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STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS

AND

SPECIAL PROVISIONS

FOR CONSTRUCTION ON STATE HIGHWAY IN

SANTA CLARA COUNTY IN SAN JOSE FROM JULIAN STREET TO ROUTE 101

DISTRICT 04, ROUTE 87

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

CONTRACT NO. 04-4874R4

04-SCl-87-10.0/14.4

Federal Aid Project

ACNH-S087(023)E

Bids Open: September 10, 2002

Dated: July 29, 2002

QCQA/DRB
OSD

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IMPORTANT SPECIAL NOTICES

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

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

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

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

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

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

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

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

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

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

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

- Federal minimum wage rates for this project are no longer included in the "Proposal and Contract" book. They will be available through the California Department of Transportation's Electronic Project Document Distribution Internet Web Site at http://hqidoc1.dot.ca.gov/. See Notice to Contractors.

- Attention is directed to Section 1, "Specifications and Plans," of these special provisions for Amendments To July 1999 Standard Specifications. Amendments to the various sections of the Standard Specification have been consolidated into Section 1 and dated to reflect the most recent revision.

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A + B BIDDING
SPECIAL NOTICE

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The bidder's attention is directed to Section 2, "Proposal Requirements and Conditions," Section 3-1.01B, "Award and Execution of Contract," and Section 4, "Beginning of Work, Time of Completion and Liquidated Damages," in the special provisions. In addition to the item prices and totals, the proposal shall set forth the number of working days bid to completely open the roadway to public traffic. Working days are defined in said Section 4. All bids will be compared on the basis of the sum of the Engineer's Estimate of the quantities of work to be done plus the product of the number of working days bid to completely open the roadway to public traffic and the cost per day shown on the proposal form. The lowest bid will be determined on the basis of the "Total Basis for Comparison of Bids" set forth in the proposal.

Bids in which the number of working days bid to complete all work exceed 550 will be considered non-responsive and will be rejected.

The bidder's attention is also directed to the provisions in said Section 4 of the special provisions regarding liquidated damages.

No incentive payments will be paid nor will disincentive deductions be charged on this project.

For purposes of determining liquidated damages, the work must be completed and the contract accepted by the Director, as specified in Section 7-1.17, "Acceptance of Contract," of the Standard Specifications.

Examples of determining liquidated damages are as follows:

Completing all the work, at 11:55 p.m. on day 550 shall be deemed completing all the work shown on the project plans on day 550.

Completing all the work, at 12:05 a.m. on day 551 shall be deemed completing all the work shown on the project plans on day 551.

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STANDARD PLANS LIST

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

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A77FA	Metal Beam Guard Railing – Typical Line Post Installation
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RSP A77L	Metal Beam Guard Railing and Single Faced Barrier Railing Terminal System - End Treatments
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D97F	Corrugated Metal Pipe Coupling Details No. 6 - Positive Joint
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D98C	Grated Line Drain Details
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T1B	Temporary Crash Cushion, Sand Filled (Bidirectional)
RSP T2	Temporary Crash Cushion, Sand Filled (Shoulder Installations)
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T11	Traffic Control System for Lane Closure On Multilane Conventional Highways
T12	Traffic Control System for Lane Closure On Multilane Conventional Highways
T13	Traffic Control System for Lane Closure On Two Lane Conventional Highways
T14	Traffic Control System for Ramp Closure

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ES-3F	Signal, Lighting and Electrical Systems - Telephone Demarcation Cabinet Details, Type C
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ES-5E	Signal, Lighting and Electrical Systems - Detectors
RSP ES-6A	Lighting Standards - Types 15, 21 and 22
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DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS

CONTRACT NO. 04-4874R4

04-SCl-87-10.0/14.4

Sealed proposals for the work shown on the plans entitled:

STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROJECT PLANS FOR CONSTRUCTION ON STATE HIGHWAY IN SANTA CLARA COUNTY IN SAN JOSE FROM JULIAN STREET TO ROUTE 101

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 September 10, 2002, 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 SANTA CLARA COUNTY IN SAN JOSE FROM JULIAN STREET TO ROUTE 101

General work description: 4 LANE HIGHWAY TO BE UPGRADED TO 6 LANE FREEWAY

This project has a goal of 10 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 a combination of Class C licenses which constitutes a majority of the work.

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

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

Cross sections for this project are not available.

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

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

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

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

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

DEPARTMENT OF TRANSPORTATION

Deputy Director Transportation Engineering

Dated July 29, 2002

AM

COPY OF ENGINEER'S ESTIMATE

(NOT TO BE USED FOR BIDDING PURPOSES)

04-4874R4

Item	Item Code	Item	Unit of Measure	Estimated Quantity
1	070010	PROGRESS SCHEDULE (CRITICAL PATH)	LS	LUMP SUM
2	070018	TIME-RELATED OVERHEAD	WDAY	550
3	029509	MIGRATORY NESTING BIRDS	LS	LUMP SUM
4	029510	TEMPORARY CHAIN LINK FENCE (TYPE CL 1.8) W/ 3 LINES OF BARBED WIRE ON TOP	M	130
5	029511	TEMPORARY HIGH VISIBILITY FENCE	M	520
6	074019	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	LUMP SUM
7	074020	WATER POLLUTION CONTROL	LS	LUMP SUM
8	029512	TEMPORARY CONCRETE WASHOUT FACILITY	EA	4
9	029513	TEMPORARY ENTRANCES/EXITS	EA	5
10	074029	TEMPORARY SILT FENCE	M	2000
11	074034	TEMPORARY COVER	M2	8500
12	029514	TEMPORARY DRAIN INLET PROTECTION	EA	6
13	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM
14 (S)	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM
15	120120	TYPE III BARRICADE	EA	50
16	120159	TEMPORARY TRAFFIC STRIPE (PAINT)	M	10 600
17	120165	CHANNELIZER (SURFACE MOUNTED)	EA	270
18	120300	TEMPORARY PAVEMENT MARKER	EA	2000
19	129000	TEMPORARY RAILING (TYPE K)	M	2400
20	129100	TEMPORARY CRASH CUSHION MODULE	EA	110

Item	Item Code	Item	Unit of Measure	Estimated Quantity
21	029515	PHOTO SURVEY OF EXISTING FACILITIES	LS	LUMP SUM
22	029516	STORM DRAIN, SANITARY SEWER,1675MM WATER LINE VIDEO TAPING	EA	6
23	029517	VIBRATION MONITORING	EA	20
24	150206	ABANDON CULVERT	EA	16
25	150608	REMOVE CHAIN LINK FENCE	M	770
26	029518	REMOVE 7.2M SLIDING GATE	EA	1
27	029519	REMOVE 1050 MM SLIDE HEADGATE AND RISER ASSEMBLY	EA	1
28	150645	REMOVE BARRICADE	EA	23
29	150668	REMOVE FLARED END SECTION	EA	2
30	029520	REMOVE WHITE TRAFFIC STRIPE	M	1500
31	029521	REMOVE YELLOW TRAFFIC STRIPE	M	6900
32	150715	REMOVE THERMOPLASTIC PAVEMENT MARKING	M2	25
33	150722	REMOVE PAVEMENT MARKER	EA	1300
34	150730	REMOVE CHANNELIZERS	EA	150
35	150742	REMOVE ROADSIDE SIGN	EA	31
36	150769	REMOVE ASPHALT CONCRETE	M3	62
37	150801	REMOVE OVERSIDE DRAIN	EA	1
38	029522	REMOVE OMP INLET	EA	3
39	029523	REMOVE 300 MM PP	M	24
40	029524	REMOVE 450 MM PP	M	180

Item	Item Code	Item	Unit of Measure	Estimated Quantity
41	029525	REMOVE 300 MM SCSP	M	390
42	029526	REMOVE 450 MM SCSP	M	270
43	029527	REMOVE 450 MM RCP	M	120
44	150820	REMOVE INLET	EA	31
45	029528	REMOVE G1 CLEANOUT	EA	13
46	029529	REMOVE 300 MM DOWNDRAIN	M	47
47	150826	REMOVE MANHOLE	EA	2
48	029530	REMOVE WIRE MESH REINFORCEMENT AND FABRIC ALONG THE TEMPORARY RETAINING WALL AND SURCHARGE AREAS	M2	6530
49	150860	REMOVE BASE AND SURFACING	M3	17 800
50	151272	SALVAGE METAL BEAM GUARD RAILING	M	120
51	151274	SALVAGE CONCRETE BARRIER (TYPE K)	M	3540
52	029531	RECONSTRUCT 1050MM SLIDE HEADGATE AND RISER ASSEMBLY	EA	1
53	029532	RELOCATE BLOW-OFF ASSEMBLY	EA	1
54	152390	RELOCATE ROADSIDE SIGN	EA	4
55	152430	ADJUST INLET	EA	4
56	152432	ADJUST MANHOLE	EA	2
57	152438	ADJUST FRAME AND COVER TO GRADE	EA	19
58	152440	ADJUST MANHOLE TO GRADE	EA	3
59	153152	COLD PLANE ASPHALT CONCRETE PAVEMENT (30 MM MAXIMUM)	M2	570
60	153210	REMOVE CONCRETE	M3	52

Item	Item Code	Item	Unit of Measure	Estimated Quantity
61	029533	REMOVE RAIL AND POST AT THE JUVENILE CENTER	M	4
62	157551	BRIDGE REMOVAL, LOCATION A	LS	LUMP SUM
63	157552	BRIDGE REMOVAL, LOCATION B	LS	LUMP SUM
64	157553	BRIDGE REMOVAL, LOCATION C	LS	LUMP SUM
65	157560	BRIDGE REMOVAL (PORTION)	LS	LUMP SUM
66	029534	SALVAGE CRASH CUSHION ADIEM II 350	EA	2
67	158101	SALVAGE CRASH CUSHION MODULES	EA	80
68	160101	CLEARING AND GRUBBING	LS	LUMP SUM
69	190101	ROADWAY EXCAVATION	M3	219 000
70	190110	LEAD COMPLIANCE PLAN	LS	LUMP SUM
71 (F)	192003	STRUCTURE EXCAVATION (BRIDGE)	M3	2058
72 (F)	049101	STRUCTURE EXCAVATION (PUMPING PLANT) (TYPE A)	M3	264
73 (F)	192027	STRUCTURE BACKFILL (PUMPING PLANT)	M3	76
74 (F)	192037	STRUCTURE EXCAVATION (RETAINING WALL)	M3	615
75 (F)	193003	STRUCTURE BACKFILL (BRIDGE)	M3	2845
76 (F)	193013	STRUCTURE BACKFILL (RETAINING WALL)	M3	710
77 (F)	193030	PERVIOUS BACKFILL MATERIAL	M3	65
78	198009	IMPORTED BORROW (LIGHTWEIGHT AGGREGATE)	M3	9400
79	029535	LIGHTWEIGHT EMBANKMENT MATERIAL (EPS BLOCK)	M3	1980
80	198200	SUBGRADE ENHANCEMENT FABRIC	M2	3600

Item	Item Code	Item	Unit of Measure	Estimated Quantity
81	029536	GEOMEMBRANE (GASOLINE RESISTANT)	M2	1560
82	029537	GEOTEXTILE CUSHION	M2	280
83 (S)	029538	EROSION CONTROL NETTING	M2	400
84 (S)	203003	STRAW (EROSION CONTROL)	TONN	14
85 (S)	203014	FIBER (EROSION CONTROL)	KG	1870
86	203021	FIBER ROLLS	M	1860
87	029539	DRAIN INLET PROTECTION	EA	6
88	029540	CONCRETE DRAINAGE APRON	EA	7
89 (S)	203024	COMPOST (EROSION CONTROL)	KG	5470
90	203036	WATER POLLUTION CONTROL MAINTENANCE WORK	EA	3
91 (S)	203045	PURE LIVE SEED (EROSION CONTROL)	KG	180
92 (S)	203061	STABILIZING EMULSION (EROSION CONTROL)	KG	410
93 (S)	029541	MULCH (EROSION CONTROL)	M3	150
94	208038	NPS 3 SUPPLY LINE (BRIDGE)	M	208
95	208288	50 MM PLASTIC PIPE (PR 315) (SUPPLY LINE)	M	300
96	029542	75 MM WATER METER	EA	2
97	029543	65 MM WATER METER	EA	1
98	208501	40 MM PLASTIC PIPE (SCHEDULE 40) (SUPPLY LINE)	M	140
99	208502	50 MM PLASTIC PIPE (SCHEDULE 40) (SUPPLY LINE)	M	350
100	208723	100 MM ALTERNATIVE CONDUIT	M	28

Item	Item Code	Item	Unit of Measure	Estimated Quantity
101	208731	200 MM CORRUGATED HIGH DENSITY POLYETHYLENE PIPE CONDUIT	M	450
102	250401	CLASS 4 AGGREGATE SUBBASE	M3	16 500
103	260301	CLASS 3 AGGREGATE BASE	M3	12 900
104	290211	ASPHALT TREATED PERMEABLE BASE	M3	3700
105	390102	ASPHALT CONCRETE (TYPE A)	TONN	29 500
106	394040	PLACE ASPHALT CONCRETE DIKE (TYPE A)	M	710
107	394048	PLACE ASPHALT CONCRETE DIKE (TYPE E)	M	580
108	397001	ASPHALTIC EMULSION (PAINT BINDER)	TONN	23
109	490511	FURNISH STEEL PILING (HP 250 X 85)	M	655
110 (S)	490512	DRIVE STEEL PILE (HP 250 X 85)	EA	32
111	490696	FURNISH PILING (CLASS 900)	M	655
112 (S)	490697	DRIVE PILE (CLASS 900)	EA	36
113	490753	FURNISH PILING (CLASS 625)	M	8228
114 (S)	490754	DRIVE PILE (CLASS 625)	EA	430
115	491007	FURNISH PILING (CLASS 400)	M	1623
116 (S)	491008	DRIVE PILE (CLASS 400)	EA	128
117	029544	406 MM CAST-IN-DRILLED-HOLE CONCRETE PILE (SOUND WALL)	M	1040
118 (S)	500001	PRESTRESSING CAST-IN-PLACE CONCRETE	LS	LUMP SUM
119 (F)	510000	SEAL COURSE CONCRETE	M3	35
120 (F)	510051	STRUCTURAL CONCRETE, BRIDGE FOOTING	M3	576

Item	Item Code	Item	Unit of Measure	Estimated Quantity
121 (F)	510053	STRUCTURAL CONCRETE, BRIDGE	M3	5120
122 (F)	510060	STRUCTURAL CONCRETE, RETAINING WALL	M3	435
123	049102	JUVENILE CENTER SIGN RECONSTRUCTION	LS	LUMP SUM
124	049103	ARMORY CORPS CENTER STAIR RECONSTRUCTION	LS	LUMP SUM
125 (F)	510069	STRUCTURE CONCRETE (PUMPING PLANT)	M3	134
126 (F)	510072	STRUCTURAL CONCRETE, BARRIER SLAB	M3	1544
127 (F)	510086	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE N)	M3	463
128	510502	MINOR CONCRETE (MINOR STRUCTURE)	M3	180
129 (F)	511035	ARCHITECTURAL TREATMENT	M2	42
130	513501	CONCRETE CLOSURE WALL	M2	190
131	517961	SOUND WALL (BARRIER) (MASONRY BLOCK)	M2	1200
132	518010	ACCESS GATE (SOUND WALL)	EA	2
133 (S)	519128	JOINT SEAL ASSEMBLY (MR 100 MM)	M	40
134 (S)	519142	JOINT SEAL (MR 40 MM)	M	15
135 (S)	519144	JOINT SEAL (MR 50 MM)	M	192
136 (S-F)	520102	BAR REINFORCING STEEL (BRIDGE)	KG	766 100
137 (F)	520103	BAR REINFORCING STEEL (RETAINING WALL)	KG	30 600
138 (S-F)	520113	BAR REINFORCING STEEL (PUMPING PLANT)	KG	14 500
139	530100	SHOTCRETE	M3	45
140	560218	FURNISH SIGN STRUCTURE (TRUSS)	KG	25 000

Item	Item Code	Item	Unit of Measure	Estimated Quantity
141	560219	INSTALL SIGN STRUCTURE (TRUSS)	KG	25 000
142	561008	760 MM CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	M	6
143	561009	920 MM CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	M	6
144	029545	1524MM CAST-IN-DRILLED HOLE CONCRETE PIPE (SIGN STRUCTURE)	M	9
145	562004	METAL (RAIL MOUNTED SIGN)	KG	2520
146	566011	ROADSIDE SIGN - ONE POST	EA	6
147	566012	ROADSIDE SIGN - TWO POST	EA	2
148	568001	INSTALL SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	6
149	620904	300 MM ALTERNATIVE PIPE CULVERT	M	62
150	620909	450 MM ALTERNATIVE PIPE CULVERT	M	1060
151	620913	600 MM ALTERNATIVE PIPE CULVERT	M	920
152	620919	750 MM ALTERNATIVE PIPE CULVERT	M	53
153	650067	300 MM REINFORCED CONCRETE PIPE	M	180
154	650069	450 MM REINFORCED CONCRETE PIPE	M	150
155	650073	600 MM REINFORCED CONCRETE PIPE (SPECIAL)	M	530
156	681134	80 MM PLASTIC PIPE (EDGE DRAIN)	M	1810
157	681137	80 MM PLASTIC PIPE (EDGE DRAIN OUTLET)	M	110
158	700659	900 MM CORRUGATED STEEL PIPE INLET (2.77 MM THICK)	M	1
159	703233	GRATED LINE DRAIN	M	80
160	703572	450 MM WELDED STEEL PIPE (6.35 MM THICK)	M	19

Item	Item Code	Item	Unit of Measure	Estimated Quantity
161	703588	600 MM WELDED STEEL PIPE (6.35 MM THICK)	M	41
162	029546	JACKED 750 MM WELDED STEEL PIPE (6.35 MM THICK)	M	52
163	705334	300 MM ALTERNATIVE FLARED END SECTION	EA	1
164	705338	750 MM ALTERNATIVE FLARED END SECTION	EA	1
165 (F)	721811	SLOPE PAVING (MASONRY BLOCK)	M2	970
166	731502	MINOR CONCRETE (MISCELLANEOUS CONSTRUCTION)	M3	360
167 (S)	740500	DRAINAGE PUMPING EQUIPMENT	LS	LUMP SUM
168 (S)	741001	PUMPING PLANT ELECTRICAL EQUIPMENT	LS	LUMP SUM
169	750001	MISCELLANEOUS IRON AND STEEL	KG	10 400
170 (S-F)	750501	MISCELLANEOUS METAL (BRIDGE)	KG	4610
171 (S-F)	750520	PUMPING PLANT METAL WORK	KG	1700
172	800391	CHAIN LINK FENCE (TYPE CL-1.8)	M	215
173	029547	BLACK VINYL COATED CHAIN LINK FENCE (TYPE CL-1.8)	M	530
174	029548	CHAIN LINK FENCE (TYPE CL-3.0) W/ 3 LINES OF BARBED WIRE ON TOP	M	450
175	802596	3.7 M CHAIN LINK GATE (TYPE CL-1.8)	EA	1
176	029549	3.7M CHAIN LINK GATE (TYPE CL 2.85) W/ ONE EXISTING 150 MM DIAMETER POST	EA	1
177	029550	3.7M CHAIN LINK GATE (TYPE CL-3)	EA	2
178	832003	METAL BEAM GUARD RAILING (WOOD POST)	M	8
179 (S-F)	833033	CHAIN LINK RAILING (TYPE 7 MODIFIED)	M	21
180 (F)	833128	CONCRETE BARRIER (TYPE 25 MODIFIED)	M	2128

Item	Item Code	Item	Unit of Measure	Estimated Quantity
181	833183	CONCRETE BARRIER (TYPE 27SV)	M	440
182	839481	CONCRETE BARRIER (TYPE 50)	M	21
183	029551	RAIL AND POST AT THE JUVENILE CENTER	M	3.2
184	029552	REMOVABLE BOLLARD	EA	12
185	839565	TERMINAL SYSTEM (TYPE SRT)	EA	1
186	839701	CONCRETE BARRIER (TYPE 60)	M	1600
187 (F)	839702	CONCRETE BARRIER (TYPE 60A)	M	158
188	839705	CONCRETE BARRIER (TYPE 60E)	M	80
189 (S)	840515	THERMOPLASTIC PAVEMENT MARKING	M2	150
190 (S)	840656	PAINT TRAFFIC STRIPE (2-COAT)	M	16 210
191 (S)	850101	PAVEMENT MARKER (NON-REFLECTIVE)	EA	3600
192 (S)	850102	PAVEMENT MARKER (REFLECTIVE)	EA	1810
193 (S)	860298	SIGNAL AND LIGHTING (STAGE CONSTRUCTION)	LS	LUMP SUM
194 (S)	860300	SIGNAL AND LIGHTING (CITY STREET LOCATION 1)	LS	LUMP SUM
195 (S)	860302	SIGNAL AND LIGHTING (CITY STREET LOCATION 2)	LS	LUMP SUM
196 (S)	860303	SIGNAL AND LIGHTING (CITY STREET LOCATION 3)	LS	LUMP SUM
197 (S)	860415	LIGHTING (STAGE CONSTRUCTION)	LS	LUMP SUM
198 (S)	860460	LIGHTING AND SIGN ILLUMINATION	LS	LUMP SUM
199 (S)	860640	IRRIGATION CONTROLLER ENCLOSURE CABINET	EA	4
200 (S)	029553	TRAFFIC OPERATIONS SYSTEM	LS	LUMP SUM

Item	Item Code	Item	Unit of Measure	Estimated Quantity
201 (S)	029554	CAMERA UNIT	EA	1
202 (S)	029555	PAN/TILT UNIT	EA	1
203 (S)	029556	CAMERA CONTROL UNIT	EA	1
204 (S)	029557	VIDEO ENCODER UNIT	EA	1
205 (S)	029558	INTEGRATED SERVICE DIGITAL NETWORK TERMINAL ADAPTER	EA	1
206 (S)	029559	EXTINGUISHABLE MESSAGE SIGN PANEL(LED) WITH RADIO CONTROLLER ASSEMBLY	LS	LUMP SUM
207 (S)	029560	DIAL-UP MODEM	EA	1
208 (S)	029561	MICROWAVE VEHICLE DETECTION SENSOR SYSTEM	LS	LUMP SUM
209 (S)	029562	WIRELESS RADIO MODEM	EA	2
210	029563	ELECTRONIC MOBILE DAILY DIARY SYSTEM DATA DELIVERY	LS	LUMP SUM
211	999990	MOBILIZATION	LS	LUMP SUM

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISIONS

Annexed to Contract No. 04-4874R4

SECTION 1. SPECIFICATIONS AND PLANS

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

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

AMENDMENTS TO JULY 1999 STANDARD SPECIFICATIONS

UPDATED JUNE 13, 2002

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

SECTION 2: PROPOSAL REQUIREMENTS AND CONDITIONS

Issue Date: June 6, 2002

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

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

- The bidder shall examine carefully the site of the work contemplated, the plans and specifications, and the proposal and contract forms therefor. The submission of a bid shall be conclusive evidence that the bidder has investigated and is satisfied as to the general and local conditions to be encountered, as to the character, quality and scope of work to be performed, the quantities of materials to be furnished and as to the requirements of the proposal, plans, specifications and the contract.
- The submission of a bid shall also be conclusive evidence that the bidder is satisfied that the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information was reasonably ascertainable from an inspection of the site and the records of exploratory work done by the Department as shown in the bid documents, as well as from the plans and specifications made a part of the contract.
- Where the Department has made investigations of site conditions including subsurface conditions in areas where work is to be performed under the contract, or in other areas, some of which may constitute possible local material sources,

bidders or contractors may, upon written request, inspect the records of the Department as to those investigations subject to and upon the conditions hereinafter set forth.

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

SECTION 5: CONTROL OF WORK

Issue Date: December 31, 2001

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

5-1.02A Excavation Safety Plans

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

Contractor intends to begin excavation. If the detailed plan includes designs of protective systems developed from tabulated data, or designs for which design by a registered professional engineer is required, the plan shall be submitted at least 3 weeks before the Contractor intends to begin excavation.

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

SECTION 19: EARTHWORK

Issue Date: December 31, 2001

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

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

SECTION 42: GROOVE AND GRIND PAVEMENT

Issue Date: December 31, 2001

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

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

SECTION 49: PILING

Issue Date: December 31, 2001

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

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

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

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

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

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

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

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

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

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

SECTION 50: PRESTRESSING CONCRETE

Issue Date: December 31, 2001

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

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

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

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

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

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

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

- All bars in any individual member shall be of the same grade, unless otherwise permitted by the Engineer.
- When bars are to be extended by the use of couplers, the assembled units shall have a tensile strength of not less than the manufacturer's minimum guaranteed ultimate tensile strength of the bars. Failure of any one sample to meet this requirement will be cause for rejection of the heat of bars and lot of couplers. The location of couplers in the member shall be subject to approval by the Engineer.
- Wires shall be straightened if necessary to produce equal stress in all wires or wire groups or parallel lay cables that are to be stressed simultaneously or when necessary to ensure proper positioning in the ducts.
- Where wires are to be button-headed, the buttons shall be cold formed symmetrically about the axes of the wires. The buttons shall develop the minimum guaranteed ultimate tensile strength of the wire. No cold forming process shall be used that causes indentations in the wire. Buttonheads shall not contain wide open splits, more than 2 splits per head, or splits not parallel with the axis of the wire.
- Prestressing steel shall be protected against physical damage and rust or other results of corrosion at all times from manufacture to grouting or encasing in concrete. Prestressing steel that has sustained physical damage at any time shall be rejected. The development of visible rust or other results of corrosion shall be cause for rejection, when ordered by the Engineer.
- Epoxy-coated prestressing steel strand shall be covered with an opaque polyethylene sheeting or other suitable protective material to protect the strand from exposure to sunlight, salt spray, and weather. For stacked coils, the protective covering shall be draped around the perimeter of the stack. The covering shall be adequately secured; however, it should allow for air circulation around the strand to prevent condensation under the covering. Epoxy-coated strand shall not be stored within 300 m of ocean or tidal water for more than 2 months.
- Prestressing steel shall be packaged in containers or shipping forms for the protection of the steel against physical damage and corrosion during shipping and storage. Except for epoxy-coated strand, a corrosion inhibitor which prevents rust or other results of corrosion, shall be placed in the package or form, or shall be incorporated in a corrosion inhibitor carrier type packaging material, or when permitted by the Engineer, may be applied directly to the steel. The corrosion inhibitor shall have no deleterious effect on the steel or concrete or bond strength of steel to concrete. Packaging or forms damaged from any cause shall be immediately replaced or restored to original condition.
- The shipping package or form shall be clearly marked with a statement that the package contains high-strength prestressing steel, and the type of corrosion inhibitor used, including the date packaged.
- Prestressing steel for post-tensioning which is installed in members prior to placing and curing of the concrete, and which is not epoxy-coated, shall be continuously protected against rust or other results of corrosion, until grouted, by means of a corrosion inhibitor placed in the ducts or applied to the steel in the duct. The corrosion inhibitor shall conform to the provisions specified herein.
- When steam curing is used, prestressing steel for post-tensioning shall not be installed until the steam curing is completed.
- Water used for flushing ducts shall contain either quick lime (calcium oxide) or slaked lime (calcium hydroxide) in the amount of 0.01-kg/L. Compressed air used to blow out ducts shall be oil free.
- When prestressing steel for post-tensioning is installed in the ducts after completion of concrete curing, and if stressing and grouting are completed within 10 days after the installation of the prestressing steel, rust which may form during those 10 days will not be cause for rejection of the steel. Prestressing steel installed, tensioned, and grouted in this manner, all within 10 days, will not require the use of a corrosion inhibitor in the duct following installation of the prestressing steel. Prestressing steel installed as above but not grouted within 10 days shall be subject to all the requirements in this section pertaining to corrosion protection and rejection because of rust. The requirements in this section pertaining to tensioning and grouting within 10 days shall not apply to epoxy-coated prestressing steel strand.
- Any time prestressing steel for pretensioning is placed in the stressing bed and is exposed to the elements for more than 36 hours prior to encasement in concrete, adequate measures shall be taken by the Contractor, as approved by the Engineer, to protect the steel from contamination or corrosion.
- After final fabrication of the seven-wire prestressing steel strand, no electric welding of any form shall be performed on the prestressing steel. Whenever electric welding is performed on or near members containing prestressing steel, the welding ground shall be attached directly to the steel being welded.
- Pretensioned prestressing steel shall be cut off flush with the end of the member. For epoxy-coated prestressing steel, only abrasive saws shall be used to cut the steel. The exposed ends of the prestressing steel and a 25-mm strip of adjoining concrete shall be cleaned and painted. Cleaning shall be by wire brushing or abrasive blast cleaning to remove all dirt and residue on the metal or concrete surfaces. Immediately after cleaning, the surfaces shall be covered with one application of unthinned zinc-rich primer (organic vehicle type) conforming to the provisions in Section 91, "Paint," except that 2 applications shall be applied to surfaces which will not be covered by concrete or mortar. Aerosol cans shall not be used. The paint shall be thoroughly mixed at the time of application and shall be worked into any voids in the prestressing tendons.

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

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

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

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

For wire or bars, one 2-m long sample and for strand, one 1.5-m long sample, of each size shall be furnished for each heat or reel.

For epoxy-coated strand, one 1.5-m long sample of uncoated strand of each size shall be furnished for each reel.

If the prestressing tendon is a bar, one 2-m long sample shall be furnished and in addition, if couplers are to be used with the bar, two 1.25-m long samples of bar, equipped with one coupler and fabricated to fit the coupler, shall be furnished.

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

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

SECTION 51: CONCRETE STRUCTURES

Issue Date: December 31, 2001

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SECTION 52: REINFORCEMENT

Issue Date: December 31, 2001

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

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

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

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

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

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

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

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

SECTION 55: STEEL STRUCTURES

Issue Date: December 31, 2001

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

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

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

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

SECTION 56: SIGNS

Issue Date: December 31, 2001

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

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

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

SECTION 59: PAINTING

Issue Date: December 31, 2001

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

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

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

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

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

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

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

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

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

SECTION 75: MISCELLANEOUS METAL

Issue Date: December 31, 2001

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

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

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

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

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

* Maximum stud diameter permitted for mechanical expansion anchors.

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

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

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

Installation Torque Values, (newton meters)

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

SECTION 83: RAILINGS AND BARRIERS

Issue Date: June 13, 2002

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

- The grades and species of wood posts and blocks shall be No. 1 timbers (also known as No. 1 structural) Douglas fir or No. 1 timbers Southern yellow pine. Wood posts and blocks shall be graded in conformance with the provisions in

Section 57-2, "Structural Timber," of the Standard Specifications, except allowances for shrinkage after mill cutting shall in no case exceed 5 percent of the American Lumber Standards minimum sizes, at the time of installation.

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

- 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.

SECTION 86: SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

Issue Date: February 28, 2002

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

- Forms shall be true to line and grade. Tops of foundations for posts and standards, except special foundations, shall be finished to curb or sidewalk grade or as directed by the Engineer. Forms shall be rigid and securely braced in place. Conduit ends and anchor bolts shall be placed in proper position and to proper height, and anchor bolts shall be held in place by means of rigid templates. Anchor bolts shall not be installed more than 1:40 from vertical.

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

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

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

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

SECTION 88: ENGINEERING FABRIC

Issue Date: January 15, 2002

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

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

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

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

SECTION 90: PORTLAND CEMENT CONCRETE

Issue Date: March 12, 2002

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

SECTION 90: PORTLAND CEMENT CONCRETE
90-1 GENERAL

90-1.01 DESCRIPTION

- Portland cement concrete shall be composed of cementitious material, fine aggregate, coarse aggregate, admixtures if used, and water, proportioned and mixed as specified in these specifications.
- The Contractor shall determine the mix proportions for all concrete except pavement concrete. The Engineer will determine the mix proportions for pavement concrete. Concrete for which the mix proportions are determined either by the Contractor or the Engineer shall conform to the requirements of this Section 90.
- Unless otherwise specified, cementitious material shall be a combination of cement and mineral admixture. Cementitious material shall be either:

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:

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

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

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

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

90-3.03 FINE AGGREGATE GRADING

- Fine aggregate shall be graded within the following limits:

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

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

90-3.04 COMBINED AGGREGATE GRADINGS

- Combined aggregate grading limits shall be used only for the design of concrete mixes. Concrete mixes shall be designed so that aggregates are combined in proportions that shall produce a mixture within the grading limits for combined aggregates as specified herein. 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).

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

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

90-7.04 CURING PRECAST CONCRETE MEMBERS

• Precast concrete members shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing." Curing shall be provided for the minimum time specified for each method or until the concrete reaches its design strength, whichever is less. Steam curing may also be used for precast members and shall conform to the following provisions:

A. After placement of the concrete, members shall be held for a minimum 4-hour presteaming period. If the ambient air temperature is below 10°C, steam shall be applied during the presteaming period to hold the air surrounding the member at a temperature between 10°C and 32°C.
B. To prevent moisture loss on exposed surfaces during the presteaming period, members shall be covered as soon as possible after casting or the exposed surfaces shall be kept wet by fog spray or wet blankets.
C. Enclosures for steam curing shall allow free circulation of steam about the member and shall be constructed to contain the live steam with a minimum moisture loss. The use of tarpaulins or similar flexible covers will be permitted, provided they are kept in good repair and secured in such a manner as to prevent the loss of steam and moisture.
D. Steam at the jets shall be at low pressure and in a saturated condition. Steam jets shall not impinge directly on the concrete, test cylinders, or forms. During application of the steam, the temperature rise within the enclosure shall not exceed 22°C per hour. The curing temperature throughout the enclosure shall not exceed 65°C and shall be maintained at a constant level for a sufficient time necessary to develop the required transfer strength. Control

cylinders shall be covered to prevent moisture loss and shall be placed in a location where temperature is representative of the average temperature of the enclosure.

E. Temperature recording devices that will provide an accurate, continuous, permanent record of the curing temperature shall be provided. A minimum of one temperature recording device per 60 m of continuous bed length will be required for checking temperature.

F. Members in pretension beds shall be detensioned immediately after the termination of steam curing while the concrete and forms are still warm, or the temperature under the enclosure shall be maintained above 15°C until the stress is transferred to the concrete.

G. Curing of precast concrete will be considered completed after termination of the steam curing cycle.

90-7.05 CURING PRECAST PRESTRESSED CONCRETE PILES

• Newly placed concrete for precast prestressed concrete piles shall be cured in conformance with the provisions in Section 90-7.04, "Curing Precast Concrete Members," except that piles with a class designation ending in C (corrosion resistant) shall be cured as follows:

A. Piles shall be either steam cured or water cured. If water curing is used, the piles shall be kept continuously wet by the application of water in conformance with the provisions in Section 90-7.01A, "Water Method."

B. If steam curing is used, the steam curing provisions in Section 90-7.04, "Curing Precast Concrete Members," shall apply except that the piles shall be kept continuously wet for their entire length for a period of not less than 3 days, including the holding and steam curing periods.

90-7.06 CURING SLOPE PROTECTION

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

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

90-7.07 CURING MISCELLANEOUS CONCRETE WORK

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

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

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

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

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

90-8 PROTECTING CONCRETE

90-8.01 GENERAL

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

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

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

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

90-8.02 PROTECTING CONCRETE STRUCTURES

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

90-8.03 PROTECTING CONCRETE PAVEMENT

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

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

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

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

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

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

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

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

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

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

90-9 COMPRESSIVE STRENGTH

90-9.01 GENERAL

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

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

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

• When concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete strength to be used as a basis for acceptance of other than steam cured concrete will be determined from cylinders

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

- If the test result indicates that the compressive strength at the maximum curing age specified or allowed is below the specified strength, but is 85 percent or more of the specified strength, payments to the State as required above shall be made, unless the Contractor, at the Contractor's expense, obtains and submits evidence acceptable to the Engineer that the strength of the concrete placed in the work meets or exceeds the specified 28-day compressive strength. If the test result indicates a compressive strength at the maximum curing age specified or allowed below 85 percent, the concrete represented by that test will be rejected, unless the Contractor, at the Contractor's expense, obtains and submits evidence acceptable to the Engineer that the strength and quality of the concrete placed in the work are acceptable. If the evidence consists of tests made on cores taken from the work, the cores shall be obtained and tested in conformance with the requirements in ASTM Designation: C 42.
- No single compressive strength test shall represent more than 250 m^3.
- When a precast concrete member is steam cured, the compressive strength of the concrete will be determined from test cylinders that have been handled and stored in conformance with Method 3 of California Test 540. The compressive strength of steam cured concrete will be evaluated on the basis of individual tests representing specific portions of production. When the concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete shall be considered to be acceptable whenever its compressive strength reaches the specified 28-day compressive strength provided that strength is reached in not more than the maximum number of days specified or allowed after the member is cast.
- When concrete is specified by compressive strength, prequalification of materials, mix proportions, mixing equipment, and procedures proposed for use will be required prior to placement of the concrete. Prequalification shall be accomplished by the submission of acceptable certified test data or trial batch reports by the Contractor. Prequalification data shall be based on the use of materials, mix proportions, mixing equipment, procedures, and size of batch proposed for use in the work.
- Certified test data, in order to be acceptable, shall indicate that not less than 90 percent of at least 20 consecutive tests exceed the specified strength at the maximum number of cure days specified or allowed, and none of those tests are less than 95 percent of specified strength. Strength tests included in the data shall be the most recent tests made on concrete of the proposed mix design and all shall have been made within one year of the proposed use of the concrete.
- Trial batch test reports, in order to be acceptable, shall indicate that the average compressive strength of 5 consecutive concrete cylinders, taken from a single batch, at not more than 28 days (or the maximum age allowed) after molding shall be at least 4 MPa greater than the specified 28-day compressive strength, and no individual cylinder shall have a strength less than the specified strength at the maximum age specified or allowed. Data contained in the report shall be from trial batches that were produced within one year of the proposed use of specified strength concrete in the project. Whenever air-entrainment is required, the air content of trial batches shall be equal to or greater than the air content specified for the concrete without reduction due to tolerances.
- Tests shall be performed in conformance with either the appropriate California Test methods or the comparable ASTM test methods. Equipment employed in testing shall be in good condition and shall be properly calibrated. If the tests are performed during the life of the contract, the Engineer shall be notified sufficiently in advance of performing the tests in order to witness the test procedures.
- The certified test data and trial batch test reports shall include the following information:

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

- Certified test data and trial batch test reports shall be signed by an official of the firm that performed the tests.
- When approved by the Engineer, concrete from trial batches may be used in the work at locations where concrete of a lower quality is required and the concrete will be paid for as the type or class of concrete required at that location.
- After materials, mix proportions, mixing equipment, and procedures for concrete have been prequalified for use, additional prequalification by testing of trial batches will be required prior to making changes that, in the judgment of the Engineer, could result in a strength of concrete below that specified.
- The Contractor's attention is directed to the time required to test trial batches and the Contractor shall be responsible for production of trial batches at a sufficiently early date so that the progress of the work is not delayed.
- When precast concrete members are manufactured at the plant of an established manufacturer of precast concrete members, the mix proportions of the concrete shall be determined by the Contractor, and a trial batch and prequalification of the materials, mix proportions, mixing equipment, and procedures will not be required.

90-10 MINOR CONCRETE

90-10.01 GENERAL

- Concrete for minor structures, slope paving, curbs, sidewalks and other concrete work, when designated as minor concrete on the plans, in the specifications, or in the contract item, shall conform to the provisions specified herein.
- The Engineer, at the Engineer's discretion, will inspect and test the facilities, materials and methods for producing the concrete to ensure that minor concrete of the quality suitable for use in the work is obtained.

90-10.02 MATERIALS

- Minor concrete shall conform to the following requirements:

90-10.02A Cementitious Material

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

90-10.02B Aggregate

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

90-10.02C Water

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

90-10.02D Admixtures

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

90-10.03 PRODUCTION

- Cementitious material, water, aggregate, and admixtures shall be stored, proportioned, mixed, transported, and discharged in conformance with recognized standards of good practice that will result in concrete that is thoroughly and uniformly mixed, that is suitable for the use intended, and that conforms to requirements specified herein. Recognized standards of good practice are outlined in various industry publications such as are issued by American Concrete Institute, AASHTO, or the Department.
- The cementitious material content of minor concrete shall conform to the provisions in Section 90-1.01, "Description."
- The amount of water used shall result in a consistency of concrete conforming to the provisions in Section 90-6.06, "Amount of Water and Penetration." Additional mixing water shall not be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer.

- Discharge of ready-mixed concrete from the transporting vehicle shall be made while the concrete is still plastic and before stiffening occurs. An elapsed time of 1.5 hours (one hour in non-agitating hauling equipment), or more than 250 revolutions of the drum or blades, after the introduction of the cementitious material to the aggregates, or a temperature of concrete of more than 32°C will be considered conditions contributing to the quick stiffening of concrete. The Contractor shall take whatever action is necessary to eliminate quick stiffening, except that the addition of water will not be permitted.
- The required mixing time in stationary mixers shall be not less than 50 seconds or more than 5 minutes.
- The minimum required revolutions at mixing speed for transit-mixed concrete shall be not less than that recommended by the mixer manufacturer, and shall be increased, if necessary, to produce thoroughly and uniformly mixed concrete.
- Each load of ready-mixed concrete shall be accompanied by a weighmaster certificate that shall be delivered to the Engineer at the discharge location of the concrete, unless otherwise directed by the Engineer. The weighmaster certificate shall be clearly marked with the date and time of day when the load left the batching plant and, if hauled in truck mixers or agitators, the time the mixing cycle started.
- A Certificate of Compliance conforming to the provisions in Section 6–1.07, "Certificates of Compliance," shall be furnished to the Engineer, prior to placing minor concrete from a source not previously used on the contract, stating that minor concrete to be furnished meets contract requirements, including minimum cementitious material content specified.

90-10.04 CURING MINOR CONCRETE

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

90-10.05 PROTECTING MINOR CONCRETE

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

90-10.06 MEASUREMENT AND PAYMENT

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

90-11 MEASUREMENT AND PAYMENT

90-11.01 MEASUREMENT

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

90-11.02 PAYMENT

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

END OF AMENDMENTS

SECTION 2. PROPOSAL REQUIREMENTS AND CONDITIONS

2-1.01 GENERAL

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

The proposal shall set forth the unit prices, item totals, **TOTAL BID (A)**, the number of working days bid for completion of the work, the product of the working days bid times the cost per day shown on the Engineer's Estimate, **TOTAL BID (B)**, and the **"Total Basis for Comparison of Bids (A+B),"** all in clearly legible figures, in the respective spaces provided, and shall be signed by the bidder, who shall fill out all blanks in the proposal form as therein required.

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. The amount of the bidder's security required in Section 2-1.07, "Proposal Guaranty," of the Standard Specifications, shall be based on the **TOTAL BID (A)** set forth on the proposal form.

Submit request for substitution of an "or equal" item, and the data substantiating the request to the Department of Transportation, 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): 10 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 bidder shall bid the number of working days to complete this contract. Bids in which the number of working days bid for completion of all the work exceed 550 days will be considered non-responsive and will be rejected.

All bids will be compared on the basis of the Engineer's Estimate of the quantities of work to be done **TOTAL BID (A)**, plus the product of the number of working days bid for completion of all the work and the cost per day shown on the Engineer's Estimate, **TOTAL BID (B)**.

The apparent lowest bid will be determined on the basis of the **"Total Basis for Comparison of Bids (A + B)"** set forth in the Engineer's Estimate. The contract price for the awarded contract will be the **"TOTAL BID (A)"** set forth in the proposal.

The contract shall be signed by the successful bidder and shall be received with contract bonds by the Office of Office Engineer within 4 days, not including Saturdays, Sundays and legal holidays, after the contract has been awarded. Failure to do so shall be just cause for forfeiture of the proposal guaranty.

It is expected that within 2 days, not including Saturdays, Sundays and legal holidays, of return of the executed contract and bonds, the Department will notify the successful bidder of either approval of the contract by the Attorney General or the attorney appointed and authorized to represent the Department of Transportation, or disapproval of the submittal.

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 total number of working days to complete all work in the contract shall be the number of working days bid.

Said work shall be diligently prosecuted to completion before the expiration of the number of working days bid, beginning at 12:01 a.m. on the day after the day of contract award.

The Contractor shall pay to the State of California the sum of **$5,000** per day, for each and every calendar day's delay in finishing the work in excess of the number of working days bid.

Delays due to actions required by the Engineer performing normal inspection, testing and review duties shall be considered as included in the number of working days bid for completion of the contract and no extensions of time will be allowed for such actions in determining liquidated damages.

Full compensation for any additional costs occasioned by compliance with the provisions in this section shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefor.

No incentive payments will be paid nor will disincentive deductions be charged on this project.

Attention is directed to "Designated Portion of the Work" under the Section "Order of Work" of the these special provisions.

The work defined as "Designated Portion of the Work" shall be diligently prosecuted to completion before the expiration of

270 WORKING DAYS

beginning at 12:01 a.m. on the day after the day of contract award.

If the "Designated Portion of the Work" is not completed within the prescribed working days, the Contractor shall pay to the State of California the sum of **$5,000** per day, for each and every calendar day's delay in finishing the work in excess of the number of working days prescribed herein.

The total daily amount paid by the Contractor for liquidated damages shall not exceed $5,000 per day.

SECTION 5. GENERAL

SECTION 5-1. MISCELLANEOUS

5-1.01 PLANS AND WORKING DRAWINGS

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

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

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

5-1.012 DIFFERING SITE CONDITIONS

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

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

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

5-1.013 LINES AND GRADES

Attention is directed to Section 5-1.07, "Lines and Grades," of the Standard Specifications.

Stakes or marks will be set by the Engineer in conformance with the requirements in Chapter 12, "Construction Surveys," of the Department's Surveys Manual.

5-1.015 LABORATORY

When a reference is made in the specifications to the "Laboratory," the reference shall mean Division of Engineering Services - Materials Engineering and Testing Services and Division of Engineering Services - Geotechnical Services of the Department of Transportation, or established laboratories of the various Districts of the Department, or other laboratories

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

5-1.017 CONTRACT BONDS

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

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

5-1.019 COST REDUCTION INCENTIVE

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

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

If a cost reduction proposal submitted by the Contractor, and subsequently approved by the Engineer, provides for a reduction in contract time, 50 percent of that contract time reduction shall be credited to the State by reducing the contract working days, not including plant establishment. Attention is directed to "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions regarding the working days.

If a cost reduction proposal submitted by the Contractor, and subsequently approved by the Engineer, provides for a reduction in traffic congestion or avoids traffic congestion during construction, 60 percent of the estimated net savings in construction costs attributable to the cost reduction proposal will be paid to the Contractor. In addition to the requirements in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications, the Contractor shall provide detailed comparisons of the traffic handling between the existing contract and the proposed change, and estimates of the traffic volumes and congestion.

5-1.02 LABOR NONDISCRIMINATION

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

NOTICE OF REQUIREMENT FOR NONDISCRIMINATION PROGRAM

(GOV. CODE, SECTION 12990)

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

5-1.022 PAYMENT OF WITHHELD FUNDS

Payment of withheld funds shall conform to Section 9-1.065, "Payment of Withheld Funds," of the Standard Specifications and these special provisions.

Funds withheld from progress payments to ensure performance of the contract that are eligible for payment into escrow or to an escrow agent pursuant to Section 10263 of the California Public Contract Code do not include funds withheld or deducted from payment due to failure of the Contractor to fulfill a contract requirement.

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 TESTING

Testing of materials and work shall conform to the provisions in Section 6-3, "Testing," of the Standard Specifications and these special provisions.

Whenever the provisions of Section 6-3.01, "General," of the Standard Specifications refer to tests or testing, it shall mean tests to assure the quality and to determine the acceptability of the materials and work.

The Engineer will deduct the costs for testing of materials and work found to be unacceptable, as determined by the tests performed by the Department, and the costs for testing of material sources identified by the Contractor which are not used for the work, from moneys due or to become due to the Contractor. The amount deducted will be determined by the Engineer.

5-1.06 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES

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

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

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

5-1.07 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.

5-1.103 RECORDS

The Contractor shall maintain cost accounting records for the contract pertaining to, and in such a manner as to provide a clear distinction between, the following six categories of costs of work during the life of the contract:

A. Direct costs of contract item work.
B. Direct costs of changes in character in conformance with Section 4-1.03C, "Changes in Character of Work," of the Standard Specifications.
C. Direct costs of extra work in conformance with Section 4-1.03D, "Extra Work," of the Standard Specifications.
D. Direct costs of work not required by the contract and performed for others.
E. Direct costs of work performed under a notice of potential claim in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications.
F. Indirect costs of overhead.

Cost accounting records shall include the information specified for daily extra work reports in Section 9-1.03C, "Records," of the Standard Specifications. The requirements for furnishing the Engineer completed daily extra work reports shall only apply to work paid for on a force account basis.

The cost accounting records for the contract shall be maintained separately from other contracts, during the life of the contract, and for a period of not less than 3 years after the date of acceptance of the contract. If the Contractor intends to file claims against the Department, the Contractor shall keep the cost accounting records specified above until complete resolution of all claims has been reached.

5-1.11 PARTNERING

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

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

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

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

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

5–1.114 VALUE ANALYSIS

The Contractor may submit to the Engineer, in writing, a request for a "Value Analysis" workshop. The purpose for having a workshop is to identify value enhancing opportunities and to consider modifications to the plans and specifications that will reduce either the total cost, time of construction or traffic congestion, without impairing, in any manner, the essential functions or characteristics of the project including, but not limited to, service life, economy of operation, ease of maintenance, benefits to the travelling public, desired appearance, or design and safety standards.

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

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

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

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

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

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

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

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

5-1.12 DISPUTE REVIEW BOARD

GENERAL

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

The DRB shall be utilized when dispute or potential claim resolution at the project level is unsuccessful. The DRB shall function as specified herein until the day of acceptance of the contract, at which time the work of the DRB will cease except for completion of unfinished reports. No dispute meetings shall take place later than 30 days prior to acceptance of contract. After acceptance of contract, disputes or potential claims which have followed the dispute resolution processes of the Standard Specifications and these special provisions, but have not been resolved, shall be stated or restated by the Contractor, in response to the Proposed Final Estimate within the time limits provided in Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications and these special provisions. The State will review those claims in conformance with the provisions in Section 9-1.07B of the Standard Specifications and these special provisions. Following the adherence to and completion of the State's administrative claims procedure, the Contractor may file for arbitration in conformance with the provisions in Section 9-1.10, "Arbitration," of the Standard Specifications and these special provisions.

Disputes, as used in this section, shall include differences of opinion, properly noticed as provided hereinafter, between the State and Contractor on matters related to the work and other subjects considered by the State or Contractor, or by both, to be of concern to the DRB on this project, except matters relating to Contractor, subcontractor or supplier potential claims

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

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

SELECTION PROCESS, DISCLOSURE AND APPOINTMENTS

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

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

The State and the Contractor shall nominate and approve DRB members in conformance with the terms and conditions of the Dispute Review Board Agreement and these special provisions, within 45 days of the approval of the contract. Each party shall provide written notification to the other of the name of their selected DRB nominee along with the prospective member's written disclosure statement.

Prior to finalizing DRB appointments, the first 2 prospective DRB members shall submit complete disclosure statements to both the State and the Contractor. Disclosure statements shall include a resume of the prospective member's experience and a declaration statement describing past, present, anticipated, and planned relationships, including indirect relationships through the prospective member's primary or full-time employer, to this project and with the parties involved in this construction contract, including but not limited to, relevant subcontractors or suppliers to the parties, parties' principals, or parties' counsel. DRB members shall also include a full disclosure of close professional or personal relationships with all key members of the contract. Objections to nominees must be based on a specific breech or violation of nominee responsibilities or on nominee qualifications under these provisions unless otherwise specified. The Contractor or the State may, on a one-time basis, object to the other's nominee without specifying a reason and this person will not be selected for the DRB. Another person shall then be nominated within 15 days.

The first duty of the State and Contractor selected members of the DRB shall be to select and recommend a prospective third DRB member to the parties for final selection and approval. The first 2 DRB members shall proceed with the selection of the third DRB member immediately upon receiving written notification from the State of their selection, and shall provide their recommendation simultaneously to the parties within 15 days of the notification.

The first 2 DRB members shall select a third DRB member subject to mutual approval of the parties or may mutually concur on a list of potentially acceptable third DRB members and submit the list to the parties for final selection and approval of the third member. The goal in the selection of the third member is to complement the professional experience of the first 2 members and to provide leadership for the DRB's activities.

The third prospective DRB member shall supply a full disclosure statement to the first 2 DRB members and to the parties prior to appointment.

An impasse shall be considered to have been reached if the parties are unable to approve a third member within 15 days of receipt of the recommendation of the first 2 DRB members, or if the first 2 DRB members are unable to agree upon a recommendation within their 15 day time limit. In the event of an impasse in selection of third DRB member the State and the Contractor shall each propose 3 candidates for the third DRB member position. The parties shall select the candidates proposed under this paragraph from the current list of arbitrators certified by the Public Works Contract Arbitration Committee created by Article 7.2 (commencing with Section 10245) of the State Contract Act. The first 2 DRB members shall then select one of the 6 proposed candidates in a blind draw.

No DRB member shall have prior direct involvement in this contract. No member shall have a financial interest in this contract or the parties thereto, within a period of 6 months prior to award of this contract or during the contract, except as follows:

A. Compensation for services on this DRB.
B. Ownership interest in a party or parties, documented by the prospective DRB member, that has been reviewed and determined in writing by the State to be sufficiently insignificant to render the prospective member acceptable to the State.
C. Service as a member of other Dispute Review Boards on other contracts.
D. Retirement payments or pensions received from a party that are not tied to, dependent on or affected by the net worth of the party.
E. The above provisions apply to parties having a financial interest in this contract, including but not limited to contractors, subcontractors, suppliers, consultants, and legal and business services.

The Contractor or the State may reject any of the three DRB members who fail to fully comply at all times with all required employment and financial disclosure conditions of DRB membership as described in the Dispute Review Board Agreement and as specified herein. A copy of the Dispute Review Board Agreement is included in this section.

The Contractor, the State, and the 3 members of the DRB shall complete and adhere to the Dispute Review Board Agreement in administration of this DRB within 15 days of the parties' concurrence in the selection of the third member. No DRB meeting shall take place until the Dispute Review Board Agreement has been signed by all parties. The State authorizes the Engineer to execute and administer the terms of the Agreement. The person(s) designated by the Contractor as authorized to execute contract change orders shall be authorized to execute and administer the terms of this agreement, or to delegate the authority in writing. The operation of the DRB shall be in conformance with the terms of the Dispute Review Board Agreement.

COMPENSATION

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

OF DRB MEMBERS

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

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

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

OPERATION

The following procedure shall be used for dispute resolution:

A. If the Contractor objects to any decision, act or order of the Engineer, the Contractor shall give written notice of potential claim in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications and these special provisions, including the provision of applicable cost documentation; or file written protests or notices in conformance with the provisions in the Standard Specifications and these special provisions.
B. The Engineer will respond, in writing, to the Contractor's written protest or notice within 15 days of receipt of the written protest or notice.

C. Within 15 days after receipt of the Engineer's written response, the Contractor shall, if the Contractor still objects, file a written reply with the Engineer, stating clearly and in detail the basis of the objection.
D. Following the Contractor's objection to the Engineer's decision, the Contractor shall refer the dispute to the DRB if the Contractor wishes to further pursue the objection to the Engineer's decision. The Contractor shall make the referral in writing to the DRB, simultaneously copied to the State, within 21 days after receipt of the written reply from the Engineer. The written dispute referral shall describe the disputed matter in individual discrete segments so that it will be clear to both parties and the DRB what discrete elements of the dispute have been resolved, and which remain unresolved, and shall include an estimate of the cost of the affected work and impacts, if any, on project completion.
E. By failing to submit the written notice of referral to the DRB, within 21 days after receipt of the State's written reply, the Contractor waives future claims and arbitration on the matter in contention.
F. The Contractor and the State shall each be afforded an opportunity to be present and to be heard by the DRB, and to offer evidence. Either party furnishing written evidence or documentation to the DRB must furnish copies of such information to the other party a minimum of 15 days prior to the date the DRB is scheduled to convene the meeting for the dispute. Either party shall produce such additional evidence as the DRB may deem necessary to reach an understanding and a determination of the dispute. The party furnishing additional evidence shall furnish copies of such additional evidence to the other party at the same time the evidence is provided to the DRB. The DRB will not consider evidence not furnished in conformance with the terms specified herein.
G. Upon receipt by the DRB of a written referral of a dispute, the DRB shall convene to review and consider the dispute. The dispute meeting shall be held no earlier than 30 days and no later than 60 days after receipt of the written referral unless otherwise agreed to by all parties. The DRB shall determine the time and location of the DRB meeting, with due consideration for the needs and preferences of the parties while recognizing the paramount importance of a speedy resolution of the dispute.
H. There shall be no participation of either party's attorneys at DRB meetings.
I. There shall be no participation of persons who are not directly involved in the contract or who do not have direct knowledge of the dispute, including but not limited to consultants, except for expert testimony allowed at the discretion of the DRB and with approval prior to the dispute meeting by both parties.
J. The DRB shall furnish a report, containing findings and recommendations as described in the Dispute Review Board Agreement, in writing to both the State and the Contractor. The DRB may request clarifying information of either party within 10 days after the DRB dispute meeting. Requested information shall be submitted to the DRB within 10 days of the DRB request. The DRB shall complete its report, including minority opinion, if any, and submit it to the parties within 30 days of the DRB dispute meeting, except that time extensions may be granted at the request of the DRB with the written concurrence of both parties. The report shall include the facts and circumstances related to the matters under consideration, applicable laws and regulations, the pertinent provisions of the contract and the actual costs and time incurred as shown on the Contractor's cost accounting records. The DRB shall make recommendations on the merit of the dispute and, if appropriate, recommend guidelines for determining compensation.
K. Within 30 days after receiving the DRB's report, both the State and the Contractor shall respond to the DRB in writing signifying that the dispute is either resolved or remains unresolved. Failure to provide the written response within the time specified, or a written rejection of the DRB's recommendation or response to a request for reconsideration presented in the report by either party, shall conclusively indicate that the party(s) failing to respond accepts the DRB recommendation. Immediately after responses have been received by both parties, the DRB will provide copies of both responses to the parties simultaneously. Either party may request clarification of elements of the DRB's report from the DRB prior to responding to the report. The DRB will consider any clarification request only if submitted within 10 days of receipt of the DRB's report, and if submitted simultaneously in writing to both the DRB and the other party. Each party may submit only one request for clarification for any individual DRB report. The DRB shall respond, in writing, to requests for clarification within 10 days of receipt of such requests.
L. The DRB's recommendations, stated in the DRB's reports, are not binding on either party. Either party may seek a reconsideration of a recommendation of the DRB. The DRB shall only grant a reconsideration based upon submission of new evidence and if the request is submitted within the 30-day time limit specified for response to the DRB's written report. Each party may submit only one request for reconsideration regarding an individual DRB recommendation.
M. If the State and the Contractor are able to resolve their dispute with the aid of the DRB's report, the State and Contractor shall promptly accept and implement the recommendations of the DRB. If the parties cannot agree on compensation within 60 days of the acceptance by both parties of the DRB's recommendation, either party may request the DRB to make a recommendation regarding compensation.
N. The State or the Contractor shall not call DRB members who served on the DRB for this contract as witnesses in arbitration proceedings which may arise from this contract, and all documents created by the DRB shall be

inadmissible as evidence in subsequent arbitration proceedings, except the DRB's final written reports on each issue brought before it.

