the Engineer. Test results from these additional samples shall not be used as a basis for a calculated pay factor.

39-5.02 SAMPLING AND TESTING FOR VERIFICATION

Independent of the Contractor's quality control testing, the Engineer will obtain random samples of the aggregate and asphalt concrete mixture and test for in-place density.

Samples of aggregates and asphalt concrete will be obtained during asphalt concrete production and placement, and will be split into at least 4 portions. One of the split portions will be tested by the Engineer and used to verify quality control test results, one portion will be provided to the Contractor, and 2 portions will be reserved and stored for testing in conformance with the provisions in Section 39-6, "Dispute Resolution," of this Section 11-1. When verifying the relative compaction, the Engineer will obtain a sample of a sample of asphalt concrete from the mat behind the paver, will split the sample and apportion the sample as described above, and will test the sample for test maximum density.

The Engineer will test for material quality characteristics specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. Verification tests will be at a frequency of not less than 10 percent of the minimum quality control sampling and testing frequency and will be performed in conformance with the test methods specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. Verification tests will be performed using the same test methods used for quality control testing.

During the Engineer's verification of the relative compaction, the Engineer will determine the location of 500 tonnes of asphalt concrete to be tested using a random number, will obtain an asphalt concrete sample from within this location for determination of the test maximum density, and will determine the relative compaction of the in-place asphalt concrete as specified in California Test 375. The Contractor shall obtain one of the split samples of asphalt concrete for determination of test maximum density and shall determine the relative compaction of the 500 tonnes of asphalt tested by the Engineer using the same testing sites determined by the Engineer. The results of this common testing will be compared to the allowable testing difference defined in Table 39-6, "Allowable Testing Differences," of this Section 11-1. If the test maximum density or the relative compaction does not comply with the allowable testing difference, then the Engineer and Contractor will use the first 500 tonnes of the next day's production to re-correlate the nuclear gauges used in testing as defined by California Test 375.

During production start-up evaluation, the Engineer will witness the sampling of asphalt concrete and aggregates and will perform tests on the materials in conformance with Section 39-10.02A, "Production Start-Up Evaluation," of this Section 11-1.

39-5.03 VERIFICATION

The Engineer will determine the acceptability of the quality control test results by using the *t*-test for sample means to test whether or not the means of the quality control test results and verification test results are within an allowable testing difference. Quality control test results and verification test results for each indexed quality characteristic will be used in the verification process.

The *t*-value of the group of test data to be verified is computed as follows:

$$t = \frac{\left|\overline{X}_c - \overline{X}_v\right|}{S_p\sqrt{\frac{1}{n_c} + \frac{1}{n_v}}} \qquad \text{and} \qquad S_p^2 = \frac{S_c^2\,(n_c - 1) + S_v^2\,(n_v - 1)}{n_c + n_v - 2}$$

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 $n_v = 1$, $S_p = S_c$)
S_c	=	Standard deviation of the Contractor's quality control tests
S_v	=	Standard deviation of the Verification tests (when $n_v > 1$)

The comparison of quality control test results and verification test results will be considered at a level of significance, $\alpha = 0.01$. Compute *t* using the equation above and compare to the critical *t*-value, t_{crit} , from the following table:

Table 39-5 - CRITICAL t-VALUE FOR VERIFICATION OF QUALITY CONTROL TESTING

degrees of freedom (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} ($t \leq t_{crit}$), and the difference between the means of the quality control test results and verification test results are within an allowable testing difference. Quality control test results are not verified if the *t*-value computed is greater than t_{crit} ($t > t_{crit}$), and the difference between the means exceeds the allowable testing difference. The allowable testing difference shall be as follows:

Table 39-6 - ALLOWABLE TESTING DIFFERENCE

Quality	California Test	Allowable Testing Difference
Sand Equivalent (min.)	217	8
Hveem Stabilometer Value (min.)	366	10
Percent Air Voids	367	1.5
Asphalt Content	379 or 382	0.3%
Gradation	202	
19 or 12.5 mm		2
9.5 mm		4
4.75 mm		3
2.36 mm		2
600 µm		2
75 µm		1.0
Relative Compaction Test Maximum Density	375	0.8% 0.03 g/cc

If quality control test results are not verified, the Contractor will be notified of the difference. The Engineer will sample asphalt concrete production at a more frequent interval. Resolution of the problem shall be in conformance with the provisions in Section 39-6, "Dispute Resolution," of this Section 11-1.

39-6 DISPUTE RESOLUTION

39-6.01 GENERAL

The Contractor and the Engineer shall work together to avoid potential conflicts and to resolve differences that may arise from a disagreement regarding test result comparisons.

Should the results of the testing fail to meet the criteria of the stage at which the disagreement arose, production shall be suspended. Production shall not start or resume nor shall asphalt concrete be accepted until the differences have been

resolved and the Engineer is assured that the asphalt concrete conforms to this Section 11-1, "Quality Control / Quality Assurance."

When the Engineer and the Contractor, together or separately, are unable to determine the source of error, an Independent Third Party shall act as witness and referee.

In disagreements, if the Engineer's testing process meets the requirements of this Section 11-1, costs related to the review shall be borne by the Contractor. The Contractor's sampling and testing program shall be modified as necessary. New test results shall be submitted to the Engineer. Test results judged to be in error shall be removed from consideration and the new test results shall be substituted. If split samples are not available and retesting is not possible, that portion of the asphalt concrete produced or placed prior to and during the disagreement will be evaluated based on the results of the Engineer's verification test results.

In disagreements, if the Engineer's testing process fails to meet the requirements of this Section 11-1, costs related to the review shall be borne by the State. The Engineer's sampling and testing program will be modified as necessary. Test results judged to be in error shall be removed from consideration and the new test results shall be substituted. Contractor's retesting due to errors in the Engineer's testing will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. If, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of delays or errors in the Engineer's testing, the delay will be considered a right of way delay as provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

In disagreements, if both the Contractor's and the Engineer's testing processes have failed to meet the requirements of this Section 11-1 or if the cause cannot be determined, each party will bear the costs related to their own review. When appropriate, the Contractor's and the Engineer's sampling and testing programs shall be modified as necessary, split samples of the Contractor's quality control samples or the Engineer's verification samples shall be retested, and the new quality control test results shall be submitted to the Engineer. Test results judged to be in error shall be removed from consideration and the new test results shall be substituted. If split samples of aggregates or asphalt concrete mixture from the Contractor's testing are not available where retesting is required, that portion of the asphalt concrete produced prior to and during the disagreement will be evaluated based on the results of the Engineer's verification test results.

39-6.02 DURING THE ASPHALT CONCRETE MIX DESIGN REVIEW

During the asphalt concrete mix design review, if the Engineer's review does not confirm that one or more of the aggregate or the asphalt concrete mixture qualities comply with this Section 11-1, "Quality Control / Quality Assurance," both parties will review their sampling, testing, and test results and shall share their findings. Testers and laboratories shall be made available for witnessing. Calculations and test results shall be made available for review. If an error in the Contractor's testing is detected during this review, the Contractor shall, as is appropriate, recalculate or retest. The new test results shall be submitted to the Engineer. If an error in the Engineer's testing is detected, the Engineer will, as is appropriate, recalculate or retest.

If the Contractor's and Engineer's review does not reveal the source of conflict, the Contractor's and the Engineer's sampling and testing processes shall be witnessed by the Independent Third Party. Testing to resolve the dispute in results for the mix design shall be performed using samples that were obtained and split while being witnessed by the Independent Third Party. Review of sample preparation and testing will be performed at both the Contractor's and the Engineer's laboratory on a portion of the split material while being witnessed by the Independent Third Party. The resulting mix design shall be used for production.

39-6.03 DURING THE PRODUCTION START-UP EVALUATION

When the Contractor's and Engineer's test results during production start-up fail to meet the provisions in Section 39-10.02, "Production Start-Up Evaluation and Nuclear Density Test Strips," both parties will review their sampling, testing, and test results, and shall share their findings. Testers and laboratories shall be made available for witnessing. Calculations and test results shall be made available for review. If an error in the Contractor's testing is detected during this review, the Contractor shall, as is appropriate, recalculate or retest. The new test results shall be submitted to the Engineer. If an error in the Engineer's testing is detected, the Engineer will, as is appropriate, recalculate or retest.

If the Contractor's and the Engineer's review does not resolve the differences, the Contractor's and the Engineer's testing processes shall be witnessed by the Independent Third Party using the 2 remaining portions of the split samples. If necessary, a 250-tonne to 500-tonne quantity of asphalt concrete shall be placed at a location agreed to by the Engineer to provide asphalt concrete and ingredients for sampling and testing for the Independent Third Party review.

If an error in the Contractor's testing is detected by the Independent Third Party, the Contractor shall take corrective action and, as appropriate, recalculate or retest the split portion of the trial quantity of asphalt concrete in question. The new test results shall be submitted to the Engineer. If an error in the Engineer's testing is detected by the Independent Third Party, the Engineer will take corrective action and, as appropriate, recalculate or retest the split portion of the first trial quantity.

Production shall not start nor shall asphalt concrete be accepted until the differences have been resolved and the test results meet the provisions in Section 39-10.02, "Production Start-Up Evaluation and Nuclear Density Test Strips," of this Section 11-1.

39-6.04 DURING PRODUCTION

When it is determined that the quality control test results could not be verified, both parties will review their sampling, testing, and test results, and shall share their findings. Testers and laboratories will be made available for witnessing. Calculations and results will be made available for review.

If an error in the quality control sampling or testing is detected during the Contractor's or the Engineer's review, the Contractor shall either recalculate or, if appropriate, retest using the reserved split portions of the quality control samples. These new test results shall be submitted to the Engineer. If an error in the verification sampling or testing is detected, the Engineer will recalculate or, if appropriate, retest using a reserved split portion of the verification samples. Using the new test results, the Engineer will repeat the calculation of the *t*-test and will determine if the means of the quality control tests and the verification test results are within the allowable testing difference as specified in Section 39-5.03, "Verification," of this Section 11-1.

When the verification test results do not verify the quality control test results 3 consecutive times, both the Contractor's and the Engineer's testers shall be witnessed by the Independent Third Party while sampling, splitting, and testing samples from the production unit or from the mat . The Contractor may produce and place up to 1000 tonnes of asphalt concrete to provide materials and sampling opportunities. Production and placement of asphalt concrete will be suspended until the Independent Third Party has completed the review of the Contractor's and the Engineer's sampling and testing and resolved the differences.

If an error in the Contractor's testing is detected by the Independent Third Party, the Contractor shall take corrective action and, as appropriate, recalculate or retest the split portion of the quality control samples. The new test results shall be submitted to the Engineer. If an error in the Engineer's testing is detected by the Independent Third Party, the Engineer will take corrective action and, as appropriate, recalculate or retest a split portion of the verification samples. When the error has been detected and corrected, production shall resume and the services of the Independent Third Party will be discontinued.

If a problem is not identified during the Independent Third Party review, the Independent Third Party shall be retained for the duration of the project or until a problem has been identified. Until all asphalt concrete has been produced and placed, the Contractor shall sample and split quality control samples in the presence of the Independent Third Party. One portion of each sample shall be tested by the Contractor in conformance with the intervals specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1, and the other portion shall be delivered to the Engineer by the Independent Third Party. The Engineer will test at least one of every 5 of the split samples for verification purposes. A new lot will be designated for asphalt concrete produced since the Independent Third Party was consulted. The pay factor for this lot will be determined in conformance with Section 39-11.02, "Statistical Evaluation and Determination of Pay Factor," of this Section 11-1 with the exception that both the Contractor's quality control test results and the Engineer's verification test results will be combined and will be the basis for acceptance of that portion of the work. The pay factor for the lot of asphalt concrete which brought about the dispute resolution shall be determined in conformance with Section 39-11.02, "Statistical Evaluation and Determination of Pay Factor," of this Section 11-1 with the exception that both the Contractor's quality control test results and the Engineer's verification test results will be combined and will be the basis for acceptance of that portion of the work.

39-7 STORING, PROPORTIONING AND MIXING MATERIALS

39-7.01 STORAGE

The Contractor shall store the aggregate for asphalt concrete so that separately sized aggregates will not be intermingled and shall store asphalt binder so that different grades of asphalt will not be intermingled. Aggregate that has been intermingled with aggregate of another size shall be removed by the Contractor and replaced with aggregate of specified grading.

When the Contractor adds supplemental fine aggregate, each supplemental fine aggregate used shall be stored separately and kept thoroughly dry.

The measurement and storage provisions of this Section shall not apply to the dust collected in skimmers and expansion chambers (knock-out boxes) or to the dust collected in centrifugal (cyclone) collectors. Dust from these collectors may be returned to the aggregate without being measured or stored separately, provided the dust is returned uniformly at a point in advance of the sampling device in batch-mixing plants or is returned at or before mixing in continuous mixing plants.

Aggregate and asphalt binder shall be stored in conformance with the following requirements.

39-7.01A Aggregate Cold Storage

Material shall be fed from storage with a mechanical feeder. Before being fed to the drier, aggregate shall be separated into 3 or more sizes and stored separately.

39-7.01B Aggregate Hot Storage

Aggregate for asphalt concrete to be mixed in batch mixing plants shall be stored, after being dried, in conformance with the following requirements:

1. Aggregates for asphalt concrete shall be separated into 3 or more sizes.
2. After the aggregate is separated, each size shall be stored in a separate bin, and shall be recombined in conformance with the provisions in Section 39-7.03A, "Proportioning for Batch Mixing," of this Section 11-1 in order to conform to the gradings specified in Section 39-2, "Materials," of this Section 11-1. Storage bins shall be provided with chutes to prevent overflow into adjacent bins.

39-7.01C Asphalt Binder Storage

Asphalt to be used as a binder for asphalt concrete shall be stored in heated tanks.

A suitable sampling device shall be provided in asphalt feed lines connecting plant storage tanks to the asphalt weighing system or spray bar. The sampling device shall consist of a valve with a nominal diameter between 10 mm and 20 mm, constructed in such a manner that a one-liter sample may be slowly withdrawn during plant operations. The valve shall be maintained in good condition and, if the valve fails to function properly, the valve shall be replaced. The sampling device shall be readily accessible and in an area free of dangerous obstructions and shall be between 600 mm and 750 mm above the platform. A drainage receptacle shall be provided for flushing the device prior to sampling.

The discharge end of the asphalt binder circulating pipe shall be maintained below the surface of the asphalt binder in the storage tank to prevent discharging hot asphalt binder into open air.

A temperature sensing device shall be installed in the asphalt feed line. The device shall measure the temperature of the asphalt and shall be accurate to 5˚C increments. An automatic, continuous recording device shall be provided and used to maintain accurate records of the asphalt temperature during production. Where the plant controller has the capability of capturing production data electronically, including ingredient temperatures, and when this data represents the temperature at the time of production and is captured at intervals of not greater than 5 minutes, this process will be considered to be continuous recording. Captured data shall be retained for the duration of the contract and shall be submitted to the Engineer on request.

39-7.02 DRYING

Aggregate shall be fed directly to a drier-drum mixer or to a drier at a uniform rate.

Aggregate shall be dried such that, at the time of spreading, the moisture content of the completed asphalt concrete mixture shall not exceed 1.0 percent and the minimum and maximum asphalt concrete mixture temperatures are not exceeded. Moisture content will be determined in conformity with the requirements of California Test 370.

The drier or drier-drum mixer shall be provided with a device that senses the temperature of the material leaving the drier or the drier-drum mixer. The temperature-sensing device shall be accurate to the nearest 5˚C. The indicator shall be located and maintained at the point where the proportioning operations are controlled. An automatic continuous recording device shall be provided and used to maintain accurate records of the temperatures during production. Where the plant controller has the capability of capturing production data electronically, including ingredient temperatures, and when this data represents the temperature at the time of production and is captured at intervals of not greater than 5 minutes, this process will be considered to be continuous recording. Captured data shall be retained for the duration of the contract and shall be submitted to the Engineer on request.

The burner used for heating the aggregate shall achieve complete combustion of the fuel.

39-7.03 PROPORTIONING

Proportioning shall be either by hot-feed control or cold-feed control. Hot-feed control and cold-feed control indicate the location of the measuring devices or controls.

The Contractor's mixing equipment shall be equipped with a suitable, safe sampling device that will provide a sample, representative of actual production, of the aggregate being incorporated into the asphalt concrete. The delivery point of samples shall be safe and convenient. When samples are taken from a location above ground level, a means shall be provided for lowering the aggregate samples to the ground.

39-7.03A Proportioning for Batch Mixing

When the Contractor elects to use batch mixing equipment, each aggregate hot storage bin shall be equipped with a sampling device that will provide a sample of the aggregate discharged into the weigh hopper.