O. The State and Contractor shall jointly indemnify and hold harmless the DRB members from and against all claims, damages, losses, and expenses, including but not limited to attorney's fees, arising out of and resulting from the findings and recommendations of the DRB.

P. The DRB members shall have no claim against the State or the Contractor, or both, from claimed harm arising out of the parties' evaluations of the DRB's report.

DISPUTES INVOLVING SUBCONTRACTOR POTENTIAL CLAIMS

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

A. The Contractor shall identify clearly in submissions pursuant to this section, that portion of the dispute that involves a subcontractor potential claim or potential claims.

B. The Contractor shall include, as part of its submission pursuant to Step D above, a certification (False Claims Act Certification) by the subcontractor's or supplier's officer, partner, or authorized representative with authority to bind the subcontractor and with direct knowledge of the facts underlying the subcontractor potential claim. The Contractor shall submit a certification that the subcontractor potential claim is acknowledged and forwarded by the Contractor. The form for these certifications is available from the Engineer.

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

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

E. The Contractor shall include in all subcontracts under this contract that subcontractors and suppliers of any tier (a) agree to submit subcontractor potential claims to the Contractor in a proper form and in sufficient time to allow processing by the Contractor in conformance with the Dispute Review Board resolution specifications; (b) agree to be bound by the terms of the Dispute Review Board provisions to the extent applicable to subcontractor potential claims; (c) agree that, to the extent a subcontractor potential claim is involved, completion of all steps required under these Dispute Review Board special provisions shall be a condition precedent to pursuit by the subcontractor of other remedies permitted by law, including without limitation of a lawsuit against the Contractor; and (d) agree that the existence of a dispute resolution process for disputes involving subcontractor potential claims shall not be deemed to create any claim, right, or cause of action by any subcontractor or supplier against the Department.

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

RETENTION

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

DISPUTE REVIEW BOARD AGREEMENT

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

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

B. PROCEDURES

The DRB shall render written reports on disputes between the parties arising from the construction contract. Prior to consideration of a dispute, the DRB shall establish rules and regulations that will govern the conduct of its business and reporting procedures in conformance with the requirements of the contract and the terms of this AGREEMENT. DRB

recommendations, resulting from its consideration of a dispute, shall be furnished in writing to both parties. The recommendations shall be based on the pertinent contract provisions, and the facts and circumstances involved in the dispute. The recommendations shall find one responsible party in a dispute; shared or "jury" determinations shall not be rendered. The DRB shall make recommendations on the merit of the dispute, and if appropriate, recommend guidelines for determining compensation. If the parties cannot agree on compensation within 60 days of the acceptance by both parties of the DRB's recommendation, either party may request the DRB to make a recommendation regarding compensation.

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

During scheduled meetings of the DRB as well as during dispute meetings, DRB members shall refrain from expressing opinions on the merits of statements on matters under dispute or potential dispute. Opinions of DRB members expressed in private sessions shall be kept strictly confidential. Individual DRB members shall not meet with, or discuss contract issues with individual parties, except as directed by the DRB Chairperson. Such discussions or meetings shall be disclosed to both parties. Other discussions regarding the project between the DRB members and the parties shall be in the presence of all three members and both parties. Individual DRB members shall not undertake independent investigations of any kind pertaining to disputes or potential disputes, except with the knowledge of both parties and as expressly directed by the DRB Chairperson.

C. CONSTRUCTION SITE VISITS, PROGRESS MEETINGS AND FIELD INSPECTIONS

The DRB members shall visit the project site and meet with representatives of the parties to keep abreast of construction activities and to develop familiarity with the work in progress. Scheduled progress meetings shall be held at or near the project site. The DRB shall meet at least once at the start of the project, and at least once every 4 months thereafter. The frequency, exact time, and duration of additional site visits and progress meetings shall be as recommended by the DRB and approved by the parties consistent with the construction activities or matters under consideration and dispute. Each meeting shall consist of a round table discussion and a field inspection of the work being performed on the contract, if necessary. Each meeting shall be attended by representatives of both parties. The agenda shall generally be as follows:

1. Meeting opened by the DRB Chairperson.
2. Remarks by the STATE's representative.
3. A description by the CONTRACTOR's representative of work accomplished since the last meeting; the current schedule status of the work; and a forecast for the coming period.
4. An outline by the CONTRACTOR's representative of potential problems and a description of proposed solutions.
5. An outline by the STATE's representative of the status of the work as the STATE views it.
6. A brief description by the CONTRACTOR's or STATE's representative of potential claims or disputes which have surfaced since the last meeting.
7. A summary by the STATE's representative, the CONTRACTOR's representative, or the DRB of the status of past disputes and potential claims.

The STATE's representative will prepare minutes of all progress meetings and circulate them for revision and approval by all concerned within 10 days of the meeting.

The field inspection shall cover all active segments of the work, the DRB being accompanied by both parties' representatives. The field inspection may be waived upon mutual agreement of the parties.

D. DRB CONSIDERATION AND HANDLING OF DISPUTES

Upon receipt by the DRB of a written referral of a dispute, the DRB shall convene to review and consider the dispute. The dispute meeting shall be held no earlier than 30 days and no later than 60 days after receipt of the written referral, unless otherwise agreed to by all parties. The DRB shall determine the time and location of DRB dispute meetings, with due consideration for the needs and preferences of the parties while recognizing the paramount importance of speedy resolution of issues. No dispute meetings shall take place later than 30 days prior to acceptance of contract.

Normally, dispute meetings shall be conducted at or near the project site. However, any location that would be more convenient and still provide required facilities and access to necessary documentation shall be satisfactory.

Both parties shall be given the opportunity to present their evidence at these dispute meetings. It is expressly understood that the DRB members are to act impartially and independently in the consideration of the contract provisions, and the facts and conditions surrounding any dispute presented by either party, and that the recommendations concerning any such dispute are advisory and nonbinding on the parties.

The DRB may request that written documentation and arguments from both parties be sent to each DRB member, through the DRB Chairperson, for review before the dispute meeting begins. A party furnishing written documentation to the

DRB shall furnish copies of such information to the other party at the same time that such information is supplied to the DRB.

DRB dispute meetings shall be informal. There shall be no testimony under oath or cross-examination. There shall be no reporting of the procedures by a shorthand reporter or by electronic means. Documents and verbal statements shall be received by the DRB in conformance with acceptance standards established by the DRB. These standards need not comply with prescribed legal laws of evidence.

The third DRB member shall act as Chairperson for dispute meetings and all other DRB activities. The parties shall have a representative at all dispute meetings. Failure to attend a duly noticed meeting by either of the parties shall be conclusively considered by the DRB as indication that the non-attending party considers written submittals as their entire and complete argument. The claimant shall discuss the dispute, followed by the other party. Each party shall then be allowed one or more rebuttals until all aspects of the dispute are thoroughly covered. DRB members shall ask questions, seek clarification, and request further data from either of the parties as may be necessary to assist in making a fully informed recommendation. The DRB may request from either party documents or information that would assist the DRB in making its findings and recommendations including, but not limited to, documents used by the CONTRACTOR in preparing the bid for the project. A refusal by a party to provide information requested by the DRB may be considered by the DRB as an indication that the requested material would tend to disprove that party's position. In large or complex cases, additional dispute meetings may be necessary in order to consider all the evidence presented by both parties. All involved parties shall maintain the confidentiality of all documents and information, as provided in this AGREEMENT.

During dispute meetings, no DRB member shall express an opinion concerning the merit of any facet of the case. DRB deliberations shall be conducted in private, with interim individual views kept strictly confidential.

After dispute meetings are concluded, the DRB shall meet in private and reach a conclusion supported by 2 or more members. Private sessions of the DRB may be held at a location other than the job site or by electronic conferencing as deemed appropriate, in order to expedite the process.

The DRB's findings and recommendations, along with discussion of reasons therefor, shall then be submitted as a written report to both parties. Recommendations shall be based on the pertinent contract provisions, applicable laws and regulations, and facts and circumstances related to the dispute. The report shall be thorough in discussing the facts considered, the contract language, law or regulation viewed by the DRB as pertinent to the issues, and the DRB's interpretation and philosophy in arriving at its conclusions and recommendations. The DRB's report shall stand on its own, without attachments or appendices. The DRB Chairperson shall complete and furnish a completed "Summary of Dispute Review Board Recommendation" form along with a copy of the written recommendation report to the DRB Coordinator, Division of Construction, MS 44, P.O. Box 942874, Sacramento, CA 94274. The "Summary of Dispute Review Board Recommendation" form is available through the Engineer.

With prior written approval of both parties, the DRB may obtain technical services necessary to adequately review the disputes presented, including audit, geotechnical, schedule analysis and other services. The parties' technical staff may supply those services as appropriate. The cost of technical services, as agreed to by the parties, shall be borne equally by the 2 parties as specified in an approved contract change order. The CONTRACTOR will not be entitled to markups for the payments made for these services.

The DRB shall resist submittal of incremental portions of information by either party, in the interest of making a fully informed decision and recommendation.

The DRB shall make every effort to reach a unanimous decision. If this proves impossible, the dissenting member shall prepare a minority opinion, which shall be included in the DRB's report.

Although both parties should place weight upon the DRB's recommendations, they are not binding. Either party may appeal a recommendation to the DRB for reconsideration. However, reconsideration shall only be allowed when there is new evidence to present, and the DRB shall accept only one appeal from each party pertaining to an individual DRB recommendation. The DRB shall hear appeals in conformance with the terms described in the Section entitled "Dispute Review Board" in the special provisions.

E. DRB MEMBER REPLACEMENT

Should the need arise to appoint a replacement DRB member, the replacement DRB member shall be appointed in the same manner as the original DRB members were appointed. The selection of a replacement DRB member shall begin promptly upon notification of the necessity for a replacement and shall be completed within 15 days. This AGREEMENT will be amended to indicate change in DRB membership.

SECTION III CONTRACTOR RESPONSIBILITIES

The CONTRACTOR shall furnish to each DRB member one copy of pertinent documents that are or may become necessary for the DRB to perform their function. Pertinent documents are written notices of potential claim, responses to those notices, drawings or sketches, calculations, procedures, schedules, estimates, or other documents which are used in the performance of the work or in justifying or substantiating the CONTRACTOR's position. The CONTRACTOR shall also furnish a copy of such pertinent documents to the STATE, in conformance with the terms outlined in the special provisions.

SECTION IV STATE RESPONSIBILITIES

The STATE will furnish the following services and items:

A. CONTRACT RELATED DOCUMENTS

The STATE will furnish to each DRB member one copy of Notice to Contractors and Special Provisions, Proposal and Contract, Plans, Standard Specifications, and Standard Plans, change orders, written instructions issued by the STATE to the CONTRACTOR, or other documents pertinent to any dispute that has been referred to the DRB and necessary for the DRB to perform its function.

B. COORDINATION AND SERVICES

The STATE, through the Engineer, will, in cooperation with the CONTRACTOR, coordinate the operations of the DRB. The Engineer will arrange or provide conference facilities at or near the project site and provide secretarial and copying services to the DRB without charge to the CONTRACTOR.

SECTION V TIME FOR BEGINNING AND COMPLETION

Once established, the DRB shall be in operation until the day of acceptance of the contract. The DRB members shall not begin work under the terms of this AGREEMENT until authorized in writing by the STATE.

SECTION VI PAYMENT

A. ALL INCLUSIVE RATE PAYMENT

The STATE and the CONTRACTOR shall bear the costs and expenses of the DRB equally. Each DRB member shall be compensated at an agreed rate of $1,200 per day if time spent per meeting, including on-site time plus one hour of travel time, is greater than 4 hours. Each DRB member shall be compensated at an agreed rate of $700 per day if time spent per meeting, including on-site time plus one hour of travel time, is less than or equal to 4 hours. The agreed rates shall be considered full compensation for on-site time, travel expenses, transportation, lodging, time for travel and incidentals for each day, or portion thereof, that the DRB member is at an authorized DRB meeting. No additional compensation will be made for time spent by DRB members in review and research activities outside the official DRB meetings unless that time has been specifically agreed to in advance by the STATE and CONTRACTOR. Time away from the project that has been specifically agreed to in advance by the parties will be compensated at an agreed rate of $125 per hour. The agreed amount of $125 per hour shall include all incidentals including expenses for telephone, fax, and computer services. Members serving on more than one DRB involving the State, regardless of the number of meetings per day, shall not be paid more than the all inclusive rate per day or rate per hour for an individual project. The STATE will provide, at no cost to the CONTRACTOR, administrative services such as conference facilities and secretarial services to the DRB.

B. PAYMENTS

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

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

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

C. INSPECTION OF COSTS RECORDS

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

SECTION VII ASSIGNMENT OF TASKS OF WORK

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

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

DRB members may resign from the DRB by providing not less than 15 days written notice of the resignation to the STATE and CONTRACTOR. DRB members may be terminated by their original appointing power or by either party, for failing to fully comply at all times with all required employment and financial disclosure conditions of DRB membership in conformance with the terms of the contract.

SECTION IX LEGAL RELATIONS

The parties hereto mutually understand and agree that the DRB member in the performance of duties on the DRB, is acting in the capacity of an independent agent and not as an employee of either party.

No party to this AGREEMENT shall bear a greater responsibility for damages or personal injury than is normally provided by Federal or State of California Law.

Notwithstanding the provisions of this contract that require the CONTRACTOR to indemnify and hold harmless the STATE, the parties shall jointly indemnify and hold harmless the DRB members from and against all claims, damages, losses, and expenses, including but not limited to attorney's fees, arising out of and resulting from the findings and recommendations of the DRB.

SECTION X CONFIDENTIALITY

The parties hereto mutually understand and agree that all documents and records provided by the parties in reference to issues brought before the DRB, which documents and records are marked "Confidential - for use by the DRB only," shall be kept in confidence and used only for the purpose of resolution of subject disputes, and for assisting in development of DRB findings and recommendations; that such documents and records will not be utilized or revealed to others, except to officials of the parties who are authorized to act on the subject disputes, for any purposes, during the life of the DRB. Upon termination of this AGREEMENT, said confidential documents and records, and all copies thereof, shall be returned to the parties who furnished them to the DRB. However, the parties understand that such documents shall be subsequently discoverable and admissible in court or arbitration proceedings unless a protective order has been obtained by the party seeking further confidentiality.

SECTION XI DISPUTES

Disputes between the parties hereto, including disputes between the DRB members and either party or both parties, arising out of the work or other terms of this AGREEMENT, which cannot be resolved by negotiation and mutual concurrence between the parties, or through the administrative process provided in the contract, shall be resolved by arbitration as provided in Section 9-1.10, "Arbitration," of the Standard Specifications.

SECTION XII VENUE, APPLICABLE LAW, AND PERSONAL JURISDICTION

In the event that any party, including an individual member of the DRB, deems it necessary to institute arbitration proceedings to enforce any right or obligation under this AGREEMENT, the parties hereto agree that such action shall be initiated in the Office of Administrative Hearings of the State of California. The parties hereto agree that all questions shall be resolved by arbitration by application of California law and that the parties to such arbitration shall have the right of appeal from such decisions to the Superior Court in conformance with the laws of the State of California. Venue for the arbitration shall be Sacramento or any other location as agreed to by the parties.

SECTION XIII FEDERAL REVIEW AND REQUIREMENTS

On Federal-Aid contracts, the Federal Highway Administration shall have the right to review the work of the DRB in progress, except for private meetings or deliberations of the DRB.

Other Federal requirements in this agreement shall only apply to Federal-Aid contracts.

SECTION XIV CERTIFICATION OF THE CONTRACTOR, THE DRB MEMBERS, AND THE STATE

IN WITNESS WHEREOF, the parties hereto have executed this AGREEMENT as of the day and year first above written.

DRB MEMBER

By: _____

Title: _____

DRB MEMBER

By: _____

Title : _____

DRB MEMBER

By : _____

Title : _____

CONTRACTOR

By: _____

Title: _____

CALIFORNIA STATE DEPARTMENT OF TRANSPORTATION

By: _____

Title: _____

5-1.13 COMPENSATION ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS

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

ITEM CODE	ITEM
390102	ASPHALT CONCRETE (TYPE A)
290211	ASPHALT TREATED PERMEABLE BASE

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 10 percent (Iu/Ib is greater than 1.10 or less than 0.90) which occur during performance of the work.

The adjustment in compensation will be determined in conformance with the following formulae when the item of asphalt concrete 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 10 percent:

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

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

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

D. Where:

A = Adjustment in dollars per tonne of paving asphalt used to produce asphalt concrete 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. 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.

5-1.14 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.

5-1.15 AREAS FOR CONTRACTOR'S USE

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

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

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

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

5-1.16 PAYMENTS

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

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

A.	Clearing and Grubbing	$4,500
B.	Bridge Removal, Location A	$ 100,000.00
C.	Bridge Removal, Location B	$ 100,000.00

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

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

A. Sound Wall (masonry block)
B. Overhead Sign Structure
C. Alternative Pipe Culverts
D. Reinforced Concrete Pipe
E. Grated Line Drain
D. Edge Drain Pipes
E. Miscellaneous Iron and Steel
F. Chain Link Fences and Gates
G. Metal Beam Guard Railing
H. Pavement Markers
I. Luminaires
J. Signal and Lighting standards
K. Signal heads and mounting brackets
L. Irrigation controller enclosure cabinets
M. Piling
N. Prestressing Steel for Cast-in-Place Members (Sealed Packages only)
O. Prestressing Ducts and Anchorages
P. Joint Seal (Type B)
Q. Joint Seal Assemblies
R. Bar Reinforcing Steel
S. Drainage Pumping Equipment
T. Pumping Plant Electrical Equipment
U. Pumping Plant Metal Work
V. Miscellaneous Metal (Bridge)
W. Railings

5-1.17 SOUND CONTROL REQUIREMENTS

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

The noise level from the Contractor's operations, between the hours of 7:00 p.m. and 7:00 a.m., shall not exceed 86 dbA at a distance of 15 m. This requirement shall not relieve the Contractor from responsibility for complying with local ordinances regulating noise level. Pile driving and earthwork compaction operations shall not be performed between 7:00 p.m. and 7:00 a.m. Monday through Saturday. For Hedding Street UC, pile driving operations shall be performed between 4:00 pm and 9:00 pm Monday through Friday .

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

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

5-1.18 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.

5-1.19 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 report, entitled "Site Investigation Report, Route 87 from Interstate 880 to Taylor Street, San Jose, California (Route 87 SCL PM 10.1)" is available for inspection at the Department of Transportation, Duty Senior's desk, 111 Grand Avenue, Oakland, California, 94623, (510) 286-5209.

Aerially deposited lead is typically found within the top 0.6-m of material in unpaved areas within the highway right of way. Levels of lead found near the project limits range from less than 2.5 to 590 mg/kg total lead with an average concentration of 50.4 mg/kg total lead, as analyzed by EPA Test Method 6010 or EPA Test Method 7000 series.

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
San Francisco Bay 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

5-1.20 ARCHAEOLOGICALLY SENSITIVE AREAS

The entire project area is within an Archaeological Sensitive Area (ASA). All construction activities within the Archaeologically Sensitive Area shall be performed in accordance with these special provisions and as directed by the Engineer.

GENERAL

It is the intent of the Department under Section 106 of the National Historic Preservation Act of 1966, the Caltrans Environmental Handbook (Vol. 2:1-2.2) and the approved Historic Properties Treatment Plan for the Upgrade of the Guadalupe Parkway, that the ASA be archaeologically monitored during construction and that major impacts to archaeological resources be avoided or minimized. Spot and on-call archaeological monitoring by a Department staff archaeologist or consulting archaeologists will be required during construction activities.

The California Public Resources Code Chapter 1.7, Section 5097.5 makes it a criminal offense for anyone to knowingly disturb a historical feature. California Public Resources Code 5097.98 and 5097.00 require protection of Native American remains which might be found, and outline procedures for handling any burials found. The California Public Resources Code Section 5097.9 and Health and Safety Code 7050 require coordination with the Native American Heritage Commission (NAHC). All archaeological artifacts found during project activities shall become the property of the State.

CONSTRUCTION

The Department will perform archaeological monitoring during construction of this project. The Contractor, subcontractors and their employees shall cooperate with the archaeologists with regard to the discovery and evaluation of archaeological materials, if any are uncovered during construction.

An archaeological pre-construction meeting with the Contractor and subcontractors shall be held prior to the start of construction. The purpose of this meeting is to discuss archaeological issues, ascertain delineation of the location of the ASA on the ground, and introduce the Department staff archaeologist to the Contractor.

No sub-surface construction activities are permitted within the ASA without approval by the Engineer and archaeological monitor. Subsurface construction activities includes excavation, installation of shoring, grading, grubbing, piling work and any other earthmoving or land surface alterations. The Contractor shall notify the Engineer at least 5 working days in advance of commencing any subsurface construction activities within the ASA. The notification shall include a schedule of the hours to be worked, including Saturdays and legal holidays.

If human skeletal material or other archaeological finds are encountered by the Contractor during construction, the Contractor shall stop work within 20 meters of the human skeletal materials or other archaeological find and shall immediately notify the Engineer. The Contractor will be directed to continue work outside of a clearly delineated location established around the find, and the archaeologists will require up to 14 working days to complete an archaeological investigation at each location.

If, in the opinion of the Engineer, the Contractor's operation is delayed or interfered with by reason of the archaeological investigation, 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, except as provided in Section 8-1.10, "Utility and Non-Highway Facilities" of the Standard Specifications.

The Contractor shall cooperate and assist the archaeologists in their work within the ASA under the direction of the Department staff archaeologist. Contractor labor, equipment, and materials required in assisting the archaeologist shall be paid as extra work as provided in Section 4-1.03D of the Standard Specifications, except for planned work described as follows:

Removal (including saw cutting) and disposal of roadway, pavement structural section, sidewalk, curb and gutter.

Handling and disposal of soils within the structure excavation limits.

All forces provided by the Contractor in order that the work performed by both the Contractor and the archaeological team conforms to the requirements in "Hazardous and Non-Hazardous Materials. General." And "Hazardous and Non-Hazardous Materials. Excavation." elsewhere in these provisions.

Except as otherwise provided in this section, full compensation for conforming to all of the requirements in this section shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefor.

MIGRATORY NESTING BIRDS

The Bassett St. Overhead is subject to nesting by cliff swallows. The nesting season for cliff swallows is between February 15th and September 1st. All construction activities on or around the structure shall be performed in accordance with these special provisions.

GENERAL

It is the intent of the Department that migratory nesting birds not be harmed during construction. Spot and on-call biological monitoring by a Department biologist will be required during the nesting season. The Contractor, subcontractors and their employees shall cooperate with the biologists with regard to the discovery of any nests, completed or partially built, or eggs during construction.

The Migratory Bird Treaty Act makes it a criminal offense for anyone to harm the cliff swallows.

The primary method used to avoid harm to the cliff swallows by this project is to prevent the swallows from nesting on any portion of the existing structure, falsework or the newly constructed bridge. There are two components to nesting prevention – inspection and the use of exclusion devices. Once nests are more than half-built, construction may be halted so that the birds, nestlings, and eggs are not harmed.

INSPECTION

A biological pre-construction meeting with the Contractor and subcontractors shall be held prior to the start of construction. The purpose of this meeting is to discuss biological issues related to the cliff swallows, provide training to the Contractor and subcontractors with regards to identifying cliff swallows, nests and nest starts, and introduce the Department staff biologist to the Contractor.

During the breeding season, the Contractor shall inspect the existing structure, falsework and newly constructed bridge at least every 2 days for nests or partially built nests. The Contractor shall maintain and submit a weekly inspection log documenting the time, date, condition, and any actions taken. Failure to detect nest starts may result in the stoppage of work.

The Contractor shall be responsible for the removal of new and partially built nests before the nests are halfway completed. Nests should be removed with a long pole or hosed off with water. These methods are to be aimed at the nests and not at the birds. No birds, nests with eggs, or nests with hatchlings shall be disturbed.

The Contractor shall notify the Engineer immediately upon discovery of active nests or of partially built nests that are more than halfway completed. All work that may impact the nest(s) shall be stopped. The Engineer will consult with Department biologists, the City of San Jose and the California Department of Fish and Game (CDFG) to develop alternatives to avoid take of the nest. Work that may impact the nest(s) shall not resume until approved by the Engineer.

The Contractor shall be responsible for any work stoppages associated with the discovery of active or partially built nests that are more than halfway completed. The Contractor shall be expected to complete all work as in Section 4, "Beginning of Work, Time of Completion, and Liquidated Damages," of these special provisions. No additional time or compensation will be allowed therefor.

The contract lump sum price paid for migratory nesting birds shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in inspecting, logging and removing nests, complete in place, as specified in these special provisions, and as directed by the Engineer.

EXCLUSION DEVICES

Exclusion devices (netting or mesh) will be installed by others prior to February 15, 2001. Upon the start of this contract, the Contractor shall be responsible for the maintenance, repair, or replacement of the exclusion devices throughout the breeding season until all of the work on the bridge is complete.

If any areas of the exclusion devices have fallen or degraded to produce an opening, the Contractor shall immediately report this condition to the Engineer, who will coordinate with Caltrans biologists to inspect the openings. After they have been inspected and assessed by the biologist, the Contractor shall make repairs to the exclusion devices as directed by the Engineer within 24 hours.

The Contractor shall remove and dispose of all exclusion devices when all of the work on the bridge is complete.

Contractor labor, equipment, and materials required to make repairs to the exclusion devices shall be paid as extra work as provided in Section 4-1.03D of the Standard Specifications except that damage to the exclusion devices caused by the Contractor shall be repaired at no cost to the State and no additional compensation will be allowed therefor.

Full compensation for all labor, materials, tools, equipment and incidentals, and for doing all work involved in protecting, maintaining, repairing damage caused by the Contractor, removing and disposing of exclusion devices 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.

VIBRATION MONITORING

This work shall consist of vibration monitoring as a means of protecting properties from excess vibration from construction activities.

Vibration monitoring shall be performed at locations and on days as determined by the Engineer. 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 meters of any building as determined by the Engineer. 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 meters of the affected property. 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. Immediately after the warning is given by the instrument, the contractor shall inform the Engineer in writing. Monitoring instrument shall be stationed within 1 meter 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 report as specified above shall be provided to the Engineer on paper and on floppy disk or recordable compact disk. The Contractor shall submit the report no later than 5 working days after each monitoring.

All measurement results and reports shall become the property of Caltrans. The Contractor shall not provide the measurement results, verbally or written, or reports to others unless approved in writing by the Engineer.

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 one to three locations.

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.

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 With Abrasion Resistant Surface (ARS)

A. Apex, Model 921AR (100 mm x 100 mm)

B. Avery Dennison (formerly Stimsonite), Models C88 (100 mm x 100 mm), 911 (100 mm x 100 mm) and 953 (70 mm x 114 mm)
C. Ray-O-Lite, Model "AA" ARS (100 mm x 100 mm)
D. 3M Series 290 (89 mm x 100 mm)

Retroreflective With Abrasion Resistant Surface (ARS)

(for recessed applications only)

A. Avery Dennison (formerly Stimsonite), Model 948 (58 mm x 119 mm)
B. Avery Dennison (formerly Stimsonite), Model 944SB (51 mm x 100 mm)*
C. Ray-O-Lite, Model 2002 (58 mm x 117 mm)
D. Ray-O-Lite, Model 2004 ARS (51 mm x 100 mm)*
*For use only in 114 mm wide (older) recessed slots

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

A. Apex Universal (Ceramic)

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

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

PAVEMENT MARKERS, TEMPORARY TYPE

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

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

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

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

A. Apex Universal, Model 932
B. Bunzl Extrusion, 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. Garlock Rubber Technologies, Series 2000
D. P.B. Laminations, Aztec, Grade 102
E. Swarco Industries, "Director-2"
F. Trelleborg Industri, R140 Series

G. 3M, Series 620 "CR", and Series A750
H. 3M, Series A145, Removable Black Line Mask
(Black Tape: for use only on Asphalt Concrete Surfaces)
I. Advanced Traffic Marking Black "Hide-A-Line"
(Black Tape: for use only on Asphalt Concrete Surfaces)
J. Brite-Line "BTR" Black Removable Tape
(Black Tape: for use only on Asphalt Concrete Surfaces)
K. Trelleborg Industri, RB-140
(Black Tape: for use only on Asphalt Concrete Surfaces)

Preformed Thermoplastic (Heated in place)

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

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

Special Use Flexible Type, 1700 mm

A. Bunzl Extrusion, Model FG 560 (with 450 mm U-Channel base)
B. Carsonite, "Survivor" (with 450 mm U-Channel base)
C. Carsonite, Roadmarker CRM-375 (with 450 mm U-Channel base)
D. FlexStake, Model 604
E. GreenLine Models HWDU and CGD (with 450 mm U-Channel base)
F. Safe-Hit with 200 mm pavement anchor (SH248-GP1)
G. 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. Bunzl Extrusion, Flex-Guide Models FG300LD and FG300UR
C. Carsonite, "Super Duck" (Flat SDF-436, Round SDR-336)
D. Carsonite, "Super Duck II" Model SDCF203601MB "The Channelizer"
E. FlexStake, Surface Mount, Models 703 and 753 TM
F. GreenLine, Model SMD-36
G. Hi-Way Safety, Inc. "Channel Guide Channelizer" Model CGC36
H. Repo, Models 300 and 400
I. Safe-Hit, Guide Post, Model SH236SMA
J. The Line Connection, "Dura-Post" Model DP36-3 (Permanent)
K. The Line Connection, "Dura-Post" Model DP36-3C (Temporary)

CONICAL DELINEATORS, 1070 mm

(For 700 mm Traffic Cones, see Standard Specifications)

A. Bent Manufacturing Company "T-Top"

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

OBJECT MARKERS

Type "K", 450 mm

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

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

A. Bent Manufacturing "Masterflex" Model MF-360-24
B. Bunzl Extrusion, Model FG324PE
C. Carsonite, Super Duck II
D. FlexStake, Model 701KM
E. Repo, Models 300 and 400
F. Safe-Hit, Models SH8 24SMA_WA and SH8 24GP3_WA
G. The Line Connection, Model DP21-4Q

CONCRETE BARRIER MARKERS AND TEMPORARY RAILING (TYPE K) REFLECTORS

Impactable Type

A. ARTUK, "FB"
B. Bunzl Extrusion, Model PCBM-12
C. Duraflex Corp., "Flexx 2020" and "Electriflexx"
D. Hi-Way Safety, Inc., Model GMKRM100
E. Sun-Lab Technology, "Safety Guide Light Model TM-5"

Non-Impactable Type

A. ARTUK, JD Series
B. Vega Molded Products, Models GBM and JD

THRIE BEAM BARRIER MARKERS

(For use to the left of traffic)

A. Bunzl Extrusion, "Mini" (75 mm x 254 mm)
B. Duraflex Corp., "Railrider"

CONCRETE BARRIER DELINEATORS, 400 mm

(For use to the right of traffic)

A. Bunzl Extrusion, Model PCBM T-16
B. Safe-Hit, Model SH216RBM
C. Sun-Lab Technology, "Safety Guide Light, Model TM16," 75 mm x 300 mm

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

A. Stinson Equipment Company "SaddleMarker"

SOUND WALL DELINEATOR

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

A. Bunzl Extrusion, PCBM S-36
B. Sun-Lab Technology, "Safety Guide Light, Model SM12," 75 mm x 300 mm

GUARD RAILING DELINEATOR

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

Wood Post Type, 686 mm

A. Bunzl Extrusion, FG 427 and FG 527
B. Carsonite, Model 427
C. FlexStake, Model 102 GR
D. GreenLine GRD 27
E. 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. Avery Dennison T-6500 Series (Formerly Stimsonite, Series 6200) (For rigid substrate devices only)
B. Nippon Carbide, Flexible Ultralite Grade (ULG) II
C. Reflexite, PC-1000 Metalized Polycarbonate
D. Reflexite, AC-1000 Acrylic
E. Reflexite, AP-1000 Metalized Polyester
F. Reflexite, Conformalight, AR-1000 Abrasion Resistant Coating
G. 3M, High Intensity

Traffic Cones, 330 mm Sleeves

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

Traffic Cones, 100 mm and 150 mm Sleeves

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

Barrels and Drums

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

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

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

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

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

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

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

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

A. Avery Dennison, T-5500 Series
B. Nippon Carbide, Nikkalite Brand Ultralite Grade II
C. 3M Series 3870

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

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

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

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

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

A. 3M LDP Series 3970

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

A. Avery Dennison, T-7500 Series

SPECIALTY SIGNS

A. All Sign Products, STOP Sign (All Plastic), 750 mm
B. Relexite "Endurance" Work Zone Sign

SIGN SUBSTRATE

Fiberglass Reinforced Plastic (FRP)

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

Aluminum

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. Sign overlay panels for roadside signs and overhead sign structures.
C. Mast arm sign hanger assemblies
D. Hardware for mounting sign panels as follows:

    1. Blind rivets for mounting overlapping legend at sign panel joints.
    2. Closure inserts.
    3. Aluminum bolts and nuts and steel beveled washers for mounting laminated sign panels on overhead sign structures.
    4. Aluminum bolts, nuts, and washers for mounting overhead formed panels.

E. Safety locks for removable bollards
F. Padlocks for irrigation controller enclosure cabinets.
G. Disks for survey monuments.H. LED modules for ramp metering vehicular traffic signal units.
I. LED modules and lamps for vehicular traffic signal units and Type A pedestrian signals.
J. Loop detector sensor units for traffic monitoring stations.
K. Model 170 controller assemblies, including controller unit, completely wired controller cabinet, and inductive loop detector sensor units for ramp metering.
M. Model 500 changeable message sign (CMS) panels including wiring harnesses and control isolation assembly (CIA).

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.

Model 500 changeable message sign, wiring harness, and controller assembly, including the controller unit and completely wired cabinet, will be furnished to the Contractor at 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.

8-1.04 ENGINEERING FABRICS

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

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

SECTION 8-2. CONCRETE

8-2.01 PORTLAND CEMENT CONCRETE

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

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

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

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

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

Qualified testing laboratories shall conform to the following requirements:

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

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

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

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

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

    1. When the calcium oxide content of a mineral admixture is equal to or less than 2 percent by mass, the amount of mineral admixture shall not be less than 15 percent by mass of the total amount of cementitious material to be used in the mix.

2. When the calcium oxide content of a mineral admixture is greater than 2 percent by mass, and any of the aggregates used are not listed on the approved list as specified in these special provisions, then the amount of mineral admixture shall not be less than 25 percent by mass of the total amount of cementitious material to be used in the mix.
3. When the calcium oxide content of a mineral admixture is greater than 2 percent by mass and the fine and coarse aggregates are listed on the approved list as specified in these special provisions, then the amount of mineral admixture shall not be less than 15 percent by mass of the total amount of cementitious material to be used in the mix.
4. When a mineral admixture that conforms to the provisions for silica fume in Section 90-2.04, "Admixture Materials," of the Standard Specifications is used, the amount of mineral admixture shall not be less than 10 percent by mass of the total amount of cementitious material to be used in the mix.
5. When a mineral admixture that conforms to the provisions for silica fume in Section 90-2.04, "Admixture Materials," of the Standard Specifications is used and the fine and coarse aggregates are listed on the approved list as specified in these special provisions, then the amount of mineral admixture shall not be less than 7 percent by mass of the total amount of cementitious material to be used in the mix.

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

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

SECTION 8-3. WELDING

8-3.01 WELDING

GENERAL

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

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

AWS Code	Year of Adoption
D1.1	2000
D1.4	1998
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 of each weld joint prior to welding, during welding, and after welding as specified in this section and as necessary to ensure that materials and workmanship conform to the requirements of the contract documents.

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

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

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

The QC Inspector may be assisted by an Assistant QC Inspector provided that this individual is currently certified as an AWS Certified Associate Welding Inspector (CAWI) in conformance with the requirements in AWS QC1, "Standard and

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

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

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

Personnel performing nondestructive testing (NDT) shall be qualified and certified in conformance with the requirements of the American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A and the Written Practice of the NDT firm. The Written Practice of the NDT firm shall meet or exceed the guidelines of the ASNT Recommended Practice No. SNT-TC-1A. Only individuals who are 1) certified as an NDT Level II, or 2) Level III technicians who hold a current ASNT Level III certificate in that discipline and are authorized and certified to perform the work of Level II technicians, 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 each joint preparation, assembly practice, welding technique, and the performance of each welder, welding operator, and tack welder to make certain that the applicable requirements of this code and the approved welding procedure specification (WPS) are met.

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

The QC Inspector shall inspect and approve each joint preparation, assembly practice, welding technique, and the 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 all welds shall be measured using suitable gages. Visual inspection for cracks in welds and base metal, and for other discontinuities should be aided by strong light magnifiers, or such other devices as may be helpful. Acceptance criteria different from those specified in this code may be used when approved by the Engineer.

Section 6.6.5, "Nonspecified 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, "Extra Work," 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 on the shop floor or project site when any welding operation is being performed, and (2) having a QC Inspector within such close proximity of all welding operations so 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 all joint preparations, assembly practices, welding techniques, and the performance of each welder, welding operator, and tack welder shall be documented by the QC Inspector on a daily basis for each day that welding is performed. The QC Inspector shall confirm and document compliance with the requirements of the AWS code criteria and the requirements of these special provisions on all weld joints before welding, during welding, and after the completion of each weld.

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

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

WELDING QUALITY CONTROL

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

Unless otherwise specified, welding quality control shall apply when any work is welded in conformance with the provisions in Section 49, "Piling," Section 52, "Reinforcement," Section 55, "Steel Structures," Section 56-1, "Overhead Sign Structures," Section 75-1.035, "Bridge Joint Restrainer Units," or Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications.

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 or manufacturing facility which is certified under the AISC Quality Certification Program, Category Cbr, Major Steel Bridges.
B. The welding is performed at a permanent fabrication or manufacturing facility which is certified under the AISC Quality Certification Program, Category Sbd, Conventional Steel Building Structures. 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.
C. The welding is performed on pipe pile material at a permanent pipe manufacturing facility where an automatic welding process or seamless pipe operation is used in conformance with the requirements in the applicable welding code as specified elsewhere in these special provisions.

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

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

The Contractor shall submit to the Engineer, in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, 3 copies of a separate WQCP for each item of work for which welding is to be performed.

The Contractor shall allow the Engineer 2 weeks to review the WQCP submittal after a complete plan has been received. Except for work that is welded in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, and for pipe piling produced at a permanent manufacturing facility as specified above, no welding shall be performed until the WQCP is approved in writing by the Engineer. Materials welded in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, and pipe piling produced at such permanent manufacturing facilities, shall not be incorporated into the work until the WQCP is approved in writing by the Engineer. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

An amended WQCP or any addendum to the approved WQCP shall be submitted to, and approved in writing by the Engineer, for proposed revisions to the approved WQCP. An amended WQCP or addendum will be required for revisions to the WQCP, including but not limited to a revised WPS, additional welders, changes in NDT firms 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 affected by the proposed revisions shall not be performed until the amended WQCP or addendum has been approved. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of

time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Each WQCP shall include the applicable portions of the following, as determined by the Engineer:

A. The name of the welding firm and any required NDT inspection personnel or firms.
B. A manual prepared by the NDT inspection personnel or firm that shall include equipment, testing procedures, code of safe practices, the Written Practice of the NDT inspection personnel or 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.
    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 authorized copy or original code book for 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.
K. Forms to be used for Certificates of Compliance, daily production logs, and daily reports.

After final approval of the WQCP, amended WQCP, or addendum, the Contractor shall submit 7 copies to the Engineer of the 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 conformance 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, and for piling produced at a permanent manufacturing facility, the following items shall be included in a Welding Report that is to be submitted to the Engineer 48 hours prior to 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.
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 in the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

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

Except for noncritical weld repairs, the Engineer shall be notified immediately in writing when welding problems, deficiencies, base metal repairs, or any other type of repairs not submitted in the WQCP are discovered and also of the proposed repair procedures to correct them. The Contractor shall allow the Engineer one week to review these procedures. No remedial work shall begin until the repair procedures are approved in writing by the Engineer. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

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

PAYMENT

Full compensation for conforming to the requirements of 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, barriers and barrier slabs at the top of five existing mechanically stabilized embankment retaining walls and one pump plant, as shown on the plans and briefly described as follows:

NORTHBOUND ON-RAMP
(Bridge No. 37-0583)

A multiple-span cast-in-place prestressed concrete box girder and slab bridge approximately 165 meters in length and of variable depth and width. Foundations utilize driven piling.

HEDDING STREET UNDERCROSSING
(Bridge No. 37-0608)

A one-span cast-in-place prestressed concrete box girder bridge approximately 37 meters in length, 1.6 meters in depth and 38 meters in width. Foundations utilize driven piling.

RTE 87/880 SEPARATION
(Bridge No. 37-0609)

A two-span cast-in-place prestressed concrete box girder bridge approximately 80 meters in length, 1.6 meters in depth and 38 meters in width. Foundations utilize driven piling. Work at this location includes removal of Guadalupe Parkway OC (Br. No. 37-0181 & 37-0182) and the existing temporary bridge.

MSE RETAINING WALL NO. 1 (MOD.)
(Bridge No. 37-0588M)

Barrier and barrier slab at the top of an existing mechanically stabilized embankment retaining wall, approximately 139 meters in length.

MSE RETAINING WALL NO. 2 (MOD.)
(Bridge No. 37-0589M)

Barrier and barrier slab at the top of an existing mechanically stabilized embankment retaining wall, approximately 137 meters in length.

MSE RETAINING WALL NO. 3 (MOD.)
(Bridge No. 37-0590M)

Barrier and barrier slab at the top of an existing mechanically stabilized embankment retaining wall, approximately 382 meters in length.

MSE RETAINING WALL NO. 4 (MOD.)
(Bridge No. 37-0591M)

Barrier and barrier slab at the top of an existing mechanically stabilized embankment retaining wall, approximately 389 meters in length.

MSE RETAINING WALL NO. 5 (MOD.)
(Bridge No. 37-0595M)

Barrier and barrier slab at the top of an existing mechanically stabilized embankment retaining wall, approximately 193 meters in length.

TALYOR ST. FRONTAGE RD. PUMP PLANT
(Bridge No.37-0635W)

A reinforced concrete pumping plant with related mechanical and electrical equipment.

SECTION 10. CONSTRUCTION DETAILS

SECTION 10-1. GENERAL

10-1.00 CONSTRUCTION PROJECT INFORMATION SIGNS

Before any major physical construction work readily visible to highway users is started on this contract, the Contractor shall furnish and erect 2 Type 2 Construction Project Information signs at the locations designated by the Engineer.

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

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

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

FEDERAL HIGHWAY TRUST FUNDS
STATE HIGHWAY FUNDS

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

HIGHWAY CONSTRUCTION

The sign message to be used for the Year of Completion of Project Construction will be furnished by the Engineer. The Contractor shall furnish and install the "Year" sign overlay within 10 working days of notification of the year date to be used.

The letter sizes to be used shall be as shown on the plans. The information shown on the signs shall be limited to that shown on the plans.

The signs shall be kept clean and in good repair by the Contractor.

Upon completion of the work, the signs shall be removed and disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.

Full compensation for furnishing, erecting, maintaining, and removing and disposing of the construction project information signs shall be considered as included in the contract lump sum price paid for construction area signs and no additional compensation will be allowed therefor.

10-1.01 ORDER OF WORK

Order of work shall conform to the provisions in Section 5-1.05, "Order of Work," of the Standard Specifications and these special provisions.

A first order of work shall be to construct the "Designated Portion of the Work" as described below.

DESIGNATED PORTION OF THE WORK

The following is defined as "Designated Portion of the Work":

Route 87 shall be completely open to public traffic on all lanes of the permanent roadway from Stations G 145+00 to G 160+00 (including the Taylor Street southbound off-ramp and final pavement delineation and signing from Stations G 138+00 to G 178+00). There shall be no further lane or shoulder closures on the main line, unless authorized by the Engineer.

The work defined as "Designated Portion of the Work" shall be diligently prosecuted to completion before the expiration of

270 WORKING DAYS.

Attention is directed to Section 4, "Beginning of Work, Time of Completion and Liquidated Damages," of these special provisions regarding completion of the work within the "Designated Portion of the Work."

If the "Designated Portion of the Work" is not completed within the prescribed working days, the Engineer shall have the authority to suspend all other work on the project until the "Designated Portion of the Work" is complete.

Hedding Street may be closed to vehicular traffic for a maximum of six (6) months from the date of its actual closure. Pedestrian traffic shall be maintained at all times. The Hedding Street closure is allowed only to construct the Hedding Street Undercrossing. The City of San Jose Traffic department shall be notified of this closure 15 days in advance of the closure.

Pile driving for Hedding Street Undercrossing shall be limited to the hours between 4:00 p.m. to 9:00 p.m. weekdays only. For Saturday the pile driving is limited to the hours between 7:00 a.m. to 7:00 p.m. No pile driving is allowed on Sunday and Legal Holidays.

At the Armory Center Parking Lot No.2 temporary construction easement from 40 m Rt. G151+57 to 45 m Rt. G 152+83,asphalt concrete paving shall be done on weekends only. The temporary construction easement (TCE) for the State of California Armory will not be available until December 2003. The TCE for the Santa Clara County Transit District (VTA) light rail yard is not available until August 1, 2004. The TCE for the Santa Clara County Juvenile Center is not available until August 1, 2004. These TCE's are only available for the time period required to perform the work as shown on the plans.

Attention is directed to "Vibration Monitoring" of these special provisions. Prior to performing pile driving, hauling, placement of basement material, earthwork compaction, and paving operations, vibration monitoring for baseline reading shall be completed.

Attention is directed to "Sound Control Requirements" of these special provisions.

Attention is directed to "Migratory Nesting Birds" of these special provisions.

Attention is directed to "Archaeologically Sensitive Areas" of these special provisions.

Attention is directed to "Slope Paving" of these special provisions regarding constructing a 1.2 m by 1.8 m test panel prior to placing the permanent slope paving.

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.

All work on City streets in the City of San Jose shall require a permit from the City of San Jose. The permit shall be at no cost to the Contractor, except penalties for violations of the permit regulations shall be the responsibility of the Contractor. Regulations and local ordinances for the City of San Jose will be available to the prospective bidders at:

City of San Jose
Department of Transportation
1404 Mabury Road
San Jose, CA 95133
Phone (408) 277-5515

Before starting work, the Contractor shall submit to the Engineer writing description and detailed schedule of the intended operations relative to keeping the traffic signals and street lighting in operation. Such schedule shall be part of the progress schedule required in Section 10-3, "Signal, Lighting and Electrical Systems," of these special provisions.

The 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 (traffic stripes, pavement markings, and pavement markers) that is to be replaced on the same alignment and location, as determined by the Engineer, the pavement delineation shall be referenced by the Contractor, with a sufficient number of control points to reestablish the alignment and location of the new pavement delineation. The references shall include the limits or changes in striping pattern, including one- and 2-way barrier lines, limit lines, crosswalks and other pavement markings. Full compensation for referencing existing pavement delineation shall be considered as included in the contract prices paid for new pavement delineation and no additional compensation will be allowed therefor.

Prior to applying asphalt concrete, the Contractor shall cover all manholes, valve and monument covers, grates, or other exposed facilities located within the area of application, using a plastic or oil resistant construction paper secured to the facility being covered by tape or adhesive. The covered facilities shall be referenced by the Contractor, with a sufficient number of control points to relocate the facilities after the asphalt concrete has been placed. After completion of the asphalt concrete paving operation, all covers shall be removed and disposed of in a manner satisfactory to the Engineer. Full compensation for covering manholes, valve and monument covers, grates, or other exposed facilities, referencing, and removing temporary cover shall be considered as included in the contract price paid per tonne for asphalt concrete (Type A), and no additional compensation will be allowed therefor.

At the end of each working day if a difference in excess of 0.045 -meter exists between the elevation of the existing pavement and the elevation of excavations within 1.5 m of the traveled way, material shall be placed and compacted against the vertical cuts adjacent to the traveled way. During excavation operations, native material may be used for this purpose; however, once placing of the structural section commences, structural material shall be used. The material shall be placed to the level of the elevation of the top of existing pavement and tapered at a slope of 1:4 (vertical:horizontal) or flatter to the bottom of the excavation. 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 the material is required, and subsequent removing or reshaping of the material to the lines and grades shown on the plans shall be considered as included in the contract price paid for the materials involved and

no additional compensation will be allowed therefor. No payment will be made for material placed in excess of that required for the structural section.At those locations exposed to public traffic where guard railings are to be constructed,, or removed, the Contractor shall schedule operations so that at the end of each working day there shall be no post holes open nor shall there be any railing posts installed without the blocks and rail elements assembled and mounted thereon.

Attention is directed to "Environmentally Sensitive Areas (General)" and " Temporary Fence (Type ESA)," of these special provisions regarding establishing the and delineating the limits of environmentally sensitive areas in the field, as shown on the plans, prior to beginning work.

Not less than 60 days prior to applying seeds, the Contractor shall furnish the Engineer a statement from the vendor that the order for the seed required for this contract has been received and accepted by the vendor. The statement from the vendor shall include the names and quantity of seed ordered and the anticipated date of delivery.

Attention is directed to "Move in/Move out (Erosion Control)" in these special provisions regarding the mobilization of equipment and materials for erosion control work.

Attention is directed to "Fiber Rolls" of these special provisions, regarding restrictions for erosion control (Type D) operations.

Attention is directed to "Erosion Control (Netting)" of these special provisions, regarding restrictions for erosion control (Type D) operations.

If the project is scheduled to include any dates between January 1 and August 15, Caltrans biologists, through the Engineer, need to be notified at least 30 days prior to the start of construction. Caltrans biologists will perform pre-construction bird surveys to identify any areas of special concern. Areas of special concern may include, but not be limited to, raptors nesting in trees to be disturbed or ground nesting birds that may be impacted.

If the Caltrans biologists determine that no birds are nesting within the project area or in the trees within the zone of potential disturbance, then the project can proceed as planned.

If nests are observed, Caltrans biologists will make a field determination if the construction activity would adversely affect the nesting birds. If the Caltrans biologists determine the construction activity will not adversely affect the nesting birds, then the project can proceed as planned.

If the construction activity is determined to have an adverse affect on the nesting birds, then the Caltrans biologists will establish a construction-free buffer zone around each nest. The contractor will be prohibited from performing work within the buffer zones until the birds have completed all nesting activities.

Additionally, Caltrans biologists, through the resident engineer, must be notified of any periods longer than ten calendar days in which no work will be performed at the site. Caltrans biologists will determine whether the site must be re-surveyed for nesting birds at that time.

When embankment settlement periods or surcharge embankment settlement periods are specified, the settlement periods and the deferment of portions of the work shall comply with the provisions in Section 19-6.025, "Settlement Period," of the Standard Specifications and in "Earthwork" of these special provisions.

Installation of the Taylor Street Frontage Road Pumping Plant will be required for the completion of this contract. The contractor shall be responsible for temporary erosion control, as described elsewhere in these special provisions. Upon completion of the pumping plant work 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 Taylor Street Frontage Road Pumping Plant.

The total drainage capacity to be maintained shall not be less than 12,114 liters per minute at 4.95 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 pumps, sump pumps and discharge piping; or

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 Region 2 - 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, including State Water Resources Control Board (SWRCB) Resolution No. 2001-046, and the NPDES Permit for the State of California Department of Transportation Properties, Facilities, and Activities, No. CAS000003, Order No, 99-06-DWQ issued by the SWRCB. These permits, hereafter referred to as the "Permits," regulate storm water discharges associated with construction activities.

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

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

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

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

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

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

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

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

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

STORM WATER POLLUTION PREVENTION PLAN PREPARATION, APPROVAL AND AMENDMENTS

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

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

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

Within 30 days after the approval of the contract, the Contractor shall submit 3 copies of the draft SWPPP to the Engineer. The Engineer will have 15 days to review the SWPPP. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the SWPPP within 15 days of receipt of the Engineer's comments. The Engineer will have 5 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. If the Engineer does not review or approve the SWPPP within the time specified, compensation will be made in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The SWPPP shall apply to all areas that are directly related to construction including, but not limited to, staging areas, storage yards, material borrow areas, and access roads within or outside of the highway right-of-way.

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

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

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

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

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
Non Storm Water Control	NS-2 Dewatering Operations NS-3 Paving and Grinding Operations
Waste Management & Materials Pollution Control	WM-3 Stockpile Management WM-8 Concrete Waste Management

The following contract items of work, shall be incorporated into the SWPPP as "Temporary Water Pollution Control Practices": Temporary Concrete Washout Facility, Temporary Drainage Inlet Protection, Temporary Construction Road (Entrance/Exit), Temporary Silt Fence and Temporary Cover. The Contractor's attention is directed to these special provisions provided for each temporary water pollution control .

The following contract items of work, as shown on the project plans or as specified elsewhere in these special provisions, shall be identified in the SWPPP as permanent water pollution control practices: Erosion Control Mulch, Erosion Control Netting, Fiber Rolls, Drain Inlet Protection, Concrete Drainage Apron (FES) and Concrete Drainage Apron (Type G Grates). 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

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

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

COST BREAK-DOWN

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

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

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

The sum of the amounts for the units of work listed in the cost break-down shall be equal to the contract lump sum price paid for water pollution control. 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. Attention is directed to "Overhead" of these special provisions.

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. 04-4874R4

UNIT DESCRIPTION	UNIT	APPROXIMATE QUANTITY	VALUE	AMOUNT
MINIMUM REQUIREMENTS:				
SS-1 Scheduling	LS	Lump Sum		
SS-2 Preservation of Existing Vegetation	LS	Lump Sum		
SS-3 Hydraulic Mulch	LS	Lump Sum		
SC-7 Street Sweeping and Vacuuming	LS	Lump Sum		
WE-1 Wind Erosion Control	LS	Lump Sum		
NS-6 Illicit Connection/Illegal Discharge Detection and Reporting	LS	Lump Sum		
NS-8 Vehicle and Equipment Cleaning	LS	Lump Sum		
NS-9 Vehicle and Equipment Fueling	LS	Lump Sum		
NS-10 Vehicle and Equipment Maintenance	LS	Lump Sum		
WM-1 Material Delivery and Storage	LS	Lump Sum		
WM-2 Material Use	LS	Lump Sum		
WM-4 Spill Prevention and Control	LS	Lump Sum		
WM-5 Solid Waste Management	LS	Lump Sum		
WM-9 Sanitary/Septic Waste Management	LS	Lump Sum		
SPECIAL REQUIREMENTS:				
NS-2 Dewatering Operations	LS	Lump Sum		
NS-3 Paving and Grinding Operations	LS	Lump Sum		
WM-3 Stockpile Management	LS	Lump Sum		
WM-8 Concrete Waste Management	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 (Storm Water Pollution Prevention Plan)," the Engineer may order the suspension of construction operations which create water pollution.

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

Year-Round Implementation Requirements

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

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

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

In order to provide effective erosion control the Contractor may be directed to apply permanent erosion control in small or multiple units as disturbed soil areas are deemed substantially complete by the Engineer. The Contractor's attention is directed to "Erosion Control (Type C) (Type D)" 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
Temporary Construction Entrance	Used at the interface between the project site and public/private road

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 15 and April 15.

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 2.0 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 Preparation Manual or an alternative inspection checklist provided by the Engineer. One copy of each site inspection record shall be submitted to the Engineer within 24 hours of completing the inspection.

REPORTING REQUIREMENTS

Report of Discharges, Notices or Orders

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

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

Report of First-Time Non-Storm Water Discharge

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

Annual Certifications

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

PAYMENT

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

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

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

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

Storm water sampling and analysis will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

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

Soil Stabilization

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

Sediment Control

All temporary water pollution control practices.

Tracking Control

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

Wind Erosion Control

All temporary water pollution control practices.

Non-Storm Water Control

No sharing of maintenance costs will be allowed.

Waste Management & Material Control

No sharing of maintenance costs will be allowed.

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

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

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

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

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

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

10-1.03 TEMPORARY COVER

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

The Contractor shall use temporary cover as one of the various measures to prevent water pollution. The Storm Water Pollution Prevention Plan shall include the use of temporary cover.

Attention is directed to "Water Pollution Control" of these special provisions. Temporary cover is used as a temporary soil stabilization control.

MATERIALS

Temporary Cover Fabric

Temporary cover fabric shall be either a geomembrane (plastic sheeting) or a geotextile (engineering fabric) conforming to one of the following requirements:

A. The geotextile shall be a woven, slit film fabric which is also known as woven tape. The fabric shall be non-biodegradable, resistant to deterioration by sunlight, and inert to most soil chemicals. Edges of the woven, silt film fabric shall be selvaged or serged to prevent unraveling. The temporary cover fabric shall also conform to the following requirements:

Specification	Requirements
Grab tensile strength (25-mm grip), kilonewtons, minimum ASTM Designation: D4632*	0.89
Elongation at break, percent, minimum ASTM Designation: D4632*	15
Toughness, kilonewtons, minimum (percent elongation x grab tensile strength)	13.3
Permittivity, 1/sec, maximum, (liters per minute per square meter) ASTM Designation: D 4491	0.08 (244)
Ultraviolet light stability, percent tensile strength retained after 500 hours, minimum ASTM Designation: D 4355 (xenon arc lamp method)	70

* or appropriate test method for specific polymer

B. Geomembrane shall consist of 0.25-mm thick, single-ply material in conformance to the requirements in ASTM Designation: D 5199.

The geomembrane or geotextile shall be manufactured from polyethelene or polypropylene, or comparable polymers in conformance with these special provisions. The polymer materials may be virgin, recycled, or a combination of virgin and recycled materials. No virgin or recycled polymer materials shall contain biodegradable filler materials that can degrade the physical or chemical characteristics of the finished fabric. The Engineer may order tests to confirm the absence of biodegradable filler materials in conformance to the requirements in ASTM Designation: E 204 (Fourier Transformed Infrared Spectroscopy-FTIR).

Restrainers

Restrainers for securing the temporary cover fabric on the slope and stockpile shall consist of one or a combination of the following:

A. Gravel-filled bags, when used as restrainers, shall be knotted, roped, and placed at a maximum of 2 m apart on the temporary cover fabric as shown on the plans. Gravel-filled bags shall be between 600 mm and 800 mm in length, and between 400 mm and 500 mm in width. The gravel bag fabric shall be non-woven polypropylene geotextile with a minimum unit weight of 235 g/m^2. The fabric shall have a minimum grab tensile strength (25-mm grip) of

0.89 kN in conformance to the requirements in ASTM Designation: D 4632, and an ultraviolet (UV) stability of 70 percent tensile strength retained after 500 hours in conformance to the requirements in ASTM Designation: D 4355, xenon arc lamp method. Gravel shall consist of non-cohesive material between 5 mm and 75 mm in diameter, free of clay balls, organic matter, and other deleterious material. The opening of filled gravel bags shall be secured to prevent escape of gravel. Each filled gravel bag shall be between 13 kg and 22 kg in mass.

B. Restrainers consisting of steel anchor with wooden lath shall be fabricated and placed as shown on the plans. Wooden lath shall conform to the provisions in Section 20-2.12, "Lumber," of the Standard Specifications and shall be fir or pine, 38 mm x 89 mm in size, and 2.4 m in length. The wooden lath shall be secured to the temporary cover with steel anchors placed 1.2 m apart along the lath.

The Contractor may use an alternative restrainer if approved by the Engineer in writing. The Contractor shall submit details for an alternative restrainer to the Engineer prior to installation. Any increase in cost for the alternative restrainer shall be borne by the Contractor. The alternative restrainer shall be installed and maintained in conformance with these special provisions.

INSTALLATION

Temporary cover shall be installed as follows:

A. Temporary cover fabric shall be placed and anchored as shown on the plans.
B. Abutting edges of the temporary cover fabric shall overlap a minimum length of 0.6-m. Non-abutting edges shall be embedded in the soil a minimum length of 150 mm.
C. Restrainers shall be placed at the overlap area and along the toe of the slope. Restrainers outside the overlap areas shall be placed at a maximum spacing of 2.4 m apart.
D. Steel anchors shall be installed to allow the leg of the steel anchor to pierce through the temporary cover fabric into the slope with the crown section securing the wooden lath firmly against the slope.
E. Earthern berm, a linear sediment barrier, shall be constructed adjacent to the toe of the slope with a minimum height of 200 mm and a minimum width of 940 mm. The earthern berms shall be hand or mechanically compacted. Alternative linear sediment barrier may be used at the Constractor's expense if approved by the Engineer in writing .

Temporary cover that is damaged as a result of the Contractor’s operations shall be replaced by the Contractor at his expense.

When no longer required as determined by the Engineer, temporary cover shall be removed and disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way" of the Standard Specifications.

MAINTENANCE

The Contractor shall maintain the temporary cover throughout the contract to prevent displacement or migration of the stockpiled material.

Temporary cover shall be maintained to minimize exposure of the protected area. Restrainers shall be relocated and secured as needed to restrain the temporary cover fabric in place. Temporary cover that breaks free shall be immediately secured. Holes, tears, and voids in the temporary cover fabric shall be replaced, or patched and repaired. When patches or repairs are unacceptable as determined by the Engineer, the temporary cover shall be replaced.

MEASUREMENT AND PAYMENT

The contract price paid per square meter for temporary cover shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing, maintaining, and removing the 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 other works, the temporary cover shall be replaced and secured by the Contractor at no additional cost to the State.

The cost of maintaining the temporary cover will be divided equally by the State and the Contractor.

The division of cost will be made by determining the cost of maintaining temporary cover in conformance with the provisions in Section 9-1.03, "Force Account Payment," of the Standard Specifications. Clean-up, repair, removal, disposal, replacement because of improper installation, and replacement of temporary cover damaged as a result of the Contractor's negligence will not be considered as included in the cost for performing maintenance.

10-1.04 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.

The Contractor shall select the appropriate drainage inlet protection shown on the plans to meet 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 at each location. Each proposed drainage inlet protection shall be approved by the Engineer to ensure safety.

Throughout the duration of the Contract, the Contractor shall be required to provide protection to meet with the changing condition of the drainage inletSome conditions may require combining materials outlined in the special provision to address conditions that cannot be anticipated in advance . 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 250g/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.

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 as shown on the plans.

INSTALLATION AND MAINTENANCE

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 rock bag dike . 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 expense.

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 or as approved by the Engineer. The protection is measured one time only and no additional measurement is recognized and no additional compensation made if the temporary drainage inlet protection changes during the course of construction.

Temporary Drainage Inlet Protection shall be measured and paid for as Temporary Drainage Inlet Protection.

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 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.

10-1.05 TEMPORARY CONCRETE WASHOUT FACILITY

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

Temporary concrete washout facilities shall be used as one of the various measures to prevent water pollution. The Storm Water Pollution Prevention Plan shall include the use of temporary concrete washout facilities.

Attention is directed to "Water Pollution Control" of these special provisions.

MATERIALS

Plastic Liner

Plastic liner shall be single ply, new polyethylene sheeting, a minimum of 0.25-mm thick and shall be free of holes, punctures, tears or other defects that compromise the impermeability of the material. Plastic liner shall not have seams or overlapping joints.

Gravel-filled Bags

Gravel-filled bag fabric shall be non-woven polypropylene geotextile (or comparable polymer), with a minimum unit weight of 235 g/m^2. The fabric shall have a minimum grab tensile strength of 0.89-kilonewtons in conformance to the requirements in ASTM Designation: D 4632, 25-mm grip, and an ultraviolet (UV) stability of 70 percent tensile strength retained after 500 hours in conformance to the requirements in ASTM Designation: D 4355, xenon arc lamp method.

Gravel-filled bags shall be between 600 mm and 800 mm in length, and between 400 mm and 500 mm in width.

Gravel shall be between 5 mm and 75 mm in diameter, and shall be clean and free from clay balls, organic matter, and other deleterious materials. The opening of filled gravel-filled bags shall be secured such that gravel does not escape. Gravel-filled bags shall be between 13 kg and 22 kg in mass.

Straw Bales

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

Straw bales shall be a minimum of 360 mm in width, 450 mm in height, 900 mm in length and shall have a minimum mass of 23 kg. The straw bale shall be composed entirely of vegetative matter, except for binding material.

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

Stakes

Stakes shall be 50 mm x 50 mm wood posts. Metal stakes may be used as an alternative, and shall be a minimum 13 mm in diameter. Stakes shall be a minimum 1200 mm in length. The tops of the metal stakes shall be bent at a 90-degree angle or capped with an orange or red plastic safety cap that fits snugly to the metal stake. The Contractor shall submit a sample of the metal stake and plastic cap, if used, to the Engineer prior to installation.

Staples

Staples shall be as shown on the plans.

Signs

Signs shall be constructed as shown on the plans. Wood posts shall conform to the provisions in Section 56-2.02B, "Wood Posts," of the Standard Specifications. Lag screws shall conform to the provisions in Section 56-2.02D, "Sign Panel Fastening Hardware," of the Standard Specifications.

Plywood shall be freshly painted for each installation with not less than 2 applications of flat white paint. Sign letters shown on the plans shall be stenciled with commercial quality exterior black paint. Testing of paint will not be required.

INSTALLATION

Temporary concrete washout facilities shall be installed on grade or below grade as shown on the plans and as follows:

A. Temporary concrete washout facilities shall be installed prior to beginning placement of concrete and located a minimum of 15 m from storm drain inlets, open drainage facilities, and water courses unless determined infeasible by the Engineer. Temporary concrete washout facilities shall be located away from construction traffic or access areas at a location determined by the Contractor and approved by the Engineer.
B. A sign shall be installed adjacent to each washout facility at a location determined by the Contractor and approved by the Engineer. Signs shall be installed in conformance with the provisions in Section 56-2.03, "Construction," and Section 56-2.04, "Sign Panel Installation," of the Standard Specifications and as shown on the plans.
C. The length and width of a temporary concrete washout facility may be increased from the minimum dimensions shown on the plans, at the Contractor's expense and upon approval of the Engineer.
D. Temporary concrete washout facilities shall be constructed in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations for all concrete wastes. These facilities shall be constructed to contain all liquid and concrete waste without seepage, spillage or overflow.
E. Berms for below grade temporary concrete washout facilities shall be constructed from compacted native material. Gravel may be used in conjunction with compacted native material
F. Plastic liner may be installed in below grade temporary concrete washout facilities at the option of the Contractor. No additional compensation will be allowed for the use of plastic liner in below grade temporary concrete washout facilities.

The Contractor may use an alternative temporary concrete washout facility if approved by the Engineer in writing. The Contractor shall submit details for an alternative temporary concrete washout facility to the Engineer at least 7 days prior to installation. Any increase in cost, including maintenance costs, for the alternative temporary concrete washout facility shall be borne by the Contractor. The alternative temporary concrete washout facility shall be installed and maintained in conformance with these special provisions.

When temporary concrete washout facilities are no longer required for the work, as determined by the Engineer, the hardened concrete and liquid residue shall be removed and disposed of in conformance with the provisions in Section 15-3.02, "Removal Methods," of the Standard Specifications. Material used to construct temporary concrete washout facilities shall become the property of the Contractor, shall be removed from the site of the work, and shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Holes, depressions or other ground disturbance caused by the installation and 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.

MAINTENANCE

Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 300 mm. 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. Holes, rips, and

voids in the plastic liner shall be patched and repaired by taping or the plastic liner shall be replaced. Plastic liner shall be replaced when patches or repairs compromise the impermeability of the material as determined by the Engineer.

MEASUREMENT AND PAYMENT

The contract unit 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 temporary concrete washout facilities, complete in place, including maintenance, removal of materials, and backfilling and repairing holes, depressions and other ground disturbance, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.06 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.

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. The minimum number of temporary entrance/exits required shall be 4.

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, "Certificate 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.
H. For temporary entrance/exits (Type 2), a minimum of three panel sections shall be coupled to one another at each temporary entrance/exits.

A sump shall beconstructed 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 day when temporary entrance/exits are in use. Soil and sediment or other extraneous material tracked onto pavement shall be prevented from entering drainage facilities and shall be removed at least once each day.

When 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 unit 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.

10-1.07 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 .

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.

10-1.08 TEMPORARY FENCE (WITH 3 LINES OF BARBED WIRE)

Temporary fence (With 3 Lines of Barbed Wire) 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 (With 3 Lines of Barbed Wire) 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. Temporary fence (With 3 Lines of Barbed Wire) shall be portable type with concrete block footings. Temporary fence (With 3 Lines of Barbed Wire) shall have 3 lines of barbed wire on top. Such portable fence when mounted on the ground shall be prevented from any lateral movement and shall be maintained on its location until no longer needed.

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.

Temporary fence (With 3 Lines of Barbed Wire) 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 (With 3 Lines of Barbed Wire) 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.

Temporary fence (With 3 Lines of Barbed Wire) 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 (With 3 Lines of Barbed Wire) shall be considered as included in the contract prices paid per meter for temporary fence (With 3 Lines of Barbed Wire) and no additional compensation will be allowed therefor.

10-1.09 TEMPORARY HIGH VISIBILITY FENCE

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

MATERIALS

Used materials may be installed provided the used materials conform to these special provisions. Materials for temporary high visibility fence shall conform to the following:

High Visibility Fabric

High visibility fabric shall be machine produced mesh manufactured from polypropylene or polyethylene and shall be orange in color. High visibility fabric may be virgin or recycled polymer materials, or a combination of virgin and recycled polymer materials. No virgin or recycled polymer materials shall contain biodegradable filler materials that degrade the physical or chemical characteristics of the finished fabric. High visibility fabric shall be fully stabilized ultraviolet (UV) resistant. High visibility fabric shall be a minimum of 1.22 m in width with a maximum mesh opening of 50 mm x 50 mm. High visibility fabric shall be furnished in one continuous width and shall not be spliced to conform to the specified width dimension.

Posts

Posts for temporary high visibility fence shall be of one of the following:

A. Posts shall be fir or pine, a minimum of 38 mm x 50 mm in size, and a minimum 1.6 m in length. One end of the post shall be pointed. Posts shall not be treated with wood preservative.
B. Posts shall be steel and have a "U", "T", "L" or other cross sectional shape that resists failure by lateral loads. Steel posts shall have a minimum mass per length of 1.1 kg/m and a minimum length of 1.6 m. One end of the steel post shall be pointed and the other end shall have a high visibility colored top.

Fasteners

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

A. The high visibility fabric shall be attached to wooden posts with commercial quality nails or staples, or as recommended by the manufacturer or supplier, as determined by the Engineer.
B. Tie wire or locking plastic fasteners shall be used for attaching the high visibility fabric to steel posts. Maximum spacing of tie wire or fasteners shall be 600 mm along the length of the steel post.

INSTALLATION

Temporary fence high visibility shall be installed as follows:

A. Posts shall be driven into the soil a minimum of 400 mm. Posts shall be spaced at 2-m centers minimum and shall at all times support the fence in a vertical, upright position.
B. Temporary high visibility fence shall be constructed prior to any clearing and grubbing work and a sufficient distance from protected plants to enclose all of the foliage canopy and not encroach upon visible roots of the plants.
C. Temporary high visibility fence shall be located to be unobstructed from view, as determined by the Engineer.

When no longer required for the work, as determined by the Engineer, temporary high visibility fence shall be removed. Removed temporary fence shall become the property of the Contractor and shall be removed from the site of the work, except when reused as provided in this section.

Holes caused by the removal of temporary high visibility fence shall be backfilled in conformance with the provisions in the second paragraph of Section 15-1.02, "Preservation of Property," of the Standard Specifications.

MAINTENANCE

Temporary high visibility fence that is damaged during the progress of the work shall be repaired or replaced by the Contractor the same day the damage occurred.

MEASUREMENT AND PAYMENT

Temporary high visibility fence shall be measured in the manner specified for permanent fences in Section 80, "Fences," of the Standard Specifications.

The contract price paid per meter for temporary high visibility fence shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing temporary high visibility fence) complete in place, including maintenance and removal and disposal of materials, as specified in these special provisions,and as directed by the Engineer.

10-1.10 ENVIRONMENTALLY SENSITIVE AREA

Attention is directed to the designated Environmentally Sensitive Areas (ESAs) shown on the plans. The exact location of the boundaries of ESAs will be determined by the Engineer and shall be clearly delineated by the placement of temporary high visibility fence as specified in these special provisions.

Vehicle access, storage or transport of materials or equipment, or other project related activities are prohibited within the boundaries of ESAs.

The Contractor shall repair, or perform work to mitigate, damage or impacts to ESAs caused by the Contractor's operations, at the Contractor's expense. If the Engineer determines repairs or mitigation work will be performed by others, or if mitigation fees are assessed the Department, deductions from moneys due or to become due the Contractor will be made for the repair or mitigation costs.

10-1.11 PRESERVATION OF PROPERTY

Attention is directed to Section 7-1.11, "Preservation of Property," of the Standard Specifications and these special provisions.

Existing trees, shrubs and other plants, that are not to be removed as specified in these special provisions, and are injured or damaged by reason of the Contractor's operations, shall be replaced by the Contractor. The minimum size of tree replacement shall be 610 mm box and the minimum size of shrub replacement shall be No. 15 container. Replacement ground cover plants shall be from flats and shall be planted 300 mm on center. Replacement planting shall conform to the requirements in Section 20-4.07, "Replacement," of the Standard Specifications. The Contractor shall water replacement plants in conformance with the provisions in Section 20-4.06, "Watering," of the Standard Specifications.

Damaged or injured plants shall be removed and disposed of outside the highway right of way in conformance with the provisions in Section 7-l.13 of the Standard Specifications. At the option of the Contractor, removed trees and shrubs may be reduced to chips. The chipped material shall be spread within the highway right of way at locations designated by the Engineer.

Replacement planting of injured or damaged trees, shrubs and other plants shall be completed not less than 20 working days prior to acceptance of the contract. Replacement plants shall be watered as necessary to maintain the plants in a healthy condition.

10-1.12 TEMPORARY CONSTRUCTION ENTRANCE

Temporary construction entrance shall be constructed, maintained, and later removed in conformance with the details as shown on the plans, as specified in these special provisions and as directed by the Engineer.

Temporary construction entrance shall be either Type 1 or Type 2 at the option of the Contractor.

The Contractor shall use temporary construction entrance as one of the various measures to prevent water pollution. The Storm Water Pollution Prevention Plan shall include the use of temporary construction entrance.

Attention is directed to "Water Pollution Control" of these special provisions. Temporary construction entrance is used as a temporary sediment tracking control.

MATERIALS

Temporary Entrance Fabric

Temporary entrance fabric shall be manufactured from polyester, nylon or polypropylene material or any combination thereof. Temporary entrance fabric shall be a nonwoven, needle-punched fabric, and free of any needles which may have broken off during the manufacturing process. Temporary entrance fabric shall be permeable and shall not act as a wicking agent.

Temporary entrance fabric shall be manufactured from virgin or recycled, or a combination of virgin and recycled polymer materials. No virgin or recycled materials shall contain biodegradable filler materials that can degrade the physical or chemical characteristics of the finished fabric. The Engineer may order tests to confirm the absence of biodegradable filler materials in conformance to the requirements in ASTM Designation: E 204 (Fourier Transformed Infrared Spectroscopy-FTIR).

Temporary entrance fabric shall conform to the following requirements:

Specification	Requirements
Mass per unit area, grams per square meter, minimum ASTM Designation: D 5261	235
Grab tensile strength (25-mm grip), kilonewtons, minimum ASTM Designation: D4632*	0.89
Elongation at break, percent, minimum, ASTM Designation: D4632*	50
Toughness, kilonewtons, minimum (percent elongation x grab tensile strength)	53

* or appropriate test method for specific polymer

Rocks

Rocks shall be angular to subangular in shape, and shall conform to the material requirements in Section 72-2.02, "Materials," of the Standard Specifications for apparent specific gravity, absorption, and durability index. Rocks used for the temporary entrance shall conform to the following sizes:

Square Screen Size (mm)	Percentage Passing
150	100
75	0-20

Corrugated Steel Panels

Corrugated steel panels shall be prefabricated and shall be pressed or shop welded as shown on the plans, with a slot or hooked section to facilitate coupling at the ends of the panels.

INSTALLATION

Temporary construction entrance shall be installed as follows:

A. Prior to placing the temporary entrance fabric, the areas shall be cleared of all trash and debris. Vegetation shall be removed to the ground level. Trash, debris, and removed vegetation 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.
B. A sump shall be constructed within 6 m of each temporary construction entrance as shown on the plans. The exact location of the sump will be determined by the Engineer.
C. Before placing the temporary entrance fabric, the ground shall be graded to a uniform plane with a minimum 90 percent compaction. The ground surface shall be free of sharp objects that may damage the temporary entrance fabric, and shall be graded to drain to the sump as shown on the plans.
D. Temporary entrance fabric shall be positioned longitudinally along the alignment of the entrance, as directed by the Engineer.
E. The adjacent ends of the fabric shall be overlapped a minimum length of 300 mm.
F. Rocks to be placed directly over the fabric shall be spread in the direction of traffic, longitudinally and along the alignment of the temporary construction entrance.

G. During spreading of the rocks, vehicles or equipment shall not be driven directly on the fabric. A minimum of 150 mm thick layer of rocks will be required between the fabric and the spreading equipment to prevent damage to the fabric.
H. Fabric damaged during rock placement 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.
I. For Type 2 temporary construction entrance, a minimum of 6 coupled panel sections shall be installed for each temporary construction entrance. Prior to installing the panels, the ground surface shall be cleared of all debris to ensure uniform contact with the ground surface.

Damage to the fabric resulting from the Contractor's vehicles, equipment, or operations shall be repaired at the Contractor's expense.

While the temporary construction entrance are in use, pavement shall be cleaned and sediment removed at least once a day, and as often as necessary when directed by the Engineer. Soil and sediment or other extraneous material tracked onto existing pavement shall not be allowed to enter drainage facilities.

The Contractor may use an alternative temporary construction entrance if approved by the Engineer in writing. The Contractor shall submit details for an alternative temporary construction entrance to the Engineer at least 7 days prior to installation. Any increase in cost for the alternative temporary construction entrance shall be borne by the Contractor. The alternative temporary construction entrance shall be installed and maintained in conformance with these special provisions.

MAINTENANCE

The Contractor shall maintain temporary construction entrance throughout the contract or until removed. The Contractor shall prevent displacement or migration of the rock surfacing or corrugated steel panels. Any significant depressions resulted from settlement or heavy equipment shall be repaired by the Contractor, as directed by the Engineer.

Temporary construction entrance shall be maintained to minimize tracking of soil and sediment onto existing public roads. If buildup of soil and sediment deter the function of the temporary construction entrance, the Contractor shall immediately remove and dispose of the soil and sediment, and install additional corrugated steel panels and spread additional rocks to increase the capacity of the temporary construction entrance.

When the temporary construction entrances are no longer required, the rocks, temporary entrance fabric, as well as soil and sediment shall be removed and disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications. Corrugated steel panels used in the construction of temporary construction entrance shall become the property of the Contractor.

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

MEASUREMENT AND PAYMENT

The contract unit price paid for temporary construction entrance 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 the temporary construction entrance, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The cost of maintaining the temporary construction entrance will be divided equally by the State and the Contractor.

The division of cost will be made by determining the cost of maintaining temporary construction entrance in conformance with the provisions in Section 9-1.03, "Force Account Payment," of the Standard Specifications. Clean-up, repair, removal, disposal, replacement because of improper installation, and replacement of temporary construction entrance damaged as a result of the Contractor's negligence will not be considered as included in the cost for performing maintenance.

10-1.13 COOPERATION

Attention is directed to Section 7-1.14, "Cooperation," and Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications and these special provisions.

It is anticipated that work by other contractors adjacent to or within the project limits of this contract will be in progress.

Contracts to upgrade or widen Route 87 to a 6-lane freeway which may be in progress during the working period of this contract include but are not necessarily limited to the following:

Contract No. 04-4874F4. Upgrade Rte, 87 freeway from west of Julian St. to 0.3 km south of West Taylor Street (KP 9.8 to KP 10.8).

Contract No. 04-4874Q4. Construct Taylor St. Interchange (KP 10.3 to KP 11.4)

Contract No. 04-4874C4. Construct Skyport Interchange and Airport Pkwy. Grade Separation. Located from north of Route 880 to Route 101 (KP 12.6 to 14.6)

Contract No. 4874A4. Embankment construction and riparian grading. Located from north of Route 880 to 0.3 km north of Airport Pkwy. (KP 12.2 to KP 14.5)

Contract No. 439614. Project by Santa Clara Valley Transportation Authority. Located from Route 280 to Julian St. (KP 8.2 to KP 9.8)

Contract No. 04-4874V4) to install riparian mitigation planting and irrigation and provide three years of plant establishment in San Jose on Route 87 from north of Coleman Avenue to north of Airport Parkway (KP 10.5 to KP 14.3)

Contract No. 04-262004, I-880/Coleman Ave Interchange (KP 3.9/5.1)

Santa Clara County Juvenile Hall Improvements Contract

The progress schedules for other work in progress, if available may be inspected by the Contractor upon approval by the Engineer. Such progress schedules are tentative and cannot be guaranteed to be accurate.

The Contractor shall attend joint coordination meetings, to be organized by the Engineer, with the contractors on adjacent projects in order to minimize potential conflicts. The Contractor shall coordinate with and accommodate other contractors.

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

10-1.14 PROGRESS SCHEDULE (CRITICAL PATH METHOD)

The Contractor shall submit to the Engineer practicable critical path method (CPM) progress schedules in conformance with these special provisions. Whenever the term "schedule" is used in this section it shall mean CPM progress schedule.

Attention is directed to "Payments" of Section 5 of these special provisions.

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

DEFINITIONS

The following definitions shall apply to this section:

A. ACTIVITY.—A task, event or other project element on a schedule that contributes to completing the project. Activities have a description, start date, finish date, duration and one or more logic ties.
B. BASELINE SCHEDULE.—The initial schedule representing the Contractor's work plan on the first working day of the project.
C. CONTRACT COMPLETION DATE.—The current extended date for completion of the contract shown on the weekly statement of working days furnished by the Engineer in conformance with the provisions in Section 8-1.06, "Time of Completion," of the Standard Specifications.
D. CRITICAL PATH.—The longest continuous chain of activities for the project that has the least amount of total float of all chains. In general, a delay on the critical path will extend the scheduled completion date.
E. CRITICAL PATH METHOD (CPM).—A network based planning technique using activity durations and the relationships between activities to mathematically calculate a schedule for the entire project.
F. DATA DATE.—The day after the date through which a schedule is current. Everything occurring earlier than the data date is "as-built" and everything on or after the data date is "planned."
G. EARLY COMPLETION TIME.—The difference in time between an early scheduled completion date and the contract completion date.
H. FLOAT.—The difference between the earliest and latest allowable start or finish times for an activity.
I. MILESTONE.—An event activity that has zero duration and is typically used to represent the beginning or end of a certain stage of the project.
J. NARRATIVE REPORT.—A document submitted with each schedule that discusses topics related to project progress and scheduling.
K. NEAR CRITICAL PATH.—A chain of activities with total float exceeding that of the critical path but having no more than 10 working days of total float.
L. SCHEDULED COMPLETION DATE.—The planned project finish date shown on the current accepted schedule.
M. STATE OWNED FLOAT ACTIVITY.—The activity documenting time saved on the critical path by actions of the State. It is the last activity prior to the scheduled completion date.
N. TIME IMPACT ANALYSIS.—A schedule and narrative report developed specifically to demonstrate what effect a proposed change or delay has on the current scheduled completion date.
O. TOTAL FLOAT.—The amount of time that an activity or chain of activities can be delayed before extending the scheduled completion date.
P. UPDATE SCHEDULE.—A current schedule developed from the baseline or subsequent schedule through regular monthly review to incorporate as-built progress and any planned changes.

GENERAL REQUIREMENTS

The Contractor shall submit to the Engineer baseline, monthly update and final update schedules, each consistent in all respects with the time and order of work requirements of the contract. The project work shall be executed in the sequence indicated on the current accepted schedule.

Schedules shall show the order in which the Contractor proposes to carry out the work with logical links between time-scaled work activities, and calculations made using the critical path method to determine the controlling operation or operations. The Contractor is responsible for assuring that all activity sequences are logical and that each schedule shows a coordinated plan for complete performance of the work.

The Contractor shall produce schedules using computer software and shall furnish compatible software for the Engineer's exclusive possession and use. The Contractor shall furnish network diagrams, narrative reports, tabular reports and schedule data as parts of each schedule submittal.

Schedules shall include, but not be limited to, activities that show the following that are applicable to the project:

A. Project characteristics, salient features, or interfaces, including those with outside entities, that could affect time of completion.
B. Project start date, scheduled completion date and other milestones.
C. Work performed by the Contractor, subcontractors and suppliers.
D. Submittal development, delivery, review and approval, including those from the Contractor, subcontractors and suppliers.
E. Procurement, delivery, installation and testing of materials, plants and equipment.
F. Testing and settlement periods.
G. Utility notification and relocation.
H. Erection and removal of falsework and shoring.
I. Major traffic stage switches.
J. Finishing roadway and final cleanup.
K. State-owned float as the predecessor activity to the scheduled completion date.
L. “Designated Portion of Work” Activities.
M. Hedding Street Closure.

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.

10-1.15 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.

10-1.16 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

It is anticipated that the following utility facilities will be relocated prior to the dates shown:

Utility	Location	Date
21 kv PG&E	Hedding St. from "H" sta. 0+80 to 1+60	11/01/02

Attention is directed to Section 8-1.10, "Utility and Non-Highway Facilities," Section 15, "Existing Highway Facilities," and Section 51-1.19, "Utility Facilities," of the Standard Specifications and these special provisions.

The Contractor shall notify the Engineer in writing at least 30 days in advance of the date or dates that the interfering utility facilities are to be rearranged. The Engineer will, in turn, notify the owners of the utility facilities.

The utility facilities listed in the following table, and other utility facilities that possibly exist at locations which might interfere with the pile driving operations or substructure construction, will not be rearranged in advance of or during construction operations. Should the Contractor desire to have any of the utility facilities rearranged or temporarily deactivated for his convenience, the Contractor shall make the necessary arrangements as provided in Section 8-1.10:

Utility Facility	Location
Water Line	Northbound On-Ramp Br. No. 37-0583
Abandoned Water Line	Northbound On-Ramp Br. No. 37-0583

Full compensation for conforming to the requirements of this section, not otherwise provided for, 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.

10-1.17 MOBILIZATION

Mobilization shall conform to the provisions in Section 11, "Mobilization," of the Standard Specifications.

10-1.18 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.

If requested by the Engineer, the Contractor shall provide a written list of Category 2 devices to be used on the project at least 5 days prior to beginning any work using the devices. For each type of device, the list shall indicate the FHWA acceptance letter number and the name of the manufacturer.

Full compensation for providing self-certification for crashworthiness of Category 1 traffic control devices and for providing a list of Category 2 devices used on the project and labeling Category 2 devices as specified shall be considered as included in the prices paid for the various contract items of work requiring the use of the Category 1 or Category 2 traffic control devices and no additional compensation will be allowed therefor.

10-1.19 CONSTRUCTION AREA SIGNS

Construction area signs shall be furnished, installed, maintained, and removed when no longer required in conformance with the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. Type II retroreflective sheeting shall not be used on construction area sign panels.

Attention is directed to "Construction Project Information Signs" of these special provisions regarding the number and type of construction project information signs to be furnished, erected, maintained, and removed and disposed of.

The Contractor shall notify the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to commencing excavation for construction area sign posts. The regional notification centers include, but are not limited to, the following:

Notification Center	Telephone Number
Underground Service Alert-Northern California (USA)	1-800-642-2444 1-800-227-2600
Underground Service Alert-Southern California (USA)	1-800-422-4133 1-800-227-2600

Excavations required to install construction area signs shall be performed by hand methods without the use of power equipment, except that power equipment may be used if it is determined there are no utility facilities in the area of the proposed post holes.

Sign substrates for stationary mounted construction area signs may be fabricated from fiberglass reinforced plastic as specified under "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

The Contractor may be required to cover certain signs during the progress of the work. Signs that are no longer required or that convey inaccurate information to the public shall be immediately covered or removed, or the information shall be corrected. Covers for construction area signs shall be of sufficient size and density to completely block out the complete face of the signs. The retroreflective face of the covered signs shall not be visible either during the day or at night. Covers shall be fastened securely so that the signs remain covered during inclement weather. Covers shall be replaced when they no longer cover the signs properly.

10-1.20 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.

In addition to the provisions set forth in "Public Safety" of these special provisions, whenever work to be performed on the freeway traveled way (except the work of installing, maintaining and removing traffic control devices) is within 1.8 m of the adjacent traffic lane, the adjacent traffic lane shall be closed.

At locations where falsework pavement lighting or pedestrian openings through falsework are designated, falsework lighting shall be installed in conformance with the provisions in Section 86-6.11, "Falsework Lighting," of the Standard Specifications.

Openings shall be provided through bridge falsework for the use of public traffic at each location where falsework is constructed over the streets or routes listed in the following table. The type, minimum width, height, and number of openings at each location, and the location and maximum spacing of falsework lighting, if required for each opening, shall conform to the requirements in the table. The width of vehicular openings shall be the clear width between temporary railings or other

protective work. The spacing shown for falsework pavement lighting is the maximum distance center to center in meters between fixtures.

RTE 87/880 Separation
Br. No. 37-0609

	Number	Width	Height
Vehicle Openings			
NB 880	1	17.2	4.6
SB 880	1	17.2	4.6

	Location	Spacing
Falsework Pavement Lighting NB 880 & SB 880	R &L Staggered 1/2 space	12.0

(Width and Height in meters)
(R = Right side of traffic. L = Left side of traffic)
(C = Centered overhead)

The exact location of openings will be determined by the Engineer.

Personal vehicles of the Contractor's employees shall not be parked 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 as shown on the plans.

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 Route 880. At the junction with Route 87.

	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																2	2	2	1	
Fridays	1	1	1	1	1																2	2	2	2	
Saturdays	1	1	1	1	1	1	2	2	2												2	2	2	2	
Sundays	1	1	1	1	1	1	1	1	2	2											2	2	2	1	
Day before designated legal holiday	1	1	1	1	1																2	2	2	2	
Designated legal holidays	1	1	1	1	1	1	1	1	2	2											2	2	2	1	

Legend:

1 One lane open in direction of travel

2 Two adjacent lanes open in direction of travel

No lane closure allowed

REMARKS:

Chart No. 2
Multilane Lane Requirements

Location: Southbound Route 880. At the junction with Route 87.

	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																		2	1	
Fridays	1	1	1	1	1																		2	2	
Saturdays	2	1	1	1	1	1	2	2															2	2	
Sundays	2	1	1	1	1	1	1	1	2														2	1	
Day before designated legal holiday	1	1	1	1	1																		2	2	
Designated legal holidays	2	1	1	1	1	1	1	1	2														2	1	

Legend:

1 One lane open in direction of travel

2 Two adjacent lanes open in direction of travel

No lane closure allowed

REMARKS:

Chart No. 3
Complete Closure Requirements

Location: Northbound Route 880. At the junction with Route 87.

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X																					
Fridays	X	X	X	X																					
Saturdays			X	X	X																				
Sundays			X	X	X																				
Day before designated legal holiday	X	X	X	X																					
Designated legal holidays			X	X	X																				

Legend:

X Freeway may completely be closed and traffic detoured

No freeway closure allowed

REMARKS: 1) Complete closure applies only to the removal and erection of falsework.
2) See Detour Plan No. 1

Chart No. 4
Complete Closure Requirements

Location: Southbound Route 880. At the junction with Route 87.

FROM HOUR TO HOUR	a.m. 12	1	2	3	4	5	6	7	8	9	10	11	p.m. 12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays		X	X	X	X																				
Fridays		X	X	X	X																				
Saturdays			X	X	X	X																			
Sundays			X	X	X	X																			
Day before designated legal holiday		X	X	X	X																				
Designated legal holidays			X	X	X	X																			

Legend:

X Freeway may completely be closed and traffic detoured

No freeway closure allowed

REMARKS: 1) Complete closure applies only to the erection and/or removal of falsework.
2) See Detour Plan No. 2

Chart No. 5
Multilane Lane Requirements

Location: Northbound Route 87- From Taylor St. to north of Route 880.

	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																2	2	2	1	
Fridays	1	1	1	1	1																	2	2	2	
Saturdays	1	1	1	1	1	1	2	2	2												2	2	2	2	
Sundays	1	1	1	1	1	1	1	1	2	2										2	2	2	2	1	
Day before designated legal holiday	1	1	1	1	1																	2	2	2	
Designated legal holidays	1	1	1	1	1	1	1	1	2	2										2	2	2	2	1	

Legend:

1 One lane open in direction of travel

2 Two adjacent lanes open in direction of travel

No lane closure allowed

REMARKS:

Chart No. 6
Multilane Lane Requirements

Location: Southbound Route 87- From Taylor St. to north of Route 880.

	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	2																	2	
Fridays	1	1	1	1	1	1	2																	2	
Saturdays	2	1	1	1	1	1																2	2	2	
Sundays	2	1	1	1	1	1	1	1	2	2	2													2	
Day before designated legal holiday	1	1	1	1	1	1	2																	2	
Designated legal holidays	2	1	1	1	1	1	1	1	2	2	2													2	

Legend:

1 One lane open in direction of travel

2 Two adjacent lanes open in direction of travel

No lane closure allowed

REMARKS:

Chart No. 7
City Street Lane Requirements

Location: Eastbound and Westbound Hedding Street at Route 87

	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	1	
Fridays	1	1	1	1	1																1	1	1	1	
Saturdays	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Sundays	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Day before designated legal holiday	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Designated legal holidays	1	1	1	1	1	1	1	1	1	1	1	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 allowed

REMARKS:

Pedestrian access facilities shall be provided through construction areas within the right of way as shown on the plans and as specified herein. Pedestrian walkways shall be surfaced with asphalt concrete, portland cement concrete or timber. The surface shall be skid resistant and free of irregularities. Hand railings shall be provided on each side of pedestrian walkways as necessary to protect pedestrian traffic from hazards due to construction operations or adjacent vehicular traffic. Protective overhead covering shall be provided as necessary to insure protection from falling objects and drip from overhead structures.

In addition to the required openings through falsework, pedestrian facilities shall be provided during pile driving, footing, wall, and other bridge construction operations. At least one walkway shall be available at all times. If the Contractor's operations require the closure of one walkway, then another walkway shall be provided nearby, off the traveled roadway.

Railings shall be constructed of wood, S4S, and shall be painted white. Railings and walkways shall be maintained in good condition. Walkways shall be kept clear of obstructions.

Full compensation for providing pedestrian facilities shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

Erection and removal of falsework at locations where falsework openings are required shall be undertaken one location at a time. During falsework erection and removal, public traffic in the lanes over which falsework is being erected or removed shall be routed around the work area on adjacent streets or where 2 falsework openings are called for at one location, the public traffic may be routed through the work and through the opening for the opposing lanes of traffic by means of a local detour as shown on the plans. Erection shall include all adjustments or removal of falsework components prior to concrete placement that contribute to the horizontal stability of the falsework system**.** Removal shall include lowering falsework, blowing sand from sand jacks, turning screws on screw jacks, and removing wedges.

Local detours shall be not less than 3.6 m in width, adjacent to the median side of the opposing traffic lanes, and shall not encroach on the lanes.

Erection and removal of falsework at locations where falsework openings are required shall be undertaken one location at a time. During falsework erection and removal, public traffic in the lanes over which falsework is being erected or removed shall be stopped for periods of time not to exceed 30 minutes. Following each time traffic is stopped, the accumulated traffic shall pass through the work before another closure is made. Erection shall include all adjustments or removal of falsework components prior to concrete placement that contribute to the horizontal stability of the falsework system**.** Removal shall include lowering falsework, blowing sand from sand jacks, turning screws on screw jacks and removing wedges.

Rerouting or stopping traffic during erection or removal of girders falsework shall be undertaken only during daylight hours or between the hours of 9:00 a.m. and 3:00 p.m., Monday through Fridays, except designated legal holidays and days preceding designated legal holidays, for the period necessary for erecting or removing the girders falsework.

Regardless of the construction procedure, methods and equipment selected, the Contractor shall have necessary materials and equipment on the site to erect or remove the girders falsework in any one span or over any one opening prior to

detouring or stopping public traffic, and shall erect or remove the girders falsework in an expeditious manner in order that inconvenience to public traffic will be at a minimum.

The Contractor may occupy one 3-meter lane while placing or removing forms for the superstructure of bridges over Route 880 which are to remain open. Occupation of a traffic lane because of form work at a location will be permitted only during such times as construction operations are actually in progress and only during daylight hours or between the hours of 9:00 a.m. and 3:00 p.m., Monday through Friday, except during hours shown on the charts included in this section "Maintaining Traffic," designated legal holidays and days preceding designated legal holidays, or when necessary for the safety of public traffic.

10-1.21 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 $4,100 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.

10-1.22 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE

A traffic control system shall consist of closing traffic lanes 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 closures are made for work periods only, at the end of each work period, components of the traffic control system, except portable delineators placed along open trenches or excavation adjacent to the traveled way, shall be removed from the traveled way and shoulder. If the Contractor so elects, the components may be stored at selected central locations, designated by the Engineer within the limits of the highway right of way.

Each vehicle used to place, maintain and remove components of a traffic control system on multilane highways shall be equipped with a Type II flashing arrow sign which shall be in operation when the vehicle is being used for placing, maintaining or removing the components. Vehicles equipped with Type II flashing arrow sign not involved in placing, maintaining or removing the components when operated within a stationary type lane closure shall only display the caution display mode. The sign shall be controllable by the operator of the vehicle while the vehicle is in motion. The flashing arrow sign shown on the plans shall not be used on the vehicles which are doing the placing, maintaining and removing of components of a traffic control system and shall be in place before a lane closure requiring the sign's use is completed.

MOVING LANE CLOSURE

Flashing arrow signs used in moving lane closures shall be truck-mounted. Changeable message signs used in moving lane closure operations shall conform to the provisions in Section 12-3.12, "Portable Changeable Message Signs," of the Standard Specifications, except the signs shall be truck-mounted and the full operation height of the bottom of the sign may be less than 2.1 m above the ground, but should be as high as practicable.

Truck-mounted attenuators (TMA) for use in moving lane closures shall be any of the following approved models, or equal:

A. Hexfoam TMA Series 3000, Alpha 1000 TMA Series 1000 and Alpha 2001 TMA Series 2001, manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601-2076, Telephone (312) 467-6750.

   1. Distributor (Northern): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, Telephone 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.

10-1.23 TEMPORARY PAVEMENT DELINEATION

Temporary pavement delineation shall be furnished, placed, maintained, and removed in conformance with the provisions in Section 12-3.01, "General," of the Standard Specifications and these special provisions. Nothing in these special provisions shall be construed as reducing the minimum standards specified in the Manual of Traffic Controls published by the Department or as relieving the Contractor from the responsibilities specified in Section 7-1.09, "Public Safety," of the Standard Specifications.

GENERAL

Whenever the work causes obliteration of pavement delineation, temporary or permanent pavement delineation shall be in place prior to opening the traveled way to public traffic. Laneline or centerline pavement delineation shall be provided at all times for traveled ways open to public traffic. On multilane roadways (freeways and expressways) edgeline delineation shall be provided at all times for traveled ways open to public traffic.

The Contractor shall perform the work necessary to establish the alignment of temporary pavement delineation, including required lines or marks. Surfaces to receive temporary pavement delineation shall be dry and free of dirt and loose material. Temporary pavement delineation shall not be applied over existing pavement delineation or other temporary pavement delineation. Temporary pavement delineation shall be maintained until superseded or replaced with a new pattern of temporary pavement delineation or permanent pavement delineation.

Temporary pavement markers, including underlying adhesive, and removable traffic tape which are applied to the final layer of surfacing or existing pavement to remain in place or which conflicts with a subsequent or new traffic pattern for the area shall be removed when no longer required for the direction of public traffic, as determined by the Engineer.

TEMPORARY LANELINE AND CENTERLINE DELINEATION

Whenever lanelines or centerlines are obliterated and temporary pavement delineation to replace the lines is not shown on the plans, the minimum laneline and centerline delineation to be provided for that area shall be temporary pavement markers placed at longitudinal intervals of not more than 7.3 m. The temporary pavement markers shall be the same color as the laneline or centerline the pavement markers replace. Temporary pavement markers shall be, at the option of the Contractor, one of the temporary pavement markers listed for short term day/night use (14 days or less) or long term day/night use (6 months or less) in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. The temporary pavement markers shall be placed in conformance with the manufacturer's instructions. Temporary pavement markers for long term day/night use (6 months or less) shall be cemented to the surfacing with the adhesive recommended by the manufacturer, except epoxy adhesive shall not be used to place the temporary pavement markers in areas where removal of the temporary pavement markers will be required.

Temporary laneline or centerline delineation consisting entirely of temporary pavement markers listed for short term day/night use (14 days or less), shall be placed on longitudinal intervals of not more than 7.3 m and shall be used for a maximum of 14 days on lanes opened to public traffic. Prior to the end of the 14 days the permanent pavement delineation shall be placed. If the permanent pavement delineation is not placed within the 14 days, the Contractor shall replace the temporary pavement markers and provide additional temporary pavement delineation and shall bear the cost thereof. The additional temporary pavement delineation to be provided shall be equivalent to the pattern specified for the permanent pavement delineation for the area, as determined by the Engineer.

Full compensation for furnishing, placing, maintaining, and removing the temporary pavement markers (including underlying adhesive, layout (dribble) lines to establish alignment of temporary pavement markers or used for temporary laneline and centerline delineation for those areas where temporary laneline and centerline delineation is not shown on the plans and for providing equivalent patterns of permanent traffic lines for those areas when required, shall be considered as included in the contract prices paid for the items of work that obliterated the laneline and centerline pavement delineation and no separate payment will be made therefor.

TEMPORARY EDGELINE DELINEATION

On multilane roadways (freeways and expressways), whenever edgelines are obliterated and temporary pavement delineation to replace those edgelines is not shown on the plans, the edgeline delineation to be provided for those areas adjacent to lanes open to public traffic shall be as follows:

A. Temporary pavement delineation for right edgelines shall, at the option of the Contractor, consist of either a solid 100-mm wide traffic stripe of the same color as the stripe the temporary edgeline delineation replaces, or traffic cones, portable delineators or channelizers placed at longitudinal intervals not to exceed 30 m.
B. Temporary pavement delineation for left edgelines shall, at the option of the Contractor, consist of either solid 100-mm wide traffic stripe of the same color as the stripe the temporary edgeline delineation replaces, traffic cones, portable delineators or channelizers placed at longitudinal intervals not to exceed 30 m or temporary pavement markers placed at longitudinal intervals of not more than 1.8 m. Temporary pavement markers used for temporary left edgeline delineation shall be one of the types of temporary pavement markers listed for short term day/night use (14 days or less) or long term day/night use (6 months or less) in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Traffic stripe (100-mm wide) placed as temporary edgeline delineation which will require removal shall conform to the provisions of "Temporary Traffic Stripe (Tape)" of these special provisions. Where removal of the 100-mm wide traffic stripe will not be required, painted traffic stripe conforming to the provisions of "Temporary Traffic Stripe (Paint)" of these special provisions may be used. The quantity of temporary traffic stripe (tape) or temporary traffic stripe (paint) used for this temporary edgeline delineation will not be included in the quantities of tape or paint to be paid for.

The lateral offset for traffic cones, portable delineators or channelizers used for temporary edgeline delineation shall be as determined by the Engineer. If traffic cones or portable delineators are used as temporary pavement delineation for edgelines, the Contractor shall provide personnel to remain at the project site to maintain the cones or delineators during the hours of the day that the portable delineators are in use.

Channelizers used for temporary edgeline delineation shall be the surface mounted type and shall be orange in color. Channelizer bases shall be cemented to the pavement in the same manner provided for cementing pavement markers to pavement in "Pavement Markers" of these special provisions, except epoxy adhesive shall not be used to place channelizers on the top layer of pavement. Channelizers shall be, at the Contractor's option, one of the surface mount types (900 mm) listed in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Temporary edgeline delineation shall be removed when no longer required for the direction of public traffic as determined by the Engineer.

The quantity of channelizers used as temporary edgeline delineation will not be included in the quantity of channelizers to be paid for. Full compensation for furnishing, placing, maintaining and removing temporary edgeline delineation for those areas where temporary edgeline delineation is not shown on the plans shall be considered as included in the contract prices paid for the items of work that obliterated the edgeline pavement delineation and no separate payment will be made therefor.

TEMPORARY TRAFFIC STRIPE (PAINT)

Temporary traffic stripe consisting of painted traffic stripe shall be applied and maintained at the locations shown on the plans. The painted temporary traffic stripe shall be complete in place at the location shown prior to opening the traveled way to public traffic. Removal of painted temporary traffic stripe will not be required.

Temporary painted traffic stripe shall conform to the provisions in "Paint Traffic Stripes and Pavement Markings" of these special provisions, except for payment. At the option of the Contractor, either one or 2 coats shall be applied regardless of whether on new or existing pavement.

At the Contractor's option, temporary removable striping tape listed in "Prequalified and Tested Signing and Delineation Materials" of these special provisions may be used instead of painted temporary traffic stripes. When traffic stripe tape is used in place of painted temporary traffic stripes, the tape will be measured and paid for by the meter as temporary traffic stripe (paint).

When painted traffic stripe is specified for temporary left edgeline delineation, temporary pavement markers placed at longitudinal intervals of not more than 1.8 m may be used in place of the temporary painted traffic stripe. Temporary pavement markers shall be one of the types of temporary pavement markers listed for long term day/night use (6 months or less) in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. When temporary reflective pavement markers are used in place of temporary painted traffic stripe, payment for those temporary pavement markers will be made on the basis of the theoretical quantity of temporary traffic stripe (paint) required for the left edgeline the temporary pavement markers replace.

TEMPORARY PAVEMENT MARKING (PAINT)

Temporary pavement marking consisting of painted pavement marking shall be applied and maintained at the locations shown on the plans. The painted temporary pavement marking shall be complete in place at the location shown prior to opening the traveled way to public traffic. Removal of painted temporary pavement marking will not be required.

Temporary painted pavement marking shall conform to the provisions in "Paint Traffic Stripes and Pavement Markings" of these special provisions, except for payment. At the option of the Contractor, either one or 2 coats shall be applied regardless whether on new or existing pavement.

At the Contractor's option, temporary removable pavement marking tape or permanent pavement marking tape listed in "Prequalified and Tested Signing and Delineation Materials" of these special provisions may be used instead of painted temporary pavement markings. When pavement marking tape is used, regardless of which type of tape is placed, the tape will be measured and paid for by the square meter as temporary pavement marking (paint).

TEMPORARY PAVEMENT MARKERS

Temporary pavement markers shall be applied at the locations shown on the plans. The pavement markers shall be applied complete in place at the locations shown prior to opening the traveled way to public traffic.

Temporary pavement markers shown on the plans shall be, at the option of the Contractor, one of the temporary pavement markers for long term day/night use (6 months or less) listed in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Temporary pavement markers shall be placed in conformance with the manufacturer's instructions and shall be cemented to the surfacing with the adhesive recommended by the manufacturer, except epoxy adhesive shall not be used in areas where removal of the pavement markers will be required.

Where the temporary pavement delineation shown on the plans for lanelines or centerlines consists entirely of a pattern of broken traffic stripe and pavement markers, the Contractor may use groups of the temporary pavement markers for long term day/night use (6 months or less) in place of the temporary traffic stripe tape or painted temporary traffic stripe. The groups of pavement markers shall be spaced as shown on the plans for a similar pattern of permanent traffic line, except pavement markers shown to be placed in the gap between the broken traffic stripe shall be placed as part of the group to delineate the pattern of broken temporary traffic stripe. The kind of laneline and centerline delineation selected by the Contractor shall be continuous within a given location. Payment for those temporary pavement markers used in place of temporary traffic stripe will be made on the basis of the theoretical length of the patterns of temporary traffic stripe (tape) or temporary traffic stripe (paint).

Retroreflective pavement markers conforming to the provisions in "Pavement Markers" of these special provisions may be used in place of temporary pavement markers for long term day/night use (6 months or less) except to simulate patterns of broken traffic stripe. Placement of the retroreflective pavement markers used for temporary pavement markers shall conform to the provisions in "Pavement Markers" of these special provisions except the waiting period provisions before placing the pavement markers on new asphalt concrete surfacing as specified in Section 85-1.06, "Placement," of the Standard Specifications shall not apply and epoxy adhesive shall not be used to place pavement markers in areas where removal of the pavement markers will be required.

MEASUREMENT AND PAYMENT

Temporary traffic stripe (paint) and temporary pavement marking (paint) will be measured and paid for in the same manner specified for paint traffic stripe (1-coat) and paint pavement marking (1-coat) in Section 84-3.06, "Measurement," and Section 84-3.07, "Payment," of the Standard Specifications.

Temporary pavement markers, shown on the plans, will be measured and paid for by the unit in the same manner specified for retroreflective pavement markers in Section 85-1.08, "Measurement," and Section 85-1.09, "Payment," of the Standard Specifications. Temporary pavement markers used for temporary laneline and centerline delineation for areas which are not shown on the plans will not be included in the quantities of temporary pavement markers to be paid for. Full

compensation for removing temporary pavement markers, when no longer required, shall be considered as included in the contract unit price paid for temporary pavement marker and no separate payment will be made therefor.

10-1.24 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.

10-1.25 CHANNELIZER

Channelizers shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Channelizers shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

When no longer required for the work as determined by the Engineer, channelizers and underlying adhesive used to cement the channelizer bases to the pavement shall be removed. Removed channelizers and adhesive shall become the property of the Contractor and shall be removed from the site of work.

10-1.26 TEMPORARY CRASH CUSHION MODULE

This work shall consist of furnishing, installing, and maintaining sand filled temporary crash cushion modules in groupings or arrays at each location shown on the plans, as specified in these special provisions or where designated by the Engineer. The grouping or array of sand filled modules shall form a complete sand filled temporary crash cushion in conformance with the details shown on the plans and these special provisions.

Attention is directed to "Public Safety", "Order of Work", and "Temporary Railing" of these special provisions.

Whenever the work or the Contractor's operations establishes a fixed obstacle, the exposed fixed obstacle shall be protected with a sand filled temporary crash cushion. The sand filled temporary crash cushion shall be in place prior to opening the lanes adjacent to the fixed obstacle to public traffic.

Sand filled temporary crash cushions shall be maintained in place at each location, including times when work is not actively in progress. Sand filled temporary crash cushions may be removed during a work period for access to the work provided that the exposed fixed obstacle is 4.6 m or more from a lane carrying public traffic and the temporary crash cushion is reset to protect the obstacle prior to the end of the work period in which the fixed obstacle was exposed. When no longer required, as determined by the Engineer, sand filled temporary crash cushions shall be removed from the site of the work.

At the Contractor's option, the modules for use in sand filled temporary crash cushions shall be either Energite III Inertial Modules, Fitch Inertial Modules or TrafFix Sand Barrels manufactured after March 31, 1997, or equal:

A. Energite III and Fitch Inertial Modules, manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601-2076. Telephone 1-312-467-6750, FAX 1-800-770-6755

   1. Distributor (North): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828. Telephone 1-800-884-8274, FAX 1-916-387-9734
   2. Distributor (South): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805. Telephone 1-800-222-8274, FAX 1-714-937-1070

B. TrafFix Sand Barrels, manufactured by TrafFix Devices, Inc., 220 Calle Pintoresco, San Clemente, CA 92672. Telephone 1-949 361-5663, FAX 1-949 361-9205

   1. Distributor (North): United Rentals, Inc., 1533 Berger Drive, San Jose, CA 95112. Telephone 1-408 287-4303, FAX 1-408 287-1929
   2. Distributor (South): Statewide Safety & Sign, Inc., P.O. Box 1440, Pismo Beach, CA 93448. Telephone 1-800-559-7080, FAX 1-805 929-5786

Modules contained in each temporary crash cushion shall be of the same type at each location. The color of the modules shall be the standard yellow color, as furnished by the vendor, with black lids. The modules shall exhibit good workmanship free from structural flaws and objectionable surface defects. The modules need not be new. Good used undamaged modules conforming to color and quality of the types specified herein may be utilized. If used Fitch modules requiring a seal are furnished, the top edge of the seal shall be securely fastened to the wall of the module by a continuous strip of heavy duty tape.

Modules shall be filled with sand in conformance with the manufacturer's directions, and to the sand capacity in kilograms for each module shown on the plans. Sand for filling the modules shall be clean washed concrete sand of commercial quality. At the time of placing in the modules, the sand shall contain not more than 7 percent water as determined by California Test 226.

Modules damaged due to the Contractor's operations shall be repaired immediately by the Contractor at the Contractor's expense. Modules damaged beyond repair, as determined by the Engineer, due to the Contractor's operations shall be removed and replaced by the Contractor at the Contractor's expense.

Temporary crash cushion modules shall be placed on movable pallets or frames conforming to the dimensions shown on the plans. The pallets or frames shall provide a full bearing base beneath the modules. The modules and supporting pallets or frames shall not be moved by sliding or skidding along the pavement or bridge deck.

A Type R or P marker panel shall be attached to the front of the crash cushion as shown on the plans, when the closest point of the crash cushion array is within 3.6 m of the traveled way. The marker panel, when required, shall be firmly fastened to the crash cushion with commercial quality hardware or by other methods determined by the Engineer.