Fine material collected in dust control systems, other than centrifugal collectors or knock-out boxes, shall be considered to be supplemental fine aggregate. When supplemental fine aggregate is used, it shall be proportioned by mass.

A sampling device for supplemental fine aggregate shall be installed in each feed line or surge tank preceding the weigh hopper.

39-7.03A(1) Batching Tolerances

Aggregate and asphalt shall be proportioned by mass as follows:

A. The zero tolerance for aggregate scales shall be 0.5-percent of the total batch mass of the aggregate. The zero tolerance for separate scales for weighing supplemental fine aggregate or asphalt binder shall be 0.05-percent of the total batch mass of the aggregate.
B. Unless otherwise approved by the Engineer, the indicated mass of material drawn from storage shall not vary from the preselected scale setting as defined by target values of the approved mix design by more than the following percentages of the total batch mass of the aggregate:

    1. Aggregate shall be within one percent, except that when supplemental fine aggregate is used and is weighed cumulatively with the aggregate, the draft of aggregate drawn immediately before the supplemental fine aggregate shall be within 0.5-percent.
    2. Supplemental fine aggregate shall be within 0.5-percent.
    3. Asphalt binder shall be within 0.1-percent.

The asphalt binder shall be measured by a tank scale.

39-7.03A(2) Automatic Controls

Batch proportioning shall be by an automatic plant controller. The proportioning devices shall be automatic to the extent that the only manual operation required for proportioning materials for one batch shall be a single operation of a switch or starter.

Proportioning devices shall be of a type in which materials discharged from the several bins are controlled by gates or by mechanical conveyors. The batching devices shall be so interlocked that no new batch may be started until weigh hoppers are empty, the scales are at zero, and the discharge gates are closed. The means of withdrawal from the bins and of discharge from the weigh box shall be interlocked so that not more than one bin can discharge onto a given scale at one time, and so that the weigh box cannot be tripped until the required quantity from each of the bins has been deposited therein. In addition, automatic proportioning devices shall be interlocked so that the weighing cycle will be interrupted whenever the amount of material drawn from storage varies from the pre-selected amount by more than the tolerances specified in this Section 11-1. Whenever the weighing cycle is interrupted, that specific batch shall not be used in the work unless it can be manually adjusted to meet the specified tolerances based on the total mass of the batch. When partial batches are batched, the interlock tolerances, except the zero tolerance, shall apply to the total mass of aggregate in the partial batch.

Proportioning devices shall be operated so that all mass increments required for a batch are preset at the same time. Controls shall be designed so that these settings may be changed without delay and the order of discharge from the several bins can be changed.

Proportioning controls shall be equipped with the means for inspection of the interlock tolerance settings. Instructions for performing the inspection shall be available at the point of operation.

The necessary means shall be provided to check the mass of various proportioned amounts on a separate vehicle scale located at the plant site.

39-7.03B Proportioning for Continuous Mixing

Asphalt binder shall be introduced into the mixer through a meter conforming to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications. The asphalt meter shall automatically compensate for changes in the asphalt temperature, unless the meter is the mass flow, coriolis effect, type. The system shall be capable of varying the rate of delivery of binder proportionate with the delivery of aggregate. During a day's run, the temperature of asphalt binder shall not vary more than 30˚C. The meter and lines shall be heated and insulated. The binder storage shall be equipped with a device for automatic plant cut-off when the level of binder is lowered sufficiently to expose the pump suction line.

When supplemental fine aggregate is used, it shall be proportioned by a method that uniformly feeds the material within 2 percent of the required amount. Supplemental fine aggregate shall be discharged from the proportioning device directly into the mixer.

The supplemental fine aggregate proportioning system shall function with a degree of accuracy such that, when operated between 30 percent and 100 percent of maximum operating capacity, the average difference between the indicated mass of material delivered and the actual mass delivered shall not exceed one percent of the actual mass for three individual 15-minute runs. For the 3 individual 15-minute runs, the indicated mass of material delivered shall not vary from the actual mass delivered by more than 2 percent of the actual mass.

The fine material collected in dust control systems may be returned to the aggregate production stream without proportioning if returned at a rate commensurate with overall plant production, and if returned at or before the mixer. A return rate of less than 100 percent of the collection rate shall be metered as specified above for supplemental fine aggregate.

The asphalt feeder, each of the aggregate feeders, the supplemental fine aggregate feeder, if used, and the combined aggregate feeder shall be equipped with devices by which the rate of feed can be determined while the plant is in full operation.

The combined aggregate shall be weighed using a belt scale. The belt scale shall be of such accuracy that, when the plant is operating between 30 percent and 100 percent of belt capacity, the average difference between the indicated mass of material delivered and the actual mass delivered shall not exceed one percent of the actual mass for three individual 3-minute runs. For the 3 individual 3-minute runs, the indicated mass of material delivered shall not vary from the actual mass delivered by more than 2 percent of the actual mass.

The actual mass of material delivered for proportioning device calibrations shall be determined by a vehicle scale located at the plant site conforming to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications. The vehicle scale shall be error checked within 24 hours of checking the plant's proportioning devices. The plant shall be equipped so that this accuracy check can be made prior to the first production operation for a project and at other times when requested by the Engineer.

The belt scale for the combined aggregate, the proportioning devices for supplemental fine aggregate, if used, and the asphalt proportioning meter shall be interlocked so that the rates of feed of the aggregates and asphalt will be adjusted automatically (at all production rates and production rate changes) to maintain the asphalt ratio (kilograms of asphalt per 100 kg of dry aggregate including supplemental fine aggregate, if used) designated in the mix design in conformance with the provisions in Section 39-2.03, "Asphalt Concrete Mixture," of this Section 11-1. The plant shall not be operated unless this automatic system is functioning and in good working condition.

Asphalt meters and aggregate belt scales used for proportioning aggregates and asphalt shall be equipped with rate-of-flow indicators to show the rates of delivery of asphalt and aggregate. Meters and scales shall be equipped with resettable totalizers so that the total amounts of asphalt and aggregate introduced into the asphalt concrete mixture can be determined. Rate-of-flow indicators and totalizers for like materials shall be accurate within one percent when compared directly. The asphalt cement totalizer shall not register when the asphalt metering system is not delivering material to the mixer.

The bin or bins containing the fine aggregate and supplemental fine aggregate, if used, shall be equipped with vibrating units or other equipment that will prevent hang-up of material while the plant is operating. Each belt feeder shall be equipped with a device to monitor the depth of aggregate between the troughing rollers. The device for monitoring depth of aggregate shall automatically shut down the plant whenever the depth of aggregate is less than 70 percent of the target depth. To avoid erroneous shut down by normal fluctuations, a delay between sensing less than 70 percent flow and shutdown of the plant will be permitted, as determined by the Engineer, at the time of the initial California Test 109. A second device shall be located either in the stream of aggregate beyond the belt or where it will monitor movement of the belt by detecting revolutions of the tail pulley on the belt feeder. The device for monitoring no-flow or belt movement, as the case may be, shall stop the plant automatically and immediately when there is no flow. The plant shall not be operated unless both low-flow and no-flow monitoring devices are in good working condition and functioning properly.

For continuous pugmill mixing plants, an aggregate sampling device that will provide a 25-kg to 40-kg sample of the combined aggregate while the plant is in full operation shall be provided in advance of the point where the aggregate enters the mixer.

For drier-drum mixing plants, an aggregate sampling device that will provide a 25-kg to 40-kg sample of the combined aggregate while the plant is in full operation shall be provided in advance of the point where the aggregate enters the drier-drum mixer.

When supplemental fine aggregate is used, a sampling device shall be installed in each feed line or surge tank preceding the proportioning device for the supplemental fine aggregate.

39-7.04 (BLANK)

39-7.05 MIXING

Aggregate, supplemental fine aggregate, and asphalt binder shall be mixed in a batch mixer, continuous mixing pugmill mixer, or continuous mixing drier-drum. The charge in a batch mixer, or the rate of feed to a continuous mixer, shall not exceed that which will permit complete mixing of the material. Dead areas in the mixer, in which the material does not move or is not sufficiently agitated, shall be corrected by a reduction in the volume of material or by other adjustments.

Asphalt binder shall be at a temperature of not less than 120°C nor more than 190°C when added to the aggregate. The temperature of the aggregate before adding the binder shall not be more than 165°C.

39-7.05A Batch Mixing

When asphalt concrete is produced by batch mixing, the mixer shall be equipped with a sufficient number of paddles of a type and arrangement so as to produce a properly mixed batch.

The binder shall be introduced uniformly into the mixer along the center of the mixer parallel to the mixer shafts, or by pressure spraying. When a pan is used, it shall be equipped with movable vanes in order that the flow of binder may be directed across the width of the pan, as desired. The vanes shall be equipped with a means for quick adjustment, and a positive lock to prevent shifting.

The mixer platform shall be of ample size to provide safe and convenient access to the mixer and other equipment. The mixer housing and weighbox housing shall be equipped with gates of ample size to permit ready sampling of the discharge of aggregate from each of the plant bins and from each feed line or surge tank of supplemental fine aggregate, if used. The Contractor shall provide a sampling device capable of delivering a representative sample of sufficient size to permit the required tests.

The mixer shall be equipped with a timing device that will indicate by a definite audible or visual signal the expiration of the mixing period. The device shall measure the time of mixing within 2 seconds.

The time of mixing a batch shall begin on the charging stroke of the weighhopper dumping mechanism and shall end when discharge is started. Mixing shall continue until a homogeneous asphalt concrete mixture of uniformly distributed and properly coated aggregates of unchanging appearance is produced. The time of mixing shall be not less than 30 seconds.

An interval timer shall control the time of mixing. The interval timer shall be interlocked so that the mixer cannot be discharged until the materials have been mixed for the full amount of time specified.

39-7.05B Continuous Mixing

Continuous mixing plants shall utilize pugmill or drier-drum mixers.

When asphalt concrete is produced by pugmill mixing, the mixer shall be equipped with paddles of a type and arrangement to provide sufficient mixing action and movement to the asphalt concrete mixture to produce properly mixed asphalt concrete. The combined aggregate shall be fed directly from the drier to the mixer at a uniform and controlled rate.

Mixing shall continue until a homogeneous asphalt concrete mixture of thoroughly and uniformly coated aggregates of unchanging appearance is produced at the discharge point from the mixer.

The temperature of the completed asphalt concrete mixture shall not exceed 165°C upon discharge from the mixer.

The mixer shall discharge into a storage silo with a capacity of not less than that specified in Section 39-7.06, "Asphalt Concrete Storage," of this Section 11-1. The Contractor shall provide a means of diverting the flow of asphalt concrete away from the silo to prevent incompletely mixed portions of the asphalt concrete mixture from entering the silo.

39-7.06 ASPHALT CONCRETE STORAGE

When asphalt concrete is stored, it shall be stored only in silos. Asphalt concrete shall not be stockpiled. The minimum quantity of asphalt concrete in a silo during mixing shall be 18 tonnes except for the period immediately following a shut-down of the plant of 2 hours or more. A means shall be provided to indicate that storage in each silo is being maintained as required.

Storage silos shall be equipped with a surge-batcher sized to hold a minimum of 1800 kg of material. A surge-batcher consists of equipment placed at the top of the storage silo that catches the continuous delivery of the completed asphalt concrete mix and changes it to individual batch delivery to prevent the segregation of product ingredients as the completed asphalt concrete mix is placed into storage. The surge-batcher shall be center loading and shall be constructed to prevent material buildup. Rotary chutes shall not be used as surge-batchers.

The surge-batcher shall be independent and distinct from conveyors or chutes used to collect or direct the completed asphalt concrete mixture being discharged into storage silos and shall be the last device to handle the material before it enters the silo. Multiple storage silos shall be served by an individual surge-batcher for each silo. Material handling shall be free of oblique movement between the highest elevation (conveyor outfall) and subsequent placement in the silo. Discharge gates on surge-batchers shall be automatic in operation and shall discharge only after a minimum of 1800 kg of material has been collected and shall close before the last collected material leaves the device. Discharge gate design shall prevent the deflection of material during the opening and closing operation.

Asphalt concrete stored in excess of 18 hours shall not be used in the work. Asphalt concrete mixture containing hardened lumps shall not be used. A storage facility that contained the material with the hardened lumps shall not be used for further storage until the cause of the lumps is corrected.

39-7.07 ASPHALT CONCRETE PLANTS

Plants, including commercial plants, that produce asphalt concrete subject to these specifications shall conform to the provisions in Section 7-1.01F, "Air Pollution Control," of the Standard Specifications, and shall be equipped with a wet-tube dust washer or equal and other devices that will reduce the dust emission to the degree that adjacent property is not damaged. The washer and other equipment shall function efficiently when the plant is in operation.

During production, petroleum products such as diesel fuel and kerosene shall not be used as a release agent on belts, conveyors, hoppers, or hauling equipment.

Plants shall be equipped with an inspection dock constructed so that a quality control technician or inspector standing on the dock can inspect the completed asphalt concrete mixture and take samples, as necessary, from the hauling vehicle before the vehicle leaves the plant site. This inspection dock shall allow the hauling vehicle to pull alongside and shall meet applicable safety requirements of the California Division of Occupational Safety and Health. Haul vehicle drivers shall be instructed to stop at the dock whenever a quality control technician or inspector is on the dock and to remain there until directed to leave by that individual.

39-8 SUBGRADE, PRIME COAT, PAINT BINDER (TACK COAT), AND PAVEMENT REINFORCING FABRIC

39-8.01 SUBGRADE

Immediately prior to applying prime coat or paint binder (tack coat), or immediately prior to placing the asphalt concrete when a prime coat or paint binder (tack coat) is not required, the subgrade to receive asphalt concrete shall conform to the compaction requirement and elevation tolerances specified for the material involved and shall be free of loose or extraneous material. If the asphalt concrete is to be placed on an existing base or pavement that was not constructed as part of the contract, the surface shall be cleaned by sweeping, flushing or other means to remove loose particles of paving, dirt, and other extraneous material immediately before applying the prime coat or paint binder (tack coat).

39-8.02 PRIME COAT AND PAINT BINDER (TACK COAT)

A prime coat of liquid asphalt shall be applied to the areas to be surfaced when there is a contract item for the work or when the work is required in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

Prime coat shall be applied only to those areas designated by the Engineer.

Prime coat shall be applied at the approximate total rate of 1.15 L per square meter of surface covered. The exact rate and number of applications will be determined by the Engineer.

Prime coat shall be applied at a temperature conforming to the range of temperatures specified in Section 93-1.03, "Mixing and Applying," of the Standard Specifications for distributor application of the grade of liquid asphalt being used.

A paint binder (tack coat) of asphaltic emulsion shall be furnished and applied in conformance with the provisions in Section 94, "Asphaltic Emulsions," of the Standard Specifications and shall be applied to vertical surfaces of existing pavement, curbs, gutters, and construction joints in the surfacing against which additional material is to be placed, to a pavement to be surfaced, and to other surfaces designated in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

Paint binder (tack coat) shall be applied in one application at a rate of from 0.10-L to 0.45-L per square meter of surface covered. The exact rate of application will be determined by the Engineer.

At the Contractor's option, paving asphalt may be used for paint binder (tack coat) instead of asphaltic emulsion. If paving asphalt is used, the grade to be used and the rate of application will be determined by the Engineer. The paving asphalt shall be applied at a temperature of not less than 140°C or more than 175°C.

Prime coat or paint binder (tack coat) shall be applied in advance of placing the surfacing only as far as shall be approved by the Engineer. When asphaltic emulsion is used as a paint binder (tack coat), the asphalt concrete shall not be placed until the asphaltic emulsion has cured.

Immediately in advance of placing asphalt concrete, additional prime coat or paint binder (tack coat) shall be applied as directed by the Engineer to areas where the prime coat or paint binder (tack coat) has been damaged. Loose or extraneous material shall be removed and no additional compensation will be allowed therefor.

39-8.03 PAVEMENT REINFORCING FABRIC

Pavement reinforcing fabric shall be placed on existing pavement to be surfaced or between layers of asphalt concrete when such work is shown on the plans, or specified in "Asphalt Concrete" in Section 10-1, of these special provisions, or ordered by the Engineer.

Before placing the pavement reinforcing fabric, a binder of paving asphalt shall be applied to the surface to receive the pavement reinforcing fabric at an approximate rate of 1.15 L per square meter of surface covered. The exact rate will be determined by the Engineer. The binder shall be applied to a width equal to the width of the fabric mat plus 75 mm on each side.

Before applying binder, large cracks, spalls, and depressions in existing pavement shall be repaired as directed by the Engineer and, if not included in the item, the repair work will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

The fabric shall be aligned and placed with no wrinkles that lap. The test for lapping shall be made by gathering together the fabric in a wrinkle. If the height of the doubled portion of extra fabric is 15 mm or more, the fabric shall be cut to remove the wrinkle, then lapped in the direction of paving. Lap in excess of 50 mm shall be removed. Pavement reinforcing fabric shall not be placed in areas of conform tapers where the thickness of the overlying asphalt concrete is 30 mm or less.