At the completion of the project, temporary crash cushion modules, sand filling, pallets or frames, and marker panels shall become the property of the Contractor and shall be removed from the site of the work. Temporary crash cushion modules shall not be installed in the permanent work.

Temporary crash cushion modules will be measured by the unit as determined from the actual count of modules used in the work or ordered by the Engineer at each location. Temporary crash cushion modules placed in conformance with the provisions in "Public Safety" of these special provisions and modules placed in excess of the number specified or shown will not be measured nor paid for.

Repairing modules damaged by public traffic will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. Modules damaged beyond repair by public traffic, when ordered by the Engineer, shall be removed and replaced immediately by the Contractor. Modules replaced due to damage by public traffic will be measured and paid for as temporary crash cushion module.

If the Engineer orders a lateral move of the sand filled temporary crash cushions and the repositioning is not shown on the plans, moving the sand filled temporary crash cushion will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications and these temporary crash cushion modules will not be counted for payment in the new position.

The contract unit price paid for temporary crash cushion module shall include full compensation for furnishing all labor, materials (including sand, pallets or frames and marker panels), tools, equipment, and incidentals, and for doing all the work involved in furnishing, installing, maintaining, moving, and resetting during a work period for access to the work, and removing from the site of the work when no longer required (including those damaged by public traffic) sand filled temporary crash cushion modules, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.27 EXISTING HIGHWAY FACILITIES

The work performed in connection with various existing highway facilities shall conform to the provisions in Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

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 Caltrans Maintenance yard at 500 Queens Lane, San Jose, CA 95112 and stockpiled.

The Contractor shall notify the Engineer and the District Regional Recycle Coordinator, telephone (408)452-7134 a minimum of 48 hours prior to hauling salvaged material to the Recycle Center.

Plans and working drawings of the existing bridges and mechanically stabilized embankment retaining walls may be requested by fax from the Office of Structure Maintenance and Investigations, 1801 30th Street, Sacramento, CA, Fax (916) 227-8357.

Plans and working drawings of the existing bridges and mechanically stabilized embankment retaining walls available to the Contractor are reproductions of the original contract plans with significant changes noted and working drawings and do not necessarily show normal construction tolerances and variances. Where dimensions of new construction required by this contract are dependent on the dimensions of the existing bridges, the Contractor shall verify the controlling field dimensions and shall be responsible for adjusting dimensions of the work to fit existing conditions.

EXISTING PAINT SYSTEMS

The existing paint systems on Guadalupe Parkway OC (Bridge Number 37-0181 & 37-0182) consist of red lead. Any work that disturbs the existing paint system will expose workers to health hazards and will (1) produce debris containing heavy metal in amounts that exceed the thresholds established in Titles 8 and 22 of the California Code of Regulations or (2) produce toxic fumes when heated. All debris produced when the existing paint system is disturbed shall be contained.

Debris Containment and Collection Program

Prior to starting work, the Contractor shall submit a debris containment and collection program to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, for debris produced when the existing paint system is disturbed. The program shall identify materials, equipment, and methods to be used when the existing paint system is disturbed and shall include working drawings of containment systems, loads applied to the bridge by containment structures, and provisions for ventilation and air movement for visibility and worker safety.

If the measures being taken by the Contractor are inadequate to provide for the containment and collection of debris produced when the existing paint system is disturbed, the Engineer will direct the Contractor to revise the operations and the debris containment and collection program. The directions will be in writing and will specify the items of work for which the Contractor's debris containment and collection program is inadequate. No further work shall be performed on the items until the debris containment and collection program is adequate and, if required, a revised program has been approved for the containment and collection of debris produced when the existing paint system is disturbed.

The Engineer will notify the Contractor of the approval or rejection of the submitted or revised debris containment and collection program within 2 weeks of submittal of the Contractor's program or revised program.

The State will not be liable to the Contractor for failure to approve all or any portion of an originally submitted or revised debris containment and collection program, nor for delays to the work due to the Contractor's failure to submit an acceptable program.

Full compensation for the debris containment and collection program shall be considered as included in the contract price paid for the item of work causing the existing paint system to be disturbed, and no additional compensation will be allowed therefor.

Safety and Health Provisions

Attention is directed to Section 7-1.06, "Safety and Health Provisions," of the Standard Specifications. Work practices and worker health and safety shall conform to the California Code of Regulations, Title 8, Construction Safety Orders, including Section 1532.1, "Lead."

The Contractor shall furnish the Engineer a written Code of Safe Practices and shall implement an Injury and Illness Prevention Program and a Hazard Communication Program in conformance with the requirements of Construction Safety Orders, Sections 1509 and 1510.

Prior to starting work that disturbs the existing paint system, and when revisions to the program are required by Section 1532.1, "Lead," the Contractor shall submit the compliance programs required in subsection (e)(2), "Compliance Program," of Section 1532.1, "Lead," of the Construction Safety Orders to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The compliance programs shall include the data specified in subsections (e)(2)(B) and (e)(2)(C) of Section 1532.1, "Lead." Approval of the compliance programs by the Engineer will not be required. The compliance programs shall be reviewed and signed by a Certified Industrial Hygienist (CIH) who is certified in comprehensive practice by the American Board of Industrial Hygiene (ABIH). Copies of all air monitoring or jobsite inspection reports made by or under the direction of the CIH in conformance with Section 1532.1, "Lead," shall be furnished to the Engineer within 10 days after the date of monitoring or inspection.

Full compensation for furnishing the Engineer with the submittals and for implementing the programs required by this safety and health section shall be considered as included in the contract price paid for the item of work causing the existing paint system to be disturbed, and no additional compensation will be allowed therefor.

Debris Handling

Debris produced when the existing paint system is disturbed shall not be temporarily stored on the ground. Debris accumulated inside the containment system shall be removed before the end of each work shift. Debris shall be stored in approved, leakproof containers and shall be handled in such a manner that no spillage will occur.

Disposal of debris produced when the existing paint system is disturbed shall be performed in conformance with all applicable Federal, State, and Local hazardous waste laws. Laws that govern this work include:

A. Health and Safety Code, Division 20, Chapter 6.5 (California Hazardous Waste Control Act).

B. Title 22; California Code of Regulations, Division 4.5, (Environmental Health Standards for the Management of Hazardous Waste).
C. Title 8, California Code of Regulations.

Except as otherwise provided herein, debris produced when the existing paint system is disturbed shall be disposed of by the Contractor at an approved Class 1 disposal facility in conformance with the requirements of the disposal facility operator. The debris shall be hauled by a transporter currently registered with the California Department of Toxic Substances Control using correct manifesting procedures and vehicles displaying current certification of compliance. The Contractor shall make all arrangements with the operator of the disposal facility and perform any testing of the debris required by the operator.

At the option of the Contractor, the debris produced when the existing paint system is disturbed may be disposed of by the Contractor at a facility equipped to recycle the debris, subject to the following requirements:

A. Copper slag abrasive blended by the supplier with a calcium silicate compound shall be used for blast cleaning.
B. The debris produced when the existing paint system is disturbed shall be tested by the Contractor to confirm that the solubility of the heavy metals is below regulatory limits and that the debris may be transported to the recycling facility as a non-hazardous waste.
C. The Contractor shall make all arrangements with the operator of the recycling facility and perform any testing of the debris produced when the existing paint system is disturbed that is required by the operator.

Full compensation for debris handling and disposal shall be considered as included in the contract price paid for the item of work causing the existing paint system to be disturbed, and no additional compensation will be allowed therefor.

ABANDON CULVERT AND SEWER

Existing culverts and sewers, where shown on the plans to be abandoned, shall be abandoned in place or, at the option of the Contractor, the culverts and sewers 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 sewers in place shall conform to the following:

A. Culverts and sewers that intersect the side slopes shall be removed to a depth of not less than one meter measured normal to the plane of the finished side slope, before being abandoned.
B. Culverts and sewers 300 mm in diameter and larger, shall, at the Contractor's option, be backfilled with either sand, controlled low strength material or slurry cement backfill conforming to the provisions in Section 19-3.062, "Slurry Cement Backfill," of the Standard Specifications by any method acceptable to the Engineer that completely fills the pipe. Sand backfill material shall be clean, free draining, and free from roots and other deleterious substances.
C. The ends of culverts and sewers shall be securely closed by a 150 mm thick tight fitting plug or wall of commercial quality concrete.

Culverts and sewers shall not be abandoned until their use is no longer required. The Contractor shall notify the Engineer in advance of any intended culvert or pipeline abandonment.

Full compensation for concrete plugs, pipe removal, structure excavation, and backfill (including sand, controlled low strength material or slurry cement backfill) shall be considered as included in the contract unit price paid for abandon culverts and sewers and no additional compensation will be allowed therefor.

SALVAGE METAL BEAM GUARD RAILING

Existing metal beam guard railing, 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 yard at 500 Queens Lane, San Jose, CA 95112 and stockpiled.

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 metal beam guard railing and no separate payment will be made therefor.

SALVAGE CONCRETE BARRIER (TYPE K)

Existing concrete barrier (Type K), where shown on the plans to be salvaged, shall be removed and salvaged.

Salvaged concrete barrier (Type K) shall be hauled to Caltrans Maintenance yard at 1007 Knox Avenue, San Jose, CA 95122 and stockpiled.

SALVAGE CRASH CUSHION ADIEM II 350

Existing crash cushions ADIEM II 350, where shown on the plans to be salvaged, shall be removed and salvaged.

Salvaged crash cushions ADIEM II 350 materials shall be hauled to Caltrans Maintenance yard at 500 Queens Lane, San Jose, CA 95112 and stockpiled.

SALVAGE CRASH CUSHION MODULES

Existing crash cushion modules, where shown on the plans to be salvaged, shall be removed and salvaged.

Sand from existing crash cushion modules shall be removed and disposed of.

Salvaged crash cushion modules shall be hauled to Caltrans Maintenance yard at 500 Queens Lane, San Jose, CA 95112 and stockpiled.

Full compensation for removing and disposing of sand shall be considered as included in the contract price paid per unit for salvage crash cushion modules and no separate payment will be made therefor.

REMOVE RAIL AND POST

Existing rail and post at the Juvenile Center, including post footings, where shown on the plans, shall be removed and disposed of.

REMOVE CHAIN LINK FENCE

Existing chain link fence, including post footings, 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 CHANNELIZERS

Existing channelizers, where shown on the plans to be removed, shall be removed.

The channelizers shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.

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 DRAINAGE FACILITY

Existing inlets, pipe inlets,pipes, manholes, G1 cleanouts, 300 mm downdrains, overside drains, sliding gates, slide headgate and riser assembly 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 TRAFFIC STRIPE AND PAVEMENT MARKING

Traffic stripe and pavement marking shall be removed at the locations shown on the plans and as directed by the Engineer.

Attention is directed to "Water Pollution Control" of these special provisions.

Waste from removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking contains lead chromate in average concentrations greater than or equal to 5 mg/L Soluble Lead or 1000 mg/kg Total Lead. Yellow painted traffic stripe and pavement markings exist from U-Line Station 78+75 to 82+18, G-Line Station 138+51 to 177+80 and right of 151+10. Also, pavement markings exist from F-Line Stations 8+60 (at), 8+80 (right of), 9+20 (at), 9+70 (right of), 11+60 (at), 11+95 (right of), 12+00 (at), FR-Line at station 12+20 (right of) and H-Line Station 1+00. Residue produced from when yellow thermoplastic and yellow paint are removed may contain heavy metals in concentrations that exceed thresholds established by the California Health and Safety Code and may produce toxic fumes when heated.

The removed yellow thermoplastic and yellow paint shall be disposed of at a Class 1 disposal acility or a Class 2 disposal facility permitted by the Regional Water Quality Control Board in conformance with the requirements of the disposal facility operator within 30 days after accumulating 100 kg of residue and dust. The Contractor shall make necessary arrangements with the operator of the disposal facility to test the yellow thermoplastic and yellow paint residue as required by the facility and these special provisions. Testing shall include, at a minimum, (1) Total Lead and Chromium by EPA Method 7000 series and (2) Soluble Lead and Chromium by California Waste Extraction Test. From the first 3360 L of waste or portion thereof, if less than 3360 L of waste are produced, a minimum of four randomly selected samples shall be taken and analyzed. From each additional 840 L of waste or portion thereof, if less than 840 L are produced, a minimum of

one additional random sample shall be taken and analyzed. The Contractor shall submit the name and location of the disposal facility and analytical laboratory along with the testing requirements to the Engineer not less than 15 days prior to the start of removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking. The analytical laboratory shall be certified by the Department of Health Services Environmental Laboratory Accreditation Program. Test results shall be provided to the Engineer for review prior to signing a waste profile as requested by the disposal facility, prior to issuing an EPA identification number, and prior to allowing removal of the waste from the site.

The Contractor shall prepare a project specific Lead Compliance Plan to prevent or minimize worker exposure to lead while handling removed yellow thermoplastic and yellow paint residue. Attention is directed to Title 8, California Code of Regulations, Section 1532.1, "Lead," for specific Cal-OSHA requirements when working with lead.

The Lead Compliance Plan shall contain the elements listed in Title 8, California Code of Regulations, Section 1532.1(e)(2)(B). Before submission to the Engineer, the Lead Compliance Plan shall be approved by an Industrial Hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene. The Plan shall be submitted to the Engineer at least 7 days prior to beginning removal of yellow thermoplastic and yellow paint.

Prior to removing yellow thermoplastic and yellow painted traffic stripe and pavement marking, personnel who have no prior training, including State personnel, shall complete a safety training program provided by the Contractor that meets the requirements of Title 8, California Code of Regulations, Section 1532.1, "Lead," and the Contractor's Lead Compliance Program.

Personal protective equipment, training, and washing facilities required by the Contractor's Lead Compliance Plan shall be supplied to State personnel by the Contractor. The number of State personnel will be 3.

Where grinding or other methods approved by the Engineer are used to remove yellow painted traffic stripe and pavement marking, the removed residue, including dust, shall be contained and collected immediately. Sweeping equipment shall not be used. Collection shall be by a high efficiency particulate air (HEPA) filter equipped vacuum attachment operated concurrently with the removal operations or other equally effective methods approved by the Engineer. The Contractor shall submit a written work plan for the removal, storage, and disposal of yellow thermoplastic and yellow painted traffic stripe and pavement marking to the Engineer for approval not less than 15 days prior to the start of the removal operations. Removal operations shall not be started until the Engineer has approved the work plan.

The removed yellow painted traffic stripe and pavement marking residue shall be stored and labeled in covered containers. Labels shall conform to the provisions of Title 22, California Code of Regulations, Sections 66262.31 and 66262.32. Labels shall be marked with date when the waste is generated, the words "Hazardous Waste", composition and physical state of the waste (for example, asphalt grindings with thermoplastic or paint), the word "Toxic", the name and address of the Engineer, the Engineer's telephone number, contract number, and Contractor or subcontractor. The containers shall be a type approved by the United States Department of Transportation for the transportation and temporary storage of the removed residue. The containers shall be handled so that no spillage will occur. The containers shall be stored in a secured enclosure at a location within the project limits until disposal, as approved by the Engineer.

If the yellow painted traffic stripe and pavement marking residue is transported to a Class 1 disposal facility, a manifest shall be used, and the transporter shall be registered with the California Department of Toxic Substance Control. The Engineer will obtain the United States Environmental Protection Agency Identification Number and sign all manifests as the generator within 2 working days of receiving sample test results and approving the test methods.

The Contractor shall assume that the yellow paint removed is not regulated under the Federal Resource Conservation and Recovery Act (RCRA). Additional disposal costs for removal residue regulated under RCRA, as determined by test results required by the disposal facility, will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

Nothing in these special provisions shall relieve the Contractor of the Contractor's responsibilities as specified in Section 7-1.09, "Public Safety," of the Standard Specifications.

Attention is directed to "Material Containing Aerially Deposited Lead" of these special provisions regarding payment for the Lead Compliance Plan.

Full compensation for providing a written work plan for the removal, storage, and disposal of yellow thermoplastic and yellow painted traffic stripe and pavement marking shall be considered as included in the contract items paid per meter for remove yellow thermoplastic traffic stripe and remove yellow painted traffic stripe or per square meter for remove yellow thermoplastic pavement marking and yellow painted pavement marking and no separate payment will be made therefor.

REMOVE ROADSIDE SIGN

Existing roadside signs, at those locations shown on the plans to be removed, shall be removed and disposed of.

Existing roadside signs shall not be removed until replacement signs have been installed or until the existing signs are no longer required for the direction of public traffic, unless otherwise directed by the Engineer.

RECONSTRUCT SLIDE HEADGATE AND RISER ASSEMBLY

Existing 1050 mm slide headgate and riser assembly, at the locations shown on the plans, shall be reconstructed.

RELOCATE BLOW-OFF ASSEMBLY

Existing blow-off assembly shall be removed and relocated to the new locations shown on the plans.

RELOCATE ROADSIDE SIGN

Existing roadside signs shall be removed and relocated to the new locations shown on the plans.

Each roadside sign shall be installed at the new location on the same day that the sign is removed from its original location.

Two holes shall be drilled in each existing post as required to provide the breakaway feature shown on the plans.

ADJUST INLET AND MANHOLE

Existing manholesand concrete drainage inlets shall be adjusted as shown on the plans.

Portland cement concrete shall be minor concrete or may be produced from commercial quality concrete containing not less than 350 kilograms of cement per cubic meter.

Adjustment of manholes and inlets shall be performed prior to paving and shall be limited to the area to be paved or surfaced during the working day in which the adjustment is performed. The top of the manhole or inlet grate or cover shall be protected from the asphalt concrete during paving operations by means of heavy plywood covers, steel plate covers or by other methods approved by the Engineer. Excess paving material shall be removed prior to rolling.

Where manholes and inlets are located in areas to be paved or surfaced, no individual structure shall be constructed to final grade until the paving or surfacing has been completed immediately adjacent to the structure.

The contract price paid per unit for adjust manhole and inlet shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in adjusting inlets, including removing portions of inlets, bar reinforcing steel, concrete and structure excavation and structure backfill, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

ADJUST FRAME AND COVER TO GRADE

Frames and covers of existing manholes shall be adjusted to grade in conformance with the provisions in Section 15-2.05, "Reconstruction," of the Standard Specifications.

ADJUST FRAME AND GRATE TO GRADE

Frames and grates of existing drainage inlets be adjusted to grade in conformance with the provisions in Section 15-2.05, "Reconstruction," of the Standard Specifications.

REMOVE ASPHALT CONCRETE

Existing asphalt concrete shown on the plans to be removed, shall be removed . 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 asphalt concrete 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 asphalt concrete.

REMOVE WIRE MESH AND FABRIC AT TEMPORARY MSE WALLS

Existing wire mesh and fabric at temporary MSE walls shown on the plans to be removed, shall be removed . 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 wire mesh and fabric at temporary MSE wallswill be measured by the squaremeter and will be paid for at the contract price per squaremeter for remove wire mesh and fabric at temporary MSE walls.

REMOVE BASE AND SURFACING

Existing base and bituminous surfacing shown on the plans to be removed, shall be removed to a depth of at least 150 mm below the grade of the existing surfacing. Resulting holes and depressions shall be backfilled with earthy material selected from excavation to the lines and grade established by the Engineer.

The material removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 15-2.03, "Disposal," of the Standard Specifications.

Removing base and surfacing will be measured by the cubic meter in the same manner specified for roadway excavation in conformance with the provisions in Section 19, "Earthwork," of the Standard Specifications and will be paid for at the contract price per cubic meter for remove base and surfacing.

COLD PLANE ASPHALT CONCRETE PAVEMENT

Existing asphalt concrete pavement shall be cold planed at the locations and to the dimensions shown on the plans.

Planing asphalt concrete pavement shall be performed by the cold planing method. Planing of the asphalt concrete pavement shall not be done by the heater planing method.

Cold planing machines shall be equipped with a cutter head not less than 750 mm in width and shall be operated so that no fumes or smoke will be produced. The cold planing machine shall plane the pavement without requiring the use of a heating device to soften the pavement during or prior to the planing operation.

The depth, width, and shape of the cut shall be as shown on the typical cross sections or as designated by the Engineer. The final cut shall result in a uniform surface conforming to the typical cross sections. The outside lines of the planed area shall be neat and uniform. Planing asphalt concrete pavement operations shall be performed without damage to the surfacing to remain in place.

Planed widths of pavement shall be continuous except for intersections at cross streets where the planing shall be carried around the corners and through the conform lines. Following planing operations, a drop-off of more than 45 mm will not be allowed between adjacent lanes open to public traffic.

Where transverse joints are planed in the pavement at conform lines no drop-off shall remain between the existing pavement and the planed area when the pavement is opened to public traffic. If asphalt concrete has not been placed to the level of existing pavement before the pavement is to be opened to public traffic a temporary asphalt concrete taper shall be constructed. Asphalt concrete for temporary tapers shall be placed to the level of the existing pavement and tapered on a slope of 1:30 (Vertical: Horizontal) or flatter to the level of the planed area.

Asphalt concrete for temporary tapers shall be commercial quality and may be spread and compacted by any method that will produce a smooth riding surface. Temporary asphalt concrete tapers shall be completely removed, including the removal of loose material from the underlying surface, before placing the permanent surfacing. The removed material shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

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. The quantity to be paid for will be the actual area of surface cold planed irrespective of the number of passes required to obtain the depth shown on the plans.

The contract price paid per square meter for cold plane asphalt concrete pavement shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in cold planing asphalt concrete surfacing and disposing of planed material, including furnishing the asphalt concrete for and constructing, maintaining, removing, and disposing of temporary asphalt concrete tapers, as specified in the Standard Specifications and these special provisions and as directed by the Engineer.

BRIDGE REMOVAL

Removing bridges and portions of bridges shall conform to the provisions in Section 15-4, "Bridge Removal," of the Standard Specifications and these special provisions.

BRIDGE REMOVAL (PORTION)
NORTHBOUND ON-RAMP
(Bridge No. 37-0583)

Bridge removal (portion) shall consist of removing a portion of existing concrete barrier as shown on the plans.

BRIDGE REMOVAL, LOCATION A
GUADALUPE PARKWAY OC
(Bridge No. 37-0181)

Bridge removal, location A shall consist of removing the existing two-span composite welded steel girder bridge. The existing paint systems on this bridge consist of red lead. The existing footings at Bent 2 shall be completely removed.

BRIDGE REMOVAL, LOCATION B
GUADALUPE PARKWAY OC
(Bridge No. 37-0182)

Bridge removal, location B shall consist of removing the existing two-span composite welded steel girder bridge. The existing paint systems on this bridge consist of red lead. The existing footings at Bent 2 shall be completely removed.

BRIDGE REMOVAL, LOCATION C
ROUTE 87/880 SEPARATION (TEMP)
(Bridge No. 37-0596)

Bridge removal, location C shall consist of removing the temporary two-span precast prestressed concrete girder bridge.

All removed materials that are not to be salvaged or used in the reconstruction shall become the property of the Contractor and shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The Contractor shall submit a complete bridge removal plan to the Engineer detailing procedures and sequence for removing portions of bridge, including all features necessary to remove the bridges in a safe and controlled manner.

The bridge removal plan shall be furnished for Guadalupe Parkway OC (Br. No. 37-0181 & 37-0182) and Route 87/880 Separation (Temp), (Br. No. 37-0596), and shall include the following:

A. The bridge removal sequence for the entire structure, including staging of bridge removal;
B. Equipment locations on the structure during removal operations;
C. Temporary support shoring or temporary bracing;
D. Locations where work is to be performed over traffic; and
E. Details and locations of protective covers or other measures to assure that people, property, and improvements will not be endangered.

Temporary support shoring, temporary bracing, and protective covers as required, shall be designed and constructed in conformance with the provisions in Section 51-1.06, "Falsework," of the Standard Specifications and these special provisions.

The assumed horizontal load to be resisted by the temporary support shoring and temporary bracing, for removal operations only, shall be the sum of the actual horizontal loads due to equipment, construction sequence or other causes, and an allowance for wind, but in no case shall the assumed horizontal load to be resisted in any direction be less than 5 percent of the total dead load of the structure to be removed.

The following additional requirements apply to the removal of portions of bridges that are over or adjacent to roadways that may be closed to public traffic for only brief periods of time:

A. The closure of roadways to public traffic shall conform to the provisions in "Order of Work" and "Maintaining Traffic" of these special provisions.
B. Prior to closing a roadway to traffic to accommodate bridge removal operations, the Contractor shall have all necessary workers, materials, and equipment at the site as needed to proceed with the removal work in an expeditious manner. While the roadway is closed to public traffic, work shall be pursued promptly and without interruption until the roadway is reopened to public traffic.
C. All removal operations shall be performed during periods of time that the roadway is closed to public traffic except as specified herein for preliminary work.
D. Preliminary work shall be limited to operations that will not reduce the structural strength or stability of the bridge, or any element thereof, to a level that in the judgment of the Engineer would constitute a hazard to the public. Such preliminary work shall also be limited to operations that cannot cause debris or any other material to fall onto the roadway. Protective covers may be used to perform preliminary work such as chipping or cutting the superstructure into segments, provided the covers are of sufficient strength to support all loads and are sufficiently tight to prevent dust and fine material from sifting down onto the traveled way. Protective covers shall extend at least 1.2 m beyond

the limit of the work underway. Bottom slabs of box girders may be considered to be protective covers for preliminary work performed on the top slab inside the limits of the exterior girders.

E. Temporary support shoring, temporary bracing, and protective covers shall not encroach closer than 2.4 m horizontally from the edge or 4.6 m vertically above any traffic lane or shoulder that is open to public traffic.

F. During periods when the roadway is closed to public traffic, debris from bridge removal operations may be allowed to fall directly onto the lower roadway provided adequate protection is furnished for all highway facilities. The minimum protection for paved areas shall be a 0.6-m thick earthen pad or a 25-mm thick steel plate placed over the area where debris can fall. Prior to reopening the roadway to public traffic, all debris, protective pads, and devices shall be removed and the roadway swept clean with wet power sweepers or equivalent methods.

G. The removal operations shall be conducted in such a manner that the portion of the structure not yet removed remains in a stable condition at all times. For girder bridges, each girder shall be completely removed within a span before the removal of the adjacent girder is begun. For slab type bridges, removal operations within a span shall be performed along a front that roughly parallels the primary reinforcing steel.

The Contractor shall submit working drawings, with design calculations, to the Engineer for the proposed bridge removal plan. The bridge removal plan shall be prepared by an engineer who is registered as a Civil Engineer in the State of California. The design calculations shall be adequate to demonstrate the stability of the structure during all stages of the removal operations. Calculations shall be provided for each stage of bridge removal and shall include dead and live load values assumed in the design of protective covers. At a minimum, a stage will be considered to be removal of the deck, the soffit, or the girders, in any span; or walls, bent caps, or columns at support locations.

The bridge removal plan shall conform to the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The number of sets of drawings and design calculations and times for review for any bridge removal plans shall be the same as specified for falsework working drawings in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications.

The time to be provided for the Engineer's review of the working drawings for removing specific structures, or portions thereof, shall be as follows:

Structure or Portion of Structure	Review Time - Weeks
Guadalupe Parkway OC Br. No. 37-0181	4
Guadalupe Parkway OC Br. No. 37-0182	4
Route 87/880 Separation (Temp) Br. No. 37-0596	4

At a bridge site where a bridge removal plan is required, the Contractor's registered engineer shall be present at all times when bridge removal operations are in progress. The Contractor's registered engineer shall inspect the bridge removal operation and report in writing on a daily basis the progress of the operation and the status of the remaining structure. A copy of the daily report shall be available at the site of the work at all times. Should an unplanned event occur, the Contractor's registered engineer shall submit immediately to the Engineer for approval, the procedure of operation proposed to correct or remedy the occurrence.

REMOVE CONCRETE

Concrete, where shown on the plans to be removed, shall be removed.

The pay quantities of concrete to be removed will be measured by the cubic meter, measured before and during removal operations.

Concrete removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

10-1.28 CLEARING AND GRUBBING

Clearing and grubbing shall conform to the provisions in Section 16, "Clearing and Grubbing," of the Standard Specifications and these special provisions.

Vegetation shall be cleared and grubbed only within the excavation and embankment slope lines.

At locations where there is no grading adjacent to a bridge or other structure, clearing and grubbing of vegetation shall be limited to 1.5 m outside the physical limits of the bridge or structure.

Existing vegetation outside the areas to be cleared and grubbed shall be protected from injury or damage resulting from the Contractor's operations.

Activities controlled by the Contractor, except cleanup or other required work, shall be confined within the graded areas of the roadway.

Nothing herein shall be construed as relieving the Contractor of the Contractor's responsibility for final cleanup of the highway as provided in Section 4-1.02, "Final Cleaning Up," of the Standard Specifications.

10-1.29 WATERING

Watering shall conform to the provisions in Section 17, "Watering," of the Standard Specifications and these special provisions.

Water used for dust control on this project shall be nonpotable water and shall be furnished and applied as provided in Section 17, "Watering," of the Standard Specifications. Water for uses other than dust control on this project may, at the option of the Contractor, be nonpotable.

Attention is directed to the source or sources of reclaimed waste water for use on the project as provided in "Materials Information" available to contractors.

Reclaimed waste water from sources, not listed in the "Materials Information," that are developed for use on the project shall meet the California Department of Health Services water reclamation criteria and the Regional Water Quality Control Board requirements. The Contractor shall obtain either a waste water discharge permit or a waiver from the Regional Water Quality Control Board. Copies of permits or waivers from the Regional Water Quality Control Board, for sources not listed in the "Materials Information," shall be delivered to the Engineer before using reclaimed waste water on the project.

Full compensation for developing nonpotable water supply, loading and transporting nonpotable water, and labeling as specified shall be considered as included in the prices paid for the various contract items of work involving the use of water and no additional compensation will be allowed therefor.

10-1.30 EARTHWORK

Earthwork shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

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

The grading plane of embankments beneath structure approach slabs and beneath the thickened portion of sleeper slabs shall not project above the grade established by the Engineer.

Surplus excavated material not designated or determined to contain aerially deposited lead shall become the property of the Contractor and shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Where a portion of the existing surfacing is to be removed, the outline of the area to be removed shall be cut on a neat line with a power-driven saw to a minimum depth of 50 mm before removing the surfacing. Full compensation for cutting the existing surfacing shall be considered as included in the contract price paid per cubic meter for roadway excavation and no additional compensation will be allowed therefor.

The portion of imported borrow placed within 1.5 m of the finished grade shall have a Resistance (R-Value) of not less than 15.

Reinforcement or metal attached to reinforced concrete rubble placed in embankments shall not protrude above the grading plane. Prior to placement within 0.6-m below the grading plane of embankments, reinforcement or metal shall be trimmed to no greater than 20 mm from the face of reinforced concrete rubble. Full compensation for trimming reinforcement or metal shall be considered as included in the contract prices paid per cubic meter for the types of excavation shown in the Engineer's estimate, or the contract prices paid for furnishing and placing imported borrow or embankment material, as the case may be, and no additional compensation will be allowed therefor.

The Contractor shall remove and dispose of the existing MSE retaining wall soil reinforcement mats where they will extend into the roadway structural section. The Contractor shall remove and dispose of the existing geosynthetic reinforced embankment as shown on the plans.

Full compensation for removal and disposal of the existing MSE retaining wall soil reinforcement mats .shall be considered as included in the contract price paid per cubic meter of roadway excavation and no additional compensation will be allowed therefor.

Surcharge embankments were previously constructed under Caltrans Contract No. 04-4874S4 and 4874A4 above the grading plane and are listed in the following table:

"G" Line

Stations	Surcharge Height, Meters	Settlement Period, Calender Days
149+00 to 150+40	Up to 3.6 m	From November, 1, 2001. 360 days or until desired amount of settlement occurs as measured by field monitoring devices
150+80 to 154+85	Up to 3.6 m	From November 1, 2001. 360 days or until desired amount of settlement occurs as measured by field monitoring devices
155+80 to 160+00	Up to 3.6 m	From June 30, 2002. 360 days or until desired amount of settlement occurs as measured by field monitoring devices

The duration of the required settlement period at each location will be determined by the Engineer. The estimated duration of the settlement periods are listed in the tables of settlement data. The Engineer may order an increase or decrease in any estimated settlement period. An ordered increase or decrease in any settlement period will result in an increase or decrease in the number of working days allowed for the completion of the work if the settlement period involved is considered to be the current controlling operation in conformance with the provisions in Section 8-1.06, "Time of Completion," of the Standard Specifications. Neither the Contractor nor the State will be entitled to any compensation other than an adjustment of contract time due to increases or decreases in the settlement periods.

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).

10-1.31 SUBGRADE ENHANCEMENT FABRIC

Subgrade enhancement fabric shall be placed where shown on the plans and locations designated by the Engineer in accordance with the 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:

Specification	Requirement	
	Woven	Non-Woven
Weight, grams per square meter, min. ASTM Designation: D 3776	200	200
Grab tensile strength (25-mm grip), kilonewtons, min. in each direction ASTM Designation: D 4632	0.90	0.81
Modulus (Tensile strength at 10% Elongation) kilonewtons, min.	0.495	NA
Elongation at break, percent min. ASTM Designation: D 4632	35 max.	50 min.

Subgrade enhancement fabric shall be furnished in an appropriate protective cover that 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, “Certificate 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 or loose or extraneous material and sharp objects that may be damage the fabric during installation.

Subgrade enhancement fabric shall be handled and placed in accordance with the manufacturer’s recommendations and shall be positioned longitudinally along the alignment, and pulled taut to form a 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 base or other material, as shown on the plans, 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 to provide a minimum 1-m 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 base material, of other material placed immediately above the fabric, vehicles and 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 the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.32 IMPORTED BORROW (LIGHTWEIGHT AGGREGATE)

Imported borrow (lightweight aggregate) shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

Imported borrow (lightweight aggregate) shall consist of a rotary kiln expanded shale aggregate of the extruded type or a processed, naturally-occurring volcanic aggregate.

Imported borrow (lightweight aggregate) grading shall be as specified in these special provisions.

Imported borrow (lightweight aggregate) material, when deposited in place, shall conform to the following grading and quality requirements:

Grading Requirements

Sieve Sizes	Percentage Passing
37.5-mm	100
25-mm	95 - 100
19-mm	90 - 100
9.5-mm	15 - 85
75-µm	0 - 9

Grading will be determined in conformance with the requirements of California Test 202, except shaking in the sieves shall be limited to 5 minutes.

Quality Requirements

Test	Requirement
Resistance (R-Value)	50 min
Durability Index	35 min

When imported borrow (lightweight aggregate) is used as structure backfill for galvanized steel or reinforced concrete pipe culverts, the imported borrow (lightweight aggregate) shall have a minimum resistivity greater than or equal to 1000 ohm-cm and a pH greater than or equal to 5.5 For reinforced concrete pipe culverts, if the minimum resistivity of the native soil is less than 1,000 ohm-cm, imported borrow (lightweight aggregate) used as structure backfill shall have a chloride content less than or equal to 500 parts per million and a sulfate content less than or equal to 2000 parts per million. For aluminum or aluminum-coated steel culverts, imported borrow (lightweight aggregate) used for structure backfill shall have a minimum resistivity greater than 1,500 ohm-cm and a pH between 5.5 and 8.5. Minimum resistivity and pH shall be determined in conformance with the requirements of California Test Method 643, chloride content shall be determined in conformance with the requirements of California Test Method 422, and sulfate content shall be determined in conformance with the requirements of California Test Method 417.

At locations directed by the Engineer, the material used to backfill the outer 0.6-m portion of structure backfill adjacent to pipe and culvert inlets and outlets shall be a compacted impervious material, conforming to the provisions in Section 19-3.06, "Structure Backfill," of the Standard Specifications.

At locations directed by the Engineer, the structure backfill placed within 0.6-m of finished ground around abutments, abutment wingwalls, retaining walls, and other portions of structures shall be a compacted impervious material, conforming to the provisions in Section 19-3.06, "Structure Backfill," of the Standard Specifications. If the minimum resistivity of the

native soil is less than 1,000 ohm-cm, then the imported borrow (lightweight aggregate) shall have a chloride content less than or equal to 500 parts per million and a sulfate content less than or equal to 2000 parts per million.

When imported borrow (lightweight aggregate) is used as embankment material for geosynthetically reinforced embankments, the pH shall be between 4.5 and 9 as determined in conformance with the requirements of California Test Method 643.

Imported borrow (lightweight aggregate) shall have a maximum calculated saturated surface dry unit weight of 960 kg/m^3. The saturated surface dry unit weight shall be calculated using the dry loose unit weight and the absorption of the coarse and fine aggregates. Dry loose unit weight shall be determined in conformance with the requirements in California Test Method 212, using test procedure (b) Compaction Method (by jigging). Absorption of the coarse and fine aggregates shall be determined in conformance with the requirements in California Test Methods 206 and 207, except that the samples shall be oven dry before soaking and shall be soaked for 24 hours plus or minus 30 minutes. Saturated surface dry unit weight shall be calculated as follows:

1. multiply the percent coarse aggregate by the absorption of the coarse aggregate;
2. multiply the percent fine aggregate by the absorption of the fine aggregate;
3. add the two values from 1. and 2. and divide by 10000;
4. add one (1) to the result from 3. and multiply by the dry loose unit weight.

Imported borrow (lightweight aggregate) shall be placed and compacted to the designated dimensions in conformance with the provisions in Sections 19-1.03, "Grade Tolerance," and 19-6, "Embankment Construction," of the Standard Specifications. The provisions in Section 19-5, "Compaction," of the Standard Specifications shall not apply.

Initial layers of imported borrow (lightweight aggregate) may be placed by end dumping from trucks, or by any other method approved by the Engineer.

Imported borrow (lightweight aggregate) shall be spread or placed in such manner that will prevent bulking of the material and minimize particle breakdown. Imported borrow (lightweight aggregate) shall be compacted in uniform layers not to exceed 0.2-m thickness before compaction. Compaction shall be obtained by a minimum of 3 complete coverage passes using smooth drum steel roller compaction equipment imposing contact force of 1,850 kg per-meter-width of the roller face. Track type equipment which imposes the equivalent contact pressure as that specified for steel drum rollers, as determined by the Engineer, may be used provided the 3 complete coverages of the tracks of the track type equipment are achieved. Sufficient moisture treatment shall be made to aid the compactive effort. Compaction using pneumatic-tired equipment or compaction within trenches or other limited-access areas, or compaction in areas of low confining pressure, shall be by a method approved by the Engineer.

When alternative compaction equipment and methods of compaction (including use of pneumatic-tired equipment in trenches, in limited-access areas, and areas of low confining pressure) are proposed by the Contractor, a test site placing and compacting lightweight aggregate material shall be constructed. The alternative compaction equipment and methods of compaction shall not be used until, evaluation of the test site by the Engineer and the alternative methods and equipment have been approved by the Engineer.

Quantities of imported borrow (lightweight aggregate) shall be paid for by the cubic meter calculated on the basis of the mass, measured in place in conformance with the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications divided by the 95 percent of the dry unit weight measured in conformance with the requirements in California Test Method 212, using test procedure (b) Compaction Method (by jigging).

The contract price paid per cubic meter for imported borrow (lightweight aggregate) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing imported borrow (lightweight aggregate), complete in place (including constructing and removing any test sites required), as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

10-1.33 LIGHTWEIGHT EMBANKMENT MATERIAL (EPS BLOCK)

Lightweight embankment material (EPS block) shall be expanded polystyrene (EPS) material. Lightweight embankment material (EPS block) shall be fabricated as blocks measuring approximately 0.61 m x 1.22 m x 2.44 m. Manufacturer's standard size blocks will be acceptable. Special-size blocks will be required at the edges of the lightweight embankment material section to fill the volume shown on the plans.

Lightweight embankment material (EPS block) shall have the following physical properties:

Physical Property	ASTM Designation	Acceptance Value
Density	C 303	24 kg/m^3 Minimum 32 kg/m^3 Maximum
Compressive Strength (at 5% deformation)	D 1621	100 kPa Minimum
Flexural Strength	C 203	300 kPa Minimum
Tensile Strength	D 1623	130 kPa Minimum
Water Absorption	C 272	2.0% Maximum by Volume

A certificate of compliance from the manufacturer of the lightweight embankment material (EPS block) shall be furnished in accordance with the provisions of Section 6-1.07 "Certificates of Compliance" of the Standard Specifications. Shop drawings showing special size blocks and the layout of lightweight embankment material (EPS block) blocks in each layer shall be submitted to the Engineer for approval prior to fabrication of the blocks. The long axis of blocks in adjacent layers shall be rotated horizontally 90 degrees and the edges of blocks in adjacent layers shall be offset approximately 1.2 m to minimize continuous joints.

The Contractor shall prevent damage to the lightweight embankment material (EPS block) during delivery, storage, and construction. Lightweight embankment material (EPS block) shall be protected from petroleum products, ultraviolet light, and/or mechanical damage. Any lightweight embankment material (EPS block) damaged by the Contractor's equipment or operations shall be replaced by the Contractor at his expense. It shall be the Contractor's responsibility to ensure that the EPS blocks are not exposed to hydrocarbons contamination during the life of the contract.

Between stages, as shown on the plans, the lightweight embankment material (EPS block) shall be protected with temporary geomembrane (Type A-gasoline resistant) and weighted down with sufficient sand bags to keep it in place. Temporary geomembrane shall conform to the provisions in the Section "Geomembrane (Type A-Gasoline Resistant)" elsewhere in these special provisions. Sand bags shall conform to the provisions in Section 19-3.025B, "Sand Bedding," of the Standard Specifications. The sacks for sand bags shall be made of at least 280 gram burlap and shall be approximately 500-mm x 910-mm measured inside the seams when the sack is laid flat. The capacity of each sack shall be approximately 0.04 cubic meters. The sacks shall be filled with approximately 0.03 cubic meters of sand loosely placed so as to leave room for folding at the top. The fold shall be just enough to retain the sand at the time of placing.

Lightweight embankment material (EPS block) shall be placed to the lines and grades shown on the plans and as directed by the Engineer. Surfaces to receive lightweight embankment material (EPS block) shall be finished such that there is no more than a 15 mm variation in vertical grade over any 3 m interval, and are within 60 mm of the grade shown on the contract plans. The surface of a layer of lightweight embankment material (EPS block) blocks on which additional blocks are to placed shall be plane, with no more than a 15 mm variation in vertical grade over any 3 m interval. All blocks shall fit accurately against adjacent blocks, without voids wider than 15 mm at any vertical joint. The finished surface of the lightweight embankment material (EPS block) fill shall be constructed to a tolerance of plus or minus 100 mm from the grade shown on the contract plans. Lightweight embankment material (EPS block) shall not be less than 150 mm in thickness. This may require saw cutting the lower blocks to achieve a minimum 150 mm thickness for the top most EPS blocks in order to meet roadway superelevations and grades.

Sliding of lightweight embankment material (EPS block) blocks along horizontal joints shall be prevented by timber fasteners placed on 1.2 m centers or by gluing. Timber fasteners shall have 16 prongs approximately 25 mm on-center which penetrate a minimum of 12 mm into the foam block above and below or as approved by the Engineer. Timber fasteners shall be placed a minimum of 250 mm from block edges. Glue shall be as recommended by the manufacturer of the lightweight embankment material (EPS block). Glue joints shall be capable of developing a minimum of 85 kPa of shear strength when tested in accordance with ASTM Designation D 732 test procedures. EPS blocks, while wrapped with geomembrane, shall not be exposed to temperature greater than 32.2ºC.

MEASUREMENT.--Lightweight embankment material (EPS block) shall be measured by the cubic meter of material placed as shown on the plans or as directed by the Engineer. No additional compensation will be made for material placed outside these limits.

PAYMENT.--The contract price paid per cubic meter for lightweight embankment material (EPS block) shall include full compensation for furnishing all labor, materials (including temporary geomembrane (gasoline resistant) and sand bags),

equipment, tools, and incidentals necessary to construct the lightweight embankment material (EPS block), complete in place, as shown on the plans, as specified in these special provisions and as directed by the Engineer.

10-1.34 GEOMEMBRANE (GASOLINE RESISTANT)

Geomembrane (gasoline resistant) shall consist of reinforced or unreinforced tri-polymer membrane consisting of polyvinyl chloride (PVC), ethylene interpolymer alloy, and polyurethane or a comparable polymer combination. The geomembrane shall be suitable for the containment of spilled liquid hydrocarbons, including gasoline, diesel fuel, kerosene, hydraulic fluid, methanol, ethanol, mineral spirits, and naptha. The geomembrane shall be sufficiently flexible to cover and closely conform to 90 degree edges and corners of lightweight fill (EPS block) subgrade material at ambient temperatures as low as 7°C without application of heat.

Geomembrane (gasoline resistant) shall have the following physical properties, specified as minimum or maximum, not average roll properties:

Physical Property	ASTM Designation	Acceptance Value
Unleaded Gasoline Permeability	D 814	122 g/m^2 Maximum per 24 hours
Thickness	D 751 *	0.71 mm Minimum
Grab Tensile Strength (25 mm grip, 100 mm x 200 mm sample	D 751 *	2.67 kN Minimum in each direction
Tensile Strength	D 1623	130 kPa Minimum
Elongation at break	D 4632 *	20 Percent Minimum
Toughness (Percent elongation times Grab Tensile Strength **)	N/A	62 kN Minimum
Puncture Resistance (ball tip)	D 751 ***	356 kN Minimum
Cold Crack Resistance (25 mm mandrel, 4 hours)	D 2138 *	Pass at -17°C

* or ASTM test method appropriate for specific polymer
** for example, 3 kN x 30% = 90 kN
*** or FTMS 101C, Method 2065

All factory-produced seams shall have a minimum bonded width of 30 mm, and shall have a minimum shear strength of 1.42 kN when tested in accordance with ASTM D 751 (Modified per NSF Standard No. 54). Failure shall occur in the base geomembrane material.

A certificate of compliance from the manufacturer of the geomembrane shall be furnished in accordance with the provisions of Section 6-1.07, "Certificates of Compliance" of the Standard Specifications.

INSTALLATION.--Geomembrane (gasoline resistant) shall be placed directly on the surface of the lightweight fill (EPS block) fill, which shall be clean and free of sharp objects. Field seams shall be bonded with an electrically-heated hot-wedge device as recommended by the manufacturer. Hot air extrusion welding devices or solvent bonding chemicals shall not be used. The temperature of the bonded geomembrane shall not exceed 74°C immediately before contacting the lightweight fill (EPS block) fill. Before installation of geomembrane, the Contractor shall demonstrate to the Engineer that the equipment, techniques, and personnel proposed for the bonding of field seams can produce vapor-tight seams under similar weather and work conditions near the job site. Field seams shall be inspected and, when ordered by the Engineer, shall be tested and pass the Vacuum Box Test. Construction equipment shall not be operated directly on the geomembrane.

Any material damaged by the Contractor's equipment or operations shall be replaced or repaired to the satisfaction of the Engineer by the Contractor at his expense.

MEASUREMENT.--Geomembrane (gasoline resistant) shall be measured by the square meter of area covered as shown on the plans or as directed by the Engineer.

PAYMENT.--The contract price paid per square meter for geomembrane (gasoline resistant) shall include full compensation for furnishing all labor, materials, equipment, tools, and incidentals necessary to install the geomembrane as shown on the plans, as specified in these special provisions and as directed by the Engineer.

10-1.35 GEOTEXTILE CUSHION

Geotextile cushion shall consist of a nonwoven needle-formed fabric of polypropylene, polyester, or a combination of polymer materials including polyester polyethylene terephthalate (PET). Geotextile cushion shall conform to the following physical properties:

Physical Property	ASTM Designation	Acceptance Value
Weight	D 4682 *	265 g/m^3 Minimum
Grab Tensile Strength (25 mm grip)	D 4632	0.89 kN Minimum in each direction
Toughness (Grab Tensile Strength times Percent elongation **)	D 4632	50 Percent Minimum
Thickness	D 461 *	2.5 mm Minimum

* or ASTM test method appropriate for specific polymer
** for example, 1.0 kN x 55% = 55 kN

A Certificate of Compliance from the manufacturer of the geotextile cushion shall be furnished in accordance with the provisions of Section 6-1.07, "Certificates of Compliance" of the Standard Specifications.

INSTALLATION.--Geotextile cushion shall be placed directly on the surface of the geomembrane (gasoline resistant), which shall be clean and free of sharp objects. Joints shall overlap a minimum of 300 mm. Construction equipment shall not be operated directly on the geotextile cushion.

MEASUREMENT.--Geotextile cushion shall be measured by the square meter of material placed as shown on the plans or as directed by the Engineer. No extra compensation for overlaps will be made.

PAYMENT.--The contract price paid per square meter for geotextile cushion shall include full compensation for furnishing all labor, materials, equipment, tools, and incidentals necessary to place the geotextile cushion as shown on the plans, as specified in these special provisions and as directed by the Engineer.

10-1.36 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.

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 Lead Compliance Plan shall include perimeter air monitoring incorporating upwind and downwind locations as shown on the plans or as approved by the Engineer. Monitoring shall be by personal air samplers using National Institute of Safety and Health (NIOSH) Method 7082. Sampling shall achieve a detection limit of 0.05µg/m^3 of air per day. Daily monitoring shall take place while the Contractor clears and grubs and performs earthwork operations. A single representative daily sample shall be analyzed for lead. Results shall be analyzed and provided to the Engineer within 24 hours. Average lead concentrations shall not exceed 1.5µg/m^3 of air per day. If concentrations exceed this level the Contractor shall stop work and modify the work to prevent release of lead. Monitoring shall be done under the direction of and data reviewed by and signed by a Certified Industrial Hygienist.

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.

10-1.37 EROSION CONTROL (NETTING)

Erosion control (netting) 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 (netting) work shall consist of installing erosion control netting at locations shown on the plans and other areas designated by the Engineer.

Following the installation of erosion control netting, erosion control materials shall be applied onto the netting face as specified in “Erosion Control (Type D),” of these special provisions.

MATERIALS

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

A. **Erosion Control Netting**

Erosion control netting shall consist of 100 percent spun coir fiber and shall conform to the following:

Specification	Requirement
Weight, grams per square meter ASTM Designation: D 3776	400
Minimum Tensile Strength, kilonewtons, ASTM Designation: D 4595-86	0.23/0.14 (dry) 0.17/0.11 (wet)
Roll Width, meters, min.	4
Area/Roll, square meters, min.	200
Open Area, percent	63-70

B. **Staples**

Staples for erosion control netting shall be made of 3.05-mm minimum steel wire and shall be U-shaped with 200-mm legs and 50-mm crown.

INSTALLATION

Erosion control (netting) materials shall be placed as shown on the plans and as follows:

Erosion control netting strips shall be placed loosely on the slope with the longitudinal joints parallel to the slope contour lines and channel centerline. The netting face shall be anchored longitudinally with staples in the pattern as shown on the plans. Edges shall be overlapped between adjoining sections as shown on the plans. Longitudinal and transverse joints of

netting shall be overlapped and stapled as shown on the plans. Staples shall be driven perpendicular to the ground plane such that the top of the staple is flush with the ground surface.

MEASUREMENT AND PAYMENT

The quantity of erosion control (netting) will be determined by the square meter from actual measurement of the area covered by the erosion control netting.

The contract price paid per square meter for erosion control (netting) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing and anchoring erosion control netting, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.38 EROSION CONTROL (MULCH)

Erosion control (mulch) shall conform to the provisions in Section 20-3, "Erosion Control," of the Standard Specifications and these special provisions.

Erosion control (mulch) work shall consist of spreading mulch on all embankment slopes, excavation slopes, and other areas designated by the Engineer. Erosion control (mulch) shall extend to the edge of retaining walls, dikes, paving and to within 1.2 meters from the flow line of paved and unpaved drainage ditches.

Erosion control materials shall be applied no later than September 1, to slopes where the earthwork portions are finished between May 1 and September 1, as provided in Section 22, "Finishing Roadway," of the Standard Specifications.

Embankment or excavation slopes where the earthwork portions are finished, as noted above, between September 1 and April 15, shall be treated immediately following the finishing of said slopes. Unfinished slopes being constructed within this time period shall have control measures implemented as required to comply with the requirements outlined in Section 7-1.01G “Water Pollution” of the Standard Specifications.

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

Mulch shall conform to the requirements in Section 20-2.08, "Mulch," of the Standard Specifications and these special provisions. Mulch shall consist of either wood chips or tree bark or a combination of both.

MEASUREMENT AND PAYMENT

The contract price paid per cubic meter for erosion control (mulch) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in erosion control (mulch), complete in place, including furnishing and spreading mulch, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.39 MOVE-IN/MOVE-OUT (EROSION CONTROL)

Move-in/move-out (erosion control) shall include moving onto the project when an 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 (TypeD), as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.40 EROSION CONTROL (TYPE D)

Erosion control (Type D) work shall consist of applying erosion control materials to erosion control netting areas, all embankment and excavation slopes unlined ditches and other areas disturbed by construction activities. Erosion control

(Type D) shall be applied during the period starting September 1 and ending November 30; or, if the slope on which the erosion control is to be placed is finished during the winter season as specified in "Water Pollution Control" of these special provisions, the erosion control shall be applied immediately; or, if the slope on which the erosion control is to be placed is finished outside both specified periods and the contract work will be completed before September 1, the erosion control shall be applied as a last item of work.

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.

For those areas where Erosion control (netting) is proposed, Erosion Control materials shall be applied upon completion of installation as described in 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.

Legume Seed

Legume seed shall be pellet-inoculated or industrial-inoculated and shall conform to the following:

A. Inoculated seed shall be inoculated in conformance with the provisions in Section 20-2.10, "Seed," of the Standard Specifications.
B. Inoculated seed shall have a calcium carbonate coating.
C. Industrial-inoculated seed shall be inoculated with Rhizobia and coated using an industrial process by a manufacturer whose principal business is seed coating and seed inoculation.
D. Industrial-inoculated seed shall be sown within 180 calendar days after inoculation.
E. Legume seed shall consist of the following:

LEGUME SEED

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed Per Hectare (Slope Measurement)
Trifolium fragarium (O'Connor's Strawberry Clover)	60	4.0
Lupinus bicolor (Pygmy-leaved Lupine)	60	4.0

Non-Legume Seed

Non-legume seed shall consist of the following:

NON-LEGUME SEED

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed Per Hectare (Slope Measurement)
Eschscholzia californica (California Poppy)	45	1.5
Lasthenia glabrata (Goldfields)	50	0.5
Festuca ovina 'Covar' (Sheep Fescue)	40	20.0
Festuca idahoensis 'Siskiyou'* (Siskiyou Hard Fescue)	45	30.0

* California native species only.

Straw

Straw shall conform to the provisions in Section 20-2.06, "Straw," of the Standard Specifications and these special provisions.

Wheat and barley straw shall be derived from irrigated crops.

Prior to delivery of wheat or barley straw to the project site, the Contractor shall provide the name, address and telephone number of the grower.

Straw shall be derived from wheat or barley.

Compost

Compost shall be derived from green material consisting of chipped, shredded or ground vegetation or clean processed recycled wood products or a Class A, exceptional quality biosolids composts, as required by the United States Environmental Protection Agency (EPA), 40 CFR, Part 503c regulations or a combination of green material and biosolids compost. The compost shall be processed or completed to reduce weed seeds, pathogens and deleterious material, and shall not contain paint, petroleum products, herbicides, fungicides or other chemical residues that would be harmful to plant or animal life. Other deleterious material, plastic, glass, metal or rocks shall not exceed 0.1 percent by weight or volume. A minimum internal temperature of 57˚C shall be maintained for at least 15 continuous days during the composting process. The compost shall be thoroughly turned a minimum of 5 times during the composting process and shall go through a minimum 90-day curing period after the 15-day thermophilic compost process has been completed. Compost shall be screened through a maximum 9.5-mm screen. The moisture content of the compost shall not exceed 35 percent. Compost products with a higher moisture content may be used provided the weight of the compost is increased to equal the compost with a moisture content of 35 percent. Moist samples of compost on an as received basis shall be dried in an oven at a temperature between 105°C and 115°C until a constant dry weight of the sample is achieved. The percentage of moisture will be determined by dividing the dry weight of the sample by the moist weight of the sample and then multiplying by 100. Compost will be tested for maturity and stability with a Solvita test kit. The compost shall measure a minimum of 6 on the maturity and stability scale.

Stabilizing Emulsion

Stabilizing emulsion shall conform to the provisions in Section 20-2.11, "Stabilizing Emulsion," of the Standard Specifications and these special provisions.

Stabilizing emulsion shall be in a dry powder form, may be re-emulsifiable, and shall be a processed organic adhesive derivative of Plantago ovata used as a soil tackifier.

APPLICATION

Erosion control materials shall be applied in separate applications in the following sequence:

A. Legume seed shall be applied by a dry method at the rate of 8 kg per hectare (slope measurement). Legume seed shall not be applied with hydro-seeding equipment.

B. 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:

Material	Kilograms Per Hectare (Slope Measurement)
Legume Seed	8
Non-Legume Seed	52
Fiber	320
Compost	940

C. 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.
D. Straw shall be applied at the rate of 4.5 tonnes per hectare based on slope measurements. Incorporation of straw will not be required. Straw shall be distributed evenly without clumping or piling.
E. 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

Hydroseeding, for all erosion control (netting) areas shall be applied by hose, from the ground. Erosion control materials shall be applied at close range onto the slope face such that the materials are well integrated into the erosion control materials and in close contact with the ground surface. Application shall be perpendicular to the slope face such that erosion control (netting) materials are not damaged or displaced. Any erosion control materials that are damaged or displaced shall be immediately be repaired by the Contractor at his expense.