If manual laydown methods are used, the fabric shall be unrolled, aligned, and placed in increments of approximately 9 m.

Adjacent borders of the fabric shall be lapped 50 mm to 100 mm. The preceding roll shall be lapped 50 mm to 100 mm over the following roll in the direction of paving at ends of rolls or at a break. At fabric overlays, both the binder and the fabric shall overlap previously placed fabric by the same amount.

Seating of the fabric with rolling equipment after placing will be permitted. Turning of the paving machine and other vehicles shall be gradual and kept to a minimum to avoid damage to the fabric.

A small quantity of asphalt concrete, to be determined by the Engineer, may be spread over the fabric immediately in advance of placing asphalt concrete surfacing in order to prevent fabric from being damaged by construction equipment.

Public traffic shall not be allowed on the bare reinforcing fabric, except that public cross traffic may be allowed to cross the fabric under traffic control after the Contractor has placed a small quantity of asphalt concrete over the fabric.

Care shall be taken to avoid tracking binder material onto the pavement reinforcing fabric or distorting the fabric during seating of the fabric with rolling equipment. If necessary to protect the pavement reinforcing fabric, exposed binder material may be covered lightly with sand.

39-9 SPREADING AND COMPACTING EQUIPMENT

39-9.01 SPREADING EQUIPMENT

Asphalt pavers shall be self-propelled mechanical spreading and finishing equipment provided with a screed or strike-off assembly capable of distributing the material to not less than the full width of a traffic lane unless otherwise approved by the Engineer. Screed action shall include cutting, crowding or other practical action that is effective on the asphalt concrete mixture without tearing, shoving or gouging and that produces a surface texture of uniform appearance. The screed shall be adjustable to the required section and thickness. The screed shall be provided with a suitable full width compacting device. Pavers that leave ridges, indentations or other marks in the surface shall not be used unless the ridges, indentations or marks are eliminated by rolling or prevented by adjustment in the operation.

When end dump haul vehicles are used, the asphalt paver shall operate independently of the vehicle being unloaded or shall be capable of propelling the vehicle being unloaded. The load of the haul vehicle shall be limited to that which will insure satisfactory spreading. While being unloaded, the haul vehicle shall be in contact with the machine and the brakes on the haul vehicle shall not be depended upon to maintain contact between the vehicle and the machine.

No portion of the mass of hauling or loading equipment, other than the connection, shall be supported by the asphalt paver. No vibrations or other motions of the loader that could have a detrimental effect on the riding quality of the completed pavement shall be transmitted to the paver.

When asphalt concrete is placed directly upon asphalt treated permeable base, the asphalt concrete shall be placed in a manner and with equipment that will not disturb or displace the asphalt treated permeable base.

39-9.02 COMPACTING EQUIPMENT

A sufficient number of rollers shall be provided to obtain the specified compaction and surface finish required by this Section 11-1. Rollers shall be sized to achieve the required results.

Rollers shall be equipped with pads and water systems that prevent sticking of the asphalt concrete mixtures to the pneumatic or steel-tired wheels. A parting agent that will not damage the asphalt concrete mixture may be used to aid in preventing the asphalt concrete mixture from sticking to the wheels.

39-10 SPREADING AND COMPACTING

39-10.01 GENERAL REQUIREMENTS

Asphalt concrete shall be handled, spread, and compacted in a manner which is in conformance with this Section 11-1, "Quality Control / Quality Assurance."

Asphalt concrete shall be placed in such a manner that cracking, shoving, and displacement will be avoided.

Type A and Type B asphalt concrete shall be placed only when the ambient temperature is above 10°C.

Asphalt concrete shall not be placed when the underlying layer or surface is frozen or not dry or when weather conditions will prevent proper handling, finishing or compaction of the mixture.

Asphalt concrete shall be spread and compacted in the layers and thicknesses indicated in the following table:

Asphalt Concrete Layers and Thickness

Total Thickness Shown on the Plans*	Number of Layers	Top Layer Thickness (Millimeters)		Next Lower Layer Thickness (Millimeters)		All Other Lower Layers Thickness (Millimeters)	
		Min.	Max.	Min.	Max.	Min.	Max.
75 mm or less	1	----	-----	----	----	----	----
76 through 89 mm	2	35	45	35	45	----	----
90 through 135 mm	2	45	60	45	75	—	—
136 mm or more	**	45	60	45	75	45	120

Notes:

*When pavement reinforcing fabric is shown to be placed between layers of asphalt concrete, the thickness of asphalt concrete above the pavement reinforcing fabric shall be considered to be the "Total Thickness Shown on the Plans" for the purpose of spreading and compacting the asphalt concrete above the pavement reinforcing fabric.

**At least 3 layers if total thickness is more than 135 mm and less than 255 mm. At least 4 layers if total thickness is 255 mm or more.

A layer shall not be placed over a layer that exceeds 75 mm in compacted thickness until the temperature of the layer being covered is less than 70°C at mid-depth unless approved by the Engineer.

Asphalt concrete to be placed on shoulders, and on other areas off the traveled way having a width of 1.50 m or more, shall be spread in the same manner as specified above.

The completed mixture shall be deposited on the roadbed at a uniform quantity per linear meter, as necessary to provide the required compacted thickness without resorting to spotting, picking-up or otherwise shifting the mixture. During transporting, spreading and compacting, petroleum products such as diesel fuel and kerosene shall not be used as a release agent on trucks, spreaders or compactors in contact with the asphalt concrete.

Segregation shall be avoided. Surfacing shall be free from pockets of coarse or fine material. Asphalt concrete containing hardened lumps shall not be used.

Longitudinal joints in the top layer of Type A or Type B asphalt concrete shall correspond with the edges of planned traffic lanes. Longitudinal joints in other layers shall be offset not less than 150 mm alternately each side of the edges of traffic lanes.

Unless otherwise provided herein or approved by the Engineer, the top layer of asphalt concrete for shoulders, tapers, transitions, road connections, private drives, curve widenings, chain control lanes, turnouts, left-turn pockets, and other areas shall not be spread before the top layer of asphalt concrete for the adjoining through lane has been spread and compacted. At locations where the number of lanes is changed, the top layer for the through lanes shall be paved first. When existing pavement is to be surfaced and the specified thickness of asphalt concrete to be spread and compacted on the existing pavement is 75 mm or less, the shoulders or other adjoining areas may be spread simultaneously with the through lane provided the completed surfacing conforms to the requirement of this Section 11-1. Tracks or wheels of spreading equipment shall not be operated on the top layer of asphalt concrete until final compaction has been completed.

At those locations shown on the plans, as specified in "Asphalt Concrete" in Section 10-1, "General," of these special provisions, or as directed by the Engineer, the asphalt concrete shall be tapered or feathered to conform to existing surfacing or to other highway and non-highway facilities.

At locations where the asphalt concrete is to be placed over areas inaccessible to spreading and rolling equipment, the asphalt concrete shall be spread by practical means to obtain the specified results and shall be compacted thoroughly to the required lines, grades, and cross sections by means of pneumatic tampers or by other methods that will produce the same degree of compaction as pneumatic tampers.

39-10.02 PRODUCTION START-UP EVALUATION AND NUCLEAR DENSITY TEST STRIPS

The Contractor shall demonstrate that the proposed asphalt concrete mixture is being produced and placed on the roadway in conformance with this Section 11-1, "Quality Control / Quality Assurance." The production start-up evaluation shall demonstrate that the aggregates and asphalt concrete mixture conform to the requirements of Table 39-3, "Asphalt Concrete Mixture Requirements," and of Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1 when produced using the plant proposed for this project. The nuclear density test strip serves to provide the Contractor with a location to develop a correlation between cores taken from the test strip and the Contractor's and Engineer's nuclear density

gage readings taken from the same locations on the test strip and for the Contractor to demonstrate the ability to achieve a minimum of 96 percent relative compaction.

Production start-up evaluation and the nuclear density test strip may be constructed separately or at the same time to serve both purposes. Asphalt concrete used in the nuclear density test strip shall be representative of the asphalt concrete that shall be placed in the project.

Should the test results or testing program fail to meet these criteria, production will be suspended and the Contractor shall resolve the problem in conformance with the provisions in Section 39-6, "Dispute Resolution," of this Section 11-1.

Attention is directed to longitudinal and transverse construction joint requirements specified in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

Test data used for the production start up evaluation and the nuclear gage test strips shall not be included with the test data used for acceptance of the work in conformance with the provisions in Section 39-11, "Acceptance of Work," of this Section 11-1.

A production start-up evaluation and a nuclear density test strip shall be used when production of asphalt concrete has been resumed following a suspension of production due to unsatisfactory material quality as specified in Section 39-4.04, "Contractor Process Control," Section 39-4.05, "Contractor Quality Control," and Section 39-11.02A, "General" of this Section 11-1.

39-10.02A Production Start-Up Evaluation

Before or on the first day of asphalt concrete production, the Contractor shall produce a trial quantity of between 250 tonnes and 500 tonnes of asphalt concrete to demonstrate that asphalt concrete produced for this project conforms to the quality characteristics of this Section 11-1. The location of the production start-up evaluation shall be approved by the Engineer.

Asphalt concrete shall be produced by production procedures intended for the entire project. Production of asphalt concrete shall stop after placement of the trial quantity of asphalt concrete. Asphalt concrete production and placement may resume after the quality characteristics of the asphalt concrete mixture have been tested and found to be in conformance with the quality requirements of this Section 11-1.

The Contractor shall randomly obtain 3 aggregate samples from the plant and 3 asphalt concrete mixture samples from the mat behind the paver. Each sample from the plant shall be split into 4 portions; each sample from the mat shall be split into 4 portions. One portion of each sample shall be tested by the Contractor and one portion of each sample shall be provided to the Engineer for testing. The remaining portions shall be delivered to the Engineer and stored for dispute resolution should the test results not conform to this Section 11-1. The Contractor and the Engineer shall evaluate the samples for conformance to the requirements for sand equivalent, stability, percent air voids, and the quality characteristics designated in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. The percent air voids of the asphalt concrete mixture shall be within ± 1.0 percent of the percent air voids designated in the Contractor's mix design.

The trial quantity of asphalt concrete will be accepted if:

A. Not more than 3 of the test results from the combined 6 test results from the Contractor's and Engineer's samples for quality characteristics indexed 2, 3, 4, and 5 in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1 are outside the specified limits.
B. Not more than one of the test results from the combined 6 test results from the Contractor's and the Engineer's samples for sand equivalent, stability, percent air voids or critical start-up characteristics designated in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1 are outside the specified limits.

If the test results from the combined 6 test results fail to meet the conditions above, corrective action shall be taken, and a new trial quantity of asphalt concrete shall be placed and evaluated in conformance with the provisions in this section to demonstrate conformance. If the test results from the combined 6 test results fail to meet the requirements above, then the trial quantity of asphalt concrete will be rejected.

The testing program will be considered adequate only if the average of the Contractor's test results and the average of the Engineer's test results for sand equivalent, stability, percent air voids, and the quality characteristics designated in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1 are within the allowable testing difference designated in Table 39-6, "Allowable Testing Difference," of this Section 11-1.

The Contractor shall not proceed to regular production until the requirements of this Section 39-10.02A, "Production Start-Up Evaluation" have been met. At the request of the Contractor, the Engineer may elect to leave the asphalt concrete which does not meet the requirements of this Section 39-10.02A in place if mitigation at the Contractor's expense can be agreed to. If this quantity of asphalt concrete is left in place, the Contractor will be paid 75 percent of the contract price paid per tonne for asphalt concrete.

The Contractor shall establish a correlation factor for stability of cured versus uncured briquettes. From a single split sample of asphalt concrete, 6 briquettes shall be fabricated. Three of the 6 briquettes shall be cured for 15 hours in

conformance with the requirements of California Test 366 and 3 briquettes shall not be cured. The difference between the average stability value determined for the cured and the uncured specimens shall be considered the correlation factor, and shall be applied to stability values determined on uncured samples throughout the life of the project. The correlation factor may range from zero to 4. If the correlation factor is less than zero, a factor of zero shall be applied. If the factor is greater than 4, the correlation factor shall be approved by the Engineer.

39-10.02B Nuclear Density Test Strip

On the first day of placement of each layer of asphalt concrete the Contractor shall place a test strip in conformance with the requirements of California Test 375. The purpose of the test strip is to determine a correlation between cores taken from the test strip and the nuclear density gage readings taken at the core locations and to demonstrate that the asphalt concrete can be placed and compacted to the standards of this Section 11-1, "Quality Control / Quality Assurance." Asphalt concrete used in the nuclear density test strip shall be representative of the asphalt concrete that shall be placed in the project. The location for the nuclear density test strip shall be approved by the Engineer.

The Contractor shall place nuclear density test strips until conditions of the test method and this Section 11-1 have been met. The requirements of this section and the test method shall apply for the correlation of each gage that is used to determine relative compaction for this project. Relative compaction results will not be accepted if they have been determined using a nuclear gage that has not been correlated using a test strip.

Asphalt concrete in test strips may be left in place under the following conditions:

A. If the relative compaction for the test strip is determined to be 96 percent or greater, the Contractor will be paid at the contract price per tonne of asphalt concrete.
B. If the relative compaction for the test strip is determined to be less than 96 percent but greater than 93 percent, the Contractor will be paid at 75 percent of the contract price per tonne of asphalt concrete. A new test strip will be required, and mitigation measures shall be at Contractor's expense.

Asphalt concrete in test strips will be rejected when the relative compaction for the test strip is below 93 percent. Production and placement shall not begin until the Contractor has demonstrated the ability to achieve 96 percent relative compaction in conformance with this Section 11-1.

39-10.03 SPREADING

Layers shall be spread with an asphalt paver, unless otherwise specified or approved by the Engineer. Asphalt pavers shall be operated in such a manner as to insure continuous and uniform movement of the paver.

In advance of spreading asphalt concrete over an existing base, surfacing or bridge deck, if there is a contract item for asphalt concrete (leveling) or if ordered by the Engineer, asphalt concrete shall be spread by mechanical means that will produce a uniform smoothness and texture. Asphalt concrete (leveling) shall include, but not be limited to, the filling and leveling of irregularities and ruts. Asphalt concrete used to change the cross slope or profile of an existing surface shall not be considered as asphalt concrete (leveling).

Paint binder (tack coat) shall be applied to each layer in advance of spreading the next layer.

Before placing the top layer adjacent to cold transverse construction joints, the joints shall be trimmed to a vertical face on a neat line. Transverse joints shall be tested with a 3.6-m ± 0.06-m straightedge and shall be cut back for surface smoothness as required in conformance with Section 39-10.04, "Compacting," of this Section 11-1. Connections to existing surfacing shall be feathered to conform to the requirements for smoothness. Longitudinal joints shall be trimmed to a vertical face and on a neat line if the edges of the previously laid surfacing are, in the opinion of the Engineer, in such a condition that the quality of the completed joint will be affected.

39-10.04 COMPACTING

Compacting equipment shall conform to the provisions in Section 39-9.02, "Compacting Equipment," of this Section 11-1, "Quality Control / Quality Assurance."

Rolling shall commence at the lower edge and shall progress toward the highest portion. When compacting layers that exceed 75 mm in compacted thickness, rolling shall commence at the center and shall progress outwards.

Asphalt concrete shall be compacted to a relative compaction of not less than 96 percent and shall be finished to the lines, grades, and cross sections shown on the plans. In-place density of asphalt concrete will be determined prior to opening the pavement to public traffic. No rolling will be permitted after the asphalt concrete temperature is below 60°C.

Asphalt concrete placed in dig outs, as a leveling course, for slope correction, for detours not included in the finished roadway prism, in areas where in the judgment of the Engineer compaction or compaction measurement by conventional methods is impeded or on the uppermost lift of shoulders with rumble strips shall be compacted by a method approved by the Engineer.

Relative compaction shall be determined in conformance with the requirements of California Test 375 except that only a nuclear gauge with thin lift capability shall be used for asphalt concrete layer of 30 mm to 59 mm in thickness. Laboratory specimens shall be compacted in conformance with the requirements of California Test 304. Test locations will be established for asphalt concrete areas to be tested, as specified in California Test 375. If the Contractor compacts the asphalt concrete in any form or quantity after sites for testing have been chosen in conformance with the requirements of California Test 375 or after California Test 375 has begun, the quality control tester shall choose a new set of random numbers for locating test sites.

Upon completion of rolling operations, if ordered by the Engineer, the asphalt concrete shall be cooled by applying water. Applying water shall conform to the provisions in Section 17, "Watering," of the Standard Specifications.

The completed surfacing shall be thoroughly compacted, smooth, and free from ruts, humps, depressions, or irregularities. Ridges, indentations or other objectionable marks left in the surface of the asphalt concrete by blading or other equipment shall be eliminated by rolling or other suitable means. The use of equipment that leaves ridges, indentations or other objectionable marks in the asphalt concrete shall be discontinued.

When a straightedge 3.6 m ± 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 traffic lane.

Pavement within 15 m of a structure or approach slab shall conform to the smoothness tolerances specified in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications.

39-11 ACCEPTANCE OF WORK

39-11.01 GENERAL

The Engineer shall select the procedure used to determine the quantities of asphalt concrete for acceptance and payment determination in conformance with the provisions of this Section 11-1, "Quality Control / Quality Assurance."

Quality control test results that have been verified shall form the basis for statistical evaluation of the work in conformance with Section 39-11.02, "Statistical Evaluation and Determination of Pay Factor," of this Section 11-1. The quality requirements on which statistical evaluation will be based are specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1.

Work determined to be in conformance with the provisions of this Section 11-1 will be accepted and paid for at the contract price per tonne for asphalt concrete and may be subject to compensation adjustment in conformance with Section 39-11.02C, "Pay Factor Determination and Compensation Adjustment," of this Section 11-1.

Work that is not in compliance with the provisions of this Section 11-1 may be rejected by the Engineer and shall be removed and replaced at the Contractor's expense.

When there are fewer than 5 verified quality control tests, the work will be accepted or rejected based on whether the individual test results meet the quality requirements specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. Section 39-11.02, "Statistical Evaluation and Pay Factor Determination," of this Section 11-1 shall not apply.

Aggregates, asphalt binder, and asphalt concrete mixtures that do not conform to this Section 11-1 shall not be used.

The Engineer may reject a quantity of material that is determined to be defective based on visual inspection or noncompliance with the provisions of this Section 11-1.

39-11.02 STATISTICAL EVALUATION AND DETERMINATION OF PAY FACTOR

Statistical evaluation of the work shall be used to verify the Contractor's quality control test results to determine compliance with this Section 11-1, "Quality Control / Quality Assurance."

39-11.02A General

The quality characteristics to be evaluated and the specification limits are specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. Asphalt content, aggregate gradation (600-µm and 75-µm sieves), and relative compaction shall be considered for purposes of this Section 11-1 to be critical quality characteristics.

A lot represents the total quantity of asphalt concrete placed. More than one lot will occur if changes in the target values, material sources or mix design are requested by the Contractor and made in conformance with this Section 11-1 or if production of asphalt concrete is suspended due to unsatisfactory performance. However, asphalt concrete placed in dig outs, as a leveling course, for slope correction, for detours not to be included in the finished roadway prism, in areas where in the judgment of the Engineer compaction or compaction measurement by conventional methods is impeded or on the uppermost lift of shoulders with rumble strips shall be considered as a separate lot from other asphalt concrete. In addition, a new lot may be designated by the Engineer if the production and placement have been suspended for longer than 30 days due to seasonal suspension of phases of work.

A minimum of 5 samples shall be required to perform a statistical evaluation. The maximum obtainable pay factor with the 5 samples shall be 1.01. A minimum of 8 samples shall be required to obtain a pay factor of 1.05. If the sampling frequencies and quantity of work would otherwise result in fewer than 8 samples, the Contractor may submit a written request to increase the sampling frequency to provide a minimum of 8 samples. The request shall be included in the Quality Control Plan.

The lot will be accepted and a final pay factor determined when the Contractor's sampling, inspection, and test results are completed, have been submitted and evaluated, and the Engineer has visually inspected the pavement. Quality control test results shall be verified using the *t*-test in conformance with the provisions of Section 39-5.03, "Verification," of this Section 11-1 before the results will be used in considering the acceptance of asphalt concrete.

If the current composite pay factor of a lot is greater than 0.90, the lot will be accepted, provided the lowest single pay factor is not within the reject portion of Table 39-8, "Pay Factors," of this Section 11-1. If the lowest single pay factor is within the reject portion of Table 39-8, "Pay Factors," of this Section 11-1, the lot will be rejected. Rejected asphalt concrete shall be removed from the project site at the Contractor's expense.

If the current composite pay factor of a lot is less than 0.90, production of asphalt concrete shall be terminated and corrective action taken. Upon approval of the Engineer, up to 1000 tonnes of asphalt concrete may be placed to demonstrate that the asphalt concrete is once again in conformance with this Section 11-1. Production of asphalt concrete shall not start until the Engineer has received test results confirming conformance with this Section 11-1. A new lot will be established when production resumes.

If a pay factor for a critical quality characteristic designated in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1 is less than 0.90 for the lot or is within the rejection range for the last 5 tests, production of asphalt concrete shall be terminated and corrective action taken. Upon approval of the Engineer, up to 1000 tonnes of asphalt concrete may be placed to demonstrate that the asphalt concrete is once again in conformance with this Section 11-1. Production of asphalt concrete shall not start until the Engineer has received test results confirming conformance with this Section 11-1. A new lot will be established when production resumes.

Defective asphalt concrete may be voluntarily removed and replaced with new asphalt concrete to avoid a low pay factor. New material will be sampled, tested, and evaluated in conformance with this Section 11-1.

39-11.02B Statistical Evaluation

The Variability-Unknown/Standard Deviation Method will be used to determine the estimated percentage of the lot that is outside specification limits. The number of significant figures used in the calculations will be in conformance with the requirements of AASHTO Designation R-11, Absolute Method.

The estimated percentage of work that is outside of the specification limits for each quality characteristic will be determined as follows:

1. Calculate the arithmetic mean ($\overline{X}$) of the test values;

$$\overline{X} = \frac{\Sigma x}{n}$$

where:

$\sum$	=	summation of
x	=	individual test values
n	=	total number of test values

2. Calculate the standard deviation (s);

$$s = \sqrt{\frac{n\sum(x^2)-(\sum x)^2}{n(n-1)}}$$

where:

$\sum(x^2)$	=	summation of the squares of individual test values
$(\sum x)^2$	=	summation of the individual test values squared
n	=	total number of test values

3. Calculate the upper quality index (Q_u);

$$Q_u = \frac{USL - \overline{X}}{s}$$

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.)

4. 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

5. From Table 39-7, "Estimated Percent of Work Outside Specification Limits," of this Section 11-1, determine P_U ;

where:

P_U	=	the estimated percentage of work outside the USL. (P_U = 0, when USL is not specified.)

6. 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.)

7. 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

8. Repeat Steps 1 through 7 for each quality characteristic listed for acceptance.

39-11.02C Pay Factor Determination and Compensation Adjustment

The pay factor and compensation adjustment for a lot will be determined as follows:

1. From Table 39-8, "Pay Factors," of this Section 11-1, determine the pay factor for each quality characteristic, (PF_{QC}), using the total number of test result values and the total estimated percentage outside the specification limits ($P_U + P_L$) from Step 7 in Section 39-11.02B, "Statistical Evaluation," of this Section 11-1.
2. The pay factor for the lot is a composite of single pay factors determined for each quality characteristic designated in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1. The following formula is used:

$$PF_C = \sum_{i=1}^{8} w_i \, PF_{QC_i}$$

where:

PF_C = the composite pay factor for the lot,
PF_{QC} = the pay factor for the individual quality characteristic,
w = the weighting factor listed in Table 39-9, and
i = the quality characteristic index number in Table 39-9.

3. Payment to the Contractor for the lot of asphalt concrete will be subject to a compensation adjustment. The Compensation Adjustment Factor (CAF) will be determined as follows:

$$CAF = PF_C - 1$$

4. The amount of the compensation adjustment will be calculated as the product of:

a. the Compensation Adjustment Factor (CAF)
b. the total tonnes represented in the lot, and
c. the contract price paid per tonne for the item of asphalt concrete involved.

If the compensation adjustment is a negative value, the compensation adjustment will be deducted from moneys due, or that may become due, the Contractor under the contract. If the compensation adjustment is a positive value, the compensation adjustment will be added to moneys due, or that may become due, the Contractor under the contract.

Table 39-7.—ESTIMATED PERCENT OF WORK OUTSIDE SPECIFICATION LIMITS

P_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, use the next lower value.
2. If Q_U or Q_L are negative values, P_U or P_L is equal to 100 minus the table value for P_U or P_L.

Table 39-8.—PAY FACTOR

Pay Factor	Sample Size (n)												
	5	6	7	8	9	10-11	12-14	15-17	18-22	23-29	30-42	43-66	>66
	Maximum Allowable Percent of Work Outside Specification Limits for A Given Pay Factor ($P_U + P_L$)												
1.05				0	0	0	0	0	0	0	0	0	0
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. To obtain a pay factor when the estimated percent outside specification limits from Table 39-7, "Estimated Percent of Work Outside Specification Limits," does not correspond to a value in the table, use the next larger value.
2. The maximum obtainable pay factor is 1.05 (with a minimum of 8 test values).

Table 39-9.—MINIMUM QUALITY CONTROL REQUIREMENTS

Index (i)	Quality Characteristic	Specification Limits	Weighting Factor (w)	California Test	Minimum Sampling and Testing Frequency	Point of Sampling
1	**Asphalt Content** [2,3]	TV ± 0.5%	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
2	19 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 [2,3]	TV ± 4	0.08			
7	75 µm [2]	TV ± 2	0.10			
8	**Relative Compaction** [2]	96%	0.40	375 [5]	One sample per 500 tonnes or part thereof Not less than one test per day	Finished mat after final rolling
	Test Maximum Density			375	Per Test Method	Mat behind the paver
9	**Mix Moisture Content**	≤1%		370	One sample per 1000 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. Depending on aggregate gradation specified.
3. Quality characteristics 1, 6, 7, and 8 are defined as critical quality characteristics in the verification testing process.
4. Quality characteristics 1, 6, and 7 are defined as critical start-up characteristics in the Production Start-Up Evaluation.
5. California Test 375, Part 3, Section B, "Testing Frequency," is revised to change 450 tonnes to 500 tonnes and 45 tonnes to 50 tonnes.

39-12 MEASUREMENT AND PAYMENT

39-12.01 MEASUREMENT

Asphalt concrete will be measured by mass. The quantity to be paid for will be the combined mass of the mixture for the various types of asphalt concrete, as designated in the Engineer's Estimate.

The mass of the materials will be determined in conformance with the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications.

Quantities of paving asphalt, liquid asphalt, and asphaltic emulsion to be paid for as contract items of work will be determined in conformance with the methods provided in Section 92, "Asphalts," Section 93, "Liquid Asphalts," or Section 94, "Asphaltic Emulsions," of the Standard Specifications, as the case may be.

When recorded batch masses are printed automatically, these masses may be used for determining pay quantities provided the following requirements are complied with:

A. Total aggregate and supplemental fine aggregate mass per batch shall be printed. When supplemental fine aggregate is weighed cumulatively with the aggregate, the total batch mass of aggregate shall include the supplemental fine aggregate.
B. The total bitumen mass per batch shall be printed.

C. Zero-tolerance mass shall be printed prior to weighing the first batch and after weighing the last batch of each truckload.
D. The time, date, mix number, load number, and truck identification shall be correlated with the load slip.
E. A copy of the recorded batch masses shall be certified by a licensed weighmaster and submitted to the Engineer.

Pavement reinforcing fabric will be measured and paid for by the square meter for the actual pavement area covered.

39-12.02 PAYMENT

Asphalt concrete placed in the work, unless otherwise specified, will be paid for at the contract price per tonne for asphalt concrete of the types designated in the Engineer's Estimate.

Compensation adjustment for asphalt concrete will be in conformance with Section 39-11.02C, "Pay Factor Determination and Compensation Adjustment," of this Section 11-1, "Quality Control / Quality Assurance."

When there is a contract item for asphalt concrete (leveling), quantities of asphalt concrete placed for leveling will be paid for at the contract price per tonne for asphalt concrete (leveling). When there is no contract item for asphalt concrete (leveling), and leveling is ordered by the Engineer, asphalt concrete so used will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

For asphalt concrete placed in dig outs, as a leveling course, for slope correction, for detours not included in the finished roadway prism, in areas where in the judgment of the Engineer compaction or compaction measurement by conventional methods is impeded or on the uppermost lift of shoulders with rumble strips the relative compaction provisions of Section 39-11.02, "Statistical Evaluation and Determination of Pay Factor," of this Section 11-1, shall not apply. In the computation of the composite pay factor (PF_C)for the lot composed of this asphalt concrete, an individual pay factor of 1.0 for the relative compaction (PF_{QC8}) shall be used.

Full compensation for the Contractor's Quality Control Plan, including furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in developing, implementing, modifying, and fulfilling the requirements of the Quality Control Plan shall be considered as included in the contract price paid per tonne for asphalt concrete of the types designated in the Engineer's Estimate and no additional compensation will be allowed therefor.

Full compensation for Contractor sampling, testing, inspection, testing facilities, and preparation and submission of results shall be considered as included in the contract price paid per tonne for asphalt concrete of the types designated in the Engineer's Estimate and no additional compensation will be allowed therefor.

Quantities of pavement reinforcing fabric placed and paving asphalt applied as a binder for the pavement reinforcing fabric will be paid for at the contract price per square meter for pavement reinforcing fabric and per tonne for paving asphalt (binder-pavement reinforcing fabric). Full compensation for furnishing and spreading sand to cover exposed binder material, if necessary, shall be considered as included in the contract price paid per tonne for paving asphalt (binder-pavement reinforcing fabric) and no separate payment will be made therefor.

Small quantities of asphalt concrete placed on pavement reinforcing fabric to prevent the fabric from being displaced by construction equipment or to allow public traffic to cross over the fabric shall be considered as part of the layer of asphalt concrete to be placed over the fabric and will be measured and paid for by the tonne as asphalt concrete of the types designated in the Engineer's Estimate.

When there is a contract item for liquid asphalt (prime coat), the quantity of prime coat will be paid for at the contract price per tonne for the designated grade of liquid asphalt (prime coat). When there is no contract item for liquid asphalt (prime coat) and the special provisions require the application of a prime coat, full compensation for furnishing and applying the prime coat shall be considered as included in the contract price paid per tonne for asphalt concrete of the types designated in the Engineer's Estimate and no separate payment will be made therefor.

When there is a contract item for asphaltic emulsion (paint binder), the quantity of asphaltic emulsion or paving asphalt used as paint binder (tack coat) will be paid for at the contract price per tonne for asphaltic emulsion (paint binder). When there is no contract item for asphaltic emulsion (paint binder), full compensation for furnishing and applying paint binder (tack coat) shall be considered as included in the contract price paid per tonne for asphalt concrete of the types designated in the Engineer's Estimate and no separate payment will be made therefor.

Fog seal coat will be paid for as provided in Section 37-1, "Seal Coats," of the Standard Specifications.

No adjustment of compensation will be made for an increase or decrease in the quantities of paint binder (tack coat) or fog seal coat required, regardless of the reason for such increase or decrease. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications shall not apply to the items of paint binder or fog seal coat.

The above contract prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing asphalt concrete, complete in place, as shown on the plans, as specified in this Section 11-1, "Quality Control / Quality Assurance," and "Asphalt Concrete" in Section 10-1, "General," of these special provisions, and as directed by the Engineer.

SECTION 11-2. PORTLAND CEMENT CONCRETE

11-2.01 GENERAL

Portland cement concrete shall conform to the provisions in this Section 11-2, "Portland Cement Concrete," and the section entitled "Portland Cement Concrete" in Section 8, "Materials," of these special provisions. Section 90, "Portland Cement Concrete," of the Standard Specifications is deleted. Section 90, "Portland Cement Concrete," of the Standard Specifications is amended to read as follows.

SECTION 90: PORTLAND CEMENT CONCRETE

90-1 GENERAL

90-1.01 DESCRIPTION

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

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

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

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.

· 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 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.

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

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

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

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

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

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

90-2.02A Coarse Aggregate

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

· Coarse aggregate shall conform to the following quality requirements:

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

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

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: C618; silica fume conforming to the requirements in ASTM Designation: C1240, with reduction of mortar expansion of 80 percent, minimum, using the cement from the proposed mix design.

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

90-3 AGGREGATE GRADINGS

90-3.01 GENERAL

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

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

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

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

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

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

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

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

90-3.03 FINE AGGREGATE GRADING

· Fine aggregate shall be graded within the following limits:

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

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

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

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

90-3.04 COMBINED AGGREGATE GRADINGS

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

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

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

Grading Limits of Combined Aggregates

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

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

90-4 ADMIXTURES

90-4.01 GENERAL

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

· Chemical admixtures and air-entraining admixtures containing chlorides as Cl in excess of one percent by mass of admixture, as determined by California Test 415, shall not be used in prestressed or reinforced concrete.