The ratio of total water to total stabilizing emulsion in the mixture shall be as recommended by the manufacturer.

Once straw work is started in an area, stabilizing emulsion applications shall be completed in that area on the same working day.

The proportions of erosion control materials may be changed by the Engineer to meet field conditions.

MEASUREMENT AND PAYMENT

Compost (erosion control) will be measured by the kilogram or tonne, whichever unit is designated in the Engineer's Estimate The weight will be as determined by the Engineer from marked mass and sack count or from scale weighings.

The contract price paid per kilogram or tonne for compost (erosion control) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying compost for erosion control, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.41 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 600 mm apart along the total length of the rolls and 300 mm from the end of each individual roll. 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. Stakes shall be placed on alternate sides of the fiber roll, spaced as shown on the plans. 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.

10-1.42 DRAIN INLET PROTECTION

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

MATERIALS

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

Erosion Control Blanket

Erosion control blanket shall be secured in place with wire staples and shall conform to the following:

A. Erosion control blanket shall consist of 100 percent spun coir fiber and shall conform to the following:

Specification	Requirement
Weight, grams per square meter ASTM Designation: D 3776	400
Minimum Tensile Strength, kilonewtons, ASTM Designation: D 4595-86	0.23/0.14 (dry) 0.17/0.11 (wet)
Roll Width, meters, min.	2
Area/Roll, square meters, min.	200
Open Area, percent	63-70

B. Staples for erosion control blankets shall be made of 11-gage minimum steel wire and shall be U-shaped with 200-mm legs and 50-mm crown.

Fiber Rolls

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 2.4m 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 al150 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 600 mm in length.

INSTALLATION

The bedding area shall be excavated and cleared of obstructions including, but not limited to, rocks, clods, and mulch prior to installation of the erosion control blanket. The edges of the erosion control blanket shall be keyed into trenches, stapled, backfilled, and tamped. Upon completion of the backfill and tamping, the resulting key trench shall have an indentation or furrow of 50 mm to 100 mm to accept the fiber roll. Fiber rolls shall be installed along the edges of the erosion control blanket, in the furrow, and secured as shown on plans. Excess soil from excavation of the key trenches shall be disposed of uphill of the installed fiber rolls.

Stakes shall be installed 600 mm apart along the total length of the rolls and 300 mm from the end of each individual roll. Stakes shall be driven flush or a maximum of 50 mm above the roll.

At the option of the Contractor, fiber rolls may be installed using rope and notched stakes to restrain the fiber roll against the slope face in conformance with these special provisions. The indentation or furrow will not be required. The additional cost of installing fiber rolls using rope and notched stakes shall be at the Contractor's expense.

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.

Stakes shall be placed on alternate sides of the fiber roll, spaced 600 mm apart as shown on the plans. 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.

Wood stakes shall be placed on either side of the fiber roll with the notch facing away from the roll, as shown on the plans.

MEASUREMENT AND PAYMENT

The contract price paid per drain inlet protection shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing drain inlet protection, complete in place, including furnishing and installing fiber rolls and erosion control blanket as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.43 CONCRETE DRAINAGE APRON

Concrete drainage aprons shall conform to the details shown on the plans, the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications and these special provisions.

Concrete drainage apron work shall consist of excavation and subgrade preparation and constructing concrete aprons around existing or new drainage inlets as shown on the plans.

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 concrete drainage apron as shown on the plans.

Surplus excavated material 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. At the Contractor's option, surplus excavated material may be spread within the highway right of way, provided spreading material within the highway right of way is approved in advance by the Engineer.

Surplus excavated material where designated by the Engineer to be spread, shall be spread to a uniform depth of 25 mm. If spreading surplus excavated material within highway right of way is approved, the costs associated with spreading excavated material shall be at the Contractor's expense.

The contract price paid for each concrete drainage aprons shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in concrete drainage aprons, complete in place, including subgrade preparation, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.44 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.

10-1.45 WATER SUPPLY LINE (BRIDGE)

Water supply lines identified on the plans as supply line (bridge) shall be of the size shown and shall conform to the details shown on the plans, the provisions in Section 20-5, "Irrigation Systems," of the Standard Specifications, and these special provisions.

GENERAL

Unless otherwise shown on the plans, casings shall be installed at each abutment and 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

The Contractor shall submit complete working drawings for the temporary support of the casing at the abutments to the Office of Structure Design (OSD) in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications.

For initial review, 5 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to the OSD for final approval and use during construction.

MATERIALS

Pipe and Fittings for Supply Lines Less Than NPS 4

Pipe and fittings for supply lines less than NPS 4 shall conform to the provisions in Section 20-2.15A, "Steel Pipe," of the Standard Specifications.

Air Release Valve Assemblies for Supply Lines Less Than NPS 4

Each air release valve assembly for supply lines less than NPS 4 shall consist of a threaded tee of the same diameter as the supply line or pipe saddle, a NPS 1 ball valve, an automatic air release valve, and a tank vent. The air release valve shall have a cast iron body with stainless steel trim and float, a NPS 1 inlet pipe connection, and a 4.8 mm orifice. The tank vent shall be the size of the air release valve outlet and shall have a double opening facing down with screen cover.

Casing Insulators for Supply Lines Less Than NPS 4

Casing insulators for supply lines less than NPS 4 shall be designed for the size of casing and the supply line shown on the plans. Casing insulators for supply lines shall be high density, injection molded polyethylene, 2-piece construction with cadmium plated nuts and bolts and shall have a non-conductive inner liner. Casing insulators shall be factory constructed to ensure the supply line is centered in the casing to avoid any pipe to pipe contact and shall have at least 2 runners seated on the bottom of the casing.

Pipe End Seals for Supply Lines Less Than NPS 4

Pipe end seals for supply lines less than NPS 4 shall cover the space between the supply line and the end of the casing. Pipe end seals shall be made with 50-mm thick construction grade redwood and cut to fit the supply line.

Expansion Assemblies for Supply Lines Less Than NPS 4

Expansion assemblies for supply lines less than NPS 4 shall be the hose type. Hose shall be medium or heavy weight, oil resistant, flexible, rubber or synthetic rubber cover and tube, reinforced with a minimum of 2-ply synthetic yarn or steel wire and shall be equipped with steel flanges. The hose and flange assembly shall have the same nominal inside diameter as the supply line and shall be rated for a minimum working pressure of 1.4 MPa. Hoses carrying potable water shall meet Food and Drug Administration standards.

Insulated Flange Connections

Each insulated flange connection shall consist of a dielectric flange gasket, insulating washers, and sleeves held in place with steel bolts and nuts. The gasket shall have a minimum dielectric rating of 500 V/0.025-mm.

Casings

Casings shall be welded steel pipe and shall conform to the provisions in Section 70-1.02B, "Welded Steel Pipe," of the Standard Specifications and these special provisions. 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 conformance with the requirements in ANSI/AWWA C214.

Pipe Wrapping Tape

Wrapping tape for pipe in contact with the earth shall be a pressure sensitive polyvinyl chloride or polyethylene tape with a minimum thickness of 1.27 mm.

Concrete Pipe Supports

Each concrete pipe support shall consist of either a precast or cast-in-place concrete pipe cradle, a galvanized steel pipe clamp, anchor bolts, and where shown on the plans, a stainless steel pipe protection shield.

Concrete pipe supports and pipe stops shall conform to the dimensions shown on the plans and shall be constructed of commercial quality concrete with a cement content not less than 350 kg of portland cement per cubic meter and commercial quality wire mesh. The concrete for pipe supports and pipe stops shall be moist cured for not less than 3 days.

Steel anchor bolts, nuts, pipe clamps, pipe protection shields, and other fittings shall be suitable for the type and size of the supply line or casing and shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

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.

INSTALLATION

Water supply lines in bridge structures shall be supported as shown on the plans and in conformance with these special provisions.

If a blockout is provided in the bridge abutment wall for casing, the space between the casing 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.

When the bridge superstructure is to be prestressed, the space around supply lines through abutments shall not be filled until the prestressing has been completed.

Openings for supply lines through bridge superstructure concrete shall either be formed or shall consist of pipe sleeves.

Cleaning and Closing of Pipe

The interior of the pipe shall be cleaned before installation. Openings shall be capped or plugged as soon as the pipe is installed to prevent the entrance of foreign material. The caps or plugs shall remain in place until the adjacent pipe sections are to be installed.

Wrapping and Coating Pipe

Damaged coating on supply line pipe in contact with the earth shall be wrapped with tape as follows:

A. Pipe to be wrapped shall be thoroughly cleaned and primed as recommended by the tape manufacturer.
B. Tape shall be tightly applied with one-half 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 that the tape will conform closely to the contours of the joint.

TESTING

Water supply lines less than NPS 4 shall be tested in conformance with the provisions in Section 20-5.03H(1), "Method A," of the Standard Specifications, except that the testing period shall be 4 hours minimum with no leakage or pressure drop.

The Contractor shall furnish pipe anchorages to resist thrust forces occurring during testing. Leaks shall be repaired and defective materials shall be replaced by the Contractor at the Contractor's expense.

Pressure testing and necessary repairing of water lines shall be completed prior to backfilling, placing deck slabs over supply lines in box girder cells, or otherwise covering the supply lines.

Each end of the supply line shall be capped prior to and after the testing.

The supply line shall be tested as one unit. The limits of the unit shall be 1.5 m beyond the casing at each end of the bridge.

MEASUREMENT AND PAYMENT

Measurement and payment for supply line (bridge) for each size listed in the Engineer's Estimate shall be made in the same manner as galvanized steel pipe and plastic pipe supply lines in Section 20-5.04, "Measurement," and Section 20-5.05, "Payment," of the Standard Specifications.

Full compensation for furnishing and installing air release valve assemblies, steel hangers, steel brackets and other fittings, casings and casing insulators, pipe end seals, concrete supports, pipe anchorages, concrete pipe stops, pipe wrapping tape, epoxy adhesives, expansion assemblies, for cleaning, closing, wrapping, and coating pipe, and for pressure testing, shall be considered as included in the contract prices paid per meter for the sizes of water supply line (bridge) involved, and no additional compensation will be allowed therefor.

10-1.46 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 or consist of material processed from reclaimed asphalt concrete, portland cement concrete, lean concrete base, cement treated base, glass or combination of these materials. 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	30 - 65	25 - 70
75-µm	0 - 15	0 - 18

Class 4 aggregate subbase shall also conform to the following quality requirements:

Quality Requirements

Test	Operating Range	Contract Compliance
Sand Equivalent	21 Min.	18 Min.
Resistance (R-value)	----	50 Min.

The provisions of the last 4 paragraphs in Section 25-1.02A, "Class 1, Class 2, and Class 3 Aggregate Subbases," of the Standard Specifications shall apply to Class 4 aggregate subbase.

At the option of the Contractor, Class 2 aggregate subbase conforming to the grading and quality requirements in Section 25-1.02A, may be used in place of Class 4 aggregate subbase. The restriction that the amount of reclaimed material included in Class 2 aggregate subbase not exceed 50 percent of the total volume of the aggregate used shall not apply. Aggregate for Class 2 aggregate subbase may include reclaimed glass. Aggregate subbase incorporating reclaimed glass shall not be placed at locations where surfacing will not be placed over the aggregate subbase. Once a class of aggregate subbase is selected, the class shall not be changed without written approval of the Engineer.

Regardless of the class of aggregate subbase supplied under the provisions of this section, payment for all aggregate subbase will be made as Class 4 aggregate subbase.

10-1.47 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 or consist of material processed from reclaimed asphalt concrete, portland cement concrete, lean concrete base, cement treated base, glass or combination of these materials. Aggregate base incorporating reclaimed glass shall not be placed at locations where surfacing will not be placed over the aggregate base.

Aggregate for Class 3 aggregate base shall conform to the following requirements:

Grading Requirements (Percentage Passing)

Sieve Sizes	37.5 - mm. Maximum	
	Operating Range	Contract Compliance
50-mm	100	100
37.5-mm	90 - 100	87 - 100
25-mm	------	------
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

Grading Requirements (Percentage Passing)

Sieve Sizes	19 - mm. Maximum	
	Operating Range	Contract Compliance
50-mm	------	------
37.5-mm	------	------
25-mm	100	100
19-mm	90 - 100	87 - 100
4.75-mm	35 - 60	30 - 65
600-µm	10 - 30	5 - 35
75-µm	2 - 11	0 - 14

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.

10-1.48 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.

10-1.49 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.

Surfacing of miscellaneous areas with asphalt concrete shall conform to the provisions in "Asphalt Concrete (Miscellaneous Areas)" of these special provisions.

In addition to the provisions in Section 39-9.01, "Spreading Equipment," in Section 11-1, "Quality Control / Quality Assurance," of these special provisions, asphalt paving equipment shall be equipped with automatic screed controls and a sensing device or devices.

When placing asphalt concrete to lines and grades established by the Engineer, the automatic controls shall control the longitudinal grade and transverse slope of the screed. Grade and slope references shall be furnished, installed, and maintained by the Contractor. Should the Contractor elect to use a ski device, the minimum length of the ski device shall be 9 m. The ski device shall be a rigid one piece unit and the entire length shall be utilized in activating the sensor.

When placing the initial mat of asphalt concrete on existing pavement, the end of the screed nearest the centerline shall be controlled by a sensor activated by a ski device not less than 9 m long. The end of the screed farthest from centerline shall be controlled manually.

When placing the initial mat of asphalt concrete on existing pavement, the end of the screed nearest the centerline shall be controlled by a sensor activated by a ski device not less than 9 m long. The end of the screed farthest from centerline shall be controlled by an automatic transverse slope device set to reproduce the cross slope designated by the Engineer.

When paving contiguously with previously placed mats, the end of the screed adjacent to the previously placed mat shall be controlled by a sensor that responds to the grade of the previously placed mat and will reproduce the grade in the new mat within a 3 mm tolerance. The end of the screed farthest from the previously placed mat shall be controlled in the same manner the screed was controlled when placing the initial mat.

If the methods and equipment furnished by the Contractor fail to produce a layer of asphalt concrete conforming to the provisions, including straightedge tolerance, in Section 39-10.04, "Compacting," in Section 11-1, "Quality Control / Quality Assurance," of these special provisions, the paving operations shall be discontinued and the Contractor shall modify the equipment or methods, or furnish substitute equipment.

If the automatic screed controls fail to operate properly during a day's work, the Contractor may use manual control of the spreading equipment for the remainder of that day. However, the equipment shall be corrected or replaced with alternative automatically controlled equipment conforming to the requirements in this section before starting another day's work.

If the finished surface of the asphalt concrete on Route 87 traffic lanes 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.

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.

Where the existing pavement is to be widened by constructing a new structural section adjacent to the existing pavement, the new structural section, on both sides of the existing pavement, shall be completed to match the elevation of the edge of the existing pavement for the entire length of the project prior to spreading and compacting asphalt concrete over the adjacent existing pavement.

Shoulders or median borders adjacent to a lane being paved shall be surfaced prior to opening the lane to public traffic.

Shoulder conform tapers, as shown on the plans, shall be placed concurrently with the paving of the adjacent lane.

Asphalt concrete surfacing shall be placed on existing surfacing, including curve widening, chain control lanes, turnouts, left turn pockets, and public and private road connections shown on the plans, unless otherwise directed by the Engineer.

Additional asphalt concrete surfacing material shall be placed along the edge of the surfacing at road connections and private drives, hand raked, if necessary, and compacted to form smooth tapered conforms. Full compensation for furnishing all labor and tools and doing all the work necessary to hand rake said conforms shall be considered as included in the contract prices paid per tonne for the various contract items of asphalt concrete surfacing involved and no additional compensation will be allowed therefor.

10-1.50 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.

Aggregate for asphalt concrete dikes shall conform to the 9.5-mm maximum grading specified in Section 39-2.02, "Aggregate," of the Standard Specifications.

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.

10-1.51 PILING

GENERAL

Piling shall conform to the provisions in Section 49, "Piling," of the Standard Specifications, and these special provisions.

Unless otherwise specified, welding of any work performed in conformance with the provisions in Section 49, "Piling," of the Standard Specifications, shall be in conformance with the requirements in AWS D1.1.

Foundation recommendations are included in the "Information Handout" available to the Contractor as provided for in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

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

Difficult pile installation is anticipated due to the presence of dense soils, cobbles, boulders, underground utilities, existing pile conditions and traffic control.

Jetting and Drilling

Jetting 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.

Drilling to obtain the specified penetration in conformance with the provisions in Section 49-1.05, "Driving Equipment," of the Standard Specifications shall only be used for driven type piles at the locations and to the bottom of hole elevations listed in the following table. Materials resulting from drilling holes shall be disposed of in conformance with the provisions in Section 19-2.06, "Surplus Material," of the Standard Specifications.

Bridge Name orNumber	Abutment Number	Bent Number	Elevation of Bottom of Hole
Northbound On-Ramp Br. No. 37-0583	Pier 5 & Abut 11 (Alt. "V" or "X" driven piles)	Bent 3, 4, 6, 7, 8, 9 &10 (Alt. "V" or "X" driven piles)	3 meters above pile specified tip elevation
Hedding Street Undercrossing Br. No. 37-0608	Abut 1 & 2 (Alt. "V" or "X" driven piles)		Elevation + 6.0 meters
RTE 87/880 Separation Br. No. 37-0609	Abut 1 & 3 (Alt. "V" or "X" driven piles)	Bent 2 (Alt. "V" or "X" driven piles)	3 meters above pile specified tip elevation
RTE 87/880 Separation Br. No. 37-0609		Bent 2 Column 2 & 3, (H-piles within 2.5 pile diameters of existing piles)	Elevation + 7.0 meters

Predrilled Holes

Piles shall be driven in oversized drilled holes in conformance with the provisions in Section 49-1.06, "Predrilled Holes," of the Standard Specifications at the locations and to the corresponding bottom of hole elevations listed in the following table:

Bridge Name orNumber	Abutment Number		Elevation of Bottom of Hole
RTE 87/880 Separation Br. No. 37-0609	1 & 3		+ 18.0 meters

MEASUREMENT AND PAYMENT (PILING)

Measurement and payment for the various types and classes of piles shall conform to the provisions in Sections 49-6.01, "Measurement," and 49-6.02, "Payment," of the Standard Specifications and these special provisions.

Full compensation for 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.

Furnishing pile extension at Northbound On-Ramp (Br. No. 37-0583) will be measured and paid for as furnish piling (class 625).

Driving pile extension at Northbound On-Ramp (Br. No. 37-0583) will be measured and paid for as drive pile (Class 625).

10-1.52 PRESTRESSING CONCRETE

Prestressing concrete shall conform to the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications and these special provisions.

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.

10-1.53 CONCRETE STRUCTURES

Portland cement concrete structures shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

GENERAL

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 Hedding Street Undercrossing (Br. No. 37-0608) and RTE 87/880 Separation (Br. No. 37-0609) 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.

Constructing colored concrete (raised island) at Northbound On-Ramp (Br. No. 37-0583) shall conform to “Colored Concrete (Raised Island)” of these Special Provisions.

Grate frames for the drainage inlets behind the existing mechanically stabilized embankment retaining walls shall conform to the provisions in Section 75-1.02, “Miscellaneous Iron and Steel,” of the Standard Specifications.

FALSEWORK

Falsework shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

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
Northbound On-Ramp Br. No. 37-0583	4
Hedding Street Undercrossing Br. No. 37-0608	4
RTE 87/880 Separation Br. No. 37-0609	4

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.

Welding and Nondestructive Testing

Welding of steel members, except for previously welded splices and except for when fillet welds are used where load demands are less than or equal to 175 N/mm for each 3 mm of fillet weld, shall conform to AWS D1.1 or other recognized welding standard. The welding standard to be utilized shall be specified by the Contractor on the working drawings. Previously welded splices for falsework members are defined as splices made prior to the member being shipped to the project site.

Splices made by field welding of steel beams at the project site shall undergo nondestructive testing (NDT). At the option of the Contractor, either ultrasonic testing (UT) or radiographic testing (RT) shall be used as the method of NDT for each field weld and any repair made to a previously welded splice in a steel beam. Testing shall be performed at locations selected by the Contractor. The length of a splice weld where NDT is to be performed, shall be a cumulative weld length equal to 25 percent of the original splice weld length. The cover pass shall be ground smooth at the locations to be tested. The acceptance criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional NDT shall be performed on the repaired sections. The NDT method chosen shall be used for an entire splice evaluation including any required repairs.

For all field welded splices, the Contractor shall furnish to the Engineer a letter of certification which certifies that all welding and NDT, including visual inspection, are in conformance with the specifications and the welding standard shown on the approved working drawings. This letter of certification shall be signed by an engineer who is registered as a Civil Engineer in the State of California and shall be provided prior to placing any concrete for which the falsework is being erected to support.

For previously welded splices, the Contractor shall determine and perform all necessary testing and inspection required to certify the ability of the falsework members to sustain the stresses required by the falsework design. This welding certification shall be in writing, shall be signed by an engineer who is registered as a Civil Engineer in the State of California, and shall be provided prior to placing any concrete for which the falsework is being erected to support.

The Contractor's engineer who signs the falsework drawings shall also certify in writing that the falsework is constructed in conformance with the approved drawings and the contract specifications prior to placing concrete. This certification shall include performing any testing necessary to verify the ability of the falsework members to sustain the stresses required by the falsework design. The engineer who signs the drawings may designate a representative to perform this certification. Where falsework contains openings for railroads, vehicular traffic, or pedestrians, the designated representative shall be qualified to perform this work, shall have at least three years of combined experience in falsework design or supervising falsework construction, and shall be registered as a Civil Engineer in the State of California. For other falsework, the designated representative shall be qualified to perform this work and shall have at least three years of combined experience in falsework design or supervising falsework construction. The Contractor shall certify the experience of the designated representative in writing and provide supporting documentation demonstrating the required experience if requested by the Engineer.

COST REDUCTION INCENTIVE PROPOSALS FOR CAST-IN-PLACE PRESTRESSED BOX GIRDER BRIDGES

Except as provided herein, cast-in-place prestressed box girder bridges shall be constructed in conformance with the details shown on the plans and the provisions in Section 50, "Prestressing Concrete," and Section 51, "Concrete Structures," of the Standard Specifications.

If the Contractor submits cost reduction incentive proposals for cast-in-place prestressed box girder bridges, the proposals shall be in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications and these special provisions.

The Engineer may reject any proposal which, in the Engineer's judgment, may not produce a structure which is at least equivalent to the planned structure.

At the time the cost reduction incentive proposal (CRIP) is submitted to the Engineer, the Contractor shall also submit 4 sets of the proposed revisions to the contract plans, design calculations, and calculations from an independent checker for all changes involved in the proposal, including revisions in camber, predicted deck profile at each construction stage, and falsework requirements to the Office of Structure Design, Documents Unit, P.O. Box 942874, Sacramento, CA 94274-0001 (1801 30th Street, Sacramento, CA 95816), telephone (916) 227-8230. When notified in writing by the Engineer, the Contractor shall submit 12 sets of the CRIP plan revisions and calculations to the Office of Structure Design for final approval and use during construction. The calculations shall verify that all requirements are satisfied. The CRIP plans and calculations shall be signed by an engineer who is registered as a Civil Engineer in the State of California.

The CRIP plans shall be either 279 mm x 432 mm, or 559 mm x 864 mm in size. Each CRIP plan sheet and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Kilometer Post. Each CRIP plan sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

Within 3 weeks after final approval of the CRIP plan sheets, one set of the corrected good quality prints on 75-g/m^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 15 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.

DECK CRACK TREATMENT

The Contractor shall use all means necessary to minimize the development of shrinkage cracks.

The Contractor shall remove all equipment and materials from the deck and clean the surface as necessary for the Engineer to measure the surface crack intensity. Surface crack intensity will be determined by the Engineer after completion of concrete cure, prior to prestressing, and prior to the release of falsework. In any 50-m^2 portion of deck within the limits of the new concrete deck, should the intensity of cracking be such that there are more than 5 m of cracks whose width at any location exceeds 0.5-mm, the deck shall be treated with methacrylate resin. The area of deck to be treated shall have a width that extends for the entire width of new deck inside the concrete barriers and a length that extends at least 1.5 m beyond the

furthest single continuous crack outside the 50-m^2 portion, measured from where that crack exceeds 0.5-mm in width, as determined by the Engineer.

Deck crack treatment shall consist of test sealing, and furnishing and applying methacrylate resin in conformance with the requirements of these special provisions. If grinding operation is required, deck treatment shall take place after grinding.

Prior to the start of deck treatment work, the Contractor shall submit for approval by the Engineer, a program for public safety associated with the use of methacrylate resin. The program shall identify materials, equipment, and methods to be used. The Contractor shall not perform deck treatment work, other than that specifically authorized in writing by the Engineer, until the program has been approved.

If the measures being taken by the Contractor are inadequate to provide for public safety associated with use of methacrylate resin, the Engineer will direct the Contractor to revise the operations and the public safety program. Directions for revisions will be in writing and will specify the items in which the Contractor's program is inadequate. No further deck treatment shall be performed until public safety measures are adequate, and a revised program for public safety has been approved.

The Engineer will notify the Contractor of the approval or rejection of any submitted or revised program for public safety associated with the use of methacrylate resin within 10 working days of receipt of the final submitted program.

The State will not be liable to the Contractor for failure to approve all or any portion of an originally submitted or revised program for public safety associated with the use of methacrylate resin, nor for any delays to the work due to the Contractor's failure to submit an acceptable program for public safety associated with the use of methacrylate resin. If the Engineer does not review or approve the program submitted by the Contractor within the time specified and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the program for public safety, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Materials

The material used for treating the deck shall be a low odor, high molecular weight methacrylate resin. Prior to adding initiator, the resin shall have a maximum volatile content of 30 percent when tested in conformance with the requirements in ASTM Designation: D 2369, and shall conform to the following:

PROPERTY	TEST METHOD	REQUIREMENT
Viscosity mPa·s, maximum, (Brookfield RVT with UL adaptor, 50 RPM at 25°C)	ASTM D 2196	0.025
Specific Gravity minimum, at 25°C	ASTM D 1475	0.90
Flash Point °C, minimum	ASTM D 3278	82
Vapor Pressure mm Hg, maximum, at 25°C	ASTM D 323	1.0
Tack-free time minutes, maximum at 25°C	California Test 551	400
PCC Saturated Surface-Dry Bond Strength MPa, minimum at 24 hours and 21±1°C	California Test 551	3.5
* Test shall be performed prior to adding initiator.		

A Material Safety Data Sheet shall be furnished prior to use for each shipment of high molecular weight methacrylate resin.

The promoter and initiator, if supplied separately from the resin, shall not be mixed directly with each other. Containers of promoters and initiators shall not be stored together in a manner that will allow leakage or spillage from one to contact the containers or material of the other.

Testing

The Contractor shall allow 14 days for sampling and testing by the Engineer of the high molecular weight methacrylate resin prior to proposed use.

The Contractor shall treat a test area within the project limits of approximately 50 m^2 at a location approved by the Engineer. Conditions during the test treatment shall be similar to those expected on the deck. Equipment used in the test shall be similar to those used for the deck treating operations. If the test area is on the traveled way, traffic shall not be allowed on the treated test area until (1) the treated surface is tack free (non-oily), (2) the sand cover adheres sufficiently to resist brushing by hand, and (3) the coefficient of friction of the deck is at least 0.35 when tested in conformance with the requirements in California Test 342.

Should the above requirements for traffic use not be met, the Contractor shall suspend treating of bridge decks until another test area is treated and complies with the requirements.

Construction

Prior to deck treatment with methacrylate resin, the bridge deck surface shall be cleaned by abrasive blasting and all loose material shall be blown from visible cracks using high-pressure air. Concrete curing seals shall be cleaned from the deck surface to be treated, and the deck shall be dry when blast cleaning is performed. If the deck surface becomes contaminated at any time prior to placing the penetrating sealer, the deck surface shall be cleaned by abrasive blasting.

Equipment shall be fitted with suitable traps, filters, drip pans, or other devices as necessary to prevent oil or other deleterious material from being deposited on the deck.

Where abrasive blasting is being performed within 3 m of a lane occupied by public traffic, the residue including dust shall be removed immediately after contact between the abrasive and the surface being treated. The removal shall be by a vacuum attachment operating concurrently with the abrasive blasting operation.

The relative humidity shall be less than 90 percent at time of treatment.

A compatible promoter/initiator system shall be capable of providing a resin gel time of not less than 40 minutes nor more than 1.5 hours at the temperature of application. Gel time shall be adjusted to compensate for the changes in temperature throughout treatment application.

The quantity of resin mixed with promoter and initiator shall be limited to 20 L at a time for manual application.

Machine application of the resin shall be performed by using a two-part resin system using a promoted resin for one part and an initiated resin for the other part. This two-part resin system shall be combined at equal volumes to the spray bars through separate positive displacement pumps. Combining of the 2 components shall be by either static in-line mixers or by external intersecting spray fans. The pump pressure at the spray bars shall not be great enough to cause appreciable atomization of the resin. Compressed air shall not be used to produce the spray. A shroud shall be used to enclose the spray bar apparatus. Hand held spray apparatus shall not be used.

The Contractor shall allow methacrylate resin to be applied only to the specified area. Barrier rails, joints, and drainage facilities shall be adequately protected to prevent contamination by the treatment material. Contaminated items shall be repaired at the Contractor's expense.

The prepared area shall be dry and the surface temperature shall be less than or equal to 38°C when the resin is applied. The rate of application of promoted/initiated resin shall be approximately 2.5 square meters per liter, ± 0.1 square meter per liter.

The deck surfaces to be treated shall be flooded with resin, allowing penetration into the concrete and filling of all cracks. The treatment shall be applied within 5 minutes after complete mixing. A significant increase in viscosity shall be cause for rejection. Excess material shall be redistributed by squeegees or brooms within 10 minutes after application.

After the resin has been applied, at least 20 minutes shall elapse before applying sand. The sand shall be commercial quality dry blast sand. Ninety-five percent of the sand shall pass the 2.36-mm sieve, and 95 percent shall be retained on the 850-µm sieve. The sand shall be applied at a rate of one kilogram per square meter, ± 0.1 kilogram per square meter.

Excess sand shall be removed from the deck surface by vacuuming or sweeping prior to opening to traffic.

Traffic shall not be allowed on the treated area until (1) the treated surface is tack free (non-oily), (2) the sand cover adheres sufficiently to resist brushing by hand, and (3) the coefficient of friction of the deck is at least 0.35 when tested in conformance with the requirements in California Test 342.

MEASUREMENT AND PAYMENT

Measurement and payment for concrete in structures shall conform to the provisions in Section 51-1.22, "Measurement," and Section 51-1.23, "Payment," of the Standard Specifications and these special provisions.

The contract price paid per cubic meter for structural concrete, barrier slab shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing barrier slabs, complete in place, including structure excavation, structure backfill, furnishing and placing all bar reinforcing steel, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Modifying top of existing mechanically stabilized embankment retaining walls to meet finished grades will be paid for as extra work as provided in Section 4-1.03D, “Extra work,” of the Standard Specifications.

Full compensation for furnishing and constructing drainage inlets and grate frames behind the existing mechanically stabilized embankment retaining walls shall be considered as included in the contract price paid per cubic meter for structural concrete, barrier slab and no separate payment will be allowed therefor.

Full compensation for deck crack treatment, including a program for public safety, shall be considered as included in the contract price paid per cubic meter for structural concrete (bridge) and no additional compensation will be allowed therefor.

10-1.54 CLOSURE WALLS

Concrete closure walls used to curtain off open areas at bridges 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.

The closure walls shall be constructed in conformance with either Alternative 1, 2 or 3 as shown on the plans, at the option of the Contractor.

For prestressed concrete closure wall panels, the provisions in Section 5-1.02, “Drawings,” of the Standard Specifications shall not apply. The Contractor shall submit 2 sets of working drawings for the prestressed concrete panels to the Engineer for use in administering the contract. The drawings shall show the panel dimensions, materials, prestressing methods, tendon arrangement and working stresses, including any addition or rearrangement of reinforcing steel from that shown on the plans. Prestressing steel shall be placed not more than 150 mm from the edges of the panel and spaced at not more than 450-mm on center between the edge tendons.

Anchorage details consisting of bars and bolts shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications. The bolt holes shall conform to the provisions in Section 55-3.14A, "Bolt Holes," of the Standard Specifications, except that the holes shall not be punched to full size and the finished hole sizes shall be as shown on the plans.

Precast panels shall have an exposed surface matching the adjacent cast-in-place concrete.

Access door with associated hardware and fittings shall conform to the provisions in Section 75-1.03, “Miscellaneous Bridge Metal,” of the Standard Specifications.

Architectural treatment for closure walls shall conform to “Architectural Surface (Textured Concrete)” of these specifications.

The quantity of concrete closure wall will be measured by the square meter on the outside surface of the completed panels.

The contract price paid per square meter for concrete closure wall shall include full compensation for furnishing all labor, materials (including reinforcement, prestressing steel, and anchorages), tools, equipment, and incidentals, and for doing all the work involved in constructing the closure wall, complete in place, including earthwork and erecting precast 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 furnishing and installing access door shall be considered as included in the contract price paid per square meter for concrete closure wall and no separate payment will be allowed therefor.

10-1.55 STRUCTURE APPROACH SLABS (Type N)

This work shall consist of constructing reinforced concrete approach slabs, structure approach drainage system, and treated permeable base at structure approaches in conformance with the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

GENERAL

Attention is directed to "Engineering Fabrics" of these special provisions.

STRUCTURE APPROACH DRAINAGE SYSTEM

Geocomposite Drain

Geocomposite drain shall consist of a manufactured core not less than 6.35 mm thick nor more than 50 mm thick with one or both sides covered with a layer of filter fabric that will provide a drainage void. The drain shall produce a flow rate, through the drainage void, of at least 25 liters per minute per meter of width at a hydraulic gradient of 1.0 and a minimum externally applied pressure of 168 kPa.A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished for the geocomposite drain certifying that the drain produces the required flow rate and complies with these special provisions. The Certificate of Compliance shall be accompanied by a flow capability graph for the geocomposite drain showing flow rates and the externally applied pressures and hydraulic gradients. The flow capability graph shall be stamped with the verification of an independent testing laboratory.

Filter fabric for the geocomposite drain shall conform to the provisions for fabric for underdrains in Section 88, "Engineering Fabrics," of the Standard Specifications.

The manufactured core shall be either a preformed grid of embossed plastic, a mat of random shapes of plastic fibers, a drainage net consisting of a uniform pattern of polymeric strands forming 2 sets of continuous flow channels, or a system of plastic pillars and interconnections forming a semirigid mat.

The core material and filter fabric shall be capable of maintaining the drainage void for the entire height of geocomposite drain. Filter fabric shall be integrally bonded to the side of the core material with the drainage void. Core material manufactured from impermeable plastic sheeting having nonconnecting corrugations shall be placed with the corrugations approximately perpendicular to the drainage collection system.

The geocomposite drain shall be installed with the drainage void and the filter fabric facing the embankment. The fabric facing the embankment side shall overlap a minimum of 75 mm at all joints and wrap around the exterior edges a minimum of 75 mm beyond the exterior edge. If additional fabric is needed to provide overlap at joints and wrap-around at edges, the added fabric shall overlap the fabric on the geocomposite drain at least 150 mm and be attached thereto.

Should the fabric on the geocomposite drain be torn or punctured, the damaged section shall be replaced completely or repaired by placing a piece of fabric that is large enough to cover the damaged area and provide a 150-mm overlap.

Plastic Pipe

Plastic pipe shall conform to the provisions for pipe for edge drains and edge drain outlets in Section 68-3, "Edge Drains," of the Standard Specifications.

Drainage Pads

Concrete for use in drainage pads shall be minor concrete, except the concrete shall contain not less than 300 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 number of stitches per 25 mm of seam shall be 5 to 7.

Equipment or vehicles shall not be operated or driven directly on the filter fabric.

TREATED PERMEABLE BASE UNDER APPROACH SLAB

Treated permeable base under structure approach slabs shall consist of constructing either an asphalt treated permeable base or a cement treated permeable base in accordance with Section 29, "Treated Permeable Bases," of the Standard Specifications and these special provisions.

The type of treatment, asphalt or cement, to be used shall be at the option of the Contractor.

The Contractor shall notify the Engineer in writing, not less than 30 days prior to the start of placing the treated permeable base, which type of treated permeable base will be furnished. Once the Contractor has notified the Engineer of the selection, the type to be furnished shall not be changed without a prior written request to do so and approval thereof in writing by the Engineer.

Asphalt treated permeable base shall be placed at a temperature of not less than 93°C nor more than 121°C. Material stored in excess of 2 hours shall not be used in the work.

Asphalt treated permeable base material may be spread in one layer. The base material shall be compacted with a vibrating shoe type compactor or rolled with a roller weighing at least 1.3 tonnes but no more than 4.5 tonnes. Rolling shall begin as soon as the mixture has cooled sufficiently to support the weight of the rolling equipment without undue displacement.

Cement treated permeable base material may be spread in one layer. The base material shall be compacted with either a vibrating shoe type compactor or with a steel-drum roller weighing at least 1.3 tonnes but no more than 4.5 tonnes. Compaction shall follow within one-half hour after the spreading operation and shall consist of 2 complete coverages of the treated material.

APPROACH SLABS

Concrete for use in approach slabsshall contain not less than 400 kilograms of cementitious material per cubic meter.

Grate frames for the drainage inlets attached to the approach slabs shall conform to the provisions in Section 75-1.02, “Miscellaneous Iron and Steel,” of the Standard Specifications.

Structure approach slabsshall be cured for not less than 5 days prior to opening to public traffic, unless, at the option of the Contractor, the structure approach slabsare constructed using concrete with a non-chloride Type C chemical admixture conforming to these special provisions.

Portland cement for use in concrete using a non-chloride Type C chemical admixture shall be Type II Modified, Type II Prestress, or Type III. Type II Modified and Type III cement shall conform to the provisions in Section 90-2.01, "Cement," of the Standard Specifications. Type II Prestress cement shall conform to the requirements of Type II Modified cement, except the mortar containing the portland cement to be used and Ottawa sand, when tested in conformance with California Test 527, shall not contract in air more than 0.053-percent.

The non-chloride Type C chemical admixture, approved by the Engineer, shall conform to the requirements in ASTM Designation: C 494 and Section 90-4, "Admixtures," of the Standard Specifications.

The concrete with non-chloride Type C chemical admixture shall be prequalified prior to placement in conformance with the provisions for prequalification of concrete specified by compressive strength in Section 90-9.01, "General," of the Standard Specifications and the following:

A. Immediately after fabrication of the 5 test cylinders, the cylinders shall be stored in a temperature medium of 21 ± 1.5°C until the cylinders are tested.
B. The 6-hour average strength of the 5 test cylinders shall not be less than 5.85 MPa. No more than 2 test cylinders shall have a strength of less than 5.5 MPa.

The top surface of approach slabsshall 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 slabsshall 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 slabsconstructed 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 slabsusing concrete with a non-chloride Type C chemical admixture, an insulating layer or blanket shall be used to cover the surface. The insulating layer or blanket shall have an R-value rating given in the table below. At the Contractor's option, a heating tent may be used in lieu of or in combination with the insulating layer or blanket.

Temperature range during curing period	R-value, minimum
13°C to 18°C	1
7°C to 13°C	2
4°C to 7°C	3

JOINTS

Hardboard and expanded polystyrene shall conform to the provisions in Section 51-1.12D, "Sheet Packing, Preformed Pads and Board Fillers," of the Standard Specifications.

Type AL joint seals shall conform to the provisions in Section 51-1.12F, "Sealed Joints" of the Standard Specifications. The sealant may be mixed by hand-held power-driven agitators and placed by hand methods.

The pourable seal between the steel angle and concrete barrier shall conform to the requirements for Type A and AL seals in Section 51-1.12F(3), "Materials and Installation," of the Standard Specifications. The sealant may be mixed by hand-held power-driven agitators and placed by hand methods. Immediately prior to placing the seal, the joint shall be

thoroughly cleaned, including abrasive blast cleaning of the concrete surfaces, so that all foreign material and concrete spillage are removed from all joint surfaces. Joint surfaces shall be dry at the time the seal is placed.

MEASUREMENT AND PAYMENT

Structural concrete, approach slab (Type N)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.

Full compensation for furnishing and constructing drainage inlets, grate frames and down drains shall be considered as included in the contract price paid per cubic meter for structural concrete, approach slab (type N) and no separate payment will be allowed therefor.

10-1.56 SOUND WALL

DESCRIPTION

This work shall consist of constructing sound walls of masonry block. Sound walls shall be supported on concrete barriers as shown on the plans.

The Contractor shall select a sound wall type from the alternates shown on the plans. Types of sound wall shall not be mixed in any one installation.

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, post 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 for sound wall footings, pile caps and grade beams, if required, shall be minor concrete.

Concrete masonry units shall be hollow, load bearing, conforming to the requirements in ASTM Designation: C 90, lightweight or medium weight classification, Type II. Standard or open end units may be used. Open end units, if used, shall not reduce the spacing of the bar reinforcement as shown on the plans.

The masonry units shall be nominal size and texture and of uniform color. The color shall closely conform to Color No. 23722, a beige of federal Standard 595B.

When high strength concrete masonry units with f'm=17.2 MPa are shown on the plans, the high strength masonry units shall have a minimum compressive strength of 26 MPa based on net area. Each high strength concrete masonry unit shall be identified with a groove embedded in an interior corner. The groove shall extend from a mortar surface for a length of about 50 mm and shall have a depth of about 5 mm.

Expansion joint filler shall conform to the requirements in ASTM Designation: D 1751 or ASTM Designation: D 2000 2AA-805.

Portland cement mortar shall be colored to match the units. Coloring shall be chemically inert, fade resistant mineral oxide or synthetic type.

Portland cement for wall stems shall conform to the provisions in Section 90-2.01, "Portland Cement," of the Standard Specifications.

Hydrated lime shall conform to the requirements in ASTM Designation: C 207, Type S.

Mortar sand shall be commercial quality.

Mortar for laying masonry units shall consist, by volume, of one part portland cement, 0 to 0.5 part hydrated lime, and 2.25 to 3 parts mortar sand. Sufficient water shall be added to make a workable mortar. Each batch of mortar shall be accurately measured and thoroughly mixed. Mortar shall be freshly mixed as required. Mortar shall not be retempered more than one hour after mixing.

Prepackaged mortar materials and mortar containing admixtures may be used when approved in writing by the Engineer, provided the mortar shall not contain more than 0.05 percent soluble chlorides when tested in conformance with California Test 422 nor more than 0.25 percent soluble sulfates, as SO_4, when tested in conformance with California Test 417.

Prior to laying masonry units using prepackaged mortar materials or mortar containing admixtures, the Contractor shall submit to the Engineer the proposed sources of the materials together with test data from an independent testing laboratory for mortar tested in conformance with California Test 551. The test data shall be from specimens having a moist cure, except, the sample shall not be immersed in lime water. The average 28-day compressive strength of the mortar shall be not less than 17.2 MPa.

Aggregate for grout used to fill masonry units shall consist of fine aggregate and coarse aggregate conforming to the provisions in Section 90-2.02, "Aggregates," of the Standard Specifications. At least 20 percent of the aggregate shall be coarse aggregate. The Contractor shall determine the grading except that 100 percent of the combined grading shall pass the 12.5-mm sieve.

At the option of the Contractor, grout for filling masonry units may be proportioned either by volume or mass. Grout shall contain only enough water to cause the grout to flow and fill the voids without segregation. The maximum amount of free water shall not exceed 0.7 times the weight of the cement for regular strength masonry. The maximum amount of free water shall not exceed 0.6 times the mass of the cement for high strength masonry.

Grout proportioned by volume for regular strength masonry shall consist of at least one part portland cement and 4.5 parts aggregate. Grout proportioned by volume for high strength masonry shall consist of at least one part portland cement and 3.5 parts aggregate. Aggregate volumes shall be based on a loose, air-dry condition.

Grout proportioned by mass for regular strength masonry shall contain not less than 325 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.

MEASUREMENT AND PAYMENT

Sound walls (barrier) will be measured by the square meter of wall projected on a vertical plane between the elevation lines shown on the plans or for walls supported on barriers from the top of the barrier to the upper elevation line and length of wall (including the exposed posts, back up wall for access openings, and access gates).

The contract price paid per square meter for 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 all supports (except barriers, and barrier supports), anchorages, access gates, ladders, corrugated steel pipe landings, excavation, backfill, reinforcement and grade beams, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer. Concrete barrier, and barrier supports supporting sound walls (barrier) will be measured and paid for as separate items of work.

10-1.57 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.

10-1.58 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 "Clean and Paint Structural Steel" of 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.

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 DSD.

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 hinges 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.

10-1.59 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 textures listed below are required at concrete surfaces shown on the plans:

A. Fractured rib texture on columns
B. Fractured fin texture on closure walls
C. Formed relief and fractured rib texture on concrete barrier
D. Heavy sandblasted texture on abutment walls

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 heavy sandblasted texture shall be an architectural texture accomplished by sandblasting the surface of the concrete to produce a generally uniform color and sandy texture with air and water bubbles in the concrete partially exposed.

The architectural texture shall simulate a formed relief constructed to the dimensions and shapes shown on the plans. Corners at the intersection of plane surfaces shall be sharp and crisp without easing or rounding. A Class 1 surface finish shall be applied to the architectural texture.

TEST PANEL

Test panels at least 1.25 m x 1.25 m in size shall be successfully completed for each architectural texture at a location approved by the Engineer before beginning work on architectural textures. The test panel for each architectural texture 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 panels approved by the Engineer shall be used as the standard of comparison in determining acceptability of architectural texture for concrete surfaces.

FORM LINERS

Form liners shall be used for textured concrete surfaces and shall be installed in conformance with the manufacturer's recommendations, unless other methods of forming textured concrete surfaces are approved by the Engineer. Form liners shall be manufactured from an elastomeric material or a semi-elastomeric polyurethane material by a manufacturer of commercially available concrete form liners. No substitution of other types of formliner material will be allowed. Form liners shall leave crisp, sharp definition of the architectural surface. Recurring textural configurations exhibited by repeating, recognizable shadow patterns shall be prevented by proper casting of form liner patterns. Textured concrete surfaces with such recurring textural configurations shall be reworked to remove such patterns as approved by the Engineer or the concrete shall be replaced.

Form liners shall have the following properties:

Description	ASTM Designation:	Range
Elastomeric material		
Shore A hardness	D 2240	20 to 65
Tensile strength (MPa)	D 412	0.9 to 6.2
Semi-elastomeric polyurethane		
Shore D hardness	D 2240	55 to 65
Tensile strength (MPa)	D 2370	18 minimum

Cuts and tears in form liners shall be sealed and repaired in conformance with the manufacturer's recommendations. Form liners that are delaminated from the form shall not be used. Form liners with deformations to the manufactured surface caused by improper storage practices or any other reason shall not be used.

Form liners shall extend the full length of texturing with transverse joints at 2.5 m minimum spacing. Small pieces of form liners shall not be used. Grooves shall be aligned straight and true. Grooves shall match at joints between form liners. Joints in the direction of grooves in grooved patterns shall be located only in the depressed portion of the textured concrete. Adjoining liners shall be butted together without distortion, open cracks or offsets at the joints. Joints between liners shall be cleaned before each use to remove any mortar in the joint.

Adhesives shall be compatible with the form liner material and with concrete. Adhesives shall be approved by the liner manufacturer. Adhesives shall not cause swelling of the liner material.

RELEASING FORM LINERS

Products and application procedures for form release agents shall be approved by the form liner manufacturer. Release agents shall not cause swelling of the liner material or delamination from the forms. Release agents shall not stain the concrete or react with the liner material. For reliefs simulating fractured concrete or wood grain surfaces the application method shall include the scrubbing method using a natural bristle scrub brush in the direction of grooves or grain The release agent shall coat the liner with a thin film. Following application of form release agent, the liner surfaces shall be cleaned of excess amounts of agent using compressed air. Buildup of form release agent caused by the reuse of a liner shall be removed at least every 5 uses.

Form liners shall release without leaving particles or pieces of liner material on the concrete and without pulling or breaking concrete from the textured surface. The concrete surfaces exposed by removing forms shall be protected from damage.

CURING

Concrete surfaces with architectural texture shall be cured only by the forms-in-place or water methods. Seals and curing compounds shall not be used.

MEASUREMENT AND PAYMENT

Fractured rib architectural texture on columns and heavy sandblasted architectural texture on abutment walls will be measured and paid for by the square meter.

The contract price paid per square meter for architectural texture of the types listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in architectural texture, complete in place, including test panels, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for architectural texture on closure wall shall be considered as included in the contract price paid per square meter for concrete closure wall and no separate payment will be made therefor.

Full compensation for 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.

10-1.60 COLORED CONCRETE (RAISED ISLAND)

This work shall consist of constructing an integrally colored concrete, for raised island at Northbound On-Ramp (Br. No. 37-0583), to the limits as shown on the contract plans.

Colored concrete shall be of minor concrete conforming to the provisions of Section 73, "Concrete Curbs and Sidewalks" of the Standard Specifications and these special provisions, with color additives as specified herein.

Surface of colored concrete shall be prepared in accordance with the manufacturer's specifications. The finish shall be light broom finish. The surface shall be scored as shown on plans.

Concrete shall be integrally colored by mixing a fine ground, mineral iron oxide, conforming to ASTM Designation: C 979 - 82 and specifically manufactured for coloring concrete, into the concrete. The coloring agent shall be uniformly and homogeneously mixed with the concrete in accordance with manufacturer's specifications.

The color of the completed concrete, after curing and when air dry, shall conform closely to Federal Standard 595B (July 1994) Color No. 12160. The dosage rate shall be based on weight of cementitious materials but not aggregate or sand. The dosage rate of color additives shall be in accordance with the manufacturer's recommendation and shall not exceed 10 percent of weight of cementitious materials in the concrete mix design.

Calcium chloride shall not be used in the colored concrete mix design. Any air entrainment admixture used shall conform to ASTM Designation C 260, shall be certified by the color additive manufacturer, and shall be approved by the Engineer. Other admixtures used in the concrete mix design shall be certified by the color additive manufacturer and shall be approved by the Engineer.

Test panels at least 1.0 m x 1.0 m in size shall be successfully completed at a location approved by the Engineer before beginning work on colored concrete. Such test panel shall be constructed and finished with the materials, tools, equipment and methods intended to be used in placing the concrete. Three test panels shall be prepared: one at the specified color dosage, one at 0.90 times the specified color dosage, and one at 1.1 times the specified color dosage. Each test panel shall be scored 0.6m and 0.8m from the edge of the panel. If ordered by the Engineer, additional test panels shall be constructed and finished until the specified color is 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 colored concrete. Samples of the cementitious materials and aggregate used in the approved test panel shall be retained. Cementitious materials and aggregates from the same sources shall be used for the colored concrete and sampled in accordance with California Test 201 for comparison of color and gradation with the material used for the approved test panel. Records of the mix used in the approved test panel shall be submitted to the Engineer.

The Contractor shall monitor the water content, weight of cement, and size, weight, and color of aggregate to maintain consistency and accuracy of the mixed colored concrete batches. Immediately prior to batching the first load of colored concrete in a mixing drum, the mixing drum shall be thoroughly clean and wet. The quantity of colored concrete mixed shall not be less than one-third of the capacity of the mixing drum and shall always be in full cubic meter increments. The Contractor shall schedule delivery of concrete to provide consistent mix times from batching until discharge.

No water shall be added after a portion of the batch has been discharged. The colored concrete mix shall not be retempered by adding water in the field.

When more than one concrete pump is used to place colored concrete, the Contractor shall designate which pumps shall receive colored concrete. These designated pumps shall receive only colored concrete during concrete placement. The priming slurry for these designated pumps shall be colored with the color additive specified in the approved colored concrete mix design. All colored concrete shall be placed within 15 calendar days.

Curing of the colored concrete shall conform to the manufacturer's recommendations , the provisions of Section 90-7, "Curing Concrete" and these special provisions. Curing by water method shall not be allowed.

Immediately after finishing operations are completed on each individual portion of the curb or raised island, curing compound shall be applied at a consistent time period after finishing operations. The curing compound used shall be clear and shall be manufactured specifically for colored concrete. The Contractor shall apply curing compound in accordance with manufacturer's instructions and shall be applied at a rate of 6.8-7.3 m^2/L when tested in accordance with California Test 535.

Full compensation for constructing colored concrete (raised island) shall be considered as included in the contract price paid per cubic meter for structural concrete, bridge and no separate payment will be allowed therefor.

10-1.61 JUVENILE CENTER SIGN RECONSTRUCTION

Juvenile center sign reconstruction shall conform to the details shown on the plans and the provisions in Section 19, "Earthwork," and Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Juvenile center sign reconstruction will be paid for on a lump sum basis.

The contract price paid per lump sum for Juvenile center sign reconstruction shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in reconstructing the

sign, complete in place, including structure excavation and structure backfill and furnishing and placing concrete and bar reinforcing steel, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.62 ARMORY CORPS CENTER STAIR RECONSTRUCTION

Armory corps center stair reconstruction shall conform to the details shown on the plans and the provisions in Section 19, “Earthwork,” Section 51, "Concrete Structures," and Section 75, “Miscellaneous Metal,” of the Standard Specifications and these special provisions.

The Contractor shall be required to obtain a permit from the Armory prior to entering the property for security purposes.

Drilling and bonding dowels shall conform to the provisions in Section 83-2.02D(1), “General,” of the Standard Specifications.

Armory corps center stair reconstruction will be paid for on a lump sum basis.

The contract price paid per lump sum for armory corps center stair reconstruction shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in reconstructing the stair, complete in place, including obtaining necessary entrance permits, structure excavation and structure backfill, furnishing and placing concrete, bar reinforcing steel and miscellaneous metal, and drilling and bonding dowels, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.63 REINFORCEMENT

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

Galvanized bar reinforcing steel shall conform to the provisions in Section 75-1.05 “Galvanizing” of the Standard Specifications.

Individual hoops, made continuous with butt welded shall conform to the requirements for "Ultimate Butt Splices" of these special provisions.

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.

Galvanized bar reinforcing steel will be measured and paid for as bar reinforcing steel (bridge).

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.

10-1.64 SHOTCRETE

Shotcrete shall conform to the provisions in Section 51, "Concrete Structures," and Section 53, "Shotcrete," of the Standard Specifications and these special provisions.

Shotcrete operations shall completely encase all reinforcement and other obstructions shown on the plans. Exceptional care shall be taken to properly encase the reinforcement and other obstructions with shotcrete.

Attention is directed to the section, "Order of Work," in these special provisions regarding furnishing preconstruction shotcrete test panels.

Except for finish coats, shotcrete shall be applied by the wet-mix process only.

Finish coats, applied by the dry-mix process, may be used only when approved by the Engineer.

Shotcrete shall have a minimum compressive strength of 22.5 MPa at 28 days or as shown on the plans, whichever is greater. No shotcrete work shall be performed prior to verification by the Engineer of the required compressive strength.

Splicing of reinforcing bars No. 22 or larger in shotcrete shall be by butt splicing only.

The Contractor shall be responsible for obtaining and testing all required preconstruction and production test cores. All coring and testing shall be at the Contractor's expense and performed in the presence of the Engineer, unless otherwise directed. The Engineer shall be notified a minimum of 24 hours prior to the Contractor performing any coring or testing operations.

All cores shall be obtained and tested for compressive strength in conformance with the requirements in ASTM Designation: C 42. Cores used for determining compressive strength shall not contain any bar reinforcement or other obstructions. The testing shall be performed at an independent testing facility approved by the Engineer. A copy of the test results shall be furnished to the Engineer within 5 days following completion of testing.

All test panels shall become the property of the Contractor and shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

PRECONSTRUCTION REQUIREMENTS

Prior to performing shotcrete work, the Contractor shall construct at least 2 preconstruction shotcrete test panels for each mixture being considered unless otherwise specified.

The nozzleperson shall have a minimum of 3000 hours experience as a nozzleperson on projects with a similar application.

At least 10 working days prior to constructing any shotcrete test panels, the Contractor shall submit to the Engineer for approval, a Quality Control Plan (QCP) for the proposed method of shotcrete placement. The plan shall include the following:

A. The number and qualifications of nozzlepersons available to place shotcrete, the number of nozzlepersons on-site at any time during the shotcrete placement, description of their work schedule, and the procedures for avoiding fatigue of any nozzleperson.
B. The proposed method of placing shotcrete, including, but not limited to, application rates, details of any proposed construction joints and their locations, and methods for achieving the required thickness and surface finish.
C. The procedure for curing shotcrete surfaces.
D. The description of a debris containment system, to be used during the cleaning of bar reinforcing steel and concrete and placing of shotcrete, as required to provide for public safety.