· Calcium chloride shall not be used in concrete containing steel reinforcement or other embedded metals.

· Mineral admixture used in concrete for exposed surfaces of like elements of a structure shall be from the same source and of the same percentage.

· Admixtures shall be uniform in properties throughout their use in the work. Should it be found that an admixture as furnished is not uniform in properties, its use shall be discontinued.

· If more than one admixture is used, the admixtures shall be compatible with each other so that the desirable effects of all admixtures used will be realized.

90-4.02 MATERIALS

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

90-4.03 ADMIXTURE APPROVAL

· No admixture brand shall be used in the work unless it is on the Department's current list of approved brands for the type of admixture involved.

· Admixture brands will be considered for addition to the approved list if the manufacturer of the admixture submits to the Transportation Laboratory a sample of the admixture accompanied by certified test results demonstrating that the admixture complies with the requirements in the appropriate ASTM Designation and these specifications. The sample shall be sufficient to permit performance of all required tests. Approval of admixture brands will be dependent upon a determination as to compliance with the requirements, based on the certified test results submitted, together with tests the Department may elect to perform.

· When the Contractor proposes to use an admixture of a brand and type on the current list of approved admixture brands, the Contractor shall furnish a Certificate of Compliance from the manufacturer, as provided in Section 6-1.07, "Certificates of Compliance," certifying that the admixture furnished is the same as that previously approved. If a previously

approved admixture is not accompanied by a Certificate of Compliance, the admixture shall not be used in the work until the Engineer has had sufficient time to make the appropriate tests and has approved the admixture for use. The Engineer may take samples for testing at any time, whether or not the admixture has been accompanied by a Certificate of Compliance.

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

90-4.04 REQUIRED USE OF CHEMICAL ADMIXTURES AND CALCIUM CHLORIDE

· When the use of a chemical admixture or calcium chloride is specified or ordered by the Engineer, the admixture shall be used at the dosage specified or ordered, except that if no dosage is specified or ordered, the admixture shall be used at the dosage normally recommended by the manufacturer of the admixture.

· Calcium chloride shall be dispensed in liquid, flake, or pellet form. Calcium chloride dispensed in liquid form shall conform to the provisions for dispensing liquid admixtures in Section 90-4.10, "Proportioning and Dispensing Liquid Admixtures."

90-4.05 OPTIONAL USE OF CHEMICAL ADMIXTURES

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

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

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

90-4.06 REQUIRED USE OF AIR-ENTRAINING ADMIXTURES

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

90-4.07 OPTIONAL USE OF AIR-ENTRAINING ADMIXTURES

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

90-4.08 REQUIRED USE OF MINERAL ADMIXTURES

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

· The calcium oxide content of mineral admixtures shall not exceed 10 percent and the available alkali, as sodium oxide equivalent, shall not exceed 1.5 percent when determined in conformance with the requirements in ASTM Designation: C 618.

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

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

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

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

90-4.09 BLANK

90-4.10 PROPORTIONING AND DISPENSING LIQUID ADMIXTURES

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

· 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 or more than 0.45-kg/m^2 in 72 hours.

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

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

· Curing compound shall be applied at a nominal rate of 3.7 m^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 210-L barrels or round 19-L containers or shall be supplied from a suitable storage tank located at the jobsite. The containers shall comply with "Title 49, Code of Federal Regulations, Hazardous Materials Regulations." The 210-L barrels shall have removable lids and airtight fasteners. The 19-L containers shall be round and have standard full open head and bail. Lids with bungholes shall not be permitted. On-site storage tanks shall be kept clean and free of contaminants. Each tank shall have a permanent system designed to completely redisperse settled material without introducing air or other foreign substances.

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

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

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

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

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

· Curing compound shall be formulated so as to maintain the specified properties for a minimum of one year. The Engineer may require additional testing before use to determine compliance with these specifications if the compound has not been used within one year or whenever the Engineer has reason to believe the compound is no longer satisfactory.

· Tests will be conducted in conformance with the latest ASTM test methods and methods in use by the Transportation Laboratory.

90-7.01C Waterproof Membrane Method

· The exposed finished surfaces of concrete shall be sprayed with water, using a nozzle that so atomizes the flow that a mist and not a spray is formed, until the concrete has set, after which the curing membrane shall be placed. The curing membrane shall remain in place for a period of not less than 72 hours.

· Sheeting material for curing concrete shall conform to the requirements in AASHTO Designation: M 171 for white reflective materials.

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

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

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

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

90-7.01D Forms-In-Place Method

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

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

90-7.02 CURING PAVEMENT

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

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

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

90-7.03 CURING STRUCTURES

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

· The curing compound method using a pigmented curing compound may be used on concrete surfaces of construction joints, surfaces that are to be buried underground, and surfaces where only Ordinary Surface Finish is to be

applied and on which a uniform color is not required and that will not be visible from a public traveled way. If the Contractor elects to use the curing compound method on the bottom slab of box girder spans, the curing compound shall be curing compound (1).

· The top surface of highway bridge decks shall be cured by both the curing compound method and the water method. The curing compound shall be curing compound (1). The curing compound shall be applied progressively during the deck finishing operations immediately after finishing operations are completed on each individual portion of the deck. The water cure shall be applied not later than 4 hours after completion of deck finishing or, for portions of the decks on which finishing is completed after normal working hours, the water cure shall be applied not later than the following morning.

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

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

90-7.04 CURING PRECAST CONCRETE MEMBERS

· Precast concrete members shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing." Curing shall be provided for the minimum time specified for each method or until the concrete reaches its design strength, whichever is less. Steam curing may also be used for precast members and shall conform to the following provisions:

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

90-7.05 CURING PRECAST PRESTRESSED CONCRETE PILES

· Newly placed concrete for precast prestressed concrete piles shall be cured in conformance with the provisions in Section 90-7.04, "Curing Precast Concrete Members," except that piles with a class designation ending in C (corrosion resistant) shall be cured as follows:

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

90-7.06 CURING SLOPE PROTECTION

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

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

90-7.07 CURING MISCELLANEOUS CONCRETE WORK

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

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

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

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

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

90-8 PROTECTING CONCRETE

90-8.01 GENERAL

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

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

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

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

90-8.02 PROTECTING CONCRETE STRUCTURES

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

90-8.03 PROTECTING CONCRETE PAVEMENT

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

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

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

· No traffic or Contractor's equipment, except as hereinafter provided, will be permitted on the pavement before a period of 10 days has elapsed after the concrete has been placed, nor before the concrete has developed a modulus of rupture

of at least 3.8 MPa. Concrete that fails to attain a modulus of rupture of 3.8 MPa within 10 days shall not be opened to traffic until directed by the Engineer.

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

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

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

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

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

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

90-9 COMPRESSIVE STRENGTH

90-9.01 GENERAL

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

· The compressive strength of concrete will be determined from test cylinders that have been fabricated from concrete sampled in conformance with the requirements of ASTM Designation: C 172. 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 ASTM Designation: C 39. 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 12. (BLANK)

SECTION 13. RAILROAD RELATIONS AND INSURANCE REQUIREMENTS

13-1.01 GENERAL.-- The term "Railroad" shall be understood to mean the Napa Valley Wine Train , Inc.

It is expected that the Railroad will cooperate with the Contractor to the end that the work may be handled in an efficient manner. However, except for the additional compensation provided for hereinafter for delays in completion of specific unit of work to be performed by the Railroad, and except as provided in Public Contracts Code Section 7102, the Contractor shall have no claim for damages, extension of time, or extra compensation in the event his work is held up by any of the work to be performed by the Railroad.

· **RAILROAD REQUIREMENTS.--** The contractor shall notify Mr. Gary Rouse, Vice President, Rail Operations, Napa Valley Wine Train, Inc. 1275 Mckinstry Street, Napa, CA 94559, telephone (707) 258-0504 (FAX 707-258-1546) and the Engineer, in writing, at least ten (10 working days before performing any work on, or adjacent to the property or tracks of the Railroad.

The Contractor shall cooperate with the Railroad where work is over or under the tracks, or within the limits of Railroad property, in order to expedite the work and to avoid interference with the operation of railroad equipment.

The Contractor shall comply with the rules and regulations of Railroad or the instructions of its representatives in relation to the proper manner of protecting the tracks and property of Railroad and the traffic moving on such tracks, as well as the wires, signals and other property of Railroad, its tenants or licensees, at and in the vicinity of the work during the period of construction.

The Contractor shall perform his work in such manner and at such times as shall not endanger or interfere with the safe operation of the tracks and property of Railroad and traffic moving on such tracks, as well as wires, signals and other property of Railroad, its tenants or licensees, at or in the vicinity of the work.

The Contractor shall take protective measures necessary to keep railroad facilities, including track ballast, free of sand or debris resulting from his operations. Any damage to railroad facilities resulting from Contractor's operations will be repaired or replaced by Railroad and the cost of such repairs or replacement shall be deducted from the contractor's progress and final pay estimates.

The Contractor shall contact the Railroad's at least 48 hours prior to commencing work, at (707) 258-0504 to determine location of underground facilities. If a telecommunications system is buried anywhere on or near railroad property, the Contractor will co-ordinate with the Railroad and the Telecommunication Company(ies) to arrange for relocation or other protection of the system prior to beginning any work on or near Railroad Property.

The Contractor shall not pile or store any materials nor park any equipment closer than 25'- 0" to the centerline of the nearest track, unless directed by Railroad's representative.

The Contractor shall also abide by the following California Public Utilities Commission (CPUC) temporary clearances during the course of construction:

12'-0" horizontally from centerline of track
21'-0" vertically above top of rail

The temporary vertical construction clearance above provided will not be permitted until authorized by the CPUC. It is anticipated that authorization will be received not later than fifteen days after the approval of the contract by the Attorney General. In the event authorization is not received by the time specified, and, if in the opinion of the Engineer, the Contractor's operations are delayed or interfered with by reason of authorization not being received by the said time, the State will compensate the Contractor for such delay to the extent provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications and not otherwise.

Walkways with railing shall be constructed by Contractor over open excavation areas when in close proximity of tracks, and railings shall not be closer than 8'-6" horizontally from centerline of the nearest track, if tangent, or 9'-6" if curved.

Any infringement on the above temporary construction clearances due to the Contractor's operations shall be submitted to the Railroad by way of Engineer, and shall not be undertaken until approved by the Railroad, and until the Engineer has obtained any necessary authorization from any governmental body or bodies having jurisdiction thereover. No extension of time or extra compensation will be allowed in the event the Contractor's work is delayed pending Railroad approval and governmental authorization.

When the temporary vertical clearance is less than 22'-6" above top of rail, Railroad shall have the option of installing tell-tales or other protective devices Railroad deems necessary for protection of Railroad trainmen or rail traffic.

Four sets of plans, in 11” x 17” format, and two sets of calculations showing details of construction affecting the Railroad’s tracks and property not included in the contract plans, including but not limited to shoring and falsework, shall be submitted to the Engineer for review prior to submittal to Railroad for final approval. Shoring and falsework design shall be in accordance with Union Pacific Railroad’s Guidelines for shoring and falsework, latest edition, issued by the Railroad’s Office of Chief Engineer. Shoring and falsework plans and calculations shall be prepared and signed by a registered professional engineer. This work shall not be undertaken until such time as the Railroad has given such approval, review by Railroad may take up to six (6) weeks after receipt of all necessary information.

The Contractor shall notify the Engineer in writing, at least 25 calendar days but not more than 40 days in advance of the starting date of installing temporary work with less than permanent clearance at each structure site. The Contractor will not be permitted to proceed with work across railroad tracks unless this requirement has been met. No extension of time or extra compensation will be allowed in the event that the Contractor's work is delayed because of his failure to comply with the requirements in this paragraph.

Private crossings at grade over tracks of Railroad for the purpose of hauling earth, rock, paving or other materials will not be permitted. If the Contractor, for the purpose of constructing highway-railway grade separation structures, including construction ramps thereto, desires to move equipment or materials across Railroad’s tracks, Contractor must first obtain written permission from Railroad. Should Railroad approved the crossing, Contractor may be required to execute a private crossing agreement. By this agreement, the Contractor would be required to bear the cost of the crossing surface, together with any warning devices that might be required. Contractor shall furnish his own employees as flagmen to control movements of vehicles on the private roadway and shall take all measures necessary to prevent the use of such roadway by unauthorized persons and vehicles.

No blasting will be permitted by Contractor unless approved by the Railroad.

The Contractor shall, upon completion of the work covered by this contract to be performed by Contractor upon the premises or over or beneath the tracks of Railroad, promptly remove from the premises of Railroad all of Contractor's tools, implements and other materials, whether brought upon said premises by said Contractor or any subcontractor, employee or agent of Contractor or of any subcontractor, and cause said premises to be left in a clean and presentable condition.

All under track pipeline installations shall be constructed in accordance with Railroad’s current standards which may be obtained from Railroad. The general guidelines are as follows:
Edges of jacking or boring pit excavations shall be kept a minimum of 20 feet from the centerline of the nearest track. If the pipe to be installed under the track is four (4) inches in diameter or less, the top of the pipe shall be at least 42 inches below base of rail. If the pipe diameter is greater than four (4) inches in diameter, it must be encased and the top of the steel pipe casing shall be at least 66 inches below base of rail. Installation of any pipe or conduit under Railroad’s tracks is to be done by dry bore and jack method. No hydraulic jacking or boring will be permitted. Care is to be exercised so as not to damage any underground facilities of Railroad.

13-1.03 PROTECTION OF RAILROAD FACILITIES

(1). Upon advance notification of not less than ten (10) working days by Contractor, Railroad representatives, conductors, flagmen or watchmen will be provided by Railroad to protect its facilities, property and movements of its trains or engines. Said notice shall be made to Gary Rouse, of Railroad at (707) 258-0504. At the time of such notification, Contractor shall provide Railroad with a schedule of dates that flagging services will be needed, as well as times, if outside normal working hours. Any subsequent deviation from said schedule shall also require ten (10) working days advance notice from the first affected date. In general, Railroad will furnish such personnel or other protective devices:

(a) When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from centerline of any track on which trains may operate, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.
(b) For any excavation below elevation of track subgrade if, in the opinion of Railroad's representative, track or other Railroad facilities may be subject to settlement or movement.
(c) During any clearing, grubbing, grading or blasting in proximity to Railroad which, in the opinion of Railroad's representative, may endanger Railroad facilities or operations.
(d) During any of Contractor's operations when, in the opinion of Railroad's representatives, Railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines or pipe lines, may be endangered.

(2) The cost of flagging and inspection provided by Railroad during the period of constructing that portion of the project located on or near Railroad property, as deemed necessary for the protection of Railroad's facilities and trains, will be borne by the State for a period of 200 working days beginning on the date work commences on or near property of Railroad. The Contractor shall pay to the State liquidated damages in the sum of $500 per day for each day in excess of the above 200 working days the Contractor works on or near Railroad property, and which requires flagging protection of Railroad's facilities and trains.

13-1.04 WORK BY RAILROAD.- Railroad will furnish or cause to be furnished as necessary due to construction, labor materials, tools and equipment to perform certain works including relocation of Railroad telephone, signal lines and appurtenances and will perform any other work in connection therewith.

The work by Railroad will be performed by its own forces and is not a part of the work under this contract.

(a) The Railroad will perform preliminary engineering, inspection and flagging as specified in Section 13-1.03 "Protection of Railroad Facilities" and State Agreement No. 04R287.

(b) The railroad shall construct shoofly tie ins and review the construction.

(c) The railroad to install signal at Redwood Road and any required modification at California Blvd.

13-1.05 DELAYS DUE TO WORK BY RAILROAD.--A delay due to work by Railroad will be considered to occur whenever:

(a) The Contractor has provided the minimum required notice, as provided herein, as to the date his work will permit the Railroad to begin work on a specific unit of work listed in the following table, and

(b) The Railroad has not completed said specific unit of work within the number of performance days listed for that unit after said date or the date when the site was made available to the Railroad, whichever is later, and

(c) In the opinion of the Engineer the Contractor's operations are delayed or interfered with by reason of the Railroad not completing the unit of work on time, and

(c) The Contractor has provided written notice to the Engineer that his operations are being delayed or interfered with by reason of the Railroad not completing the unit of work on time.

Unit of Work	Minimum Required Notice, Calendar Days	Performance Days
Signal work at Redwood Rd.	**90**	**30**
Modification at California Blvd.	**60**	**10**
Construct shoofly tie ins	**15**	**2**

If delays due to work by the Railroad occur, and the Contractor sustains loss which, in the opinion of the Engineer, could not have been avoided by the judicious handling of forces, equipment and plant, the amount of said loss shall be determined as provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

If a delay due to work by Railroad occurs, an extension of time determined pursuant to the provisions in Section 8-1.07, "Liquidated Damages," of the Standard Specifications will be granted.