The Engineer shall have 10 working days to review and approve the QCP submittal after a complete plan has been received. No construction of shotcrete test panels shall be performed until the QCP is approved by the Engineer. Should the Engineer fail to complete the review within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in approving the QCP, the delay will be considered

a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Preconstruction shotcrete test panels shall be constructed by the nozzlepersons and application crew scheduled to do the work, using equipment, materials, mixing proportions, ambient temperatures and procedures proposed for the work. The preconstruction shotcrete test panels shall conform to the following:

A. One shotcrete test panel, of the size determined by the Contractor, shall be unreinforced and shall have 3 cores taken from it and tested for compressive strength. The compressive strength shall be the average strength of the 3 cores, except that, if any core should show evidence of improper coring, the core shall be discarded and the compressive strength shall be the average strength of the remaining cores. The test panel shall be identified and submitted to the Engineer with the test results including a description of the mixture, proportions, and ambient temperature.
B. One shotcrete test panel shall have the same (1) thickness, (2) bar size and amount of bar reinforcement or other obstructions and (3) positioning of bar reinforcement or obstructions as the most heavily reinforced section of shotcrete to be placed. The test panel shall be square with the length of the sides equal to at least 3 times the thickness of the most heavily reinforced section of shotcrete to be placed, but not less than 750 mm. After a minimum 7 days of cure, the test panel shall be broken by the Contractor, in the presence of the Engineer, into pieces no larger than 250 mm in greatest dimension. The surfaces of the broken pieces shall be dense and free of laminations and sand pockets, and shall verify that the bar reinforcement or other obstructions are completely encased.
C. Both test panels shall be cured under conditions similar to the actual work.
D. At the option of the Contractor, cores to be used for determining the compressive strength may be taken from the reinforced test panel described above in lieu of making a separate unreinforced test panel as described above. The compressive strength shall be the average strength of the 3 cores, except that, if any core should show evidence of improper coring or contains bar reinforcement or other obstructions, the core shall be discarded and the compressive strength shall be the average strength of the remaining cores. If cores are taken from the reinforced test panel, the panel shall not be broken into pieces, as described above, until it has cured for a minimum of 14 days.

The requirements for constructing preconstruction shotcrete test panels may be eliminated, when approved by the Engineer, if a test panel report and certified compressive strength test data are furnished from a State highway project with a similar application of approximately equal thickness, including similar amounts and placement of reinforcement or other obstructions. The nozzle person, proposed to be used, shall have constructed the test panel described in the test panel report. The test panel report shall list the names of the application crew, equipment used, materials, mixing proportions, ambient temperatures and procedures used to make the test panels. The certified compressive strength test data shall be for cores taken from the same test panels.

PLACING

An air blowpipe shall be used during shotcrete placement to remove rebound, overspray and other debris from the areas to receive shotcrete.

Construction joints shall be tapered, and shall conform to the provisions in Sections 51-1.13, "Bonding," of the Standard Specifications.

All overspray and rebound shall be removed prior to final set and before placement of shotcrete on adjacent surfaces.

Rebound or any other material which has already exited the nozzle shall not be reused.

Shotcrete shall be cured in conformance with the provisions of Section 90-7.03, "Curing Structures," of the Standard Specifications.

When a finish coat is to be used, all loose, uneven or excess material, glaze, and rebound shall be removed by brooming, scraping, or other means and the surface left scarified. Any surface deposits which take a final set shall be removed by abrasive blasting. Prior to placing the finish coat, the receiving surface shall be washed down with an air-water blast.

Shotcrete extending into the space shown on the plans for cast-in-place concrete shall be removed.

TESTING AND ACCEPTANCE

At least 3 production shotcrete test cores shall be taken from each 30 square meters or portion thereof of shotcrete placed each day. The cores shall be 76 mm in diameter. The location where cores are to be taken will be designated by the Engineer. Test cores shall be identified by the Contractor and a description of the core location and mixture, including proportions, shall be submitted to the Engineer with the test cores, immediately after coring. Cored holes shall be filled with mortar in conformance with the provisions in Section 51-1.135, "Mortar," of the Standard Specifications.

Upon receipt of the cores, the Engineer will perform a visual examination to determine acceptance, as described below. Within 48 hours after receipt, the Engineer will return the cores to the Contractor for compressive strength testing.

The compressive strength test shall be performed using the shotcrete production test cores described above. The compressive strength shall be the average strength of the 3 cores, except that, if any core should show evidence of improper coring, the core shall be discarded and the compressive strength shall be the average strength of the remaining cores.

The basis of acceptance for production shotcrete test cores shall be (1) that the core is dense and free of laminations and sand pockets, and shows that the reinforcement or other obstructions are completely encased and (2) the same as specified for test cylinders in the fourth and fifth paragraphs of Section 90-9.01, "General," of the Standard Specifications.

If any production test core shows signs of defective shotcrete as described in (1) above, the shotcrete represented by such test core 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 shotcrete placed in the work are acceptable.

The surface finish of the shotcrete shall conform to the provisions of Section 51-1.18, "Surface Finishes," of the Standard Specifications.

MEASUREMENT AND PAYMENT

Full compensation for the Quality Control Plan, constructing and breaking test panels, furnishing and testing cores and patching cored holes shall be considered as included in the contract price paid per cubic meter for shotcrete and no additional compensation will be allowed therefor.

10-1.65 CLEAN AND PAINT STRUCTURAL STEEL

Exposed new metal surfaces, except where galvanized, shall be cleaned and painted in conformance with the provisions in Section 59-2, "Painting Structural Steel," and Section 91, "Paint," of the Standard Specifications and these special provisions.

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 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

- The inorganic zinc coating shall have a minimum adhesion to steel of 4 MPa when measured at no more than 6 locations per span on each girder using a self-aligning adhesion tester in conformance with the requirements in ASTM Designation: D 4541. The Contractor, at the Contractor's expense, shall: (1) verify compliance with the adhesion requirements, (2) furnish test results to the Engineer, and (3) repair the coating after testing.

Cure

- The inorganic zinc coating, when properly cured, shall exhibit a solid, hard, and polished metal surface when firmly scraped with the knurled edge of a quarter. Inorganic zinc coating that is powdery, soft, or does not exhibit a polished metal surface, as determined by the Engineer, shall be repaired by the Contractor, at the Contractor's expense, by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

The final coat of inorganic zinc coating shall be applied after testing for adhesion, testing for cure, and completion of all operations that may damage or discolor the steel surface, including correction of runs, sags, thin and excessively thick areas in the paint film, skips and holidays, dry spray, or areas of non-uniform appearance.

The area to receive the final coat of inorganic zinc coating shall be lightly roughened by abrasive blasting using an abrasive no larger than 600 µm. Abrasive blasting shall remove no more than 15 µm of inorganic zinc. The surface to be lightly roughened shall be free from moisture, dust, grease or deleterious material. The undercoated areas of the under surfaces of bottom flanges shall be protected from abrasive blast cleaning operations.

The final coat of inorganic zinc coating shall be applied to the required dry film thickness in one uniform application within 24 hours after light roughening. The dry film thickness of the final coat shall be not less than 25 µm nor more than 75 µm.

Except at bolted connections, the total dry film thickness of all applications of the single undercoat and final coat of inorganic zinc coating shall be not less than 125 µm nor more than 275 µm.

Finish coats will not be required.

10-1.66 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," of the Standard Specifications. The working drawings shall include sign panel dimensions, span lengths, post heights, anchorage layouts, proposed splice locations, a snugging and tensioning pattern for anchor bolts and high strength bolted connections, and details for permanent steel anchor bolt templates. The working drawings shall be supplemented with a written quality control program that includes methods, equipment, and personnel necessary to satisfy the requirements specified herein and in the special provisions.

Working drawings shall be 559 mm x 864 mm or 279 mm x 432 mm in size and each drawing and calculation sheet shall include the State assigned designations for the contract number, sign structure type and reference as shown on the contract plans, District-County-Route-Kilometer Post, and contract number.

The Engineer shall have 20 working days to review the sign structure working drawings after a complete submittal has been received. No fabrication or installation of sign structures shall be performed until the working drawings are approved in writing by the Engineer.

Should the Engineer fail to complete the review within the time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the sign structure working drawings, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

A permanent steel template shall be used to maintain the proper anchor bolt spacing.

One top nut, one leveling nut, and 2 washers shall be provided for the upper threaded portion of each anchor bolt.

Surfaces of base plates which are to come in contact with concrete, grout, or washers and leveling nuts shall be flat to within 3 mm tolerance in 305 mm, and to within 5 mm tolerance overall. Faying surfaces of plates in high-strength bolted connections including flange surfaces of field splices, chord joints, and frame junctures, and contact surfaces of plates used for breakaway slip base assemblies shall be flat to within 2 mm tolerance in 305 mm, and within 3 mm tolerance overall.

Thermally cut holes made in tubular members of sign supports, other than holes in base and flange plates, shall initially be made a minimum of 2 mm undersized, and then be mechanically enlarged by reaming or grinding to the final required size and shape. All edges shall have a surface roughness of not greater than 6.35 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.

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.

10-1.67 ROADSIDE SIGNS

Roadside signs shall be installed at the locations shown on the plans or where designated by the Engineer and in conformance with the provisions in Section 56-2, "Roadside Signs," of the Standard Specifications and these special provisions.

Wood posts shall be pressure treated after fabrication in conformance with the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling," of the Standard Specifications with creosote, creosote coal tar solution, creosote petroleum solution (50-50), pentachlorophenol in hydrocarbon solvent, copper naphthenate, ammoniacal copper arsenate, or ammoniacal copper zinc arsenate. In addition to the preservatives listed above, Southern yellow pine may also be pressure treated with chromated copper arsenate. When other than one of the creosote processes is used, blocks shall have a minimum retention of 6.4 kg/m^3, and need not be incised.

10-1.68 ALTERNATIVE PIPE

Alternative pipe culverts shall conform to the provisions in Section 62, "Alternative Culverts," of the Standard Specifications and these special provisions.

10-1.69 REINFORCED CONCRETE PIPE

Reinforced concrete pipe shall conform to the provisions in Section 65, "Reinforced Concrete Pipe," of the Standard Specifications and these special provisions.

Where embankment will not be placed over the top of the pipe, a relative compaction of not less than 85 percent shall be required below the pipe spring line for pipe installed using Method 1 backfill in trench, as shown on Standard Plan A62D. Where the pipe is to be placed under the traveled way, a relative compaction of not less than 90 percent shall be required

unless the minimum distance between the top of the pipe and the pavement surface is the greater of 1.2 m or one half of the outside diameter of the pipe.

Except as otherwise designated by classification on the plans or in the specifications, joints for culvert and drainage pipes shall conform to the plans or specifications for standard joints.

When reinforced concrete pipe is installed in conformance with the details shown on Revised Standard Plan A62DA, the fifth paragraph of Section 19-3.04, "Water Control and Foundation Treatment," of the Standard Specifications shall not apply.

When solid rock or other unyielding material is encountered at the planned elevation of the bottom of the bedding, the material below the bottom of the bedding shall be removed to a depth of 1/50 of the height of the embankment over the top of the culvert, but not less than 150 mm nor more than 300 mm. The resulting trench below the bottom of the bedding shall be backfilled with structure backfill material in conformance with the provisions in Section 19-3.06, "Structure Backfill," of the Standard Specifications.

10-1.70 REINFORCED CONCRETE PIPE (CITY OF SAN JOSE)

Reinforced concrete pipe (City of San Jose) shall conform to Section 1207 of the City of San Jose's Standard Specifications and these special provisions.

Pipe installation shall conform to Section 1302 "Pipe Installation", Section 101, "Pipe and Fittings" and Section 1207, "Pipe and Structures," of the City of San Jose's Standard Specifications.

Trench excavation, bedding, and backfill shall conform to Section 1301, "Trench Excavation, Bedding and Backfill," of the City of San Jose's Standard Specifications and these special provisions. Bedding for all reinforced concrete pipe (City of San Jose) shall be Class I.

All reinforced concrete pipe (City of San Jose) shall be Class III with a minimum "B" wall thickness and shall have neoprene rubber gasketed joints conforming to the requirements of ASTM Designation C443. Joint assembly design shall be reinforced concrete bell and spigot type incorporating a fully retained, single or double gasket in accordance with ASTM C361. Steel joint rings will not be allowed.

Pipe minimum and maximum lengths, except where required otherwise, shall be in accordance with Section 7.3 of ASTM C361.

The pipe manufacturer shall cut a minimum of four cores, at least 65 millimeters in diameter, as indicated in the Table of Frequency of Sampling and Testing. The cores taken near the spigot end shall be taken 90 degrees from the cores taken at the bell end. Two cores shall be taken near the bell end, 180 degrees apart, and two cores shall be taken near the spigot end, 180 degrees apart. If the steel is misplaced more than plus or minus 13 millimeters in any one core, the three edge bearing test (D-load) shall be performed for that pipe. The remainder of the pipe in that period run will be accepted if the three edge bearing test requirement is met. In no case, however, shall the circumferential reinforcement cover be less than 13 millimeters.

All new reinforced concrete pipe (City of San Jose) installed shall be tested for leakage by performing an air pressure test. In addition, the Contractor shall perform a television inspection of the pipe as specified in Section 1307-3, "Television Inspection", of the City of San Jose's Standard Specifications.

Certificates of Compliance shall be submitted in accordance with Section 6-1.07 of the City of San Jose's Standard Specifications, and with the individual material specifications of these special provisions.

The Contractor shall submit to the Engineer quality control records of test as required by the following "Table of Frequency of Sampling and Testing," and as specified herein.

TABLE OF FREQUENCY OF SAMPLING AND TESTING

Item Test	Frequency	Remarks
At Manufacturing Plant		
1. RCP Core	*	1207-2.1.1(b)
2. RCP D-Load	*	ASTM C497
3. Absorption	1 core from item #1	ASTM C497 Sec. 7 Method A, Max 8.5%
4. Concrete Strength	5 cyl 6" x 12"	ASTM C361 daily Mfg. cast/ Indep. Lab test
5. Aggregate	Once per mix design	ASTM C33
6. Pipe Joint Shear Test	2 joints of first lot	
7. Cert. Of Type II modified Cement, mix design, gasket	As required	ASTM C361 Section 9.1.2
In Field		
1. Joint Leakage	Each joint	ASTM C1103

* For the purpose of this specification, a lot is defined as 120 meters but no more than 50 sections of pipe, or fraction thereof, of one size and class manufactured on consecutive working days. If the 120 meters, but no more than 50 sections of pipe, are not made on consecutive working days, then only those made on consecutive working days shall be considered a lot. If an interruption in the manufacture of a lot occurs, the Engineer may permit the pipe made after the interruption to be included in the lot provided the interruption does not last more than 7 calendar days. A new lot number will be assigned if any change occurs in the size or spacing of reinforcing steel, in the concrete mix, or in the curing method.

Reinforced concrete pipe (City of San Jose) shall be measured by the meter. The length of pipe to be paid for shall be in accordance with Section 65-1.09 "Measurement" of Caltrans' Standard Specifications.

The contract price paid per meter of reinforced concrete pipe (City of San Jose) shall include full compensation for furnishing all labor, testing, materials, tools, equipment, and incidentals, and for doing all the work involved in installing the pipe, complete in place, including structure excavation and structure backfill, as shown on the plans, and as specified in these special provisions, and as directed by the Engineer.

10-1.71 CORRUGATED METAL PIPE

Corrugated steel pipes (OMP) inlets shall conform to the provisions in Section 66, "Corrugated Metal Pipe," of the Standard Specifications and these special provisions.

10-1.72 EDGE DRAIN

Edge drains shall conform to the provisions in Section 68-3, "Edge Drains," of the Standard Specifications and these special provisions.

10-1.73 GRATED LINE DRAIN

This work shall consist of furnishing and installing precast grated line drain, with necessary fittings, coupling systems, frames, grates and associated items as shown on the plans and in conformance with these special provisions.

The interior surface of the grated line drain, below the level of the frame and grate and associated connections, shall be smooth. Grated line drain channel sections shall be manufactured of monolithic polymer concrete with no side extensions.

Monolithic polymer concrete shall be made from a composition of aggregate and polyester resin or vinylester resin and shall have the following properties when tested as follows:

PROPERTY	ASTM TEST METHOD	VALUE
Tensile Strength, MPa	C 307	10 min.
Compressive Strength, MPa	C 579	80 min.
Bending Strength, MPa	C 580	20 min.
Moisture Absorption, %	C 140	0.5 max.
Chemical Resistance	C 267	Pass
Freeze/Thaw, number of cycles w/o weight loss	C 666	1600 min.

The manufacturer of the grated line drain shall furnish the Engineer a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

Grated line drain frames and grates shall be manufactured of ductile iron conforming to the provisions in Section 75-1.02, "Miscellaneous Iron and Steel," of the Standard Specifications. The frames and grates need not be galvanized or coated with asphalt paint. Bolts, nuts, frame anchors, and other connecting hardware shall conform to the provisions in Section 75-1.02, "Miscellaneous Iron and Steel," of the Standard Specifications.

Frames and grates, when installed in conformance with the manufacturer's recommendations and these special provisions, shall withstand load testing conforming to the requirements in Federal Specification RR-F-621E for "Frames, Covers, Gratings, Steps, Manhole Sump and Catch Basin." Grates shall fit into the frames without rocking.

Frames shall be secured to the surrounding concrete backfill with steel anchoring rods as shown on the plans. Other methods may be used to secure the frame to the concrete backfill or grated line drain wall provided that a minimum pullout resistance of 10 kN per meter of length of grated line drain frame is maintained.

Grates and frames shall be one piece or the grates shall be removable. Removable grates shall be held in place by locking devices that are tamper resistant. Removable grates shall provide a minimum repetitive pullout resistance of 5 kN per meter of length after completion of 1000 hours of salt spray testing in conformance with the requirements in ASTM Designation: B 117. When a combination of one piece frame and grate and removable grates are used, the locations of the removable grates shall be shown on the plans.

Except for grates installed within designated pedestrian paths of travel, grates shall accept inflow of runoff through openings. The openings shall consist of a minimum of 60 percent of the total top surface area of the grate, with individual openings or slots having a dimension not greater than 50 mm measured in the direction of the grated line drain flow line. Grates installed within designated pedestrian paths of travel shall be certified as conforming to the requirements of the "Americans with Disabilities Act."

Grated line drains shall be installed in trenches excavated to the lines and grades established by the Engineer. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the grated line drain.

Grated line drains shall be installed and jointed in conformance with the manufacturer's recommendations.

Grated line drains shall be installed to the lines and grades with sections closely jointed and secured to ensure that no separation of the line drains occurs during backfilling.

The frame or grate of the grated line drain shall not extend above the level of the surrounding concrete backfill.

Grated line drains shall be connected to new or existing drainage facilities as shown on the plans.

Excavation and backfill shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications.

Backfill for the grated line drains shall be either minor concrete or Class 3 concrete conforming to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications, except that minor concrete shall contain not less than 300 kg of cement per cubic meter.

Concrete backfill shall be placed in the trench as shown on the plans. Concrete backfill shall be placed against undisturbed material at the sides and bottom of the trench and in a manner that will prevent floating or shifting of the grated line drain and voids in, or segregation of, the concrete. Foreign material which falls into the trench, prior to or during placement of the concrete, shall be immediately removed. Where necessary, earth plugs shall be constructed and compacted at the ends of the planned concrete backfill to contain the concrete within the trench.

Concrete backfill shall be finished flush with the adjacent surfacing.

The surface of the concrete shall be textured with a broom or burlap drag to produce a durable skid-resistant surface.

The length the grated line drain to be paid for will be the length measured by the meter along the pavement surface as designated by the Engineer. No payment will be made for grated line drain placed in excess of the designated length.

The contract price paid per meter for grated line drain shall include full compensation for furnishing all labor, materials (including frames and grates), tools, equipment, and incidentals, and for doing all the work involved in installing grated line drains, complete in place, including excavation and backfill, connecting grated line drains to new or existing facilities,

concrete collars, reinforcement, and other connecting devices, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.74 WELDED STEEL PIPE

Welded steel pipe shall conform to the provisions in Section 70, "Miscellaneous Facilities," of the Standard Specifications and these special provisions.

10-1.75 JACKED WELDED STEEL PIPE

This work shall consist of furnishing and jacking a welded steel pipe in accordance with the details shown on the plans, and these special provisions.

The wall thickness of the welded steel pipe to be jacked shall not be less than 6.35 millimeters.

The jacking operations at Station G 155+20.77 have been classified "Potentially Gassy" by the State Division of Occupational Safety and Health (Division) under Section 8422 of the Tunnel Safety Orders. The Contractor must attend a pre-job conference with the Engineer and the Division prior to commencing any activity associated with the jacking operations. A copy of the Underground Classification shall be posted at the job site. Special conditions of the Underground Classification are as follows:

1. Pre-entry and continuous monitoring of the tunnel bore and associated excavations for flammable and combustible gas shall be provided by a Certified Gas Tester before entry into the tunnel by personnel.
2. Positive mechanical ventilation shall be provided at any time a person is permitted to enter the tunnel, and at any other location where it is required for employee safety and health.

Before starting excavation, the Contractor shall submit drawings of jacking pit bracing and the proposed jacking head to be used.

Unless otherwise specified, the methods and equipment used in jacking the welded steel pipe shall be optional with the Contractor, provided the proposed method is approved by the Engineer. Such approval, however, shall in no way relieve the Contractor of the responsibility for making a satisfactory installation meeting the criteria set forth herein.

Unless otherwise approved by the Engineer, once the jacking of the welded steel pipe has commenced, the Contractor shall continue the operation until the pipe has been jacked into its final location as shown on the plans.

Dewatering for jacking or tunneling shall conform to Section 19-3.04. "Water Control and Foundation Treatment." of the Standard Specifications.

All water encountered during jacking operations shall be disposed of by the Contractor in such a manner that will not damage public or private property and as approved by the Engineer. The Contractor's dewatering equipment shall be of sufficient capacity to keep all excavations free from water until backfilling is completed unless otherwise authorized by the Engineer.

The joints of sections of welded steel pipe shall be welded with a continuous circumference weld. It shall be the Contractor's responsibility to provide stress transfer across the joints capable of resisting the jacking forces involved.

Variation from the theoretical alignment and grade at the time of completion of jacking shall not exceed 1/10 of one percent of the distance from the jacking point.

The diameter of the excavated hole shall not be more than 30 millimeters greater than the outside diameter of the welded steel pipe. Sluicing or jetting with water shall not be permitted. When loose material is encountered from outside these limits, a shield shall be used ahead of the first section of welded steel pipe or the face of excavation shall not extend beyond the end of the pipe more than 0.5 meters. Areas resulting from caving or excavating beyond the limits outlined above shall be backfilled with sand or mortar by a method which will fill the voids.

MEASUREMENT

The length of jacked welded steel pipe to be paid for will be the slope length measured in one-meter increments.

PAYMENT

The contract price paid for jacked welded steel pipe shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in jacking the welded steel pipe, complete in place, including excavation, dewatering, furnishing and placing backfill material, and constructing and later backfilling all pits after the welded steel pipe is jacked and no additional compensation will be allowed therefor.

10-1.76 SLOPE PROTECTION

Slope protection shall be placed or constructed in conformance with the provisions in Section 72, "Slope Protection," of the Standard Specifications and these special provisions.

10-1.77 SLOPE PAVING (MASONRY BLOCK)

Slopes under the bridge ends 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.

Masonry block for slope paving shall be concrete pavers conforming to ASTM Designation: C 90, Type-II. The surface exposed to view shall have split face texture.

The nominal size and color of concrete pavers shall be as shown on the plans. Head and bed mortar joints shall be 13 mm thick.

Portland cement shall conform to the provisions in Section 90-2.01, "Portland Cement," of the Standard Specifications.

Hydrated lime shall conform to ASTM Designation: C 207, Type S.

Mortar sand shall be commercially produced for masonry work and free of organic impurities and lumps of clay and shale.

Mortar for laying concrete pavers shall consist, by volume, of one part portland cement, 0 to 1/2 part of hydrated lime, and 2 1/4 to 3 parts of 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. The amount of lime shall be reduced as necessary to prevent leaching and efflorescence on finished surfaces.

A proprietary, premixed packaged blend of cement, lime, and sand, without color, that requires only water to prepare for use as brick mortar or grout may be furnished for mortar. Packages of premix shall bear the manufacturer's name, brand, weight, and color identification. The manufacturer's recommended mixing proportions and procedures shall be furnished to the Engineer.

The top surface of the air-blown mortar or concrete base shall be lightly and evenly scored horizontally and vertically with a metal scratcher having grooves not more than one inch apart.

The air-blown mortar or concrete base shall be cured by the water method for at least 2 days.

Concrete pavers shall be laid and embedded in approximately 25 mm thick mortar. Embedment shall be shoved tight so that mortar is flushed into the joints to a depth of approximately 13 mm.

Joints shall be straight and of uniform and equal width.

Surfaces of completed masonry, concrete, and other such materials exposed to view shall be protected from spillage, splatters and other deposits of cementitious materials from masonry construction. All such deposits shall be removed without damage to the materials or exposed surfaces. Stains, efflorescence, laitance, splashes or spots on the faces of masonry exposed to view shall be removed. Cleaning agents shall conform to the concrete paver manufacturers recommendations. Cleaning agents shall be applied to a sample area acceptable to the Engineer, and their performance and the cleaning methods approved by the Engineer before proceeding with cleaning beyond the sample area.

Slope paving (masonry block) will be measured by the square meter. The area to be paid for will be calculated from the lengths and widths of masonry block and smooth concrete slope paving surface placed.

The contract price paid per square meter for slope paving (masonry block) shall include full compensation for furnishing all labor, materials (including concrete pavers, concrete and reinforcement), tools, equipment, and incidentals and for doing all the work involved in slope paving, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.78 MISCELLANEOUS CONCRETE CONSTRUCTION

Curbs, sidewalks, islands, and gutter depressions shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications and these special provisions.

10-1.79 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:

   Certified pump test data
   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 job site. 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 job site 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. The contractor shall provide 100,000 liters of water for initial testing.

MISCELLANEOUS.--Discharge pipe, joints, fittings, flexible expansion couplings, bracing hardware and storage cabinets are specified in Section 74, "Pumping Plant Equipment," of the Standard Specifications.

DRAINAGE PUMPING EQUIPMENT

DRAINAGE PUMP.--Drainage pump shall be an ITT Flygt submersible type pump, 200 mm CP 3140x – 614, Type LT, 11 kW, 460V-3Ph.. 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 82-mm solids, sludge and fibrous materials. The impeller shall be dynamically balanced and factory certified in accordance with ISO Grade 6.3 for rotors in rigid frames at the RPM of the motor supplied. Balance certificate shall be submitted as part of the certified pump curve performance submittal. Balancing of impeller shall not weaken or deform the impeller. The drainage pump shall include replaceable bronze impeller wear rings and casing wear rings, and the pump shaft shall be supported by roller bearings.

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. The pump motor shall be a standard efficiency motor and sized NEMA Code G or smaller.

The pump motor shall be protected from contamination by the liquid being pumped, by a tandem, double-mechanical seal running in an oil reservoir. The oil reservoir of the pump shall be equipped with a seal failure alarm system. Seals shall be tungsten carbide or silicone carbide.

The pump motor shall have a portable Type SO cord, or cords, approved for extra hard service, of sufficient length to reach from the pump to the motor starter enclosure without splicing, as shown on the plans. Cords shall have suitable cable connectors for terminating in a junction box and contain an equipment-grounding conductor with green or green with yellow stripe insulation. Cords shall be sealed into the motor with epoxy by the pump manufacturer, and provided with strain relief features at the junction box.

The drainage pump shall be rail-mounted. The base elbow shall be specifically designed by the pump manufacturer to allow proper operation of the pump and shall be designed to support the assembled weight of the pump and motor.

The pump manufacturer's factory certified test data for each pump shall be submitted. 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% 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 power and efficiency curves from cutoff head down to 3.3 meters;
The rpm of the actual driver; and
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. The drainage pumps shall include all accessories required for mounting to the guide bars, including, but not limited to, upper guide bar brackets, intermediate guide bar brackets and lifting chains and cables.

The specified drainage pumps can be obtained from:

SHAPE, Inc.
7020 Koll Center Parkway, Suite 140
Pleasanton, CA 94566
(925) 486-9720
Contact: Mr. Danny Lemmo/Bob McLean

The price quoted for the drainage pumps (2) by the distributor is $ 21,970.00, and a 1-item of startup service of $ 500. The FOB is the jobsite. Prices, and conditions quoted will apply to all orders received on or before May 30, 2003. The above prices will be firm for all orders placed on or before May 30, 2003, provided delivery is accepted within 60 days after the order is placed. The above prices do not include taxes, discounts, or other conditions.

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 915 mm x 2130 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 2.0 mm nominal thickness, pressed sheet steel 140 mm x 50 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 doorframe 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.

If the Contractor desires to lock the pumphouse during construction, he shall furnish his own lock for the door until acceptance of the pumphouse.

PRESSURE GAGE.—Pressure gage shall be ANSI Standard: Grade A, 114 millimeter dial, liquid filled with cover, stainless steel case, reset screw, 6 millimeter MPT bottom inlet. Gage shall be dual scale kPa and PSIG, from 0 kPa to 103.4 kPa. Gage cock shall be 6-millimeter NPT ball valve. Pressure gage shall be Marsh, Ashcroft, or equal.

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.

10-1.80 PUMPING PLANT ELECTRICAL EQUIPMENT

SCOPE.--Work covered by this section shall include furnishing all labor, materials, equipment and services required to construct and install the complete electrical system in accordance with the details shown on the plans, the provisions of Section 74, "Pumping Plant Equipment" 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.

SUBMITTALS.--Submittals shall be as specified in section 74-1.04 “Data to be Furnished” of the Standard Specifications. All dimensions illustrated on submittal drawings and all units of measurement shall be shown in the International System of Units (metric system).

OPERATION AND MAINTENANCE MANUALS.--Prior to the completion of the contract, three (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:

Pump Controller
Alarm Panel (LCM)

TRAINING.--Training of State personnel in programming, connection, operation, trouble shooting, and maintenance of the pump controller shall be provided. The training shall be conducted for not more than 6 persons as designated by the Engineer at the job site or at a site mutually agreed upon by the Contractor and the Engineer for a minimum of 4 hours. The trainer shall be an authorized representative of the pump controller manufacturer.

All trainees shall be supplied with books, manuals, 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 TECHNICAL SUPPORT.--The manufacturer of the pump controller shall provide technical assistance and guidance in the operation, maintenance and trouble shooting of operational problems of the pump controller for one year following the acceptance of the Contract. The technical support shall be provided at no additional cost to the State or the City of San Jose.

Technical support shall be provided at the facility site by an authorized representative of the Pump Controller 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 pump controller. The Contractor shall make all 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 Contract.

DESCRIPTION OF OPERATION.--Automatic operation of the drainage pumps shall be controlled by the trapped air level monitoring system and the pump controller. The monitoring system shall measure the water pressure and convert it to a 4 to 20 mA signal, which shall then be scaled to provide the depth of the water in the sump relative to the bottom of the sump. The pump controller shall display the current water level and shall determine which pump to turn on. In the event that the trapped air level monitoring system or the pump controller fails, the pumps shall be controlled by the high water level float switch.

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 Pump Controller call for both pumps to start 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 or when it is in the "Test" mode), there shall be a time delay of ten seconds between the starting of each pump.

Pilot light PL5 and indicating light IL1 shall be energized whenever control power is present. If the water level reaches the high water level float switch elevation, the high water alarm pilot light PL4 shall be energized and remain energized until reset by pushbutton PB3. When motor current is sensed by a current switch, the corresponding pilot light and time meter of the pump and indicating light IL2 shall be energized.

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 phase loss, phase unbalance and phase reversal. Whenever an abnormal condition occurs for more than five seconds, the control power shall be de-energized until the condition returns to normal.

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.

CORE CONCRETE.--Holes shall be cored by methods that will not shatter or damage the concrete adjacent to the holes.

The diameter of the cored holes shall be as shown on the plans or as required.

Water for the core drilling operations shall be from the domestic water supply and shall not contain more than 1,000 parts per million of chlorides as Cl, nor more than 1,300 parts per million of sulfates as SO4, nor shall it contain any impurities in a sufficient amount to cause discoloration or etching of the surface.

Water from the core drilling operations shall not be permitted to flow into sewers or other drainage facilities.

Conduit.--

Unless otherwise shown, all conduit shall be Type 1 conduit with threaded steel or malleable iron fittings.

Conductors.--

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-2 in wet locations.

Splices.--

All splices in underground pull boxes shall be made watertight.

Power Transfer Switch (PTS).--

Power transfer switch shall be a manually operated rotary type, 3-pole double-throw switch rated 200 A continuous at 480 V (ac) without an off position. Switch shall have a handle and escutcheon plate with legend "UTILITY" and "STANDBY". The handle shall be externally operable with the interior door closed. Switch shall be mounted in the motor control center where shown on the plans.

Standby Power Receptacle (SPR).--

Standby power receptacle shall be 600 V, 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 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.

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, 3-phase 4-wire plus ground, 60 Hz service. MCC shall have a minimum fault interrupting capacity of 25,000 amperes (symmetrical) at 480 V, (ac).

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 508 mm deep, control section shall be 762 mm wide and shall be 508 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. 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 as shown on the plans, except for control section, and shall extend from the top horizontal wireway to the bottom of the available unit mounting space. 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 300 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 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 control system under transparent protective cover shall be provided with the MCC.

The MCC wiring shall be NEMA Class II, Type B wiring.

Power Switch (PS).--

Power switch shall be a 3-pole, 480-V, 200-A frame, 150-A trip, molded case circuit breaker with adjustable AC magnetic trip set at 1200 amperes mounted where shown on the plans. The interrupting capacity of the breaker shall be 25,000 A (RMS symmetrical) at 480 V, (ac). Breaker shall be equipped with means to padlock in the "OFF" position. A nameplate with the inscription "MAIN" shall be installed above the circuit breaker handle.

Phase Failure Relay Disconnect (PFRD).--

Phase failure disconnect shall be 3-pole, 480-V, (ac), 100-A frame, 15-A trip, molded case circuit breaker mounted in MCC as shown on the plans. The interrupting capacity of the breaker shall be 25,000 A (symmetrical) at 480 V, (ac).

Phase Failure Relay (PFR).--

Phase failure relay shall be 480-V, (ac), socket mounted, adjustable, automatic reset, voltage sensing phase failure relay with single-pole, double-throw, 10 A, 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.

Motor Starters (ST1 and ST2).--

Motor starters shall be NEMA Size 2, NEMA rated, 3-pole, line-voltage combination starter and motor circuit protector mounted in the MCC as shown on the plans. Starter shall have 120 V 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-close and one normally-open auxiliary contacts. The pilot lights, selector switch and time meter shall be as specified in these special provisions.

Light Disconnect (LD).--

Light disconnect shall be 2-pole, 480 V, (ac), 100 A frame, 15 A trip, molded case circuit breaker. The interrupting capacity of the breaker shall be 25,000 A (symmetrical) at 480 volts, (ac).

Light Transformer (LT).--

Light transformer shall be double-wound, 5 kVA, 60 hertz, surface-mounted, dry type transformer with 480 V primary, 120/240 V secondary. Transformer shall have copper windings and 115°C temperature rise.

Panel LP.--

Panel shall be indoor type, surface-mounted, factory assembled, single-phase, 3-wire, 120/240 V, (ac) panelboard with 2-pole, 30 A main circuit breaker, insulated neutral, and molded case circuit breakers as 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 10 meters of water with an accuracy of ±10 mm for an ambient condition ranging from 0 to 93°C. The pressure transducer shall provide a 4 to 20 mA output signal to the Pump Controller 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. Polyethylene sensing tube shall have ASTM Designation: D1248, Class A with 1 mm (minimum) wall thickness.

Pump Controller.--

The pump controller shall be a 12 V, (dc) solid state, industrial grade programmable controller with a minimum of six programmable levels. The levels shall be programmable from 0 to 12 meters and include high alarm, low alarm, lead pump on, lead pump off, lag pump on and lag pump off. Programming shall be accomplished using faceplate mounted, gold contact switches. No programming software shall be required. Lead and lag pumps shall alternate with each lead pump call unless programmed for manual sequence. The pump controller shall measure the storage liquid level by monitoring the 4 to 20 mA output signal from the pressure transducer of the trapped air level monitoring system specified in these special provisions. The storage liquid level shall be displayed with an LED digital display a minimum of 10 millimeter high letters accurate to one decimal place. The pump controller shall have a minimum of six output relays with 10 A rated contacts at 120 V, (ac), LED indicators and be mounted on plug-in bases. The pump controller shall have a test pushbutton and potentiometer to enable testing of the system by bypassing the pressure transducer input and allowing manual adjustment of the input signal. The purge interval for the trapped air level monitoring system shall be programmable from the pump controller for a minimum of 1 to 8 hours and the compressor run time per interval shall be programmable from 5 to 30 seconds. The pump controller shall have a pushbutton for manual purge, which allows the combination compressor and solenoid valve to run at the same set time. The pump controller shall have two available analog output signals proportional to the storage liquid level.

DC Power Supply.--

DC power supply shall be rated for 115 V, (ac) input and DC 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° to 50°C.

Alarm Panel (LCM).--

Alarm Panel, LCM shall be model LCM-84210, Network 8000 controllers, manufactured by Barber-Colman. Alarm panel shall accept inputs from control relays CR1 through CR7 and accept an analog input, proportional to water level, from pump controller. Alarm Panel shall send this information to remote communication unit over a phone line through a dial up modem. Alarm Panel shall disable all inputs when pushbutton PB4 is depressed. Modem shall be US Robotics external 56k modem.

The specified Alarm Panel and Modem can be obtained from:

Yamas Controls Inc.
1 South Linden Ave
South San Francisco.
CA- 94080.
(888) 430 6400 ext. 423
Contact: Mr. George Watrous

The price quoted for the Alarm Panel by the distributor is $ 4148.00 each. The price quoted for the Modem by the distributor for the US Robotics 56k modem with six foot cable is $ 236.00 each. The FOB is the shipping point. Prices, and conditions quoted will apply to all orders received on or before May 30, 2003. The above prices will be firm for all orders placed on or before May 30, 2003, provided delivery is accepted within 60 days after the order is placed. The above prices do not include taxes, discounts, or other conditions.

Uninterruptable Power Supply (UPS).--

Uninterruptable Power Supply shall be Merlin Gerin, Pulsar ESV8, 120V, (AC), 750VA).
The specified UPS can be obtained from:

All -Phase Electric Supply
731 North Market Boulevard
Sacramento, CA- 95834.
(916) 648 0134
Contact: Mr. Scott Worth

The price quoted for the UPS by the distributor is $ 297.00 each. The FOB is the factory. Prices, and conditions quoted will apply to all orders received on or before May 30, 2003. The above prices will be firm for all orders placed on or before May 30, 2003, provided delivery is accepted within 60 days after the order is placed. The above prices do not include taxes, discounts, or other conditions.

Control Transformer (CT).--

Control transformer, CT shall be 30 VA, 60 Hz transformer with 120 V primary and 24 V secondary complete with fuse and fuse holder.

Fuse (F1).--

Fuse shall be one 0.75 A dual element 250 V fuse with 2- pole 250 V barrier type fuse base.

Pushbuttons (PB2 thru PB4).--

Pushbutton shall be heavy duty, general purpose, 120 V, 30.5 mm pushbutton with one normally open, momentary contact. 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.

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 for 120 V, (ac).

Current Switches (CS1 and CS2).--

Current switch shall be self-powered, solid state, alternating current sensing switch mounted in each motor starter as 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 amperes and a high range of 15 to 300 A. Switch shall have a thru-hole of 14 mm minimum diameter for sensing the alternating current.

High water level float switch (FS2).--

High water level float switch shall be mechanical tilt, non-mercury, impact and corrosion resistant float switch with sealed cable. Switch shall be rated a minimum of 8 A at 120 V, (ac), single-pole, single-throw, with a normally open contact. Water level switch shall be wide-angle type with a 16 gauge, 2 conductor, Type SJO oil resistant cable.

Low water level float switch (FS1).--

Mechanical tilt, non-mercury, impact and corrosion resistant float switch with sealed cable. Switch shall be rated a minimum of 8 A at 120 V, (ac), single-pole, single-throw, with a normally close contact. Water level switch shall be with a 16 gauge, 2 conductor, SJOW oil resistant cable.

Time Meters (TM1 and TM2).--

Time meter shall be 120 V, 60 Hz, non-resettable running time meter with 0 to 99 999.9 hours range.

Selector Switches (SS1 and SS2).--

Selector switch shall be 10 A, 120 V, 30.5 mm, NEMA Type 4, single-pole, 2-position maintained, rotary switch mounted on the MCC door as 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).--

Pilot light shall be 120 V, (ac), 30.5 mm, NEMA Type 4, panel mounted, high visibility light emitting diode (LED) type lamp with colored plastic lens and screw cap.

Control Relays (CR1 thru CR9).--

Control relay shall be 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.

Time Delay Relay (TDR)

Time delay relay shall be an electronic type with a range of 0.6 seconds to 60 seconds. Relay shall be double-pole, double-throw, double break contacts rated 10 A at 120-V (ac). Delay relay shall have an initial setting of 10 seconds.

Terminal Blocks (TB).--

Terminal block shall be 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.

Room Light.--

Room light shall be surface mounted fluorescent fixture with two, F48T12SPEC30 lamps and -20°C ballast and one-piece clear acrylic wrap around diffuser. Fixture shall be suitable for damp locations.

Sump Light (SL).--

Sump light shall be explosionproof, heavy cast aluminum with gray epoxy powder coat finish, medium base glazed porcelain socket with 200 W incandescent lamp, impact and heat resistant clear prismatic globe with die cast guard, heavy gauge aluminum reflector with highly reflective white acrylic finish. Wiring shall be factory sealed with access to splice compartment.

Entry Light.--

Entry light shall be outdoor, wall mounted, vandal resistant 50-W, 120 V high pressure sodium luminaire with integral ballast and photocell.

Indicator Light (IL1 and IL2).--

Indicator light shall be cast-metal, vapor-tight, fluorescent lighting fixture with colored, shatterproof, polycarbonate plastic globe and twin tube 18-watt, 120-volt compact fluorescent lamp with integral ballast. Color of globe shall be as shown on the plans.

Light Switch.--

Light switch shall be 20-A, 120/277 V, (ac) specification grade switch suitable for wiring with stranded conductors in a cast metal box.

Duplex Plug Receptacles .--

Duplex plug receptacle shall be 20-A, 3-wire, 125 V, grounding type, specification grade duplex receptacle outlet suitable for wiring with stranded conductors in a cast metal box.

Computer Power Strip.--

Computer power strip shall be 15-A, 3-wire, 125 V with built-in surge protector mounted inside motor control center as shown on the plans.

Ground Fault Circuit Interrupter (GFCI) Receptacles.--

Ground fault circuit interrupter receptacles shall be NEMA Type 5-20R, feed-through type, ivory color, 3-wire, 20-ampere, 125-volt AC, grounding type, specification grade, duplex receptacle with ground fault interruption. Receptacle shall detect and trip at current leakage of 5 milliamperes and shall have front mounted test and reset buttons.

Junction and Outlet Boxes.--

All boxes installed in the wet pit shall be corrosion resistant NEMA 4X type. All other 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.--

Underground pull boxes shall be concrete type and shall be as shown on sheet ES-8 of the Standard Plans.

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.

Supporting devices.—

Supporting devices shall be corrosion resistant.

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:

Conduits.--Do not install any conduits behind ladders or within 380 mm of the center line of the ladder except as shown on the plans as directed by the Engineer.

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 installation procedure of the MCC.

The MCC shall be placed through either a doorway or roof across opening. Any disassembly, assembly or modification to the MCC and any other work needed to accomplish installation shall be at Contractor's expense. Any modification must be approved by the manufacturer and said modification shall not alter the performance in anyway.

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
120/240V-Single phase	Black, blue
480/277V-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 CS1 and CS2.-- Current switches CS1 and CS2 shall be mounted in the starter compartment of the MCC as shown on the plans. Conductors shall be looped around the sensing coil multiple times as necessary to sense current.

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..

Warning plates.-- Warning plates shall be sheet steel, not less than 1.2mm thick(18-gage) with backed enamel coating and shall have red letters 50mm height on white background. The warning plate inscription shall be as shown on the plans.

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.

PAYMENT.--Full compensation for excavation, backfilling, foundation, and core drilling 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 technical 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.

10-1.81 MISCELLANEOUS IRON AND STEEL

Miscellaneous iron and steel shall conform to the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications.

10-1.82 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, and the following:

A. Expansion couplings for deck drains
B. Pipe hangers for deck drains

Self-tapping screws used for sleeve connections shall be hex-head stainless steel, installed in holes drilled to fit the self-tapping screws, conforming to the requirements of ASTM Designation: A 276, Type 304.

At the Contractor's option, fiberglass pipes and fittings with the same diameter and minimum bend radius as those shown on the plans, may be substituted for welded steel pipe in deck drain systems.

Fiberglass pipe and fittings shall conform to the requirements in ASTM Designation: D 2996, and shall have a minimum short-term rupture strength of 207 MPa. The adhesive type recommended by the manufacturer shall be used for joining pipe and fittings. Fiberglass pipe not enclosed in a box girder cell or encased in concrete shall be manufactured from ultraviolet-resistant resin pigmented with concrete-gray color, or be coated with a concrete-gray resin-rich exterior coating. Paint shall not be used. Fiberglass pipe treated with ultraviolet protection shall withstand a minimum of 2500 hours of accelerated weathering when tested in conformance with the requirements in ASTM Designation: G 154. Lamps shall be UV-B (313 nm wavelength). The resting cycle shall be 4 hours of ultraviolet (UV) exposure at 60°C, and then 4 hour of condensate exposure at 50°C. After testing, the surface of the pipe shall exhibit no fiber exposure, crazing, or checking, and only a slight chalking or color change.

Support spacing for fiberglass pipe shall be the same as shown on the plans for welded steel pipe. Pipe supports shall have a width of not less than 38 mm.

A Certificate of Compliance for fiberglass pipe and fittings shall be furnished to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance shall include all laboratory test results conforming to the provisions specified herein.

For drainage piping NPS 8 or smaller, which is: (1) enclosed in a box girder cell and exposed for a length not greater than 6 m within the cell, or (2) encased in concrete, the Contractor shall have the option of substituting polyvinyl chloride (PVC) plastic pipe and fittings, with the same diameter and minimum bend radius as shown on the plans, for welded steel pipe.

The PVC plastic pipe and fittings shall be Schedule 40 conforming to the requirements of ASTM Designations: D 1785. The maximum support spacing for PVC plastic pipe shall be 2 m.

Couplings used to connect PVC plastic pipe or fiberglass pipe to steel shall be threaded or flanged. The sleeve connections shown on the plans shall not be used for either PVC plastic pipe or fiberglass pipe.

If PVC plastic pipe or fiberglass pipe is substituted for welded steel pipe, the quantity of drainage piping will be computed on the basis of the dimensions and details shown on the plans, and no change in the quantities to be paid for will be made because of the use of PVC plastic pipe or fiberglass pipe.

10-1.83 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.

10-1.84 CHAIN LINK FENCE AND GATES

Chain link fence and gates and vinyl coated chain link fence shall be Type CL-1.8 and CL-3.0 and shall conform to the provisions in Section 80, "Fences," of the Standard Specifications.

Vinyl coated chain link fence shall be black polyvinyl chloride bonded steel chain link fabric and fittings. Chain link fabric shall be 9 gauge, 44 mm mesh (for tennis courts) and 38 mm x 38 mm mesh (for trash enclosure) over a zinc substrate. Polyvinyl chloride shall be applied by the thermal extrusion process. Posts and rails shall be hot dipped galvanized with 2 coats of black metal paint applied over a metal primer.

10-1.85 CHAIN LINK FENCE (WITH 3 LINES OF BARBED WIRE)

Chain link fence (With 3 Lines of Barbed Wire) shall be Type CL-3.0 and shall conform to the provisions in Section 80, "Fences," of the Standard Specifications.

Barbed wire supporting arms (extension arms) shall extend upwards from the tops of the fence posts at an approximate angle of 45 degrees and shall be fitted with clips or other suitable means for attaching 3 lines of barbed wire. The top outside wire shall be attached to the extension arm at a point approximately 300 mm above the top of the chain link fabric and 300 mm out from the fence line. The other wires shall be attached to the arm uniformly between the top of the fence and the top outside wire.

Barbed wire shall conform to the provisions in Section 80-3.01C, "Barbed Wire," of the Standard Specifications.

10-1.86 REMOVABLE BOLLARDThis work shall consist of furnishing and installing removable bollards at the locations specified and conforming to the details shown on the plans and in accordance with the requirements specified in these special provisions.

Bollards shall be galvanized steel pipe with a minimum wall thickness of 8.5 mm.

Galvanized steel pipe shall conform to the provisions in Section 20-2.15A. "Steel Pipe." of the Standard Specifications.

Attention is directed to "Welding Quality Control" elsewhere in these provisions.

Welding shall conform to the provisions in Section 55-3.17. "Welding." of the Standard Specifications.

Portland cement concrete for the footings shall be produced from commercial quality aggregates and cement and shall contain not less than 275 kg of cement per cubic meter.

Permeable material below the footings shall be Class 3 and shall conform to the grading requirements in "Permeable Material (Blanket)" elsewhere in these provisions.

Eye bolts, nuts and sleeves shall be commercial quality steel and hot-dip galvanized after fabrication.

Reflective bands shall be white and shall be fabricated from flexible reflective sheeting as specified in "Approved Traffic Products" in these special provisions.

Removable bollard will be measured and paid for by the unit from actual count.

The contract unit price paid for removable bollard shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing removable bollards, complete in place, including concrete footing and drain rock, as shown on the plans, and as specified in these provisions, and as directed by the Engineer.

10-1.87 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, not including sales tax.

The above price will be firm for orders placed on or before July, 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.

10-1.88 CHAIN LINK RAILING

Chain link railing shall conform to the provisions in Section 83-l, "Railings," of the Standard Specifications and these special provisions.

Chain link railing assembly, except chain link fabric, bolts, screws, washers, and nuts, shall be powder coated. Factory paint shall be by the electro-diposition process or equal. It shall consist of one prime coat and a minimum of two finish coats. The finish shall have a dry film thickness of at least 4 mils. The finished color of the chain link railing shall conform closely to Color No. 12160, a terracotta, of Federal Standard No. 595B.

The Contractor shall submit color samples of the chain link railing to the Engineer. These samples shall simulate a section of chain link railing, including anchor post. The color sample shall be constructed, finished, and powder coated using the materials, tools, equipment, and methods intended to be used to manufacture the chain link railing. The color sample approved by the Engineer shall be used as the standard of comparison in determining acceptability of the chain link railing.

The Contractor shall submit manufacturer's written instructions and recommendations on surface preparation, handling, applications, curing and repair of the coating system.

The Contractor shall furnish to the Engineer a Certificate of Compliance from the manufacturer in accordance with the provisions in Section 6-1.07, "Certificate of Compliance," of the Standard Specifications for each lot of manufactured chain link railing. The certificate shall be signed by the manufacturer's or applicator's quality control representative and shall state that the coating and its application conform to the requirements of these special provisions.

Approved manufacturers for prime and finish coating shall be any of the following or equal:

A. H. B. Full Company
B. Tiger Drylac USA, Inc.

C. Morton International, Inc.

The coatings shall meet the following minimum performance characteristics:

	PRIMER	FINISH
Impact Test ASTM D2794 Direct & Reverse	160	160
Adhesion ASTM D3359 Method B	Pass (5B)	Pass (5B)
Pencil Hardness ASTM D3363	2H	H
Weatherometer ASTM D822	N/A	90% Gloss
Salt Spray Resistance ASTM B117 After 1000 hours	‹4000 hrs	No effect
Humidity Resistance ASTM D2247 After 1000 hours	‹5800 hrs	No effect

Primer and finish coat materials shall be produced by the same manufacturer, or the manufacturer's approved supplier, and shall be intended for use as a coating system.

All surface irregularities , welds and weld spatter shall be ground or weld filled. All sharp edges shall be ground smooth and round. All surfaces to be painted shall be thoroughly cleaned of all dirt, grease, dust and other surface contaminants in accordance with the provisions of Surface Preparation Specification No. 1, "Solvent Cleaning," of the Steel Structures Painting Council.

All metal surfaces which are to be painted shall be blast clean to near white metal in accordance with the provisions of Surface Preparation Specification No. 10, "Near-White Blast Cleaning," of the Steel Structures Painting Council to establish a surface profile of 1.0 - 2.0 mils.

Blast cleaned surfaces shall be coated with pre-treatment immediately or stored in humidity controlled environment to prevent oxidation. All materials shall be pre-treated and coated within 24 hours of blast cleaning.

Blast cleaned surfaces shall be pre-treated with iron phosphate in accordance with the coating manufacturer's recommendations to establish an iron phosphate film of 270-485 mg/m^2 on the prepared surface.

Coatings shall be immediately applied to pre-treated surfaces at the completion of the required drying cycle. Preheating, electrostatic coating application and post curing procedures and equipment shall be in strict accordance with the coating manufacturer's written instruction.

Pre-treated surfaces shall be painted with zinc-rich primer to achieve a film thickness of 2.0 - 20 mils.

Polyester TGIC finish coat shall be applied over the partially cured primer in strict accordance with the manufacturer's written instructions, at thickness of 4.0 - 6.0 mils.

The finish coating application shall be inspected and tested for holidays and dry film thickness by the applicator. All testing and inspections shall be conducted at the applicator's shop. The finished coating application shall be free of pinholes and holidays, shall be well bonded and shall be free of runs, sags, and other evidence of poor workmanship.

The dry film thickness of the paint will be measured in place with a non-destructive, calibrated magnetic film thickness gage according to Steel Structures Painting Council Specification SSPC-PA2. A minimum of 5 inspection points shall b4e conducted on each individual item.

Pinholes and holidays shall be detected using a wet sponge, low voltage holidays detector such as K-D Bird Dog or Tinker-Razor M-1 or approved equal. Pinholes and holidays shall be repaired in accordance with the manufacturer's recommendations. The electrode movement over the coating surface shall; be continuous and shall proceed in a systematic manner to insure 100% coverage. All defects shall be repaired and retested in the shop before transporting the material.

The Contractor shall take the necessary precautions to ensure that the powder coated finish is not damaged during transport of the material. The condition of the powder coated material shall be documented before shipment and re-inspected before unloading at the site.

After assembly and installation of all items, damaged shop applied coating shall be repaired with the coating manufacturer's recommended repair procedures and material. Prior to coating, all areas to be repaired shall be cleaned in accordance with the provisions of Surface Preparation Specification No 1., "Solvent Cleaning," and Surface Preparation

Specification No. 11, "Power Tool Cleaning to Bare Metal." of the Steel Structures Painting Council. Repair material shall be applied in accordance with the manufacturer's recommendation.

Full compensation for coloring and powder coating the chain link railing shall be considered as included in the contract price paid per meter for chain link railing and no separate payment will be allowed therefor.

10-1.89 RAIL AND POST AT THE JUVENILE CENTER

Metal pipe handrailing, and post at the Juvenile Centershall conform to the provisions in Section 83-1, "Railings," of the Standard Specifications.

10-1.90 CONCRETE BARRIER

Concrete barriers shall conform to the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

The provisions of the third paragraph in Section 83-2.02D(4), "Finishing," of the Standard Specifications shall not apply.

Concrete barrier markers shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. At those locations shown on the plans, concrete barrier markers shall be cemented to the barrier in conformance with the manufacturer's recommendations.

Architectural treatment for concrete barrier surfaces shall conform to “Architectural Surface (Textured Concrete)” of these specifications.

Type 25A modified concrete barriers will be measured and paid for as concrete barrier (Type 25 modified).

Full compensation for constructing barrier transitions and overhead sign suppots shall be considered as included in the contract price paid per meter for the types of concrete barrier involved and no additional compensation will be allowed therefor.

10-1.91 THERMOPLASTIC PAVEMENT MARKING

Thermoplastic pavement markings shall be applied in conformance with the provisions in Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

At the option of the Contractor, permanent traffic striping and pavement marking tape conforming to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions may be placed instead of the thermoplastic traffic stripes and pavement markings specified herein. Permanent tape, if used, shall be installed in conformance with the manufacturer's specifications. If permanent tape is placed instead of thermoplastic pavement markings, the tape will be measured and paid for by the square meter as thermoplastic pavement marking.

10-1.92 PAINT TRAFFIC STRIPE AND PAVEMENT MARKING

Painted traffic stripes (traffic lines) and pavement markings shall be applied in conformance with the provisions in Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

At the option of the Contractor, permanent traffic striping and pavement marking tape conforming to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions may be placed instead of the painted traffic stripes and pavement markings specified herein. Permanent tape, if used, shall be installed in conformance with the manufacturer's specifications. If permanent tape is placed instead of painted traffic stripes and pavement markings, the tape will be measured and paid for by the meter as paint traffic stripe and by the square meter as paint pavement marking of the number of coats designated in the Engineer's Estimate.

10-1.93 PAVEMENT MARKERS

Pavement markers shall be placed in conformance with the provisions in Section 85, "Pavement Markers," of the Standard Specifications and these special provisions.

Attention is directed to "Traffic Control System For Lane Closure" of these special provisions regarding the use of moving lane closures during placement of pavement markers with bituminous adhesive.

Retroreflective pavement markers shall comply with the specific intensity provisions for reflectance after abrading the lens surface in conformance with the "Steel Wool Abrasion Procedure" specified for pavement markers placed in pavement recesses in Section 85-1.05, "Retroreflective Pavement Markers," of the Standard Specifications.

SECTION 10-2. IRRIGATION SYSTEMS

10-2.01 GENERAL

The work performed in connection with irrigation systems shall conform to the provisions in Section 20, "Erosion Control and Highway Planting," of the Standard Specifications and these special provisions.

PIPE

Plastic Pipe

Plastic pipe supply lines shall be polyvinyl chloride (PVC) 1120 or 1220 pressure rated pipe with the minimum pressure rating (PR) shown on the plans.

Plastic pipe supply lines less than 100 mm in diameter shall have solvent cemented type joints. Primers shall be used on the solvent cemented type joints.

Fittings for plastic pipe supply lines with a pressure rating (PR) of 315 shall be Schedule 80.

RECLAIMED WATER SUPPLY LINES

Water supply lines shall be marked with a permanently affixed purple warning tape bearing the continuous wording "CAUTION RECLAIMED WATER." The tape shall be wrapped around the supply lines in a manner that produces a uniform and smooth fit, free of irregularities.

At the Contractor's option, purple colored polyvinyl chloride (PVC) supply lines may be used for reclaimed water supply lines in place of standard polyvinyl chloride (PVC) supply line with affixed purple warning tape. Purple colored polyvinyl chloride (PVC) supply lines shall conform to the following:

A. Pipe shall be made of polyvinyl chloride (PVC) 1120 with the minimum pressure ratings (PR) shown on the plans.
B. Pipe shall conform to the requirements in one of the following Standards: ASTM Designation: D 1785, ASTM Designation: D 3139 and ASTM Designation: D 2241 or ASTM Designation: D 2672.
C. Pipe shall have permanent wording "CAUTION RECLAIMED WATER" in 2 rows, approximately 180 degrees apart, in the longitudinal direction of the pipe. The warning message shall be repeated every 600 mm continuously along the pipe.

Full compensation for furnishing and installing permanently affixed purple striping tape on reclaimed water supply lines shall be considered as included in the contract prices paid per meter for the various sizes and types of pipe supply line involved and no separate payment will be made therefor.

WATER METER

Water meters for the irrigation systems will be furnished and installed by the serving utility at the locations shown on the plans.

The Contractor shall make the arrangements and pay the costs and fees required by the serving utility.

The City of San Jose South Bay Water Recycling Company has established fees of $7,000.00 for furnishing and installing a 65 mm water meter and $9,000.00 for furnishing and installing a 75 mm water meter. If, at the time of installation, these fees 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.

SECTION 10-3. SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

10-3.01 DESCRIPTION

Traffic signals, lighting, irrigation controller enclosure cabinet, sign illumination, electric service (irrigation), ramp metering systems 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.

Work to be performed within the City of San Jose's right of way shall conform to the additional or different requirements described in "City of San Jose Electrical Special Provisions," elsewhere in these special provisions. In the event the special provisions for the City or the Standard Specifications Department of Public Works San Jose do not cover a particular item the Standard Specifications and these special provisions shall be applicable.

Traffic operations system shall consist of:

1. Changeable message sign system.
2. CCTV camera system.
3. Microwave vehicle detection sensor (MVDS) system
4. Ramp metering system.
5. Extinguishable message sign system.
6. Traffic monitoring station.

Lighting equipment is included in the following structure:

A. Hedding Street UC (Bridge No. 37-0608).

Conduit is included in the following structures:

A. Hedding Street under-crossing (Bridge No. 37-0608).
B. Route 880 seperation. (Bridge No. 37-0609).

Traffic signal work shall be performed at the following locations:

A. Taylor Street and Route 87 (City Street- Location 1)
B. Mission Street and Guadalupe Parkway_(City Street- Location 2)
C. Hedding Street and Guadalupe Parkway_(City 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 20 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. cable - each size and type

10-3.03 ABBREVIATIONS

CTSS	Caltrans Standard Specifications (July 1999)
CTSP	Caltrans Standard Plans (July 1999)
SPDPWSF	Standard Plans Department of Public Works San Jose (July 1992)
SSDPWSF	Standard Specifications Department of Public Works San Jose (July 1992)

Copies of the City of San Jose's Standard Plans and Standard Specifications may be obtained at the director of the public works San Jose City Hall, Rm. 323 on payment of the prescribed purchase price.

10-3.04 FOUNDATIONS

Reinforced cast-in-drilled-hole concrete pile foundations for traffic signal and lighting standards shall conform to the provisions in "Piling" of these special provisions.

Sleeve nuts shall be used on Type 1-B standard. Foundations for Type 1-B standards shall conform to the details on Standard Plan ES-7B, "Anchor Bolts With Sleeve Nuts", except that the bottom of the base plate shall be flush with the finished grade.

10-3.05 STANDARDS, STEEL PEDESTALS AND POSTS

Standards, steel pedestals and posts for traffic signal and lighting standards shall conform to the provisions in "Steel Structures" of these special provisions.

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.

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.

Conduit between irrigation controller enclosure and adjacent service pull box shall be metric trade Size 41.

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/COUNTY) CIRCUIT" on the plans shall not have the "CALTRANS" cover marking. The covers shall be marked "CSJ".

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 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

Traffic signal conductors for phase overlaps shall be double striped as follows:

Signal Phase	Base Color	Double Stripe Color
OLA	Re, Ye, Brn	Black/Blue
OLB	Re, Ye, Brn	Black/Orange
OLC	Re, Ye, Brn	Black/Purple
OLD	Re, Ye, Brn	Black/Gray

Signal cable shall not be used.

Type TW insulation shall not be used for the CMS service feeder, nor for the CMS branch circuit conductors between the service pedestal and the CMS.

10-3.09 CLOSED CIRCUIT TELEVISION CABLES

Television control (TVC) cable shall consist of 15 No. 18 conductors, unshielded and with an outer jacket. Each conductor shall have a minimum of 16 tinned copper stands with a minimum of 400 µm insulation. Individual conductor insulation shall be chrome PVC with a nominal thickness of 1 mm. The outside diameter of the jacket shall not exceed 14 mm.

Color code for TVC cable shall be:

1. Black
2. White
3. Red
4. Green
5. Orange
6. Blue
7. White/ Black
8. Red/ Black
9. Green/ Black
10. Orange/ Black
11. Blue/ Black
12. Black/ White
13. Red/ White
14. Green/ White
15. Blue/ White

Television power (TVP) conductors shall be 3 No. 14 (120 VAC, AC-, equipment ground) individually insulated, stranded copper conductors in conformance with Section 86-2.08, "Conductors" of the Standard Specifications. The conductors shall be color coded black, white, and green respectively.

Television control power (TVCP) cable shall consist of 12 No. 18 conductors, unshielded and with an outer jacket. Each conductor shall have a minimum of 16 tinned copper strands with a minimum of 400 µm insulation. Individual conductor insulation shall be polyvinyl chloride (PVC), rated for 300 V (see color code below). The jacket shall be chrome PVC with a nominal thickness of 1 mm. The outside diameter of the jacket shall not exceed 12 mm.

Color code for TVCP cable shall be:

1. Black
2. White

3. Red
4. Green
5. Orange
6. Blue
7. White/ Black
8. Red/ Black
9. Green/ Black
10. Orange/ Black
11. Blue/ Black
12. Black/ White

Television video (TVL) cable shall consist of an RG-6/U coaxial cable. Each cable shall be provided with a solid No. 18 copper clad steel center conductor and shall conform to the following requirements:

Electrical	TVL
Capacitance (picofarads/m nominal)	54.1
Impedance (ohms-nominal)	75
Velocity of propagation (nominal)	84%
D.C. loop resistance (ohms/100 m)	11.7

Attenuation at 20˚C:

Frequency (MHz)	TVL (Nominal dB/ 100 m)
5.0	1.90
30	3.64
108	6.40

Physical Specifications	TVL Nominal O.D. (mm)
Copper-clad steel center conductor	1.00
Foam polyethylene dielectric	4.57
Sealed APA tape with 1.6 mm overlap	4.75
Woven aluminum braid	5.39
Sealed APA tape with 1.6 mm overlap	5.49
Woven aluminum braid	6.12
Flooding compound	
PVC outer jacket	7.55

(APA = Aluminum polyolefin and aluminum with adhesive)

TVL cable shall be terminated with BNC plug connector at both ends.

COAXIAL CABLE CONNECTORS (TVL COAXIAL CABLES)

Coaxial cable connectors for attaching Type TVL coaxial cable shall meet the following requirements:

1. **Electrical:**

Impedance	75 Ω nominal
Return loss	30 dB minimum (5 MHz to 300 MHz)
Rated working voltage	500 V rms

2. **Mechanical:**

Type of construction	Integral sleeve BNC
Method of attachment	Crimp-crimp
Composition	Bodies - alloy Finish - chromate conversion, silver plating, or other corrosion resistant metal

3. **Environmental:**

Temperature	-10˚C to +50˚C
Moisture	Weather resistance design

The mating connector for TVL cable in junction box shall be provided. The center contact of this jack shall be beryllium copper.

TESTING

Testing of TVL cables and connectors shall be performed in accordance with provisions in Section 86-2.14B, "Field Testing" of the Standard Specifications and these special provisions.

Cable lengths found to have faults shall be replaced and retested. The removed faulty cable shall be disposed of by the Contractor.

Prior to the beginning of work, each length of coaxial cable shall be tested for attenuation and faults to ensure compliance with specifications contained herein using a time domain reflectometer (TDR). For the purpose of these special provisions, a fault in a long length of cable is defined by one or more of the following:

a. Return loss measurements indicating that attenuation exceeds 3 dB at 5 MHz to 30 MHz in a portion of cable less than 3 m long.
b. A return loss measurement indicating that there is a short in the cable.
c. A return loss measurement indicating a cut or open circuit in the cable.
d. A visual inspection which reveals exposure of or damage to the cable shielding.

10-3.10 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.

10-3.11 BONDING AND GROUNDING

The bonding jumper in standards with handholes and traffic pull box lid covers shall be attached by a UL listed lug using a 4.5 mm or larger brass bolt and shall be run to the conduit or bonding wire in the adjacent pull box. Standards without handholes shall be bonded by a jumper attached to a UL listed ground clamp on all anchor bolts, and shall be run to the conduit or bonding wire in the adjacent pull box. The grounding jumper shall be visible after the standard has been installed and the cap has been placed on foundation.

Where slip base standards or slip base inserts are installed, the bonding jumper shall not intrude into the slip plane. Bonding shall be accomplished by a jumper attached to a UL listed ground clamp on all anchor bolts or a UL listed lug attached to the bottom slip base plate with a 4.5 mm or larger brass bolt.

Equipment bonding and grounding conductors are required in all conduit types except when the conduits contain only loop lead-in cable, fiber optic cable, signal interconnect cable or combination thereof.

Bonding of metallic conduit in metal pull boxes shall be by means of bonding bushings and bonding jumpers connected to the bonding wire running in the conduit system.

10-3.12 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.

Circuits with Model 500 changeable message signs shall have service equipment enclosures which have main busses and terminal lugs rated for 200 A, minimum, and a No. 2 bare copper ground wire.

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.

Installation of a barrier type terminal block in service equipment enclosures is not required.

ELECTRIC SERVICE (IRRIGATION)

Electric service (irrigation) shall be from the service points to the irrigation controllers (IC) and to the spaces provided in the irrigation controller enclosure cabinets (CEC) for irrigation controllers as shown on the plans.

Irrigation Controller (IC) 'A, B' : Electric service (irrigation) shall be a metered 120/240 V(ac), single-phase service in a Type III service equipment enclosure.

Irrigation Controller (IC) '1, 2' : Electric service (irrigation) shall be a metered 120/240 V(ac), single-phase service in a Type III (M) service equipment enclosure.

10-3.13 SIGN DISCONNECTS

Sign disconnects shall be fused switches.

10-3.14 NUMBERING ELECTRICAL EQUIPMENT

The placement of numbers on electrical equipment will be done by others.

10-3.15 STATE-FURNISHED CONTROLLER ASSEMBLIES

The Model 170 controller assemblies, 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.

The Contractor shall furnish and install one rackmount surge power strip with a switch in each Model 334 controller cabinet. The power strip shall be plugged into the non-GFCI duplex outlet normally labeled with "Controller Unit Recp." in the back of the PDA unit. The power strip shall be mounted at the top of the standard EIA-310 rack cage and across the two vertical back rails with four stainless steel EIA mounting screws, two on each side. The power strip shall not hinder the

accessibility to the back of all existing electrical equipment. All power cords for permanently field installed electrical equipment shall be plugged into the power strip.

The power strip, at a minimum, shall meet the following requirements:

1. It shall have a maximum rating of 15 A, 120 VAC, 60 Hz.
2. It shall have a surge protection with UL 1449 Clamping Level of 400 V, an IEEE Let-Through Voltage rating of less than 336 V, a single -pulse energy rating of 210 J and EMI/RFI noise protection rating of 40 dB.
3. It shall be 46 mm (H) x 483 mm (W) x 70 mm (D) maximum and shall not weigh more than 2.0 kg.
4. The front plate of the power strip shall have four cut-off EIA mounting screw holes, two on each side.
5. It shall have six rear outlets with 38 mm minimum apart center to center. The power cord shall enter from the rear with a length of 2 meters minimum. The clearance between the power cord entrance and the nearest outlet shall be 90 mm minimum.
6. It shall have a 15 Amp circuit breaker and an internally illuminated switch to cut off power to all outlets. Both the circuit breaker and the switch shall be front mounted.

10-3.16 IRRIGATION CONTROLLER ENCLOSURE CABINET

Irrigation controller enclosure cabinets (CEC) shall be constructed and the equipment within the cabinets shall be installed in conformance with the details shown on the plans, the provisions in the Standard Specifications, and these special provisions.

Irrigation controller enclosure cabinets shall be of metal construction conforming to the details for empty Type P signal cabinets shown on Standard Plans ES-3A and ES-3C, except that the fluorescent interior light, police panels, and shelves shall not be provided, unless otherwise shown on the plans. Cabinets shall be provided with cross ventilation, roof ventilation or a combination of both. The anchorage arrangement shall be inside the cabinet as shown on the plans. Dimensions of the cabinet shall be suitable for the equipment to be installed as shown on the plans and specified in these special provisions.

Irrigation controller enclosure cabinets shall be a minimum of 1.2 meters high, fabricated in conformance with the provisions in Section 86-3.04A, "Cabinet Construction," of the Standard Specifications.

Irrigation controller enclosure cabinets shall be fabricated of stainless steel.

Irrigation controller enclosure cabinet doors shall not be furnished with integral door locks. Irrigation controller enclosure cabinet door handles shall have provisions for padlocking in the latched position. Padlocks will be State-furnished as provided under "Materials" of these special provisions.

Irrigation controller enclosure cabinets shall be furnished with a 304 grade stainless steel or plywood mounting panel.

Mounting panels made of plywood shall be 19-mm exterior AC grade veneer plywood. The panel shall be painted with one application of an exterior, latex based, wood primer and 2 applications of an exterior, vinyl acrylic enamel, white in color. The plywood panel shall be painted on all sides and edges prior to installation of the panel in the cabinet and equipment on the panel.

Inside of the doors shall have provisions for storage of the irrigation plans.

Duplex convenience receptacles shall have ground-fault circuit interruption as defined by the Code. Circuit interruption shall occur on 6 mA of ground-fault current and shall not occur on less than 4 mA. Receptacles shall be installed in a weatherproof housing with rainproof lift covers.

Equipment, except for field wiring, shall be installed in the cabinet in a shop by the equipment manufacturer's representative or distributor prior to field installation.

Irrigation controller enclosure cabinets will be measured by the unit as determined from actual count in place.

The contract unit price paid for irrigation controller enclosure cabinet shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in fabricating and installing irrigation controller enclosure cabinets, complete in place, including constructing foundations, pads and conduits to pull box adjacent to cabinets, and installing equipment within the cabinets, except controllers, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-3.17 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.

10-3.18 VEHICLE SIGNAL FACES AND SIGNAL HEADS

Lamps for vehicular traffic signal units (except programmed visibility type) will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

10-3.19 PROGRAMMED VISIBILITY VEHICLE TRAFFIC SIGNAL HEADS FOR RAMP METERING

Lamps shall be furnished by the Contractor.

A signal technician qualified to program the programmed visibility signal heads shall be present at the time the signal heads are placed in operation.

Lamps for the signal units shall be 150-W, 120 V(ac), incandescent lamps with a minimum average rated life of 6000 hours. The lamp and socket shall be the 3-prong type.

10-3.20 PEDESTRIAN SIGNALS

Lamps for Type A pedestrian signals will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

10-3.21 DETECTORS

Loop detector sensor units will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

Loop wire shall be Type 2.

Loop detector lead-in cable shall be Type B.

Slots shall be filled with elastomeric sealant or hot-melt rubberized asphalt sealant.

At the Contractor's option, where a Type A or a Type B loop is designated on the plans, a Type E loop may be substituted. 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.

Slots in portland cement concrete shall be filled with elastomeric sealant or hot-melt rubberized asphalt sealant, or shall be filled with an epoxy sealant conforming to the provisions in Section 95-2.09, "Epoxy Sealant for Inductive Loops (State Specification 8040-06)," of the Standard Specifications.

Where one traffic signal detector consists of a sequence of 4 loops in a single lane , the front loop closest to the limit line or crosswalk shall be located 0.3 m from the line. All 4 loops in each lane shall be connected in series.

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.

10-3.22 LUMINAIRES

Ballasts shall be the lag or lead regulatortype.

10-3.23 SOFFIT AND WALL LUMINAIRES

A No. 7 pull box shall be installed adjacent to each soffit luminaire as shown on the plans.

10-3.24 INTERNALLY ILLUMINATED SIGNS

The "METER ON" sign shall be a Type A pedestrian signal modified so that the reflector shall be a single chamber with 2 incandescent lamps.

The message shall be white "METER ON" as shown on the plans. White color shall be in conformance with the provisions in Section 86-4.06, "Pedestrian Signal Faces," of the Standard Specifications.

Lenses shall be 4.8-mm, minimum thickness, clear acrylic or polycarbonate plastic or 3-mm nominal thickness glass fiber reinforced plastic, with molded, one piece, neoprene gasket. Message lettering for "METER" shall be "Series C," 113 mm high, with uniform 13-mm stroke, and for "ON" shall be "Series C," 150 mm high, with uniform 25-mm stroke. Letters shall be clear, transparent or translucent, with black opaque background silk screened on to the second surface of the lens.

10-3.25 PHOTOELECTRIC CONTROLS

Contactors shall be the mechanical mercury type.

10-3.26 EXTINGUISHABLE MESSAGE SIGN

Each extinguishable message sign shall be an internally illuminated weathertight and dust tight unit which will produce a clearly visible message only when internally illuminated and shall conform to these special provisions.

The design of each sign shall be as shown on the plans. Minor details of construction shown are typical and may be modified subject to approval by the Engineer.

Six sets of shop drawings shall be submitted to the Engineer for review prior to performing work on the signs.

HOUSING

The housing shall be ruggedly constructed, shall be rigid, weathertight, dust tight and corrosion resistant, and shall be made of durable materials.

Provisions shall be made for ease of maintenance of components.

Gaskets shall be uniform and even textured, and shall be highly resistant to stiffening and setting and the long range deleterious effects of vehicle fumes, direct sunlight, heat (up to 70°C), water, oils and aging.

CONDUCTORS AND WIRING

Sign conductors shall be No. 16 stranded copper wire and shall be labeled by UL as 105°C appliance wiring material (AWM) for use at 600 V (ac). Color coding and terminal markings shall be as shown on the plans.

Lead ends shall be fitted with spade lugs.

LUG DISCONNECT

Each plug disconnect shall consist of molded nylon plug and receptacle housings containing plug pins and individual sockets designed to be crimped to conductors and snapped into the housings. Housings shall have integral, molded, polarizing and locking devices. Minimum UL electrical rating shall be 10 A, 600 V (ac). Pins and sockets shall be tin plated phosphor bronze secured to conductors using a ratchet type precision crimping tool.

10-3.27 EXTINGUISHABLE MESSAGE SIGN PANELS (LED)

Each extinguishable message sign (EMS) panels shall use the technologies of Light Emitting Diodes (LED) in clusters (pixels), the clusters forming a module, and the modules forming legends in nominal 250 mm size letters. The LED messages shall automatically adjust its light output by means of one or more photosensors installed in the housing. All EMSs may be controlled from the same photosensor. The light output shall be proportional to the ambient light (more light / more output and less light / less output). There shall be at least three (3) adjustable levels of luminance: 100 percent, 30 percent and other levels between 30 percent and 100 percent. The signs shall have a 30 percent luminance manual control per the plans.

CONSTRUCTION

The sign external dimensions and letter layout shall be the same as the fluorescent EMS in the Standard Plans. The sign shall be constructed so that a clear front face panel shall be contained within an extruded aluminum frame having fully welded seams and a powder coat painted with high gloss textured black finish meeting the color standards of Federal specifications 595b, 17038. A 6mm minimum transparent polycarbonate or hardened acrylic front panel shall be encased in an aluminum frame, and hinged to allow access to the interior of the sign. A 9.5mm nominal black anodizes aluminum hex cell louver having 95 percent open area and providing 60 degree shielding shall be installed between the lamp clusters and the front face panel to enhance resistance to sun phantom. The louvers shall be secured in front of the modules with captive type retainers.

The sign shall be gasketed with a closed cell neoprene gasket making the sign rain tight. Stainless steel latches shall provide for quick access to the interior of the sign. The sign shall be provided with devices to retain the face panel in a fully open mode assisting the servicing of the sign. All exterior hardware shall be of stainless steel or cadmium plated materials.

The sign shall be vented on the bottom and shall be provided with an interior temperature controlled ventilation fan. Additional ventilation shall be provided such as to ensure the interior of the housing remains below 55 degrees centigrade without compromising the rain tight integrity. All vents shall have an insect screen installed.

The LED sign cluster shall utilize Aluminum Indium Gallium Phosphide (AlInGaP), Type TS technology and shall be the ultra bright type rated for 100,000 hours of continuous operation from -20^0C to $+60^0$C. The individual LED's shall be wired such that a catastrophic failure of one LED will result in the loss of not more than 5 percent of the LED sign output.

LED sign clusters shall be rated for a minimum useful life of 48 months and shall maintain not less than 85 percent of the standard light output values found below in Photometric Requirements section. The LED sign clusters shall be UV stabilized.

Each letter module shall be comprised of multiple pixels in a 5w x 7h configuration. Each pixel shall consist of at least 12 high intensity LEDs. Each pixel shall be 590nM nominal amber in color having an initial nominal luminous intensity of

9.5 cd on the maximum setting. Each module shall consume no more than 16 watts. Each Pixel shall be removable or replaceable on the module without the use of any tools other than a screwdriver, and each module shall be removable from the housing in the same way, thus making the sign fully serviceable.

All LEDs shall be soldered in place, and the LED leads shall not be shortened or a heat removal device installed. The LEDs shall be of the high power AlInGaP technology.

OPERATION

The unit shall be turned ON and OFF by means of 120 VAC, 60 Hz inputs. The LED messages shall be steadily lit when activated. The sign shall be provided with internal power supplies and dimming capability to fully operate the sign. The unit power factor shall be greater than 90 percent, and current total harmonic distortion shall be less than 25 percent.

LED extinguishable message sign shall operate from a 60Hz ± 3Hz AC line over a voltage ranging from 80 to 135 volts. The LED circuitry shall prevent perceptible flicker over the voltage range specified. The line voltage fluctuations shall show no visible effect on the luminous intensity of the indications. Rated voltage for all measurements shall be 120 volts AC.

The sign on-board circuitry shall include voltage surge protection to withstand high repetition noise transient as stated in section 2.1.6 of NEMA Standard TS-2, 1992.

LED sign and associated on-board circuitry must meet Federal Communications Commission (FCC) Title 47, SubPart B, Section 15 regulations concerning the emission of electronic noise.

PHOTOMETRIC REQUIREMENTS

The LED extinguishable message sign cluster shall meet at least 85 percent of the minimum intensity requirements while operating throughout the operating range of -20^0C to $+60^0$C.

The minimum initial luminous intensity values for LED sign cluster shall be 650 cd/m^2 at 25^0C.

The measured chromatic coordinates of the LED sign cluster shall conform to the chromaticity requirements of section 5.3.2.1. and Figure C of the Equipment and Materials Standards of the Institute of Transportation Engineers (ITE Publication No. ST-017A).

TERMINAL BLOCKS

Terminal blocks shall be installed in the interior bottom of the sign housing with sufficient number of terminals to accommodate all of the wiring. All wiring shall be bundled, wrapped, and labeled.

DOCUMENTATION

All documentation shall be submitted to the Engineer for approval before ordering or fabrication of any equipment. Complete shop drawings shall be provided and shall include mechanical, electrical, and physical drawings.

Each LED sign shall have the manufacturers name, trademark, and other necessary identification permanently marked on the side of sign. Each individual LED sign shall be identified with a serial number for warranty purposes.

The following operating characteristics shall be identified: Rated Voltage, Power Consumption, Amperes and volt-ampere.

GUARANTEE AND WARRANTY

The manufacturer shall provide a Certificate of Conformance to this standard and shall replace or repair any sign that exhibits a failure due to workmanship or material defects within 60 months of delivering the sign to the State. Further, the manufacturer shall replace or repair any sign which exhibits light degradation greater than 50 percent within the first 36 months of delivery, or if more than 20 percent of the LEDs fail during that period.

10-3.28 EXTINGUISHABLE MESSAGE SIGN RADIO CONTROLLER ASSEMBLY

Each extinguishabe message sign (EMS) radio controller assembly shall consist of an AM radio receiver unit with antenna and a DTMF decoder unit completely wired as a stand alone assembly.

Radio receiver unit shall conform to the following specifications:

Frequency range	530-1710 kHz
Modulation type	AM
IF rejection	60 dB
Image rejection	60 dB
Selectivity	60 dB
Signal-to-noise (S/N) ratio	50 dB
Usable sensitivity	20 µV (20 dB S/N)
Power source	12 VDC Negative Ground
Tone control effects	10 to 22 dB at 10 kHz
Speaker output impedance	4 or 8 Ω
Output power	8W (4 W per channel)

DTMF decoder unit shall consist of a MT8870 DTMF Decoder integrated circuit (IC). The audio signal is coupled to MT8870 with a capacitor-resistor network. The capacitor-resistor network will provide DC blocking and input biasing to the MT8870. The MT8870 DTMF Decoder shall decode all 16 DTMF tones and shall compensate for "twist." (Each tone is made up of one higher frequency tone and one lower frequency tone. "Twist" on radio link is caused by the fact that the higher frequencies travel through the air at a different speed than the lower frequencies).

The MT8870 Decoder gives a binary output on pins 11, 12, 13, and 14. The output is stored in a non-volatile Electrically Erasable Programmable Read Only Memory (EEPROM). The output relay shall have a nominal rating of 20 A at 120 VAC per output contact.

DTMF shall have the following codes:

Low Frequency (Hz)	High Frequency (Hz)	Digit
697	1209	1
697	1336	2
697	1477	3
770	1209	4
770	1336	5
770	1477	6
852	1209	7
852	1336	8
852	1477	9
941	1336	0
941	1209	*
941	1477	#
697	1633	A
770	1633	B
852	1633	C
941	1633	D

Front Panel.--

The front panel of the EMS radio controller assembly shall have the following controls, display, battery tray, and output jack:

a. A "STORE" push button switch which shall be used to teach the DTMF Decoder the code that will be used to energize the output relay.
b. A "STOP" push button switch which shall be used to manually de-energize the output relay.
c. A manual/automatic control switch which activates output relay ON/OFF while in manual mode, and tone remote control in automatic mode.
d. A audio level control nub.
e. A frequency selection nub.
f. A LED display panel which shall always display AM radio frequency in a minimum of four digits.

g. A 9 V battery tray which holds one 9 V battery to maintain the radio receiver frequency selection during a power outage.
h. An audio output jack which is used to monitor the radio reception and DTMF tone storage.

Rear Panel.--
The rear panel of the EMS radio controller assembly shall provide antenna connection, power connection, and a fuse holder with a 2 A fuse.

Physical Requirements.--
The assembly shall not exceed 49 mm x 176 mm x 134 mm in size and shall not weight more than 1.5 kg.

Environmental Requirements.--
The assembly shall operate over a temperature range from -37°C to +74°C, with up to 95 percent relative humidity.

10-3.29 EXTINGUISHABLE MESSAGE SIGN SYSTEM

The work to be done at EMS system, as shown on the plans, as a minimum, shall consist of the following:

1. Install EMS panels on wood posts.
2. Install NEMA 3R enclosure, conduits and conductors on the wood post.
3. Install conduits, conductors and pull boxes from controller cabinet to EMS.
4. Terminate conductors in the controller cabinet.
5. Terminate conductors in NEMA 3R enclosure and EMS panels.
6. Install EMS radio controller assembly.

10-3.30 MODEL 500 CHANGEABLE MESSAGE SIGN SYSTEM

Model 500 changeable message sign (CMS) systems consist of a Model 500 changeable message sign, a Model 170 controller assembly in a completely wired Type 1 or similar cabinet and the required wiring and auxiliary equipment required to control the CMS shown on the plans and in conformance with these special provisions.

The Model 500 changeable message signs, wiring harness and Model 170 controller assembly including controller unit and completely wired cabinet, but without anchor bolts, will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

Model 500 changeable message sign system components will conform to the requirements in "Specifications for Changeable Message Sign System," issued by the State of California, Department of Transportation, and to the addendums thereto current at the time of project advertising. Model 170 controller assemblies will conform to the requirements in "Traffic Signal Control Equipment Specifications," issued by the State of California, Department of Transportation, and to the addendums thereto current at the time of project advertising.

Attention is directed to "sign Structures" of these special provisions.

The sign assembly shall be installed on the sign structure. The controller cabinet foundation shall be constructed as shown on the plans for Model 334 cabinets (including furnishing and installing anchor bolts), the controller cabinet shall be installed on the foundation, and the field wiring connections shall be made to the terminal blocks in the sign assembly and in the controller cabinet.

Field conductors No. 12 and smaller shall terminate with spade terminals. Field conductors No. 10 and larger shall terminate in spade or ring terminals.

A listing of field conductor terminations, in each State-furnished changeable message sign and controller cabinet, will be furnished free of charge to the Contractor at the site of the work.

The location of the foundation for each controller cabinet will be determined by the Engineer.

State forces will maintain the sign assemblies. The Contractor's responsibility shall be limited to conformance with the provisions in Section 6-1.02, "State-Furnished Materials," of the Standard Specifications.

10-3.31 CHANGEABLE MESSAGE SIGN (CMS) SAFETY SWITCH

Each CMS shall have a disconnect switch, which shall be a UL-listed 100 Ampere, 4 pole, non-fusible switch rated for 600 V maximum. It shall have an electrical interlock to prevent accidental operation and a line terminal shield to prevent accidental contact with the terminals. It shall be housed in a NEMA 3R enclosure with a door latch and provisions for a padlock. The housing shall have a front-operated handle for provisions to lock the handle in the OFF position. The housing shall be mounted 1.8 m high on the exterior of the sign post facing oncoming traffic.

10-3.32 DIAL-UP MODEM

1. General -

a. Each dial-up modem unit shall be Hayes compatible and directly connect to Model 170 controller unit. The unit allows communication between the controller and a host computer over the public switched telephone network. The unit shall offer up to 2400 baud communication, auto-dial answer, speed detect and Hayes command set compatibility.
b. A prototype unit is not acceptable.
c. Each modem unit shall be of the current standard production units.
d. Each modem unit shall be new and not previously used.
e. The vendor shall provide one manual per each unit ordered.

2. Qualifying specifications -

a. Compatibility -

CCITT V.22 bis	2400 baud
CCITT V.22	1200 baud
Bell 212A	1200 baud
Bell 103	300 baud

Automatically adapts to calling or called modem

b. Serial Data Format -

Character asynchronous.
7 data bits with any parity type +1 or 2 stop bits.
8 data bits with mark or no parity +1 or 2 stop bits.

c. Line Requirement -

Public switched telephone network.

d. Line Interface -

Meets FCC Part 68 requirements.
Maximum transmit level -9 dBm at 600 Ω.
2-wire full duplex (Tip and Ring).

e. Operation -

Asynchronous full or half duplex.
Automatic and manual call originate and answer.

g. Modulation -

V.22 bis - Quadrature Amplitude Modulation (QAM).
V.22 and 212A - Differential Phase Shift Keying (DPSK).
V.21 and 103 - Frequency Shift Keying (FSK).

h. NVRAM -

Allows storage of two user profiles and four 36-digit dial strings.

i. Command Set -

Industry standard Hayes “AT” 2400B and 2400.

j. Equalization -

Fixed compromise equalization in transmitter.
Adaptive equalizer for 1200 and 2400 bits per second (bps).

k. Performance -

i. Bit error rate < 1:100,000 bits for a Signal to Noise (S/N) ratio of 10 dB for TxD and 45 dB for RxD.

l. Interface Signals -

RS232C levels with CCITT V.24 protocols.

m. Autodialer Type -

DTMF or pulse type dialing, specified in commands.

n. DTMF Tone Pair Balance -

Better than 3 dB.

o. DTMF Tone Duration and Spacing -

Variable from 50 to 255 ms (Register S11).
Default duration 95 ms.

p. Command Buffer Size -

40 characters maximum.
"AT" spaces and <CR><LF> are not counted

q. Guard Tones -

i. Guard tones of 1800 Hz or 550 Hz is transmitted by the answering modem, for echo suppression. Default no guard tone. Guard tone will not be transmitted in Bell 212A or 103 modes.

r. Result Codes -

Ability to limit, abbreviate, or suppress codes.

s. Receive Carrier Detect -

off-to-on Threshold	-43 dBm
on-to-off Threshold	-48 dBm
Hysteresis	Greater than 2 dB

t. Timing -

Carrier Detect Response Time at 100 ms to 25.5 s (default at 600 ms).

u. Indications -

Indicators for SD, RD, OH, CD, AA, and HS mounted on the front edge of PCB.

v. Power requirements -

Input Voltage	Maximum current consumption
+12 VDC	200 mA
-12 VDC	200 mA

w. Environmental Operating Ranges -

Temperature	-37°C to +74°C
Humidity	95% (non-condensing)

10-3.33 CHANGEABLE MESSAGE SIGN STATIONThe changeable message sign (CMS) station shall consist of installing the following equipment, as shown on the plans and as directed by the Engineer:

1. One controller isolation assembly (CIA).
2. Cable harnesses 4 and 5.
3. One CMS panel.
4. One CMS disconnect switch.
5. One controller cabinet.
6. Dial-up Modem.

10-3.34 CAMERA UNIT

Each camera unit shall consist of a camera, lens, environmental housing and camera unit cable assembly. The camera, lens and environmental housing, combined, shall not weigh more than 6.8 kg. Each camera unit shall be interchangeable with the existing camera units already installed on various traffic operations system (TOS) projects without changes or adjustments to either the system or the camera unit.

Each camera unit shall be assembled, inspected, and tested in accordance with these special provisions prior to delivery to the job site. Installation, operations and maintenance manuals shall also be submitted at the time of delivery.

Applicable Documents - The following documents of the U.S. Military Specification (MIL-SPEC), Underwriters' Laboratory, Inc. (UL), Electronics Industries Association (EIA) Standards, and other Standards form parts of the specification to the extent specified in these standards. In the event of a conflict between the content of this section and the content of the specification, the standards defined in this section shall supersede.

Military Specification Documents	
MIL-I-45208A	Inspection System Requirements, Dec. 16, 1963
MIL-C-45662	Calibration System Requirements, June 10, 1980
MIL-STD-416A	Electromagnetic Interface Characteristics Requirements for Equipment, Subsystems & Systems, Aug. 1, 1968
MIL-E-5400T	Electronic Equipment, Airborne General Specification
MIL-STD-810	Environmental Test Methods, 19 July 1983
MIL-C-5541	Chemical Conversion Coatings on Aluminum Alloys, June 3, 1970

Underwriters' Laboratory, Inc. and other documents	
UL-796	Printed Circuit Boards
EIA-170A	Electrical Performance Standards Color Television Studio Facilities
EIA RS-330	Electrical Performance Standards for Closed Circuit Television (CCTV) Camera 525/60 Interlaced

CAMERA

Approved Camera - The cameras listed below have been approved by the Engineer. Further information such as the source of the cameras can be provided upon demand. Any camera submitted by the Contractor that is not one of the

approved cameras listed below shall be stringently compared to the specifications set forth in these special provisions before it is approved by the Engineer.

Approved Cameras:

Cohu 8240
Sony SSC-C374
Burle/Philips TC293C-Z0P2X596

1. General -

a. Each camera shall be self-contained and designed for continuous unattended 24-hour operation.
b. Camera performance shall meet or exceed EIA-170A standards.
c. Each camera shall have automatic sensitivity and black level control so that it operates without further adjustment when illumination ranges from the minimum specified herein to that of full daylight.
d. Each active electronic device within the camera shall be solid-state.
e. Each camera shall have a switch selectable electronic shutter. The shutter speed shall range from 1/60 of a second (off) to 1/10,000 of a second in 8 steps. The control of the electronic shutter rate shall be accessible through a side panel opening. Remote on/off control of the shutter shall be accomplished via an output connector on the rear of the environmental housing.

2. Light sensitivity - At a scene with 50 percent light reflectivity and with light level on the scene measured to be 10 lux and greater, each camera with its 10:1 zoom lens shall generate a picture on the monitor specified in these special provisions which resolves all 10 shades of gray on the EIA Television Test Chart. Not every camera shall be required to resolve the same gray scale when the light level on the same scene is measured to be less than one lux.

3. Electrical Power - Each camera shall operate when the applied voltage is between 95 to 130 VAC, 60 Hz ±0.3 Hz, single phase. The power consumption of camera shall not exceed 10 W. All camera circuitry shall be powered by a regulated, over-voltage protected DC power supply contained in the camera.

4. Synchronization -

a. Each camera shall generate synchronization signals by means of a single integrated circuit.
b. Each camera shall operate with the internal EIA-170A crystal as the sync reference source with the field rate of 59.94 Hz.
c. Each camera shall have the capability of synchronizing to an external input source.
d. The synchronization signal at the video output shall conform to EIA-170A.

5. Scanning - Each camera's mode of scanning shall be two-to-one interlaced at 525 lines, 60 fields per second, as specified by EIA-170A.

6. Video Processing -

a. The video output level shall be maintained to within 3 dB for changes in scene brightness of 0.17 to 109 600 cd/m^2 using a motorized iris lens having a transmission range of F/1.2 to F/1200.
b. Each camera shall have a black-level control system.
c. Each camera shall have an automatic white (color) balance control to maintain proper color rendition by automatically referencing to white areas of the scene. Manual control of the white balance shall be accessible through side panel or remotely controlled via the rear connector on the environmental enclosure.
d. Automatic gain control (AGC). The switch selectable fixed gain response shall maintain the output video level to 90 percent video when the light level on the image sensor falls too low to maintain full video output. The video out will be maintained at 90 percent peak-average setting to optimize video output under varying lighting conditions. The controls for the on/off and peak average adjustments shall be accessible through the side panel of the camera.
e. One 75 Ω (±1 percent) source-terminated, single-ended video output jack shall be provided.
f. An adjustable white clipper shall be provided to limit highlight brightness.
g. The video output level shall be 1.0 V peak-to-peak composite (0.7 V video, 0.3 V sync) signal, polarity black negative, across a 75 Ω load impedance.
h. The minimum signal-to-noise ratio shall be 50 dB at 25°C.

7. Imager -

a. Each camera shall be designed to use a 12.7 or 16.9 mm format solid-state, color, interline transfer charged-coupled device (CCD) imager.
b. The imager shall have a minimum resolution of 768 horizontal by 493 vertical active picture elements.
c. When provided with 6.89 lux of highlight illumination on the environmental housing window, the camera shall provide the following resolution with AGC off:

   i. Horizontal center resolution shall be 460 TV lines minimum.
   ii. Vertical resolution shall be 350 TV lines minimum in the center and all corners simultaneously.

8. Mechanical -

a. All camera circuitry shall be on a printed circuit board which shall be removable and replaceable using no more than common hand tools.
b. Test points and adjustment identifications shall be etched or silk-screened on the boards.
c. Each camera shall be self-supporting and operable when removed from the environmental housing and shall have a lens adapter ring which accommodates a standard 16 mm C-mount. A back focal distance adjustment shall be provided.
d. Each camera shall utilize the rigidity of the environmental housing for strength against shock and vibration.

9. Environmental Operation -

a. Each camera within its environmental housing shall withstand the following requirements:

   i. Operate over an ambient temperature range on -10°C to +50°C with the use of heaters.
   ii. Peak random vibration of 5 g from 60 to 1000 Hz, with camera in operation.
   iii. Shock up to 15 g in all axes under non-operating conditions.
   iv. Exposure to sand, dust, fungus, and salt atmosphere as per MIL-E-5400T paragraphs 3.2.24.7, 3.2.24.8, 3.2.24.9, and 3.2.24.10.
   v. Up to 100 percent relative humidity as per MIL-E-5400T, paragraph 3.2.24.2.

10. Picture Quality -

a. The quality of the picture shall be such that most objects in low light levels can be distinguished without excess interference from undesirable picture attributes.
b. Undesirable picture attributes include blooming, transfer smear, vertical register shifting.

LENS

1. General -

a. Each lens shall be fully compatible with the camera provided.
b. Each lens shall have a maximum aperture of no less than F/1.2, and a minimum range of F/1.2 to F/1200.
c. Each lens shall be a 16 mm C-mount.
d. Each lens shall have a minimum zoom range of 10 to 1. The lens focal length for a 16.9-mm CCD camera shall be shall be 10-100 mm, 10.5-105 mm or 11-110 mm. The lens focal length for a 12.7 mmCCD camera shall be shall be 8-80 mm. A 1.5-X extender shall be included with the lens.
e. Each lens shall be equipped with a motorized zoom and focus control.
f. Each lens shall have an automatic, motor-driven iris with manual override. The iris shall be controlled directly through the camera in automatic mode and from the camera control unit in the manual mode. The automatic iris shall provide continuous aperture adjustments of the lens as determined by the amount of light reaching the camera imager. The power supply and electronics for iris motor shall be contained within the environmental housing.
g. Each lens shall be fitted with an intra-spot neutral density filter.
h. Each lens must be able to respond to the following inputs from camera control unit (CCU) for lens control:

Focus near	+9.0VDC @ 100 mA
Focus far	-9.0VDC @ 100 mA
Zoom in	+9.0VDC @ 100 mA
Zoom out	-9.0VDC @ 100 mA
Iris closed	+9.0VDC @ 100 mA
Iris open	-9.0VDC @ 100 mA

i. The travel time for the upper limit stop to the lower limit stop for zoom and focus shall be from 5 seconds minimum to 10 seconds maximum.
j. Each lens shall have the capability of at least 10 pre-positioning positions.

2. Environmental Operation -

a. Each lens within its pressurized environmental enclosure shall withstand the following requirements:

i. Operate over an ambient temperature range on -10°C to +50°C with the use of heaters.
ii. Peak random vibration of 5 g from 60 to 1000 Hz, with lens in operation.
iii. Shock up to 15 g in all axes under non-operating conditions.
iv. Exposure to sand, dust, fungus, and salt atmosphere as per MIL-E-5400T paragraphs 3.2.24.7, 3.2.24.8, 3.2.24.9, and 3.2.24.10.
v. Up to 100 percent relative humidity as per MIL-E-5400T, paragraph 2.24.2.

ENVIRONMENTAL HOUSING

1. General -

a. Each camera and lens shall be mounted in a sealed, cylindrical, environmental housing which shall not exceed 165 mm in diameter and 560 mm in length.
b. The housing shall be fabricated of seamless aluminum tubing Type 6061-T6 and shall be finished with heat reflecting, weather resisting enamel. The rear plate shall be fabricated of Type 6061-T6 aluminum.
c. The front of the housing shall be closed with a clear optically flat glass or Lexan window.
d. The housing shall include a sun shroud which shall be strapped to the housing bindings in such a manner as to minimize heat conduction by maintaining air space between shroud and housing. The shroud shall shield the entire top portion of the housing from the sun, and shall extend a minimum of 76 mm in front of the housing's glass plate.
e. The housing shall not interfere with the widest viewing angle of the lens.
f. The housing shall include a thermostatically controlled heating pad rated at 115 VAC, 100 W maximum.
g. The backplate, which is an integral part of the housing, shall have a nameplate attached bearing the manufacturer's camera assembly model number and serial number.
h. Camera connector -

i. The camera connector shall be designed to MIL-C-28462 Series 1 specifications with solder contacts. It shall be PT-07C-20-39 P, the male counterpart to PT-06A-20-39 S SR.
ii. The connector shall be made of the same shell material and pin arrangement as the PT-06A-20-39 S SR connector on the end of the wiring harness.
iii. The pinout of the connector shall be as shown on the plans.
iv. Each camera connector shall be mounted on the rear plate with an airtight connection and a watertight seal for each conductor on its connecting cable.

i. Each camera shall be designed for operating with the housing purged of air and filled with dry nitrogen to 35 kPa.
j. Valves -

i. The housing shall have two valves, both on the rear end plate of the housing.
ii. One valve shall be a standard Schrader valve. It shall have a tube running from the valve to the front end of the housing.
iii. The other valve shall be an air escape/pressure relief valve preset to 140 kPa.
iv. The two valves shall be arranged such that filling with dry nitrogen from the Schrader valve will force gas to flow from front end of the housing to the rear end and vent through the air escape valve.

v. The leakage rate with both valves closed and the housing pressurized to 70 kPa, shall leak less than 7 kPa per year, and less than 0.7 kPa per month.

k. The enclosure shall be factory pressurized to 35 kPa with dry nitrogen.
l. The notation "CAUTION PRESSURIZED" shall be printed on the rear plate of the enclosed.
m. A safety pressure release bolt shall be incorporated such that the enclosure may not be opened without first releasing the internal pressure.
n. A low-pressure (LP) sensor with related circuitry shall be provided to send an LP alarm (dry contact closure) via the camera connector. The LP sensor threshold shall be preset to activate the LP alarm at 14 kPa.
o. Two units of desiccant shall be placed inside the housing but will not obstruct the camera view or operation.
p. A humidity level indicator strip with discrete indications for 10, 20 and 30 percent humidity, shall be installed inside the housing in a position that allows inspection, while facing directly, through the window without obstructing the view of the camera at the widest viewing angle of the lens.

2. Mounting Base -

a. A mounting base shall surround the enclosure to provide a tamper-resistant attachment of the environmental housing to the pan/tilt unit and securely hold the housing in either an upright or inverted position. The combined height of camera housing and mounting base shall be less than 254 mm. The mounting base attachment shall be as shown on the plans.
b. All fasteners and nuts used in attaching the mounting base to the environmental housing shall be of grade 18-8 stainless steel.
c. Each camera unit shall be provided with three stainless steel hex head bolts to secure the camera unit to the pan/tilt unit.

CAMERA UNIT CABLE ASSEMBLY

1. General - Each camera unit cable assembly shall consist of box mounting socket connector and a wiring harness.

2. Box Mounting Socket Connector -

a. Each box mounting socket connector shall be MS-3102E-28-21S-F80.
b. One full set of crimp contacts shall be provided with each box mounting socket connector.
c. The pinout of the connector shall be as shown on the plans.

3. Wiring Harness -

a. The camera unit cable assembly wiring harness shall be 3 m long and shall be COHU AC27E or other cable approved by the Engineer. The coaxial cables' impedance shall be 75 Ω. One end of each wiring harness shall be type PT06A-20-39S (SR) and shall mate with the camera connector. It shall have a 90-degree end bell, Bendix 10-25997-203 or equal, for strain relief. The end bell shall be positioned such that the opening is 180 degrees from the main key on the connector. The other end of each wiring harness shall be type MS-3106E-28-21P and shall mate with the box mounting socket connector.
b. All connectors shall be potted with an appropriate potting compound for environmental sealing.
c. All connectors' pinout shall be as shown on the plans.

10-3.35 PAN/TILT UNIT

GENERAL

a. Each pan/tilt unit, with camera unit attached, shall pan 355 degrees minimum in either direction, and tilt 60 degrees minimum from horizontal position to either up or down positions.
b. Each pan/tilt unit shall be capable of minimum ten preset positions for each pan and tilt operation.

ELECTRICAL

a. Each pan/tilt unit shall operate with input voltage of 115 VAC, 60 Hz ±0.3 Hz.
b. Each pan/tilt unit shall not exceed 200 W power consumption.

c. The motors shall be impedance overload protected, two phase induction type, rated for continuous duty and shall be instantaneous reversing.
d. The limit switches shall be rated 5 A, 10 million cycles and with external adjustments.
e. Each pan/tilt unit shall be provided with box-mounting type connector.
f. One mating connector with full set of crimp contacts and strain relief shall be provided with the box-mounting connector.

MECHANICAL

a. The maximum load shall be 45 kg at 127 mm from tilt table to center of gravity in both upright and inverted position.
b. Each pan/tilt unit shall have maximum dimensions of 400 mm high, 355 mm wide and 230 mm deep.
c. Each pan/tilt unit shall not exceed the maximum weight of 27 kg.
d. Each pan/tilt unit shall be constructed in aluminum casting and plate. All internal parts shall be corrosion protected.
e. Each pan/tilt shall have textured semi-gloss beige enamel finish.
f. All bearings shall be heavy duty ball or roller bearing.
g. All gears shall be hardened steel.
h. All gasket seals shall be designed for all weather protection.
i. Each pan/tilt unit shall have a mounting hole pattern as shown on the plans.
j. Each pan/tilt unit shall have a minimum pan torque rating of 34 N·m and an instantaneous minimum tilt torque of 68 N·m.
k. The pan speed at no load shall be 6 to 8 degrees per second, nominal.
l. The tilt speed at no load shall be 3 to 4 degrees per second, nominal.

ENVIRONMENTAL

a. Ambient operating temperature shall be from -10°C to 50°C.
b. It shall be able to withstand vibration of 760 µm total excursion from 5 to 30 Hz and a peak random vibration of 5 g from 30 to 1000 Hz.
c. It shall be able to withstand shock up to 15 g in all axes under non-operating conditions, conforming to MIL-E-5400R, Para. 3.2.24.6.
d. It shall be able to operate in atmospheres up to 95 percent relative humidity, conforming to MIL-E-5400R, Para 3.2.24.4.
e. It shall be able to withstand exposure to sand, dust, fungus, and salt atmosphere, conforming to MIL-E-5400R, Para 3.2.24.7, 3.2.24.8 and 3.2.24.9.

PAN AND TILT UNIT MOUNTING

The nuts and bolts securing the pan and tilt unit to the camera platform shall be hex head and made of stainless steel. Before each bolt is fastened, a locking type coating shall be applied to the threads. The coating shall lock the bolts and nuts in place making it impossible to turn bolt or nut without tools. This coating shall last and be effective through at least 10 insertions and withdrawals of the bolt or nut.

10-3.36 CAMERA JUNCTION BOX

The camera junction box (JCB) shall be constructed as shown on the plans and described in these special provisions. All seams shall be continuously welded. All JCB mounting Hex head stainless steel nuts and bolts shall be 6 mm ∅-20 x 25 mm. Steel surfaces on which JCB is to be mounted shall be drilled and tapped 6 mm ∅-20 thread. Each JCB shall be fabricated from 14 gauge sheet steel. Two 8-32 threaded studs for terminal strip mounting shall be welded on the bottom of the box as shown on the plans. After fabrication the JCB shall be hot-dip galvanized.

A twenty position terminal block with No. 8 lugs and cover shall be mounted on the bottom of the box. Permanent terminal position markings shall be used. A laminated wiring schematic shall be permanently attached to the inside of box cover showing wiring from the camera unit box mounting connector to the terminal block.

10-3.37 CAMERA CONTROL UNIT

GENERAL

Each part of each camera control unit (CCU) shall be electrically and physically interchangeable with the like part in any other CCU furnished under this contract.

MECHANICAL

a. Each CCU shall mount in 133 mm of EIA-310 rack space with a maximum depth of 356 mm.
b. The front panel shall be white gloss color Number 17886 as per Federal Standard Color Chart 595B.
c. The front and rear panel lettering shall be black color Number 17986 as per Federal Standard Color Chart 595B.
d. A high-impedance panel jack BNC (Bayonet Nut connector) connector shall be installed on the front panel as shown on the plans. This connector shall provide video input to a test monitor without affecting the remainder of the CCTV system. This connector shall be directly connected to the video input on the rear panel.
e. A glass type, size 6.35 mm x 31.75 mm (AG) slow blow fuse shall be installed on the front panel. The fuse shall be replaceable from the outside of the front panel.
f. Switches shall protrude no more than 25 mm from the front panel and shall be mounted as shown on the plans.
g. The rear panel connectors shall be mounted as shown on the plans and shall meet the following requirements:

i. Connectors C1-C3 shall be of the following type or equivalent:

C1	AMP 206430-1
C2	AMP 206043-1
C3	AMP 206306-1

ii. The pin and socket contacts for connectors C1-C3 shall be constructed with brass contact body material and with stainless steel spring that are sub-plated with 1.27 µm nickel and plated with 0.762 µm gold. Pin diameter shall be 1.575 mm. Contact size shall be 16.
iii. Each C1, C2 and C3 connector shall use the AMP No. 601105-1 or No. 91002-1 contact insertion and the AMP No. 305183 contact extraction tool.
iv. One mating connector with a full set crimp contacts and strain relief shall be supplied with connectors C1, C2 and C3.
v. The connectors C4 and C5 shall be a DB-25 socket connector.

h. Serial cable assemblies (SCA1 and SCA2) with length of 3 m shall be provided to mate with C4 and C5, respectively.
i. Pin and socket contacts for DB-25 connectors shall be copper alloy body; finished with 0.762 µm gold over 1.27 µm nickel.
j. The rear and front panel BNC connectors shall be of copper material with bright nickel (tarnish resistant) finish for the body and silver finish for the contact.
k. Each printed circuit board shall be vertically installed.
l. Each LED shall be equal to Hewlett Packard High Intensity Red Untinted, Non-diffused LED (Part Number HLMP-D105). Each LED shall be mounted as shown on the plans.
m. A front panel on/off switch shall turn the CCU on/off and shall also control AC power to the rear panel power output connector (C1). The indicator used for AC power shall be green when energized.
n. One coaxial cable labeled "AVO" (Analog Video Output) terminated with BNC plug connectors on each end shall be provided. This cable shall be RG-59/U with overall length of one meter.

ELECTRICAL

a. Each CCU shall have auto-iris override.
b. Each CCU shall have circuitry to detect the absence and presence of video sync on its video input. Each CCU shall also have circuitry to monitor the low-pressure alarm contact closure from the camera unit. A local/remote control switch shall be provided to override the lens and pan/tilt controls through C4 when the switch is in local mode. When in local mode, the local control alarm shall be active. Alarm status shall be constantly monitored and updated. Upon receipt of a "status query" message, the CCU shall send alarm status message with data as follows:

"0"	None of the alarms active.
"1"	Local Control (LC) alarm active.
"2"	Low Pressure (LP) alarm active.
"3"	LP/LC alarms active.
"4"	Video Sync Absence (VSA) alarm active.
"5"	VSA/LC alarms active.
"6"	VSA/LP alarms active.
"7"	VSA/LP/LC alarms active.

The front panel alarm light shall be lit if any the alarms are active.

c. Each CCU shall have circuitry for a source character generator. The source character generator shall display 16 alphanumeric characters superimposed on the video image. Each character shall be 28 TV lines high and shall be derived from a standard 5 x 7 dot matrix. The programmed characters shall be stored in a non-volatile memory. Upon receipt of "Set ID" message, the CCU shall position from the camera ID in the video image as follows:

"1"	Upper 15% limit of the left viewing area
"2"	Upper 15% limit of the right viewing area
"3"	Lower 15% limit of the left side viewing area
"4"	Lower 15% limit of the right side viewing area

The characters shall be superimposed on the video signal using non-additive mixing techniques.

d. Each CCU shall be designed to prevent simultaneous operation of pan right/left, tilt up/down, zoom in/out, focus near/far or iris open/close.

e. Each CCU shall have power supply(ies) for camera zoom, focus, motors, control and interface circuits. The voltage for zoom, focus and iris shall be selectable internally by one jumper for 12.0 VDC, 9.0 VDC or 5.0 VDC at 100 mA. The CCU shall be pre-configured with the voltage jumper select set to 9.0 VDC. The operation of zoom, focus and iris shall be as follows:

Zoom in	+VDC
Zoom out	-VDC
Focus near	+VDC
Focus far	-VDC
Iris close	+VDC
Iris open	-VDC

f. The maximum power consumption for the CCU shall not exceed 450 W. Power consumption of equipment attached to pin 1 of connector C1 shall not exceed 100 W. Power consumption of equipment attached to pin 12 of connector C2 shall not exceed 200 W.

g. Each CCU shall have eight independently operating 24 VDC relays (options 1 to 8). Each relay shall be single pole, double throw (SPDT), with contacts rated 1.25 A at 120 VAC.

h. Each CCU shall be capable of a minimum of ten presets and capable of controlling camera units and pan/tilt units equipped with pre-positioning feedback potentiometers. Each CCU shall have circuitry to filter out any electrical noise interference on each of the pre-positioning feedback voltage signal for the camera unit and pan/tilt unit.

i. A system reset switch shall be a momentary-pushbutton type and be mounted on the front panel to function as external reset input to the microprocessor. System reset shall not cause existing pan/tilt and lens positions to change. System reset shall be executed without requiring the operator to hold the momentary-pushbutton for more than one second.

j. The front panel of the camera control unit shall have LEDs and switches to provide the following control functions as shown on the plans.

Function	Hardware	Indicator
Zoom (In/Off/Out)	(ON)-OFF-(ON)	2 LED
Focus (Near/Off/Far)	(ON)-OFF-(ON)	2 LED
Pan (Left/Off/Right)	(ON)-OFF-(ON)	2 LED
Tilt (Up/Off/Down)	(ON)-OFF-(ON)	2 LED
Iris (Open/Off/Close)	(ON)-OFF-(ON)	2 LED
Iris override (Manual/Auto)	ON-OFF	1 LED
Option 1 (On/Off)	ON-OFF	1 LED
Option 2 (On/Off)	ON-OFF	1 LED
Option 3 (On/Off)	ON-OFF	1 LED
Option 4 (On/Off)	ON-OFF	1 LED
Option 5 (On/Off)	ON-OFF	1 LED
Option 6 (On/Off)	ON-OFF	1 LED
Option 7 (On/Off)	ON-OFF	1 LED
Option 8 (On/Off)	ON-OFF	1 LED
Alarm (On/Off)	ON-OFF	1 LED
Control (Local/Remote)	ON-OFF	
Reset	(ON)-OFF (momentary pushbutton)	

k.