13-1.06 LEGAL RELATIONS.- The provisions of this section, "Relations with Railroad Company" and the provisions of the following section, "Railroad Protective Insurance," of these special provisions shall inure directly to the benefit of Railroad

SECTION 13-2. RAILROAD PROTECTIVE INSURANCE

The term "Railroad" shall be understood to mean the Napa Valley Wine Train, Inc.

In addition to any other form of insurance or bonds required under the terms of the contract and specifications, the Contractor will be required to carry insurance of the kinds and in the amounts hereinafter specified.

Such insurance shall be approved by the Railroad before any work is performed on Railroad's property and shall be carried until all work required to be performed on or adjacent to the Railroad's property under the terms of the contract is satisfactorily completed as determined by the Engineer, and thereafter until all tools, equipment and materials have been removed from Railroad's property and such property is left in a clean and presentable condition.

The insurance herein required shall be obtained by the Contractor, who shall furnish the Railroad with completed certificates, in the form attached hereto, signed by the insurance company or its authorized agent or representative, reflecting the existence of each of the policies required by 1 and 2 below including coverage for X, C and U and completed operations hazards, and the original policy of insurance (or a certified duplicate original policy) required by 3 below, to:

Gary Rouse, Vice President
Rail Operations
Napa Valley Wine Train, Inc.
1275 McKinstry Street
Napa, CA 94559

Certificate of insurance shall guarantee that the policy under 1 and 2 will not be amended, altered, modified or canceled insofar as the coverage contemplated hereunder is concerned, without at least thirty (30) days notice mailed by registered mail to the Railroad.

Full compensation for all premiums which the Contractor is required to pay on all the insurance described hereinafter shall be considered as included in the prices paid for the various items of work to be performed under the contract, and no additional allowance will be made therefor or for additional premiums which may be required by extensions of the policies of insurance.

The approximate ratio of the estimated cost of the work over or under or within 50 feet of Railroad's tracks to the total estimated cost is 0.072 . Approximate daily train traffic is 6 passenger trains and 1 freight trains.

1. Contractor's Public Liability and Property Damage Liability Insurance

The Contractor shall, with respect to the operations he performs within or adjacent to Railroad's property, carry regular Contractor's Public Liability and Property Damage Liability Insurance providing for the same limits as specified for Railroad's Protective Public Liability and Property Damage Liability insurance to be furnished for and in behalf of Railroad as hereinafter provided.

If any part of the work within or adjacent to Railroad's property is subcontracted, the Contractor in addition to carrying the above insurance shall provide the above insurance on behalf of the subcontractors to cover their operations.

2. Contractor's Protective Public Liability and Property Damage Liability Insurance.

The Contractor shall, with respect to the operations performed for him by subcontractors who do work within or adjacent to Railroad's property, carry in his own behalf regular Contractor's Protective Public Liability and Property Damage Liability Insurance providing for the same limits as specified for Railroad's Protective Public Liability and Property Damage Liability Insurance to be furnished for and on behalf of Railroad as hereinafter provided.

3. Railroad's Protective Public Liability and Property Damage Liability Insurance

The Contractor shall, with respect to the operations he performs within or adjacent to Railroad's property or that of any of his subcontractors who do work within or adjacent to Railroad's property perform, have issued and furnished in favor of Railroad, Policy or policies of insurance in the Railroad Protective Liability Form as hereinafter specified.

Railroad Protective Liability Form

_____
(Name of Insurance Company)

DECLARATIONS

Item 1. Named Insured:

Napa Valley Wine Train, Inc.
1275 McKinstry Street
Napa, CA 94559

Item 2. Policy Period: From _____to _____ 12:01 a.m., Standard Time, at the designated job site as stated herein.

Item 3. The insurance afforded is only with respect to such of the following coverage's as are indicated in Item 6 by specific premium charge or charges. The limit of the company's liability against such coverage or coverage's shall be as stated herein, subject to all the terms of this policy having reference thereto.

Coverage's		Limits of Liability Each Occurrence	Aggregate
A B & C	Bodily Injury Liability Property Damage Liability and Physical Damage to Property	$2,000,000 Combined Single Limit	$6,000,000 for Coverage's A, B & C

Item 4. Name and Address of Contractor:

Item 5. Name and Address of Governmental Authority for whom the work by the Contractor is being performed: State of California, acting by and through its Department of Transportation, P.O. Box 942874, Sacramento, California 94274-0001

Item 6. Designation of the Job Site and Description of Work:

FOR CONSTRUCTION ON _____

_____

_____

_____

_____

_____

Premium Bases	Rates per $100 of Cost Coverage A	Coverage's B & C	Advance Premiums Coverage A	Coverage's B & C
Contract Cost	$	$	$	$
Rental Cost	$	$	$	$

Countersigned _____, 20____ by _____

_____
Title

_____
(Name of Insurance Company)

POLICY

A _____ insurance company, herein called the company, agrees with the insured, named in the declarations made a part hereof, in consideration of the payment of the premium and in reliance upon the statements in the declaration made by the named insured and subject to all of the terms of this policy:

INSURING AGREEMENTS

I. Coverage A--Bodily Injury Liability.

To pay on behalf of the insured all sums which the insured shall become legally obligated to pay as damages because of bodily injury, sickness, or disease, including death at any time resulting therefrom, hereinafter called "bodily injury," either (1) sustained by any person arising out of acts or omissions at the designated job site which are related to or are in connection with the work described in Item 6 of the declarations, or (2) sustained at the designated job site by the Contractor or any employee of the Contractor, or by any employee of the Governmental Authority specified in Item 5 of the Declarations, or by any designated employee of the insured whether or not arising out of such acts or omissions.

Coverage B--Property Damage Liability.

To pay on behalf of the insured all sums which the insured shall become legally obligated to pay as damages because of physical injury

to or destruction of property, including loss of use of any property due to such injury or destruction, hereinafter called "property damage," arising out of acts or omissions at the designated job site which are related to or are in connection with the work described in Item 6 of the declarations.

Coverage C--Physical Damage to Property.

To pay for direct and accidental loss of or damage to rolling stock and their contents, mechanical construction equipment, or motive power equipment, hereinafter called "loss," arising out of acts or omissions at the designated job site which are related to or are in connection with the work described in Item 6 of the declarations; provided such property is owned by the named insured or is leased or entrusted to the named insured under a lease or trust agreement.

II. Definitions.

(a) **Insured**.--The unqualified word "insured" includes the named insured and also includes any executive officer, director or stockholder thereof while acting within the scope of his duties as such.

(b) **Contractor.**--The word "contractor" means the Contractor designated in Item 4 of the declarations and includes all subcontractors of said Contractor but shall not include the named insured.

(c) **Designated employee of the insured.**--The words "designated employee of the insured" mean:

(1) any supervisory employee of the insured at the job site,

(2) any employee of the insured while operating, attached to or engaged on work trains or other railroad equipment at the job site which are assigned exclusively to the Contractor, or

(3) any employee of the insured not within (1) or (2) who is specifically loaned or assigned to the work of the Contractor for prevention of accidents or protection of property, the cost of whose services is borne specifically by the Contractor or by governmental authority.

(d) **Contract.--**The word "contract" means any contract or agreement to carry a person or property for a consideration or any lease, trust or interchange contract or agreement respecting motive power, rolling stock or mechanical construction equipment.

III. Defense, Settlement, Supplementary Payments.

With respect to such insurance as is afforded by this policy under Coverage's A and B, the company shall:

(a) defend any suit against the insured alleging such bodily injury or property damage and seeking damages which are payable under the terms of this policy, even if any of the allegations of the suit are groundless, false or fraudulent; but the company may make such investigation and settlement of any claim or suit as it deems expedient;

(b) pay, in addition to the applicable limits of liability:

(1) all expenses incurred by the company, all costs taxed against the insured in any such suit and all interest on the entire amount of any judgment therein which accrues after entry of the judgment and before the company has paid or tendered or deposited in court that part of the judgment which does not exceed the limit of the company's liability thereon;

(2) Premiums on appeal bonds required in any such suit, premiums on bonds to release attachments for an amount not in excess of the applicable limit of liability of this policy, but without obligation to apply for or furnish any such bonds;

(3) expenses incurred by the insured for such immediate medical and surgical relief to others as shall be imperative at the time of the occurrence;

(4) all reasonable expenses, other than loss of earnings, incurred by the insured at the company's request.

IV. Policy Period, Territory.

This policy applies only to occurrences and losses during the policy period and within the United States of America, its territories or possessions, or Canada.

EXCLUSIONS

This policy does not apply:

(a) to liability assumed by the insured under any contract or agreement except a contract as defined herein;

(b) to bodily injury or property damage caused intentionally by or at the direction of the insured;

(c) to bodily injury, property damage or loss which occurs after notification to the named insured of the acceptance of the work by the governmental authority, other than bodily injury, property damage or loss resulting from the existence or removal of tools, uninstalled equipment and abandoned or unused materials;

(d) under Coverage's A(1), B and C, to bodily injury, property damage or loss, the sole proximate cause of which is an act or omission of any insured other than acts or omissions of any designated employee of any insured;

(e) under Coverage A, to any obligation for which the insured or any carrier as his insurer may be held liable under any workmen's compensation, unemployment compensation or disability benefits law, or under any similar law; provided that the Federal Employers' Liability Act, U.S. Code (1946), Title 45, Sections 51-60, as amended, shall for the purposes of this insurance be deemed not to be any similar law;

(f) under Coverage B, to injury to or destruction of property (1) owned by the named insured or (2) leased or entrusted to the named insured under a lease or trust agreement.

(g) 1. Under any liability coverage, to injury, sickness, disease, death or destruction

(a) with respect to which an insured under the policy is also an insured under a nuclear energy liability policy issued by Nuclear Energy Liability Insurance Association, Mutual Atomic Energy Liability Underwriters or Nuclear Insurance Association of Canada, or would be an insured under any such policy but for its termination upon exhaustion of its limit of liability; or

(b) resulting from the hazardous properties of nuclear material and with respect to which (1) any person or organization is required to maintain financial protection pursuant to the Atomic Energy Act of 1954, or any law amendatory thereof, or (2) the insured is, or had this policy not been issued would be, entitled to indemnity from the United States of America, or any agency thereof, under any agreement entered into by the United States of America, or any agency thereof, with any person or organization.

2. Under any medical payments coverage, or under any Supplementary Payments provision relating to immediate medical or surgical relief, to expenses incurred with respect to bodily injury, sickness, disease or death resulting from the hazardous properties of nuclear material and arising out of the operation of a nuclear facility by any person or organization.

3. Under any liability coverage, to injury, sickness, disease, death or destruction resulting from the hazardous properties of nuclear material, if

(a) the nuclear material (1) is at any nuclear facility owned by, or operated by or on behalf of, an insured or (2) has been discharged or dispersed therefrom;
(b) the nuclear material is contained in spent fuel or waste at any time possessed, handled, used, processed, stored, transported or disposed of by or on behalf of an insured; or

(c) the injury, sickness, disease, death or destruction arises out of the furnishing by an insured of services, materials, parts or equipment in connection with the planning, construction, maintenance, operation or use of any nuclear facility, but if such facility is located within the United States of America, its territories or possessions or Canada, this exclusion (c) applies only to injury to or destruction of property at such nuclear facility.

4. As used in this exclusion:

"hazardous properties" include radioactive, toxic or explosive properties;

"nuclear material" means source material, special nuclear material or byproduct material;

"source material", "special nuclear material", and "byproduct material" have the meanings given them in the Atomic Energy Act of 1954 or in any law amendatory thereof;

"spent fuel" means any fuel element or fuel component, solid or liquid, which has been used or exposed to radiation in a nuclear reactor;

"waste" means any waste material (1) containing byproduct material and (2) resulting from the operation by any person or organization of any nuclear facility included within the definition of nuclear facility under paragraph (a) or (b) thereof;

"nuclear facility" means

(a) any nuclear reactor,

(b) any equipment or device designed or used for (1) separating the isotopes of uranium or plutonium, (2) processing or utilizing spent fuel, or (3) handling, processing or packaging waste,

(c) any equipment or device used for the processing, fabricating or alloying of special nuclear material if at any time the total amount of such material in the custody of the insured at the premises where such equipment or device is located consists of or contains more than 25 grams of plutonium or uranium 233 or any combination thereof, or more than 250 grams of uranium 235,

(d) any structure, basin, excavation, premises or place prepared or used for the storage or disposal of waste, and includes the site on which any of the foregoing is located, all operations conducted on such site and all premises used for such operations;
"nuclear reactor" means any apparatus designed or used to sustain nuclear fission in a self-supporting chain reaction or to contain a critical mass of fissionable material;

with respect to injury to or destruction of property, the word "injury" or "destruction" includes all forms of radioactive contamination of property.

(h) under Coverage C, to loss due to nuclear reaction, nuclear radiation or radioactive contamination, or to any act or condition incident to any of the foregoing.

CONDITIONS

(The conditions, except conditions 3, 4, 5, 7, 8, 9, 10, 11 and 12, apply to all coverage's. Conditions 3, 4, 5, 7, 8, 9, 10, 11 and 12, apply only to the coverage noted thereunder.)

1. Premium.--The premium bases and rates for the hazards described in the declarations are stated therein. Premium bases and rates for hazards not so described are those applicable in accordance with the manuals in use by the company.

The term "contract cost" means the total cost of all work described in Item 6 of the declarations.

The term "rental cost" means the total cost to the Contractor for rental of work trains or other railroad equipment, including the remuneration of all employees of the insured while operating, attached to or engaged thereon.

The advance premium stated in the declarations is an estimated premium only. Upon termination of this policy the earned premium shall be computed in accordance with the company's rules, rates, rating plans, premiums and minimum premiums applicable to this insurance. If the earned premium thus computed exceeds the estimated advance premium paid, the company shall look to the Contractor specified in the declarations for any such excess; if less, the company shall return to the said Contractor the unearned portion paid.

In no event shall payment of premium be an obligation of the named insured.

2. Inspection.--The named insured shall make available to the company records of information relating to the subject matter of this insurance.

The company shall be permitted to inspect all operations in connection with the work described in Item 6 of the declarations.

3. Limits of Liability, Coverage A.--The limit of bodily injury liability stated in the declarations as applicable to "each person" is the limit of the company's liability for all damages, including damages for care and loss of services, arising out of bodily injury sustained by one person as the result of any one occurrence; the limit of such liability stated in the declarations as applicable to "each occurrence" is, subject to the above provision respecting each person, the total limit of the company's liability for all such damage arising out of bodily injury sustained by two or more persons as the result of any one occurrence.

4. Limits of Liability, Coverage's B and C.--The limit of liability under Coverages B and C stated in the declarations as applicable to "each occurrence" is the total limit of the company's liability for all damages and all loss under Coverage B and C combined arising out of physical injury to, destruction or loss of all property of one or more persons or organizations, including the loss of use of any property due to such injury or destruction under Coverage B, as the result of any one occurrence.

Subject to the above provision respecting "each occurrence," the limit of liability under Coverage's B and C stated in the declarations as "aggregate" is the total limit of the company's liability for all damages and all loss under Coverage's B and C combined arising out of physical injury to, destruction or loss of property, including the loss of use of any property due to such injury or destruction under Coverage B.

Under Coverage C, the limit of the company's liability for loss shall not exceed the actual cash value of the property, or if the loss is of a part thereof the actual cash value of such part, at time of loss, nor what it would then cost to repair or replace the property or such part thereof with other of like kind and quality.

5. Severalty of Interests, Coverage's A and B.-- The term "the insured" is used severally and not collectively, but the inclusion herein of more than one insured shall not operate to increase the limits of the company's liability.

6. Notice.--In the event of an occurrence or loss, written notice containing particulars sufficient to identify the insured and also reasonably obtainable information with respect to the time, place and circumstances thereof, and the names and addresses of the injured and of available witnesses, shall be given by or for the insured to the company or any of its authorized agents as soon as practicable. If claim is made or suit is brought against the insured, he shall immediately forward to the company every demand, notice, summons or other process received by him or his representative.

7. Assistance and Cooperation of the Insured, Coverage's A and B.--The insured shall cooperate with the company and, upon the company's request, attend hearings and trials and assist in making settlements, securing and giving evidence, obtaining the attendance of witnesses and in the conduct of suits. The insured shall not, except at his own cost, voluntarily make any payment, assume any obligation or incur any expense other than for such immediate medical and surgical relief to others as shall be imperative at the time of accident.

8. Action Against Company, Coverages A and B.--No action shall lie against the company unless, as a condition precedent thereto, the insured shall have fully complied with all the terms of this policy, nor until the amount of the insured's obligation to pay shall have been finally determined either by judgment against the insured after actual trial or by written agreement of the insured, the claimant and the company.

Any person or organization or the legal representative thereof who has secured such judgment or written agreement shall thereafter be entitled to recover under this policy to the extent of the insurance afforded by this policy. No person or organization shall have any right under this policy to join the company as a party to any action against the insured to determine the insured's liability. Bankruptcy or insolvency of the insured or of the insured's estate shall not relieve the company of any of its obligations hereunder.

Coverage C.--No action shall lie against the company unless, as a condition precedent thereto, there shall have been full compliance with all the terms of this policy nor until 30 days after proof of loss is filed and the amount of loss is determined as provided in this policy.

9. Insured's Duties in Event of Loss, Coverage C.--In the event of loss the insured shall:

(a) protect the property, whether or not the loss is covered by this policy, and any further loss due to the insured's failure to protect shall not be recoverable under this policy; reasonable expenses incurred in affording such protection shall be deemed incurred at the company's request;
(b) file with the company, as soon as practicable after loss, his sworn proof of loss in such form and including such information as the company may reasonably require and shall, upon the company's request, exhibit the damaged property.

10. Appraisal, Coverage C.--If the insured and the company fail to agree as to the amount of loss, either may, within 60 days after the proof of loss is filed, demand an appraisal of the loss. In such event the insured and the company shall each select a competent appraiser, and the appraisers shall select a competent and disinterested umpire. The appraisers shall state separately the actual cash value and the amount of loss and failing to agree shall submit their differences to the umpire. An award in writing of any two shall determine the amount of loss. The insured and the company shall each pay his chosen appraiser and shall bear equally the other expenses of the appraisal and umpire.

The company shall not be held to have waived any of its rights by any act relating to appraisal.

11. Payment of Loss, Coverage C.--The company may pay for the loss in money but there shall be no abandonment of the damaged property to the company.

12. No Benefit to Bailee, Coverage C.--The insurance afforded by this policy shall not inure directly or indirectly to the benefit of any carrier or bailee, other than the named insured, liable for loss to the property.

13. Subrogation.--In the event of any payment under this policy, the company shall be subrogated to all the insured's rights of recovery therefor against any person or organization and the insured shall execute and deliver instruments and papers and do whatever else is necessary to secure such rights. The insured shall do nothing after loss to prejudice such rights.

14. Application of Insurance.--The insurance afforded by this policy is primary insurance.

15. Three Year Policy.--A policy period of three years is comprised of three consecutive annual periods. Computation and adjustment of earned premium shall be made at the end of each annual period. Aggregate limits of liability as stated in this policy shall apply separately to each annual period.

16. Changes.--Notice to any agent or knowledge possessed by any agent or by any other person shall not effect a waiver or a change in any part of this policy or stop the company from asserting any right under the terms of this policy; nor shall the terms of this policy be waived or changed, except by endorsement issued to form a part of this policy.

17. Assignment.--Assignment of interest under this policy shall not bind the company until its consent is endorsed hereon.

18. Cancellation.--This policy may be canceled by the named insured by mailing to the company written notice stating when thereafter the cancellation shall be effective. This policy may be canceled by the company by mailing to the named insured, Contractor and governmental authority at the respective addresses shown in this policy written notice stating when not less than 30 days thereafter such cancellation shall be effective. The mailing of notice as aforesaid shall be sufficient proof of notice. The effective date and hour of cancellation stated in the notice shall become the end of the policy period. Delivery of such written notice either by the named insured or by the company shall be equivalent to mailing.

If the named insured cancels, earned premium shall be computed in accordance with the customary short rate table and procedure. If the company cancels, earned premium shall be computed pro rata. Premium adjustment may be made either at the time cancellation is effected or as soon as practicable after cancellation becomes effective, but payment or tender of unearned premium is not a condition of cancellation.

19. Declaration.--By acceptance of this policy the named insured agrees that such statements in the declarations as are made by him are his agreements and representations, that this policy is issued in reliance upon the truth of such representations and that this policy embodies all agreements existing between himself and the company or any of its agents relating to this insurance.

In witness whereof, the _____ Insurance Company has caused this policy to be signed by its president and a secretary at _____, and countersigned on the declaration page by a duly authorized agent of the company.

(Facsimile of Signature) (Facsimile of Signature)

_____ _____

Secretary President

CERTIFICATE OF INSURANCE
Exhibit "C"

This is to certify to: RAILROAD FILE NO.:

(1) Railroad Agreements Section, MS #9-2/9G SR 29, EA 04-120611
Engineering Service
1801 30th Street, Sacramento, California 95816

(2) and to the following Railroad Company: Napa Valley Wine Train, Inc.
Attention: Gary Rouse, Vice President, Rail Operations
1275 McKinstry Street, Napa, CA 94559

that such insurance as is afforded by the policy or policies described below for bodily injury liability and property damage liability is in full force and effect as of the date of this certificate and covers the following contractor as a named insured with respect to liability for damages arising out of operations performed by or for the named insured in connection with the contract or work described below.

1. Named Insured and Address

This is to certify that policies of insurance listed below have been issued to the insured named above and are in force at this time. Notwithstanding any requirement, term or condition of any contract or other document with respect to which this certificate may be issued or may pertain, the insurance afforded by the policies described herein is subject to all the terms, exclusions and conditions of such policies.

2. Description of Work

Contract No. _____

3. Coverage's	Policy Expiration Date	Limits of Liability Each Occurrence	Aggregate
Contractor's Bodily Injury Liability and Property Damage Liability			
Umbrella or Excess Liability			

All of the coverages include coverage for the completed operations hazard, and X, C and U exposures.

Name of Insurance Company by Coverage

Coverage's	Company	Policy Number
Bodily Injury Liability		
Property Damage Liability		
Umbrella or Excess Liability		

4. The policy or policies described above will not be amended, altered, modified or cancelled until thirty (30) days after written notice thereof has been given by registered mail to the Railroad named as certificate holder in this certificate.

Certificate Date:

For _____
(Insurance Company)

By _____
(Authorized Agent or Representative)

State of California
Department of Transportation
DH-0S-A104(4-09-01)

CONTRACTOR'S ENDORSEMENT

A. As a condition to entering upon Railroad's right-of-way to perform work pursuant to this agreement, Licensee's contractor, _____, whose address is _____ (hereinafter "Contractor), agrees to comply with and be bound by all the terms and provisions of this agreement relating to the work to be performed and the insurance requirements set forth in Section 13 of the Contract Special Provisions.

B. Before the Contractor commences any work, the Contractor will provide the Railroad with (1) a binder of insurance for the Railroad Protective Liability Insurance described in Section 13.2 of the Contract Special Provisions, and the original policy (or a certified duplicate original policy), and (2) a certificate issued by its insurance carrier providing the other insurance coverage required pursuant to Section 13.2 of the Contract Special Provisions in a policy or policies which contain the following type endorsement:

> NAPA VALLEY WINE TRAIN, INC. is named as an additional insured with respect to all liabilities arising out of Insured's performance of work on behalf of the State.

C. This endorsement shall be completed and directed to:

Gary Rouse, Vice President
Rail Operations
Napa Valley Wine Train, Inc
1275 McKinstry Street
Napa, CA 94559

_____
CONTRACTOR (print name on above line)

By: _____

Title: _____

SECTION 14 FEDERAL REQUIREMENTS FOR FEDERAL-AID CONSTRUCTION PROJECTS

GENERAL.—The work herein proposed will be financed in whole or in part with Federal funds, and therefore all of the statutes, rules and regulations promulgated by the Federal Government and applicable to work financed in whole or in part with Federal funds will apply to such work. The "Required Contract Provisions, Federal-Aid Construction Contracts, "Form FHWA 1273, are included in this Section 14. Whenever in said required contract provisions references are made to "SHA contracting officer", "SHA resident engineer", or "authorized representative of the SHA", such references shall be construed to mean "Engineer" as defined in Section 1-1.18 of the Standard Specifications.

PERFORMANCE OF PREVIOUS CONTRACT.—In addition to the provisions in Section II, "Nondiscrimination," and Section VII, "Subletting or Assigning the Contract," of the required contract provisions, the Contractor shall comply with the following:

The bidder shall execute the CERTIFICATION WITH REGARD TO THE PERFORMANCE OF PREVIOUS CONTRACTS OR SUBCONTRACTS SUBJECT TO THE EQUAL OPPORTUNITY CLAUSE AND THE FILING OF REQUIRED REPORTS located in the proposal. No request for subletting or assigning any portion of the contract in excess of $10,000 will be considered under the provisions of Section VII of the required contract provisions unless such request is accompanied by the CERTIFICATION referred to above, executed by the proposed subcontractor.

NON-COLLUSION PROVISION.—The provisions in this section are applicable to all contracts except contracts for Federal Aid Secondary projects.

Title 23, United States Code, Section 112, requires as a condition precedent to approval by the Federal Highway Administrator of the contract for this work that each bidder file a sworn statement executed by, or on behalf of, the person, firm, association, or corporation to whom such contract is to be awarded, certifying that such person, firm, association, or corporation has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the submitted bid. A form to make the non-collusion affidavit statement required by Section 112 as a certification under penalty of perjury rather than as a sworn statement as permitted by 28, USC, Sec. 1746, is included in the proposal.

PARTICIPATION BY MINORITY BUSINESS ENTERPRISES IN SUBCONTRACTING.—Part 23, Title 49, Code of Federal Regulations applies to this Federal-aid project. Pertinent sections of said Code are incorporated in part or in its entirety within other sections of these special provisions.

Schedule B—Information for Determining Joint Venture Eligibility

(This form need not be filled in if all joint venture firms are minority owned.)

1. Name of joint venture _____
2. Address of joint venture _____
3. Phone number of joint venture _____
4. Identify the firms which comprise the joint venture. (The MBE partner must complete Schedule A.) _____
   _____

   a. Describe the role of the MBE firm in the joint venture. _____
      _____
   b. Describe very briefly the experience and business qualifications of each non-MBE joint venturer: _____
      _____

5. Nature of the joint venture's business _____
   _____
6. Provide a copy of the joint venture agreement.
7. What is the claimed percentage of MBE ownership? _____
8. Ownership of joint venture: (This need not be filled in if described in the joint venture agreement, provided by question 6.).

   a. Profit and loss sharing.
   b. Capital contributions, including equipment.
   c. Other applicable ownership interests.

9. Control of and participation in this contract. Identify by name, race, sex, and "firm" those individuals (and their titles) who are responsible for day-to-day management and policy decision making, including, but not limited to, those with prime responsibility for:

   a. Financial decisions _____
   b. Management decisions, such as:

      (1) Estimating _____
      (2). Marketing and sales _____
      (3). Hiring and firing of management personnel _____
      _____
      (4) Purchasing of major items or supplies _____
      _____

   c. Supervision of field operations _____

Note.—If, after filing this Schedule B and before the completion of the joint venture's work on the contract covered by this regulation, there is any significant change in the information submitted, the joint venture must inform the grantee, either directly or through the prime contractor if the joint venture is a subcontractor.

Affidavit

"The undersigned swear that the foregoing statements are correct and include all material information necessary to identify and explain the terms and operation of our joint venture and the intended participation by each joint venturer in the undertaking. Further, the undersigned covenant and agree to provide to grantee current, complete and accurate information regarding actual joint venture work and the payment therefor and any proposed changes in any of the joint venture arrangements and to permit the audit and examination of the books, records and files of the joint venture, or those of each joint venturer relevant to the joint venture, by authorized representatives of the grantee or the Federal funding agency. Any material misrepresentation will be grounds for terminating any contract which may be awarded and for initiating action under Federal or State laws concerning false statements."

Name of Firm	Name of Firm
Signature	Signature
Name	Name
Title	Title
Date	Date

Date _____

State of _____

County of _____

On this ____ day of _____, 19 __, before me appeared (Name) _____, to me personally known, who, being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by (Name of firm) _____ to execute the affidavit and did so as his or her free act and deed.

Notary Public _____

Commission expires _____

[Seal]

Date _____

State of _____

County of _____

On this ___ day of _____, 19 __, before me appeared (Name) _____ to me personally known, who, being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by (Name of firm) _____ to execute the affidavit and did so as his or her free act and deed.

Notary Public _____

Commission expires _____

[Seal]

REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

I. GENERAL

1. These contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

2. Except as otherwise provided for in each section, the contractor shall insert in each subcontract all of the stipulations contained in these Required Contract Provisions, and further require their inclusion in any lower tier subcontract or purchase order that may in turn be made. The Required Contract Provisions shall not be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with these Required Contract Provisions.

3. A breach of any of the stipulations contained in these Required Contract Provisions shall be sufficient grounds for termination of the contract.

4. A breach of the following clauses of the Required Contract Provisions may also be grounds for debarment as provided in 29 CFR 5.12:

   Section I, paragraph 2;
   Section IV, paragraphs 1, 2, 3, 4, and 7;
   Section V, paragraphs 1 and 2a through 2g.

5. Disputes arising out of the labor standards provisions of Section IV (except paragraph 5) and Section V of these Required Contract Provisions shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the U.S. Department of Labor (DOL) as set forth in 29 CFR 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the DOL, or the contractor's employees or their representatives.

6. **Selection of Labor:** During the performance of this contract, the contractor shall not:

   a. discriminate against labor from any other State, possession, or territory of the United States (except for employment preference for Appalachian contracts, when applicable, as specified in Attachment A), or

   b. employ convict labor for any purpose within the limits of the project unless it is labor performed by convicts who are on parole, supervised release, or probation.

II. NONDISCRIMINATION

(Applicable to all Federal-aid construction contracts and to all related subcontracts of $10,000 or more.)

1. **Equal Employment Opportunity:** Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, and 41 CFR 60) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The Equal Opportunity Construction Contract Specifications set forth under 41 CFR 60-4.3 and the provisions of the American Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

   a. The contractor will work with the State highway agency (SHA) and the Federal Government in carrying out EEO obligations and in their review of his/her activities under the contract.

   b. The contractor will accept as his operating policy the following statement:

   "It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall

include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, preapprenticeship, and/or on-the-job training."

2. **EEO Officer:** The contractor will designate and make known to the SHA contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active contractor program of EEO and who must be assigned adequate authority and responsibility to do so.

3. **Dissemination of Policy:** All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

    a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

    b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

    c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minority group employees.

    d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

    e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. **Recruitment:** When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minority groups in the area from which the project work force would normally be derived.

    a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minority group applicants. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority group applicants may be referred to the contractor for employment consideration.

    b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, he is expected to observe the provisions of that agreement to the extent that the system permits the contractor's compliance with EEO contract provisions. (The DOL has held that where implementation of such agreements have the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Executive Order 11246, as amended.)

    c. The contractor will encourage his present employees to refer minority group applicants for employment. Information and procedures with regard to referring minority group applicants will be discussed with employees.

5. **Personnel Actions:** Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

    a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with his obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of his avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minority group and women employees, and applicants for employment.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision.

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of minority group and women employees and will encourage eligible employees to apply for such training and promotion.

7. **Unions:** If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use his/her best efforts to obtain the cooperation of such unions to increase opportunities for minority groups and women within the unions, and to effect referrals by such unions of minority and female employees. Actions by the contractor either directly or through a contractor's association acting as agent will include the procedures set forth below:

a. The contractor will use best efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minority group members and women for membership in the unions and increasing the skills of minority group employees and women so that they may qualify for higher paying employment.

b. The contractor will use best efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the SHA and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of minority and women referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minority group persons and women. (The DOL has held that it shall be no excuse that the union with which the contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority employees.) In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the SHA.

8. **Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment.

   a. The contractor shall notify all potential subcontractors and suppliers of his/her EEO obligations under this contract.

   b. Disadvantaged business enterprises (DBE), as defined in 49 CFR 23, shall have equal opportunity to compete for and perform subcontracts which the contractor enters into pursuant to this contract. The contractor will use his best efforts to solicit bids from and to utilize DBE subcontractors or subcontractors with meaningful minority group and female representation among their employees. Contractors shall obtain lists of DBE construction firms from SHA personnel.

   c. The contractor will use his best efforts to ensure subcontractor compliance with their EEO obligations.

9. **Records and Reports:** The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the SHA and the FHWA.

   a. The records kept by the contractor shall document the following:

      (1) The number of minority and non-minority group members and women employed in each work classification on the project;

      (2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women;

      (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees; and

      (4) The progress and efforts being made in securing the services of DBE subcontractors or subcontractors with meaningful minority and female representation among their employees.

   b. The contractors will submit an annual report to the SHA each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data.

III. NONSEGREGATED FACILITIES

(Applicable to all Federal-aid construction contracts and to all related subcontracts of $10,000 or more.)

   a. By submission of this bid, the execution of this contract or subcontract, or the consummation of this material supply agreement or purchase order, as appropriate, the bidder, Federal-aid construction contractor, subcontractor, material supplier, or vendor, as appropriate, certifies that the firm does not maintain or provide for its employees any segregated facilities at any of its establishments, and that the firm does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The firm agrees that a breach of this certification is a violation of the EEO provisions of this contract. The firm further certifies that no employee will be denied access to adequate facilities on the basis of sex or disability.

   b. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive, or are, in fact, segregated on the basis of race, color, religion, national origin, age or disability, because of habit, local custom, or otherwise. The only exception will be for the disabled when the demands for accessibility override (e.g. disabled parking).

c. The contractor agrees that it has obtained or will obtain identical certification from proposed subcontractors or material suppliers prior to award of subcontracts or consummation of material supply agreements of $10,000 or more and that it will retain such certifications in its files.

IV. PAYMENT OF PREDETERMINED MINIMUM WAGE

(Applicable to all Federal-aid construction contracts exceeding $2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural minor collectors, which are exempt.)

1. General:

a. All mechanics and laborers employed or working upon the site of the work will be paid unconditionally and not less often than once a week and without subsequent deduction or rebate on any account [except such payroll deductions as are permitted by regulations (29 CFR 3)] issued by the Secretary of Labor under the Copeland Act (40 U.S.C. 276c) the full amounts of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment. The payment shall be computed at wage rates not less than those contained in the wage determination of the Secretary of Labor (hereinafter "the wage determination") which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor or its subcontractors and such laborers and mechanics. The wage determination (including any additional classifications and wage rates conformed under paragraph 2 of this Section IV and the DOL poster (WH-1321) or Form FHWA-1495) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. For the purpose of this Section, contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act (40 U.S.C. 276a) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of Section IV, paragraph 3b, hereof. Also, for the purpose of this Section, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in paragraphs 4 and 5 of this Section IV.

b. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein, provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed.

c. All rulings and interpretations of the Davis-Bacon Act and related acts contained in 29 CFR 1, 3, and 5 are herein incorporated by reference in this contract.

2. Classification:

a. The SHA contracting officer shall require that any class of laborers or mechanics employed under the contract, which is not listed in the wage determination, shall be classified in conformance with the wage determination.

b. The contracting officer shall approve an additional classification, wage rate and fringe benefits only when the following criteria have been met:

(1) the work to be performed by the additional classification requested is not performed by a classification in the wage determination;

(2) the additional classification is utilized in the area by the construction industry;

(3) the proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and

(4) with respect to helpers, when such a classification prevails in the area in which the work is performed.

c. If the contractor or subcontractors, as appropriate, the laborers and mechanics (if known) to be employed in the additional classification or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the DOL, Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, D.C. 20210. The Wage and Hour Administrator, or an authorized

representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

d. In the event the contractor or subcontractors, as appropriate, the laborers or mechanics to be employed in the additional classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. Said Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary

e. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 2c or 2d of this Section IV shall be paid to all workers performing work in the additional classification from the first day on which work is performed in the classification.

3. Payment of Fringe Benefits:

a. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor or subcontractors, as appropriate, shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly case equivalent thereof.

b. If the contractor or subcontractor, as appropriate, does not make payments to a trustee or other third person, he/she may consider as a part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

4. Apprentices and Trainees (Programs of the U.S. DOL) and Helpers:

a. Apprentices:

(1) Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the DOL, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau, or if a person is employed in his/her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State apprenticeship agency (where appropriate) to be eligible for probationary employment as an apprentice.

(2) The allowable ratio of apprentices to journeyman-level employees on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate listed in the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor or subcontractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman-level hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

(3) Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman-level hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator for the Wage and Hour Division determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

(4) In the event the Bureau of Apprenticeship and Training, or a State apprenticeship agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor or subcontractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the comparable work performed by regular employees until an acceptable program is approved.

b. Trainees:

(1) Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the DOL, Employment and Training Administration.

(2) The ratio of trainees to journeyman-level employees on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(3) Every trainee must be paid at not less than the rate specified in the approved program for his/her level of progress, expressed as a percentage of the journeyman-level hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman-level wage rate on the wage determination which provides for less than full fringe benefits for apprentices, in which case such trainees shall receive the same fringe benefits as apprentices.

(4) In the event the Employment and Training Administration withdraws approval of a training program, the contractor or subcontractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Helpers**:**

Helpers will be permitted to work on a project if the helper classification is specified and defined on the applicable wage determination or is approved pursuant to the conformance procedure set forth in Section IV.2. Any worker listed on a payroll at a helper wage rate, who is not a helper under an approved definition, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed.

5. Apprentices and Trainees (Programs of the U.S. DOT):

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

6. Withholding:

The SHA shall upon its own action or upon written request of an authorized representative of the DOL withhold, or cause to be withheld, from the contractor or subcontractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements which is held by the same prime contractor, as much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the SHA contracting officer may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

7. Overtime Requirements:

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers, mechanics, watchmen, or guards (including apprentices, trainees, and helpers described in paragraphs 4 and 5 above) shall require or permit any laborer, mechanic, watchman, or guard in any workweek in which he/she is employed on such work, to work in excess of 40 hours in such workweek unless such laborer, mechanic, watchman, or guard receives compensation at a rate not less than one-and-one-half times his/her basic rate of pay for all hours worked in excess of 40 hours in such workweek.

8. Violation:

Liability for Unpaid Wages; Liquidated Damages: In the event of any violation of the clause set forth in paragraph 7 above, the contractor and any subcontractor responsible thereof shall be liable to the affected employee for his/her unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer, mechanic, watchman, or guard employed in violation of the clause set forth in paragraph 7, in the sum of $10 for each calendar day on which such employee was required or permitted to work in excess of the standard work week of 40 hours without payment of the overtime wages required by the clause set forth in paragraph 7.

9. Withholding for Unpaid Wages and Liquidated Damages:

The SHA shall upon its own action or upon written request of any authorized representative of the DOL withhold, or cause to be withheld, from any monies payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph 8 above.

V. STATEMENTS AND PAYROLLS

(Applicable to all Federal-aid construction contracts exceeding $2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural collectors, which are exempt.)

1. Compliance with Copeland Regulations (29 CFR 3):

   The contractor shall comply with the Copeland Regulations of the Secretary of Labor which are herein incorporated by reference.

2. Payrolls and Payroll Records:

   a. Payrolls and basic records relating thereto shall be maintained by the contractor and each subcontractor during the course of the work and preserved for a period of 3 years from the date of completion of the contract for all laborers, mechanics, apprentices, trainees, watchmen, helpers, and guards working at the site of the work.

   b. The payroll records shall contain the name, social security number, and address of each such employee; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalent thereof the types described in Section 1(b)(2)(B) of the Davis Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. In addition, for Appalachian contracts, the payroll records shall contain a notation indicating whether the employee does, or

does not, normally reside in the labor area as defined in Attachment A, paragraph 1. Whenever the Secretary of Labor, pursuant to Section IV, paragraph 3b, has found that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis Bacon Act, the contractor and each subcontractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, that the plan or program has been communicated in writing to the laborers or mechanics affected, and show the cost anticipated or the actual cost incurred in providing benefits. Contractors or subcontractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprentices and trainees, and ratios and wage rates prescribed in the applicable programs.

c. Each contractor and subcontractor shall furnish, each week in which any contract work is performed, to the SHA resident engineer a payroll of wages paid each of its employees (including apprentices, trainees, and helpers, described in Section IV, paragraphs 4 and 5, and watchmen and guards engaged on work during the preceding weekly payroll period). The payroll submitted shall set out accurately and completely all of the information required to be maintained under paragraph 2b of this Section V. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal stock number 029-005-0014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

d. Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his/her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) that the payroll for the payroll period contains the information required to be maintained under paragraph 2b of this Section V and that such information is correct and complete;

(2) that such laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in the Regulations, 29 CFR 3;

(3) that each laborer or mechanic has been paid not less 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.

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion — Primary Covered Transactions

1. The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

   a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

   b. Have not within a 3-year period preceding this proposal been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

   c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph 1b of this certification; and

   d. Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

2. Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Covered Transactions:

(Applicable to all subcontracts, purchase orders and other lower tier transactions of $25,000 or more - 49 CFR 29)

   a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

   b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

   c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

   d. The terms "covered transaction," "debarred," "suspended," "ineligible," "primary covered transaction," "participant," "person," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.

   e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

   f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion — Lower Tier Covered Transactions

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

XII. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

(Applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000 - 49 CFR 20)

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

   a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

   b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting his or her bid or proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

FEDERAL-AID FEMALE AND MINORITY GOALS

In accordance with Section II, "Nondiscrimination," of "Required Contract Provisions Federal-aid Construction Contracts" the following are the goals for female utilization:

Goal for Women (applies nationwide).....(percent) 6.9

The following are goals for minority utilization:

CALIFORNIA ECONOMIC AREA

		Goal (Percent)
174	**Redding, CA:**	
	Non-SMSA Counties	6.8
	CA Lassen; CA Modoc;CA Plumas;CA Shasta; CA Siskiyou; CA Tehama.	
175	**Eureka, CA**	
	Non-SMSA Counties	6.6
	CA Del Norte; CA Humboldt; CA Trinity.	
176	**San Francisco-Oakland-San Jose, CA:**	
	SMSA Counties:	
	7120 Salinas-Seaside-Monterey, CA	28.9
	CA Monterey.	
	7360 San Francisco-Oakland	25.6
	CA Alameda; CA Contra Costa; CA Marin; CA San Francisco; CA San Mateo.	
	7400 San Jose, CA	19.6
	CA Santa Clara.	
	7485 Santa Cruz, CA.	14.9
	CA Santa Cruz.	
	7500 Santa Rosa, CA	9.1
	CA Sonoma.	
	8720 Vallejo-Fairfield- Napa, CA	17.1
	CA Napa; CA Solano	
	Non-SMSA Counties	23.2
	CA Lake; CA Mendocino; CA San Benito	
177	**Sacramento, CA**:	
	SMSA Counties:	
	6920 Sacramento, CA	16.1
	CA Placer; CA Sacramento; CA Yolo.	
	Non-SMSA Counties	14.3
	CA Butte; CA Colusa; CA El Dorado; CA Glenn; CA Nevada; CA Sierra; CA Sutter; CA Yuba.	
178	**Stockton-Modesto, CA:**	
	SMSA Counties:	
	5170 Modesto, CA	12.3
	CA Stanislaus.	
	8120 Stockton, CA	24.3
	CA San Joaquin.	
	Non-SMSA Counties	19.8
	CA Alpine; CA Amador; CA Calaveras; CA Mariposa;CA Merced; CA Tuolumne.	

		Goal (Percent)
179	**Fresno-Bakersfield, CA**	
	SMSA Counties:	
	0680 Bakersfield, CA	19.1
	CA Kern.	
	2840 Fresno, CA	26.1
	CA Fresno.	
	Non-SMSA Counties	23.6
	CA Kings; CA Madera; CA Tulare.	
180	**Los Angeles, CA:**	
	SMSA Counties:	
	0360 Anaheim-Santa Ana-Garden Grove, CA	11.9
	CA Orange.	
	4480 Los Angeles-Long Beach, CA	28.3
	CA Los Angeles.	
	6000 Oxnard-Simi Valley-Ventura, CA	21.5
	CA Ventura.	
	6780 Riverside-San Bernardino-Ontario, CA.	19.0
	CA Riverside; CA San Bernardino.	
	7480 Santa Barbara-Santa Maria-Lompoc, CA	19.7
	CA Santa Barbara.	
	Non-SMSA Counties	24.6
	CA Inyo; CA Mono; CA San Luis Obispo.	
181	**San Diego, CA:**	
	SMSA Counties	
	7320 San Diego, CA.	16.9
	CA San Diego.	
	Non-SMSA Counties	18.2
	CA Imperial.	

In addition to the reporting requirements set forth elsewhere in this contract the Contractor and subcontractors holding subcontracts, not including material suppliers, of $10,000 or more, shall submit for every month of July during which work is performed, employment data as contained under Form FHWA PR-1391 (Appendix C to 23 CFR, Part 230), and in accordance with the instructions included thereon.

FEDERAL REQUIREMENT TRAINING SPECIAL PROVISIONS

As part of the Contractor's equal employment opportunity affirmative action program, training shall be provided as follows:

The Contractor shall provide on-the-job training to develop full journeymen in the types of trades or job classification involved.

The goal for the number of trainees or apprentices to be trained under the requirements of this special provision will be 22.

In the event the Contractor subcontracts a portion of the contract work, he shall determine how many, if any, of the trainees or apprentices are to be trained by the subcontractor, provided however, that the Contractor shall retain the primary responsibility for meeting the training requirements imposed by this special provision. The Contractor shall also insure that this Training Special Provision is made applicable to such subcontract. Where feasible, 25 percent of trainees or apprentices in each occupation shall be in their first year of apprenticeship or training.

The number of trainees or apprentices shall be distributed among the work classifications on the basis of the Contractor's needs and the availability of journeymen in the various classifications within a reasonable area of recruitment. Prior to commencing work, the Contractor shall submit to the Department for approval the number of trainees or apprentices to be trained in each selected classification and training program to be used. Furthermore, the Contractor shall specify the starting time for training in each of the classifications. The Contractor will be credited for each trainee or apprentice employed by him on the contract work who is currently enrolled or becomes enrolled in an approved program and will be reimbursed for such trainees or apprentices as provided hereinafter.

Training and upgrading of minorities and women toward journeymen status is a primary objective of this Training Special Provision. Accordingly, the Contractor shall make every effort to enroll minority and women trainees or apprentices (e.g., by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees or apprentices) to the extent such persons are available within a reasonable area of recruitment. The Contractor will be responsible for demonstrating the steps that he has taken in pursuance thereof, prior to a determination as to whether the Contractor is in compliance with this Training Special Provision. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

No employee shall be employed as a trainee or apprentice in any classification in which he has successfully completed a training course leading to journeyman status or in which he has been employed as a journeyman. The Contractor should satisfy this requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used the Contractor's records should document the findings in each case.

The minimum length and type of training for each classification will be as established in the training program selected by the Contractor and approved by both the Department and the Federal Highway Administration. The Department and the Federal Highway Administration will approve a program if it is reasonably calculated to meet the equal employment opportunity obligations of the Contractor and to qualify the average trainee or apprentice for journeyman status in the classification concerned by the end of the training period. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with the State of California, Department of Industrial Relations, Division of Apprenticeship Standards recognized by the Bureau and training programs approved but not necessarily sponsored by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training shall also be considered acceptable provided it is being administered in a manner consistent with the equal employment obligations of Federal-aid highway construction contracts. Approval or acceptance of a training program shall be obtained from the State prior to commencing work on the classification covered by the program. It is the intention of these provisions that training is to be provided in the construction crafts rather than clerk-typists or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, estimators, timekeepers, etc., where the training is oriented toward construction applications. Training in the laborer classification may be permitted provided that significant and meaningful training is provided and approved by the division office. Some offsite training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training.

Except as otherwise noted below, the Contractor will be reimbursed 80 cents per hour of training given an employee on this contract in accordance with an approved training program. As approved by the Engineer, reimbursement will be made for training of persons in excess of the number specified herein. This reimbursement will be made even though the Contractor receives additional training program funds from other sources, provided such other source does not specifically prohibit the Contractor from receiving other reimbursement. Reimbursement for offsite training indicated above may only be made to the Contractor where he does one or more of the following and the trainees or apprentices are concurrently employed on a Federal-aid project; contributes to the cost of the training, provides the instruction to the trainee or apprentice or pays the trainee's or apprentice's wages during the offsite training period.

No payment shall be made to the Contractor if either the failure to provide the required training, or the failure to hire the trainee or apprentice as a journeyman, is caused by the Contractor and evidences a lack of good faith on the part of the Contractor in meeting the requirements of this Training Special Provision. It is normally expected that a trainee or apprentice will begin his training on the project as soon as feasible after start of work utilizing the skill involved and remain on the project as long as training opportunities exist in his work classification or until he has completed his training program. It is not required that all trainees or apprentices be on board for the entire length of the contract. A Contractor will have fulfilled his responsibilities under this Training Special Provision if he has provided acceptable training to the number of trainees or apprentices specified. The number trained shall be determined on the basis of the total number enrolled on the contract for a significant period.

Only trainees or apprentices registered in a program approved by the State of California's State Administrator of Apprenticeship may be employed on the project and said trainees or apprentices shall be paid the standard wage specified under the regulations of the craft or trade at which they are employed.

The Contractor shall furnish the trainee or apprentice a copy of the program he will follow in providing the training. The Contractor shall provide each trainee or apprentice with a certification showing the type and length of training satisfactorily completed.

The Contractor will provide for the maintenance of records and furnish periodic reports documenting his performance under this Training Special Provision.