CCU connector assignments	
C1	4 contact connector
C2	14 contact connector
C3	37 contact connector
C4, C5	DB-25 connectors

C1 -- AC Power	
Position	Function
1	AC +
2	AC -
3	Equipment Ground
4	NA

C2 -- Pan/Tilt			
Pos.	Function	Pos.	Function
1	Pan right	8	Pan feedback
2	Pan left	9	Tilt feedback
3	AC-	10	Preset -VDC
4	Tilt up	11	NA
5	Tilt down	12	AC+
6	AC-	13	AC-
7	Preset +VDC	14	Ground

C3 -- Camera			
Pos.	Function	Pos.	Function
1	Zoom	20	Option 3 N.O.
2	Z/F/I Common	21	Option 3 Common
3	Focus	22	Option 3 N.C.
4	Iris	23	Option 4 N.O.
5	Iris Override Common	24	Option 4 Common
6	Iris Override	25	Option 4 N.C.
7	Preset +VDC	26	Option 5 N.O.
8	Zoom Preset feedback	27	Option 5 Common
9	Focus Preset feedback	28	Option 5 N.C.
10	Preset -VDC	29	Option 6 N.O.
11	LP alarm	30	Option 6 Common
12	LP alarm	31	Option 6 N.C.
13	NA	32	Option 7 N.O.
14	Option 1 N.O.	33	Option 7 Common
15	Option 1 Common	34	Option 7 N.C.
16	Option 1 N.C.	35	Option 8 N.O.
17	Option 2 N.O.	36	Option 8 Common
18	Option 2 Common	37	Option 8 N.C.
19	Option 2 N.C.		

Note:
N.O. = Normally open
N.C. = Normally closed
NA = Not Available

C4, C5 -- Serial communication ports to and from external device.			
Pos.	Function	Pos.	Function
1	NA	14	NA
2	Transmit Data	15	NA
3	Receive Data	16	NA
4	NA	17	NA
5	NA	18	NA
6	NA	19	NA
7	Signal Ground	20	NA
8	NA	21	NA
9	NA	22	NA
10	NA	23	NA
11	NA	24	NA
12	NA	25	NA
13	NA		

Serial cables			
SCA1		SCA2	
DB-25 Pin	DB-25 Pin	DB-25 Pin	DB-25 Socket
2	2	2	2
3	3	3	3
7	7	7	7

ENVIRONMENTAL

a. Each CCU shall operate in an ambient temperature environment of -10°C to 50°C.
b. Each CCU shall conform to MIL-STD-810D-516.1 and MIL-STD-810D-514.1 shock and vibration test.

CCU MESSAGES

a. Each CCU shall communicate through the C4 serial port with the following communication message codes:

DIREC-TION	MESSAGE	CHARACTER		DATA
		1ST CODE	2ND CODE	
Transmit	Alarm status	A	space	"0"-"7"
Receive	Status query	Q	space	NONE
Receive	Pan stop	p	space	NONE
Receive	Tilt stop	t	space	NONE
Receive	Zoom stop	z	space	NONE
Receive	Focus stop	f	space	NONE
Receive	Iris stop	i	space	NONE
Receive	Pan left	L	space	NONE
Receive	Pan right	R	space	NONE
Receive	Tilt up	U	space	NONE
Receive	Tilt down	D	space	NONE
Receive	Zoom in	I	space	NONE
Receive	Zoom out	O	space	NONE
Receive	Focus near	N	space	NONE
Receive	Focus Far	F	space	NONE
Receive	Iris open	J	space	NONE
Receive	Iris close	K	space	NONE
Receive	Iris manual	M	space	NONE
Receive	Iris auto	m	space	NONE
Receive	Set ID word	C	"1"-"4"	16-ASCII char.
Receive	Home position 0-9	H	"0"-"9"	NONE
Receive	Home position program 0-9	P	"0"-"9"	NONE
Receive	Option on 1-8	S	"1"-"8"	NONE
Receive	Option off 1-8	s	"1"-"8"	NONE
Receive	Enter Echo mode	E	space	NONE
Receive	Exit Echo mode	^]C	This sequence is not in a communication packet	

b. After receiving the "enter echo" command the CCU shall pass all characters from C5 to C4 and C4 to C5. The CCU shall disable all camera movement.
c. When the "exit echo" mode sequence is received on C4, the CCU shall return to normal operation.

SERIAL COMMUNICATIONS PROTOCOL

a. The communication protocol shall consist of 8 data bits, 1 stop bit and no parity.
b. Communication handshaking shall use XON/XOFF.
c. The communication packet shall contain the following items: ADDRESS, CODE, DATA, CHECKSUM, CR. The packet is sent as a string of ASCII printable characters. The ADDRESS, which has its $80 bit set in order to signal the start of the packet. The CHECKSUM is generated by Exclusive-ORing the ADDRESS, CODE, and DATA. The communication byte count shall be as follows:

ADDRESS	1
CODE	2
DATA	≥0
CHECKSUM	2
CR	1

d. The receiver will compute the CHECKSUM. If the computed CHECKSUM is correct the receiver will send ACK, otherwise the receiver will send NAK.

10-3.38 VIDEO ENCODER UNIT

GENERAL

a. A prototype of the video encoder unit (VEU) is not acceptable.
b. All equipment shall be off the shelf production units.
c. All equipment shall be new and not previously used.
d. The Contractor shall provide a manual per each unit ordered.

ACCEPTABLE EQUIPMENT

The VEU shall be compatible and interoperable with the existing video decoder unit (VDU), Enerdyne Technologies Model DEC1000R5. No other VEU/VDU pairs shall be different or deviate from other pairs.

QUALIFYING SPECIFICATIONS

a. Video encoding --

i. The VEU shall replicate the adaptive digital video standard (ADVS) for digital compression and transmission of video images.
ii. The VEU shall implement frame sensitive algorithms, joint photograhic experts group (JPEG) to perform frame updating. Motion sensitive algorithms motion picture experts group (MPEG) shall not be allowed.
iii. The VEU shall be compatible with integrated services digital network (ISDN) basic rate interface at 128 kbps and shall comply with bandwidth on demand interoperability group (BONDING) protocol.
iv. The VEU shall be compatible with Switched-56 digital service at 56 kbps.
v. The VEU shall be compatible with advanced digital network (ADN) service at 56 kbps.
vi. The VEU shall be compatible with T1 service at 1.544 Mbps.

b. Physical -- The physical size of the VEU shall be as follows:

Weight	9 kg, maximum
Height	135 mm, maximum
Width	483 mm, maximum
Depth	300 mm, maximum

c. Mounting --

i. The VEU shall be mountable in a standard EIA-310 equipment rack.
ii. Each VEU shall be designed and mounted in such a way that it is easily accessible for maintenance.

d. Primary power input and output requirements --

i. All electrical power distribution, service and wiring components shall be UL listed or equivalent and meet the requirements of the national electric code as well as these special provisions.
ii. Power input shall be 100 to 130 VAC at 60 Hz ±3 Hz.
iii. Maximum power requirement shall be 25 W at 120 VAC.

e. Local control facilities --

i. Local operator control of all essential features of the VEU shall be accomplished by the use of necessary discrete front panel controls and/or switches. Each VEU shall have a front panel status display.
ii. The VEU shall store operator set default parameters in EEPROM to retain system configuration after loss of power. These parameters shall be loaded into volatile RAM during operation where they may be modified by operator set operational parameters.
iii. The VEU shall have a front panel status display.

f. Remote control facilities --

i. The control/status ports shall be EIA-232 with selectable data rates of 1200 to 9600 bps and the connector shall be a DB-25 type.
ii. The control/status ports shall provide telephone dialing, remote and local diagnostics testing, and system configuration.
iii. The control/status port shall provide selection of any of the video inputs.
iv. The control/status port shall provide in-band dialing for all interfaces using the AT and/or V.25 bis command set.
v. The control/status port of the VEU shall override in-band control of the VEU via the VDU.
vi. The control/status port shall provide selection of all network interface data rates and/or services.
vii. The control/status port shall provide user selectable video resolution. Minimum resolution settings shall be 560 (high), 280 (standard), and 140 (low) pixels per line.
viii. The control/status port shall provide user selection of 480 lines interlaced (frame mode) or 240 lines non-interlaced (field mode).
ix. The control/status port shall provide user selection of the compression algorithm quantization levels (Q-factor).
x. The control/status port shall provide cropping of the encoded video image at minimum of 104 percent (overscan), 100 percent, 85 percent, and 63 percent.
xi. The control/status port shall provide control over image attributes including, but not limited to, color hue, tint, and saturation. Section of monochrome or color of the VEU digitized video stream shall also be possible.

g. Video interface requirements --

i. The VEU shall be capable of both color and black/white video operation without modification to the hardware. Minimum motion video resolution shall be 560 pixels x 240 lines for the 525 lines, National Television Systems Committee (NTSC) standard, 60 Hz, composite input. Motion handling capability shall be up to 30 frames per second.
ii. The video interface formats shall be the following:

Composite	525 line NTSC 60 Hz
Component	Y/C: Luminance / Chrominance

iii. The video input for the VEU shall be compatible with EIA-170 at 75 Ω impedance with Bayonet Nut Connector (BNC) type connectors and shall be provided as a minimum the following:

3 video inputs composite
3 video input Y/C

iv. All video inputs shall be software selectable from the front panel on the VEU and from the control/status port.

h. Network interface requirements --

i. The VEU shall have hardware and software selectable network bit rates with the following as a minimum: 56 kbps, 64 kbps, 112 kbps, 128 kbps, 384 kbps, 768 kbps and 1.544 Mbps (T1).
ii. The VEU shall have three network interfaces: EIA-530A, DS-1 (T1 service), and V.35.
iii. The VEU shall transmit compressed and digitized video at a minimum of 95 percent of the available channel bandwidth, whenever bandwidth is not used by telephone, camera controls and or remote diagnostics.

i. Diagnostic and alarm requirements --

i. The VEU shall have self-diagnostic features display on the front panel.
ii. The VEU shall blank video on loss of video input.
iii. The VEU shall regain video lost due to excessive temperature when the temperature has reduced to 69°C.

j. Telephone interface --

i. The VEU shall provide an RJ11 telephone jack for voice communication.
ii. The VEU shall provide 16 kbps bandwidth for telephony within the bandwidth allocated for video only when bandwidth is needed for telephone.

k. Camera control interface --

i. The camera control interface shall provide a half-duplex clear channel for camera control and status user data with the following requirements:

The port shall communicate at a user selectable data rate from 1200 to 9600 bps, asynchronous.
The port shall be EIA-232, and the connector shall be a DB-25 type.

ii. The VEU shall provide bandwidth for camera control within the bandwidth allocated for video only when bandwidth is needed for camera control/status data transmission.

l. Environmental --

i. Minimum operating temperature range shall be from -40°C to 70°C ambient, with guaranteed start up at -10°C. An environmental housing with air conditioning will not be allowed.
ii. Operating humidity shall be from 0 to 95 percent, non-condensing.

ACCESSORY ITEMS

The following VEU equipment accessory items shall be supplied by the Contractor as specified in these special provisions:

a. Service and Operations manual describing the video VEU as ordered and in accordance with these special provisions.
b. EIA-530A cable assembly shall be provided to connect the VEU to the integrated services digital network terminal adapter (ISDN TA) unit with basic rate interface that is specified elsewhere in these special provisions.

10-3.39 INTEGRATED SERVICES DIGITAL NETWORK TERMINAL ADAPTER UNIT

GENERAL

a. Each integrated services digital network terminal adapter (ISDN TA) unit shall provide an interface between data terminal equipment (DTE) such as the video encoder unit (VEU) or video decoder unit (VDU) and ISDN.
b. Each ISDN TA unit shall include an internal network termination Type 1 device (NT1) interface and include Terminal Adapter functionality. No external NT1 shall be allowed.
c. A prototype unit is not acceptable.
d. Each ISDN TA unit shall be of the current standard production units.
e. Each ISDN TA unit shall be new and not previously used.
f. The Contractor shall provide a manual for each unit supplied.

QUALIFYING SPECIFICATIONS

a. Operation --

i. Each ISDN TA shall support ISDN basic rate interface (BRI) service and shall provide three digital channels capable of simultaneous data and voice transmission via a standard telephone line. The three channels shall include two Bearer (B) channels at 64 kbps and one Data (D) channel at 16 kbps (2B+D).
ii. Leased operation shall support 1B (64 kbps) or 2B (128 kbps) clear channel synchronous configurations.

iii. At data rates over 64 kbps, the BONDING delay equalization protocol shall synchronize data over the two B channels.

b. Data rates --

i. Synchronous: 2.4, 4.8, 9.6, 19.2, 38.4, 48, 56, 64, 112, 128 kbps; selectable.
ii. Asynchronous: 0.3, 1.2, 2.4, 4.8, 9.6, 19.2, 38.4, 57.6, 115.2 kbps; selectable.

c. Interoperability -- The ISDN TA unit shall support communications with public switched 56 kbps services and switched 56 kbps channel service unit/data service unit (CSU/DSU) as well as other ISDN TA, ISDN terminal equipment, and BONDING compatible inverse multiplexers.
d. D-Channel switch compatibility -- AT&T 5ESS, NTI DMS-100, National ISDN-1.
e. Dialing --Dialing shall be supported in the following ways:

i. Manually from a front panel keypad.
ii. Automatically from up to ten stored numbers.
iii. Automatically through an RS-366 parallel dial port.
iv. Dialing over the DTE interface using the asynchronous AT command set.
v. V.25 bis in-band dialing over the DTE interface using V.25 bis commands.

f. DTE interface -- The ISDN TA shall provide both EIA-530A and V.35 interfaces. The interface to be used shall be selectable. A three meter male/female EIA-530 interface cable shall be provided with each ISDN TA.
g. Network interface -- Network termination shall be designed into the ISDN unit thereby eliminating the need for an external NT1. Connection to the network shall be made by a telephone company provided 2-wire and/or 4-wire 2B1Q U-interface which is connected directly to an eight-pin RJ45 modular jack on the rear panel of the ISDN TA unit. The ISDN TA unit shall provide two RJ45 modular jacks, where one jack shall be designated for dial-up ISDN and the other jack designated for leased ISDN. The dial-up ISDN and leased ISDN operational modes maybe integrated on a single RJ45 jack if the operational modes are user selectable.
h. Local control facilities --Local operator control of all essential features of the ISDN TA unit shall be accomplished by the use of necessary discrete front panel controls.
i. Remote control facilities -- Remote configuration and control of the ISDN TA unit shall be possible using the AT command set in-band over the DTE interface. Remote call setup and termination shall also be possible using V.25 bis in-band dialing.
j. Diagnostics requirements -- Each ISDN TA unit shall be able to perform a variety of tests that allow problems to be identified and isolated. Testing shall be supported manually from the front panel, or in-band from either the network provider or distant end unit. Internal error checking shall be available for both the local and a remote activated digital loopback.
k. Physical --

i. Each ISDN TA unit shall be secured and mounted on a shelf assembly.
ii. Each shelf assembly shall provide for a minimum of four mounting screws in order to mount the shelf assembly in 89 mm (2 rack units) of EIA-310 rack space.

l. Electrical --

i. Power input voltage shall be 115 VAC ±10 percent, 60 Hz.
ii. Power dissipation shall not be greater than 8 W.

m. Environmental --

i. Operating temperature: 0°C to 50°C, minimum.
ii. Storage temperature: -20°C to 70°C, minimum.
iii. Relative humidity: 0 to 95 percent, non-condensing.

10-3.40 CAMERA STATION

GENERAL

The Contractor shall furnish and install the following closed circuit television (CCTV) equipment at each camera station as described in these special provisions and as shown on the plans:

1. One camera unit.
2. One pan/tilt unit.
3. One CCTV pole.
4. One camera junction box (JCB).
5. One camera control unit (CCU).
6. One video encoder unit (VEU).
7. One integrated services digital network terminal adapter (ISDN TA).
8. Connectors and fittings as required.
9. Cable and conductors as required.

CABLES AND CONNECTORS

The camera unit cable assembly box mounting connector shall be mounted on one side of the JCB and shall be prewired to the 20 position terminal block as shown on the plans. The video signal pins of the camera unit cable assembly box mounting connector shall be terminated to a Bayonet Nut Connector (BNC) jack connector via Type RG-59/U coaxial cable stub.

The television control cable (TVC) and television power conductors (TVP) shall be wired to the 20 position terminal block as shown on the plans. The television control power cable (TVCP) cable shall go through but does not terminate inside the JCB. A watertight strain-relief box connector shall installed at the JCB hole for the TVCP cable.

INSTALLATION OF CAMERA STATION

The work to be done at each camera station, as shown on the plans, as a minimum, shall consist of the following:

1. Attach pan/tilt unit to the mounting plate.
2. Attach camera unit to the pan/tilt unit.
3. Install JCB junction box.
4. Terminate TVC and TVP inside JCB junction box.
5. Terminate television video cable (TVL) inside JCB junction box with a BNC plug connector.
6. Install camera unit cable assembly wiring harness (Type JC).
7. Terminate TVCP with pan/tilt mating connector.
8. Connect TVCP to the pan/tilt unit.
9. Terminate TVL inside controller cabinet with BNC plug connector.
10. Terminate TVP, TVCP and TVC with CCU mating connectors C1, C2 and C3, respectively.
11. Adjust limit stops of the pan/tilt unit as directed by the Engineer.
12. Adjust camera unit to provide the optimum picture for the full range of daylight and night time conditions as directed by the Engineer.

CAMERA UNIT MOUNTING

The camera unit shall be secured to the pan/tilt unit using the stainless steel bolts provided with the camera unit. Before each bolt is fastened, a locking type coating shall be applied to the threads. The coating shall lock the bolt and nut in place, making it impossible to turn the bolt or nut without tools. This coating shall last through and be effective through at least ten insertions and withdrawals of the bolt or nut.

The work to be done between the camera mount and the controller cabinet, as shown on the plans, as a minimum, shall consist of the following:

1. Install conduits and pull boxes as required up to the controller cabinet.
2. Install and terminate TVL, TVC, TVCP, and TVP as shown on the plans.

The work to be done at each CCTV controller cabinet, as shown on the plans, as a minimum, shall consist of the following:

1. Install CCU.

2. Connect TVC, TVCP, TVP and TVL to CCU via their respective connectors.
3. Install VEU.
4. Install ISDN TA.
5. Connect CCU to VEU.
6. Connect ISDN TA to VEU.
7. Install 8-position connecting block.
8. Connect ISDN TA to the 8-position connecting block.

The Contractor shall furnish all materials necessary to provide a complete and functional camera station in accordance with these special provisions. Miscellaneous equipment, and materials not mentioned but necessary to provide a complete and fully operational camera station shall be furnished by the Contractor as incidental to the work for which no additional compensation will be allowed therefor.

All items furnished under this contract shall be new and shall be the latest version.

The Contractor shall be responsible for demonstrating proper operation of the camera station using test software and diagnostics which shall be provided to the Engineer as incidental items at no additional cost. Testing procedures are described elsewhere in these special provisions.

CAMERA STATION TESTING

Upon completion of work, each camera station shall be subjected to post-installation tests as outlined herein. All testing shall be performed by the District Electrical Systems Branch personnel, arranged by the Engineer and in the presence of the Contractor. The Contractor shall notify the Engineer in writing fifteen days prior to the scheduled testing. Upon receipt of the notification, the Engineer shall contact the Electrical Systems Branch at (510) 286-6142. The Contractor shall provide all necessary equipment required to access the CCTV equipment for testing.

The testing shall consist of five consecutive days of continuous satisfactory operation of each camera station. If any material and equipment furnished and installed by the Contractor in this project is found defective or otherwise unsuitable, or the workmanship does not conform with the accepted standards, the Contractor shall replace such defective material and equipment at no cost to the State.

Rejected material or equipment may be offered again by the Contractor for consideration provided all non-compliance has been corrected and pretested by the Contractor. After all defects have been corrected, the camera station shall be re-tested until five consecutive days of continuous satisfactory operation is obtained.

The post-installation tests shall consist of, but not be limited to, inspection and functional testing in accordance with these special provisions.

Inspection shall consist of, but not be limited to, verification of correct wiring terminations, correct cable interconnections, good workmanship and compliance with these special provisions.

Functional testing shall include, but not be limited to, the following:

a. Verification of all local mode CCTV operations using the CCU front panel controls.
b. Verify video signal output from CCU with a National Television Systems Committee (NTSC) monitor.
c. Verify the correct operation of the auto/manual iris and power zoom .
d. Verify the correct operation of the pan/tilt unit. The pan/tilt unit shall be functionally tested over 355 degrees in the horizontal plane and ±60 degrees in the vertical plane. The pan/tilt unit limit stops shall then be adjusted to optimize the camera viewing coverage of the freeway as directed by the Engineer.
e. Verify the correct operation of the preset positions.

10-3.41 CAMERA POLES

Camera poles shall conform to the provisions in Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications.

10-3.42 MICROWAVE VEHICLE DETECTION SENSOR (MVDS) SYSTEM

The microwave vehicle detection sensor (MVDS) system shall include all microwave detector units, enclosures, connectors, cables, junction box, mounting equipment, software, firmware, power supply units and all other support equipment.

Functional Requirements.—The MVDS signal shall emulate the response of an inductive loop detector. The MVDS units shall be tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. Each MVDS unit shall operate independently and not interfere with other MVDS units.

The microwave sensor unit shall operate in the frequency band of 10.525 GHz ± 25 MHz. The transmitter power shall be a maximum of 10 mW.

The MVDS field of view shall be covered by a maximum detection range defined as follows:

Elevation beam-width	45 degrees
Azimuth beam-width	15 degrees
Range	3 to 60 meters

Each MVDS unit shall have the capability of providing a minimum of 8 detection zones within each beam footprint. The size of each zone shall be user definable with a maximum range resolution of 2 meters. The minimum footprint shall be greater than or equal to 1.8 meters.

The time of events shall be measured in a maximum of 10 millisecond resolution.

Measurement accuracy shall be better than 95% certainty for vehicle presence.

Each MVDS unit shall be supplied with a connectorized MVDS cable harness with appropriate cable length for each installation. The MVDS cable shall consist of 15 unshielded twisted pairs of No. 20 conductors with an overall shield. Each conductor shall have a minimum of 19 tinned copper strands with a minimum of 1.60 mm PVC insulation rated for 300 V at 105 ˚ C. The outer jacket shall be chrome PVC with minimum thickness of 1.60 mm. The outside diameter of the cable shall not exceed 19.2 mm. A minimum of 4 meter slack of MVDS cable is required in each controller cabinet.

The connector shall be MS3476W18-32S or equivalent. This connector shall include contacts for powering the sensor unit, RS-232 serial data communications and contact pairs for each detection zone. The connector pinout is as follows:

No.	Pin No.	Designation	Signal	Remark
1	A	Contact Closure	Opto 1	
2	B	Contact Closure	Opto 1 Return	
3	C	Contact Closure	Opto 2	
4	D	Contact Closure	Opto 2 Return	
5	E	Contact Closure	Opto 3	
6	F	Contact Closure	Opto 3 Return	
7	G	Contact Closure	Opto 4	
8	H	Contact Closure	Opto 4 Return	
9	J	Contact Closure	Opto 5	
10	K	Contact Closure	Opto 5 Return	
11	L	Contact Closure	Opto 6	
12	M	Contact Closure	Opto 6 Return	
13	N	Contact Closure	Opto 7	
14	P	Contact Closure	Opto 7 Return	
15	R	Contact Closure	Opto 8	
16	S	Contact Closure	Opto 8 Return	
17	d	Contact Closure	Opto 9	
18	e	Contact Closure	Opto 9 Return	
19	f	DC Power	12-24 VDC +	
20	g	DC Power	12-24 VDC -	
21	h	AC Power	115 VAC +	Not Used
22	j	AC Power	115 VAC -	Not Used
23	V	RS-232 p2	Tx	
24	T	RS-232 p3	Rx	
25	U, W	RS-232 p5	Signal Ground	
26	b	Auxiliary	+5VDC Out	Not Used
27	c	Auxiliary	+5VDC Out Return	Not Used
28-32				Spares

The Contractor shall wire the MVDS cable harness and power conductors to the 10 position din rail mounted terminal blocks in the controller cabinet as directed by the Engineer. The RS-232 serial data communication output conductors shall be terminated at the service panel terminal block, TB-0. The contact pair output conductors shall be terminated at the input panel terminal block, TB-2. The ends of all unused and spare conductors shall be taped to prevent accidental contact to other circuits.

All software for testing and set-up procedures shall be supplied with the MVDS unit. The software shall test the MVDS unit performance and provide diagnostic information.

Operational Requirements.—The Contractor shall provide a certification from the manufacturer that the MVDS unit will interface and operate with a Model 170 controller. In addition, the MVDS unit shall meet the following requirements:

a. Electrical.—The unit shall operate with 12-24 VDC at 0.5 A power source. The unit shall have a feature of automatic recovery after a power failure.
b. Physical.—The unit shall be encased in a weatherproof NEMA-3R enclosure. The unit shall not exceed 160 mm x 240 mm x 250 mm in size and shall not weigh more than 4.5 kg. The unit shall operate over a temperature range from -37˚ to +74˚ C, up to 95 percent relative humidity.
c. Installation and Testing.—Prior to installing any MVDS units, the Contractor shall perform functional tests to verify that all MVDS units comply with these specifications. The MVDS units shall be installed as shown on the plans and in accordance with the manufacturer's recommended installation procedures. The Contractor shall confirm equipment placement with the Engineer before installing any equipment. The Contractor shall test the MVDS units for the following functions:

    1. Presence and passage at all ramp and connector metering locations.
    2. Speed, volume and occupancy for all mainline monitoring locations.
    3. Correct speed and count readings of mainline traffic with a portable detection equipment.

The Contractor shall make sure that the MVDS system will not cause harmful interference to radio communication. If the operation of the MVDS system in a residential area is to cause harmful interference, the Contractor will be required to correct the interference at the Contractor's expense.

10-3.43 WIRELESS RADIO MODEM

General.--Acceptable wireless radio modem shall meet all qualifying specifications identified herein, and is at least equivalent in functionality to Metricom Ricochet ICR-900 modem, and has the adaptability to the Metricom Ricochet wide-area wireless network.

The wireless radio modem shall utilize spread-spectrum, packet switching data technology. The modem shall operate within the FCC license-free Radio Frequency (RF) range of 902-928 MHz.

Each radio modem shall work with wide-area wireless network which employs frequency-hopping spreading technique using 162 channels, with each channel having a bandwidth of 160 kHz. The hopping shall be asynchronous and pseudo-random. Raw RF data rate shall be 100 kbps, minimum.

The communication protocol shall emulate existing State specified point-to-multipoint communication polling scheme. Each modem shall be polled by a Front-End Processor (FEP) every 30 seconds and the maximum latency shall be 4 seconds.

Each modem and software shall be designed to provide a migration path to an upgrade communication protocol in conjunction with an Internet Protocol (IP) gateway.

Radio modem.--Each radio modem shall meet the following specifications:

Receiver:	
Type	Double Conversion Superheterodyne
Dynamic range	-98 dBm to 0 dBm
Packet error rate	$1x10^{-1}$ ($1x10^{-6}$ BER)
Frequency stability	±5 ppm

Transmitter	
RF output minimum (at antenna connection)	+27 dBm
RF output typical	+30 dBm (1.0 Watt)
Out-of-band spurious radiation	FCC 15.205
Deviation	±37.5 kHz
Modulation bandwidth	160 kHz
Modulation type	Gaussian frequency-shift keying (GFSK)
Output impedance	50 ohms
Frequency stability	±5 ppm

Processing	
CPU	SH1-RISC
Clock speed	16 MHz minimum
Memory DRAM FLASH ROM	 2 MB minimum 512 KB minimum

Data Port	
Serial interface	EIA-232
Data rate	1200 bps to 115 kbps asynchronous
Parity	Odd, Even or None
Data bits	7 or 8
Stop bits	1 or 2
Duplex	full duplex

Electrical	
Voltage	12.0 VDC (10.0 - 24.0 VDC operating range)
Rx input current @ 12 VDC (average)	400 mA
Tx input current @ 12 VDC	1 ampere
Fuse	Internal thermal resettable
Voltage line protection	reverse polarity

Mechanical	
Interface connections: Power Data port Antenna	 2-pin ampere Mate-N-Lock DB-9, female, DCE N-type, female
Status indicator	LED
Case	sheet metal
Weight	0.5 kg
Size	136 mm (W) x 202 mm (D) x 50 mm (H)

Environmental	
Operating range	-40°C to +60°C
Operating vibration	FCC part 68D paragraph 302 modified
Operating shock	20 g, 11 ms, Half sine per Military Standard 802
Humidity	Military Standard 202F, Method 106 Modified, 10 days

Agency approval	
FCC	Certified Part 15.247

EMI and power/control susceptibility	
Electromagnetic radiation	FCC Class B, Part 15.247
Electromagnetic susceptibility	ANSI C37.90.2 Modified
Surge withstanding capability	ANSI C37.90.1, FT and SWC
Electrostatic Discharge	IEC 801.2

Serial Cable Assembly
A serial cable assembly shall be provided to terminate the radio modem to the terminal blocks in the controller cabinet. All connector pins shall be crimp-type.

Communication Protocol
The radio modem shall be compatible with State specified serial communication protocol via EIA-232 interface. The EIA-232 serial interface shall be the standard three-wire interface consisting of transmit, receive and signal ground. No handshaking shall be required.

Antenna.--Each radio modem shall be provided with low-profile radome antenna including cable, connectors and mounting accessories. The antenna shall have the following requirements:

Electronic	
WSWR at resonant point	1.5:1 or less
Nominal impedance	50 ohms
Gain	3 dB minimum
Radiation pattern	omni-directional
Polarization	vertical
Maximum power input	125 watts
Frequency	890-950 MHz

Mechanical	
Height	16 mm
Top diameter	76 mm
Base diameter	108 mm
Radome	rugged, high-impact plastic with black finish

Installation
The antenna shall be mounted on the top of a metallic enclosure with a waterproof adhesive. The adhesive shall be resistant to exposure in the temperature range of -37° to 149°C. The adhesive shall not degrade with minor temporary exposure to gasoline, JP-4, mineral spirits, motor oil, acetone, or methyl ethyl Icetone.

Antenna cable
The antenna shall come with 0.5 m length of RG58/U coax cable with type N, male connector on the end. The antenna cable shall be routed through a waterproof cord-grip box (CGB) connector into the metallic enclosure.

Warranty.--The wireless radio modem shall have a minimum one-year warranty during which the manufacturer shall replace or repair any units that proven to be defective at no additional cost to the State. The warranty period starts on the date the modem is registered with network name server after its installation has been accepted in the field.

10-3.44 POWER SUPPLY AND POWER ADAPTER FOR MICROWAVE VEHICLE DETECTION SENSOR (MVDS) SYSTEM

Power Supply.--The power supply shall have the following requirements:

Input	115 VAC
Output	+12 VDC at 3 amperes
Regulation	2% line, 2% load with 50 mV peak-to-peak ripple maximum

Input shall be fuse protected. Output shall be short circuit protected. A power “ON” LED shall be used to indicate that the power supply is on.

Power Adapter.--The power adapter shall have the following requirements:

Input	115 VAC
Output	+12 VDC at 1 ampere
Regulation	2% line, 2% load with 50 mV peak-to-peak ripple maximum

10-3.45 SERVICE MANUAL REQUIREMENTS

The Contractor shall provide to the Engineer a minimum of one copy of service manuals for the camera unit, pan/tilt unit, camera control unit (CCU), video encoder unit (VEU), and integrated services digital network terminal adapter (ISDN TA) unit under this special provisions. Each manual shall contain the following sections and sub-sections.

GENERAL INFORMATION SECTION

a. A list of applicable subassemblies that comprise the specified equipment.
b. Overall description of the equipment design features (including all enhance features if applicable), performance, and applications.
c. Equipment specifications summary.
d. Equipment installation instructions.

THEORY OF OPERATIONS SECTION

a. Theory of operation of the standard equipment, with unique or unusual circuitry described in detail.
b. Theory of operation reflecting any modifications to the standard equipment.

MAINTENANCE SECTION

a. Recommended test equipment and fixtures, or minimum operational and performance requirements for appropriate test equipment.
b. Trouble shooting information and charts.
c. Removal and installation procedures for replacing assemblies and subassemblies, if not obvious or if improper sequencing of steps may result in component damage.

REPLACEMENT PARTS SECTION

a. Each manual shall contain an equipment replacement parts list including electrical parts, mechanical parts and assemblies.
b. All semiconductors shall be identified by the supplier's numbers and by JEDEC numbers if applicable.

DIAGRAM SECTION

a. Schematic diagrams(s) identifying all circuit components and showing normal test voltages and levels.
b. An overall functional block diagram.
c. Detailed interconnecting diagram(s) showing wiring between modules, circuit boards and major components.
d. Pictorial circuit board layout diagram(s) showing both component placement and printed wiring detail.
e. Diagram(s) showing location of circuit boards and other subassemblies.
f. Exploded view diagram(s) of complex mechanical assemblies.

PHYSICAL REQUIREMENTS

a. All pages, including latest revisions, shall be securely fastened together between protective covers (loose-leaf ring binding is acceptable).
b. No page shall be subject to fading from exposure to any normal source of ambient lighting (ozalid reproduced pages are not acceptable).

10-3.46 TRAFFIC OPERATIONS SYSTEM EQUIPMENT TESTING

Prior to shipping to the project, the Contractor shall submit the following items to the State of California, Department of Transportation Laboratory, 5900 Folsom Blvd., Sacramento, CA 95819 for acceptance testing:

1. Camera unit
2. Pan/tilt unit
3. Camera control unit (CCU)
4. Video encoder unit (VEU)
5. Integrated services digital network terminal adapter (ISDN TA)
6. Extinguishable Message Sign Panels

Approximately 30 days will be required for the testing. The Contractor will be notified upon completion of the testing and shall arrange for delivery of the equipment to a storage location designated by the Contractor. The costs of such testing and the transportation to and from the Laboratory shall be borne by the Contractor.

10-3.47 ELECTRONIC MOBILE DAILY DIARY SYSTEM DATA DELIVERY

Attention is directed to Sections 5-1.10, "Equipment and Plants," and 7-1.01A(3), "Payroll Records," of the Standard Specifications, and these special provisions.

The Contractor shall submit to the Engineer a list of each piece of equipment and its identifying number, type, make, model and rate code in accordance with the Department of Transportation publication entitled “Labor Surcharge and Equipment Rental Rate” which is in effect on the date the work is performed, and the names, labor rates and work classifications for all field personnel employed by the Contractor and all subcontractors in connection with the public work, together with such additional information as is identified below. This information shall be updated and submitted to the Engineer weekly through the life of the project.

This personnel information will only be used for this mobile daily diary computer system and it will not relieve the Contractor and subcontractors from the payroll records requirements as required by Section 7-1.01A(3), "Payroll Records," of the Standard Specifications.

The Contractor shall provide the personnel and equipment information not later than 11 days after the contract award for its own personnel and equipment, and not later than 5 days before start of work by any subcontractor for the labor and equipment data of that subcontractor.

The minimum data to be furnished shall comply with the following specifications:

DATA CONTENT REQUIREMENTS.

A. The Contractor shall provide the following basic information for itself and for each subcontractor that will be used on the contract:

Caltrans contract ID	Alphanumeric; up to 15 characters.
Company name.	Alphanumeric; up to 30 characters.
Federal tax ID	Alphanumeric; up to 10 characters.
State contractor license	Alphanumeric; up to 20 characters.
Company type (prime or sub)	Alphanumeric; up to 10 characters.
Address (line 1).	Alphanumeric; up to 30 characters.
Address (line 2).	Alphanumeric; up to 30 characters.
Address (city).	Alphanumeric; up to 30 chars.
Address (2-letter state code).	Alphanumeric; up to 2 characters.
Address (zip code)	Alphanumeric; up to 14 characters.
Contact FirstNname.	Alphanumeric; up to 15 characters
Contact LastName	Alphanumeric; up to 20 characters
Telephone number (with area code).	Alphanumeric; up to 20 characters.
Company code: short company name.	Alphanumeric; up to 10 characters.
Type of work (Department-supplied codes)	Alphanumeric; up to 30 characters
DBE status (Department-supplied codes)	Alphanumeric; up to 20 characters.
Ethnicity for DBE status (Department-supplied codes).	Alphanumeric; up to 20 characters.
List of laborers to be used on this contract (detail specified below).	
List of equipment to be used on this contract (detail specified below).	

For example, one such set of information for a company might be:

04-072359
XYZ CONSTRUCTION, INC.
94-2991040
AL1649T
SUB
1240 9TH STREET
SUITE 600
OAKLAND
CA
94612
JOHN
SMITH
(510) 834-9999
XYZ
PAVING
MBE
BLACK

B. The Contractor shall provide the following information for each laborer who will be used on the contract:

Caltrans contract ID	Alphanumeric; up to 15 characters.
Company code (as defined above).	Alphanumeric; up to 10 characters.
Employee ID	Alphanumeric; up to 10 characters.
Last name.	Alphanumeric; up to 20 characters.
First name.	Alphanumeric; up to 15 characters.
Middle name.	Alphanumeric; up to 15 characters.
Suffix	Alphanumeric; up to 15 characters
Labor trade (Department-provided codes).	Alphanumeric; up to 10 characters.
Labor classification (Department-provided codes).	Alphanumeric; up to 10 characters.
Regular hourly rate.	Alphanumeric; up to (6,2)
Overtime hourly rate.	Alphanumeric; up to (6,2)
Doubletime hourly rate	Alphanumeric; up to (6,2)
Standby hourly rate.	Alphanumeric; up to (6,2)
Ethnicity (Department-provided codes).	Alphanumeric; up to 20 characters.
Gender.	Alphanumeric; up to 1 characters.

For example, one such set of information might be:
04-072359
XYZ
1249
GONZALEZ
HECTOR
VINCENT
JR.
OPR
JNY
12.50
18.75
25.00
0.00
HISPANIC
M

C. The Contractor shall provide the following information for each piece of equipment that will be used on the contract:

Caltrans contract ID	Alphanumeric; up to 15 characters.
Company code (as defined above).	Alphanumeric; up to 10 characters.
Company's equipment ID number.	Alphanumeric; up to 10 characters.
Company's equipment description.	Alphanumeric; up to 60 characters.
Equipment type (from Department ratebook).	Alphanumeric; up to 60 characters.
Equipment make (from Department ratebook).	Alphanumeric; up to 60 characters.
Equipment model (from Department ratebook).	Alphanumeric; up to 60 characters.
Equipment rate code (from Department ratebook).	Alphanumeric; up to 10 characters
Regular hourly rate.	Alphanumeric; up to (6,2)
Overtime hourly rate.	Alphanumeric; up to (6,2)
Standby hourly rate	Alphanumeric; up to (6,2)
Idle hourly rate.	Alphanumeric; up to (6,2)
Rental flag.	Alphanumeric; up to 1 character.

For example, one such set of information might be:
04-072359
XYZ
B043
CAT TRACTOR D-6C
TRACC
CAT
D-6C
3645
75.00
75.00
0.00
0.00
N

DATA DELIVERY REQUIREMENTS.

A. All data described in "Data Requirements" of this section shall be delivered to the Department electronically, on 3 1/2" floppy disks compatible with the Microsoft Windows operating system. The Contractor shall provide a weekly disk and hard copy of the required correct updated personnel and equipment information for the Contractor and all the subcontractors and verified correct by the Engineer.

B. Data of each type described in the previous section (contractor, labor, and equipment information) shall be delivered separately, each type in one or more files on floppy disk. Any given file may contain information from one contractor or from multiple contractors, but only one type of data (contractor, labor, or equipment information).

C. The file format for all files delivered to Caltrans shall be standard comma-delimited, plain text files. This type of file (often called "CSV") is the most standard type for interchange of formatted data; it can be created and read by all desktop spreadsheet and desktop database applications. Characteristics of this type of file are:

1. All data is in the form of plain ASCII characters.
2. Each row of data (company, person, equipment) is delimited by a carriage return character.
3. Within rows, each column (field) of data is delimited by a comma character.

D. The files shall have the following columns (i.e., each row shall have the following fields):

1. Contractor info: 17 columns (fields) as specified in "Data Requirements #1", above.
2. Labor info: 15 columns (fields) as specified in "Data Requirements #2", above.
3. Equipment info: 13 columns (fields) as specified in "Data Requirements #3", above.

For every one type of file, columns (fields) must be in the order specified under "Data Requirements", above. All columns (fields) described under "Data Requirements" must be present for all rows, even if some column (field) values are empty. The first row of each file must contain column headers (in plain text).

E. Column (field) contents shall conform to the data type and length requirements described in the "Data Requirement" section, above. In addition, column (field) data must conform to the following restrictions:

1. All data shall be uppercase.
2. Company type shall be either "PRIME" or "SUB".
3. Labor trade and classification codes must conform to a list of standard codes that will be supplied by Department.
4. Contractor type of work codes and DBE status codes must conform to a list of standard codes that will be supplied by Department.
5. Ethnicity codes must conform to standard codes that will be supplied by Department.
6. Data in the "gender" column must be either "M" or "F".
7. Data in the "rental equipment" column must be either "Y" or "N".
8. Equipment owner's description may not be omitted. (The description, together with the equipment number, is how the equipment will be identified in the field.) Include manufacturer, rated capacity & trade description.
9. Equipment type, make, model, and ratebook code shall conform to the Department of Transportation Publication entitled "Labor Surcharge and Equipment Rental Rate", which is in effect on the date the work is

performed. If the equipment in question does not have an entry in the book then alternate, descriptive entries may be made in these fields as directed by the Engineer.

F. The name of each file shall indicate its contents, e.g., "labor.csv" for laborers, “equipment.csv” for equipment, and “contractor.csv” for contractors. Each floppy disk supplied to Caltrans must be accompanied by a printed list of the files it contains with a brief description of the contents of each file.

PAYMENT.--The contract lump sum price paid for electronic mobile daily diary computer system data delivery shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in electronic mobile daily diary computer system data delivery as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The lump sum bid price for electronic mobile daily diary computer system data delivery will be made according to the following schedule:

The Contractor will receive not more than 16.6 per cent per month of the total bid price for electronic mobile daily diary computer system data delivery . After the completion of the work, 100 per cent payment will be made for electronic mobile daily diary computer system data delivery less the permanent deduction, if any, for failure to deliver complete weekly electronic mobile daily diary computer system data in each month.

The Department will retain an amount equal to 25 percent of the estimated value of the work performed during the first estimate period in which the Contractor fails to submit electronic mobile daily diary computer system data delivery conforming to the requirements of this section, as determined by the Engineer. Thereafter, on subsequent successive estimate periods the percentage the Department will retain will be increased at the rate of 25 percent per estimate period in which acceptable electronic mobile daily diary computer system data have not been submitted to the Engineer. Retentions for failure to submit acceptable electronic mobile daily diary computer system data shall be additional to all other retentions provided for in the contract. The retention for failure to submit acceptable electronic mobile daily diary computer system data will be released for payment on the next monthly estimate for partial payment following the date that acceptable electronic mobile daily diary computer system data is submitted to the Engineer.

The adjustment provisions in Section 4-1.03, "Changes," of the Standard Specifications, shall not apply to the item of electronic mobile daily diary computer system data delivery. Adjustments in compensation for electronic mobile daily diary computer system data delivery will not be made for any increased or decreased work ordered by the Engineer in furnishing electronic mobile daily diary computer system data.

10-3.48 CITY OF SAN JOSE ELECTRICAL SPECIAL PROVISIONS

MAINTAINING EXISTING CITY TRAFFIC SIGNAL AND STREET LIGHTING SYSTEMS

The Contractor shall notify the Engineer and the Streets and Traffic Department of the City of San Jose, Phone (408) 277-5515, at least five days prior to performing any work on their existing street lighting system. All splicing of new to existing conductors or disconnection of existing conductors shall be done in the presence of the Engineer, the City Engineer and as directed.

Disconnection of any existing street lighting shall not be permitted except as directed by the Engineer.

At least 20 working days prior to performing any work on existing electrical systems located at various locations, the Contractor shall notify City of San Jose, Phone No. (408) 277-5515 and the Engineer.

Full compensation for maintaining existing traffic signal and street lighting in operation at various locations 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.

REGULATIONS AND CODE

Electrical equipment shall also conform to the following additional standards wherever applicable: The International Municipal Signal Association (IMSA); The Insulated Power Cable Engineers Association (IPCEA); The National Electrical Code as amended by the City of San Jose (CSJ) Municipal Code.

EQUIPMENT LIST AND DRAWINGS

Equipment list and Drawings shall conform to CTSP Section 86-1.03 "Equipment List and Drawings" except paragraphs 2 and 3 of said section 86-1.03 of the CTSP do not apply.

MAINTAINING EXISTING AND TEMPORARY ELECTRICAL SYSTEMS

Existing electrical systems, including traffic signals, traffic signal vehicle and pedestrian detection facilities. traffic signal communication and monitoring facilities, street lighting facilities, flashing beacons and sign illumination facilities,

or approved temporary replacements thereof, shall be kept in effective operation for the benefit of the traveling public during the progress of the work, except when shutdown is permitted to allow for alterations or final removal of the systems.

The Contractor shall give a 24 hours notice to Electrical Maintenance Supervisor at (408) 277-5515 of the City of San Jose Traffic Operations Department and the Engineer before beginning any work on the existing City traffic signals and City lighting system, including any work which may take vehicle detectors or pedestrian push-buttons out of service, or may reroute traffic off of existing vehicle detectors, so that signals can be changed to fixed time operations and lighting systems can be turned off.

The Contractor shall notify the Engineer at least 24 hours prior to any operational shutdown of traffic signals, street lighting or other electrical systems or facilities.

Police officers shall be provided, at the Contractor's expense, to direct traffic during the shutdown of a traffic signal system. The Contractor shall arrange for police officer traffic control at least 24 hours prior to the shutdown of a traffic signal system. Traffic signal shutdowns shall be limited to Monday through Thursday excluding holidays, from 9:00 AM to 3:00 PM, or as specified in the special provisions.

Where a facility requires continuous lighting the shutdown time shall be limited to one-half hour as scheduled by the Engineer, unless otherwise permitted by the Engineer. The shutdown of lighting systems shall not interfere with the regular lighting schedule, unless otherwise permitted by the Engineer.

Vehicle detectors and pedestrian push-buttons shall remain in effective operation at all times during the progress of the work on an existing actuated traffic signal system, except as indicated in the special provisions or as provided herein.

Vehicle detectors or pedestrian push buttons taken out of service shall be repaired or replaced within 72 hours. New vehicle detectors for rerouted traffic shall be installed within 72 hours. Where work conditions do not permit the installation of permanent vehicle detectors shall be installed at the Contractor's expense, as directed by the Engineer. Permanent vehicle detectors shall be installed as shown on the plans as soon as worksite conditions permit.

SCHEDULING OF WORK

"Hot cutovers" will not be allowed for electrical circuits, wiring, or equipment involving any traffic signals, streetlights and other electrical systems. The traffic signals and streetlights shall be shutdown for "cutovers" and the Contractor shall provide police officers for traffic control at the Contractor's expense. All work requiring shutdowns shall he performed in accordance with CTSP Section 86-1.05 "Maintaining Existing and Temporary Electrical Systems."

24-hour notice shall be given to the Telephone Company and/or Pacific Gas and Electric Company before the beginning of any operation involving their facilities or systems.

Traffic signal activation shall follow the Public Works procedures for "Signal Activation," or shall be as specified in the Special Provisions. The Signal Activation procedure is available from the City upon request.

INSPECTION

Prior to backfilling of conduit trenches or the pouring of concrete foundations, the Contractor shall notify the Engineer and City Inspector and request inspection of all conduits and foundation forms.

All conduits, conduit couplings, conduit bends and ground bushings shall be in place and tightened and all anchor rods/bolts and ground rods shall be in place in the foundation form prior to the request for inspection. Wire shall not be pulled in conduits until inspection backfilling and pouring of foundations are completed. Stub ends of all conduits shall have approved caps and ground bushings installed prior to backfilling or pouring of foundations.

The Contractor shall not backfill, enclose or otherwise cover up any electrical work prior to inspection and/or testing. Should any of the work be backfilled, enclosed or covered up, the Contractor shall, at his expense, expose such work for such inspection and/or testing.

EXCAVATION AND BACKFILLING

The trenches shall be straight and true to line and grade, and the bottom shall be smooth and even.

REMOVING AND REPLACING IMPROVEMENTS

Whenever a part of a square or slab of existing concrete sidewalk, curb, gutter, driveway or driveway approach is broken or damaged, the entire square section or slab from score line to score line shall be removed and the concrete reconstructed as specified in CTSP Section 73, "Concrete Curbs and Sidewalks."

All areas of Portland cement concrete sidewalks driveways and driveway approaches and asphalt and/or concrete pavements to be removed shall be cut to a minimum depth of 0.05 m with an abrasive type saw prior to removal. Cut, be neat and true along score lines.

FOUNDATIONS

Foundations shall be the type and constructed to the lines, dimensions and configurations as shown on the plans.

Foundations shall be installed at the locations shown on the plans or as designated by the Engineer.

Unless otherwise specified or shown on the plans, foundations not to be reused shall be removed or abandoned.

When a foundation abandoned the top of foundation, anchor bolts, and conduits shall be removed to a depth of not less than 0.3 m below surface of sidewalk or unimproved ground and 0.3 m below the pavement structure in street areas. The resulting hole shall be backfilled with material equivalent to the surrounding material and the surface areas restored in kind, or as directed by the Engineer. Where obstructions prevent the construction of a planned foundation, the Contractor shall consult with the Engineer to determine an effective resolution.

Unless otherwise specified by the Engineer, posts and standards shall be erected within 10 calendar days after commencement of excavation of the foundation, but not until the foundation has set at least 7 calendar days. They shall be plumbed or raked as directed by the Engineer. Plumbing of posts and standards shall be accomplished before the foundation is finished to final grade and/or before placing the mortar between the base plate and the foundation cap or structure.

Conduit shall enter the foundation at the locations as shown on the plans or as directed by the Engineer. Conduit elbows shall be integrally cast with the foundation.

Forms for foundation caps shall be rigid, at least 0.09 m in width, and shall be accurately placed and secured. The elevation or grade of the foundation cap shall conform to existing surrounding grades or as directed by the Engineer.

The top portion of the foundation or cap shall not be constructed until after the post, standard or pedestal is set in proper position and other improvement constructed, unless otherwise directed.

Mortar shall be placed between the base plate and foundation cap or structure. The thickness of mortar for signal standards shall be at least 0.030 m and not more than 0.091 m. The thickness of mortar for streetlighting standards shall be a maximum of 0.048 m. The mortar shall be struck off and brushed smooth to present a neat appearance.

In paved areas, the top of foundation shall be at least 31.75 mm but not more than 101.6 mm below finished grade. Mortar, topping slab, or pavers shall be placed after the post or standard is in proper position. Mortar shall conform to provisions of CTSP Section 51-1.135, "Mortar."

In unpaved areas posts and standards without adjacent pull boxes shall have a foundation cap formed a minimum of 0.60 mm square. When posts or standards are within of other finished concrete work, finish foundation cap shall extend to existing adjacent surfaces.

In unpaved areas posts and standards with adjacent pull boxes shall have a foundation cap constructed to include the pull box.

In unpaved areas, cabinets shall be provided with a raised pad of portland cement concrete in front of the doors: a minimum 90 mm thick, 91 mm long and 1.2 m wide, or as indicated.

Anchor bolts shall be of the sizes and lengths as shown on the plans.

Anchor bolts 15 mm through 31 mm shall have cut threads; rolled threads are not permitted.

Bending of anchor bolts will not be permitted. For traffic signal standards, anchor bolts shall extend a minimum of three full threads, but no more than 50 mm above the top nut. For streetlight standards, anchor bolts shall extend a minimum of three full threads above the top nut, but shall not extend so as to interfere with the installation of the ornamental leaf design nut cover.

All anchor bolts, nuts, and washers shall be galvanized. Anchor bolts with reinforcing bars or plates shall be set in a bolt circle using a template and securely attached to the foundation forms. The anchor bolts shall be set so that the exposed threads will accommodate the thickness of the foundation cap, mortar, base plate, locking nuts and washers.

If anchor bolts require extension, Contractor shall provide structural details to the Engineer for approval prior to start of work.

Ground rods when installed in foundations of standards shall be located to either side of the handhold opening with top of ground rod even with bottom of handhold opening.

STANDARDS, STEEL PEDESTAL AND POSTS

Standards, steel pedestals, and posts shall be of the type indicated on the plans.

The mast arm(s) signal equipment, luminaire and other devices may be assembled and attached to a standard prior to its being erected and set.

After erection, standards and posts shall be plumbed or raked as directed by the engineer. Plumbing or raking of standards and posts shall be accomplished by adjusting the leveling nuts before the foundation cap is placed. The use of shims or other similar devices for plumbing or raking of standards and posts is not acceptable.

Signal equipment shall be plumbed and aimed and luminaires shall be leveled after the standard has been erected and set.

Guard posts shall be installed when the axis of a standard is located within 0.92 m of a driveway approach to protect the standard from damage by moving vehicles or as directed by the Engineer. Guard posts shall be galvanized standard pipe conforming to the specifications of ASTM Designation: A53 or A120.

Existing standards to be relocated or reused in place shall be repaired as directed by the Engineer. Holes shall be welded closed, large dents shall be removed, shafts shall be straightened, and portions, which are in poor condition due to rust, corrosion or damage, shall be replaced. Repaired areas shall be ground smooth and primed for application of finish.

Existing standards having a painted finish which are modified, relocated, repaired or upon which equipment is altered by the Contractor shall be repainted.

The Contractor shall apply pressure-sensitive identification number labels to all lighting standards and all signal standards with luminaires, as directed by the Engineer. Labels shall Stick-On type, yellow reflectorized numbers and letters on black background measuring 35mm wide and 48 mm high, installed vertically arranged with space on either side of the middle letter. Bottom height of the number shall at 2.13 m (min.) from ground. The City will provide their identification number for each luminaire.

OCTAFLUTED LIGHTING STANDARDS

Octafluted lighting standards shall conform to the dimensions, design and gage indicated on the plans. Octafluted standards shall be certified by the fabricator to be of such manufacture as to retain a minimum yield strength safety factor of 1.8 when subjected to a 10.4 kg per square meter basic wind pressure.

Lighting standards to be installed shall be type 10B (octafluted) with type C-8 mast arm per plans.

Octafluted lighting standards shall have a uniform 0.63 mm taper over the length of the 100 mm shaft. The shaft shall be straight with a permissive variation not to exceed one 25.4 mm as measured at the midpoint of the shaft.

The shaft of octafluted lighting standards shall be fabricated from a single sheet of 11 gauge hot rolled basic open hearth steel conforming to the plans and to ASTM Designation: A 570, Grade C. Base plates shall be one piece cast steel, conforming to ASTM Designation: A27, Grade 65-35. Mast arms shall be fabricated from standard 53 mm pipe conforming to the specifications of ASTM Designation: A53 or A120.

The shaft of octafluted lighting standards shall have a single, continuous longitudinal welded seam from the base to the top of the standard. Longitudinal welds shall be formed by the submerged process. After fabrication of the shaft, the longitudinal weld shall be rolled smooth. The base plate shall be secured to the shaft by two continuous welds, one inside the standard and one outside.

The shaft octafluted lighting standards shall be tapered and shall consist of eight equally spaced doric flutes which shall be formed by the cold rolling process. Flutes shall have sharp crests and be uniform in size, taper and radius over the entire length of the shaft. The radius of the crest shall be less than the thickness of the metal in the shaft.

The standard pipe for mast arms shall be reamed, free from burns, and without intermediate splices or couplings.

Mast arms for octafluted lighting standards shall be attached to the shaft by means of a steel fitting welded to the mast arm and a matching steel fitting welded to the shaft. When assembled, the fittings on the mast arm and the shaft shall interlock and be secured by means of a hexagon head cadmium plated cap screw. The connection between the mast arm and the standard shall be weather resistant and shall form a smooth wireway.

Type C mast arms for octafluted lighting standards shall be provided with an ornamental scroll bracket as depicted in the plans. The scroll bracket shall be fabricated from cold-rolled steel "U" channel stock, 3.175 mm by 38 mm wide by 12 mm deep. The bracket shall be drilled at the ends and secured to the standard by means of hexagon head cadmium plated cap screws and 12 mm nuts welded to the shaft and the mast arm.

Type E mast arms for octafluted lighting standards shall be as as depicted in the plans.Transformer base pedestals for type 10A octafluted standards shall conform to the dimensions and design as indicated in the Standard Plan Details. The top and bottom plates of the transformer base pedestals shall be fabricated from 20mm steel plate and the sides from 7 gauge hot-rolled steel. After fabrication, exposed welds shall be ground smooth. Transformer base pedestals shall have a trapezoidal access door a minimum of 215mm wide at the top, 250 mm wide at the bottom and high. The door shall be provided with tamper resistant locking hardware. To facilitate plumbing, leveling and positioning of the transformer base pedestal, two 41mm steel anchor clip plates of the design depicted in the plans shall be provided for each anchor bolt.

Each of the four anchor bolt nuts on octafluted lighting standards shall be as depicted in the plans shall be provided for each anchor bolt concealed by an ornamental cast steel or cast aluminum leaf-design cover held in place by a hexagon head cadmium plated cap screw.

Octafluted standards shall be provided with an ornamental cast steel or cast aluminum spear point finial held in place by four cadmium plated cap screws.

Octafluted standards shall be provided with a handhole as indicated on the plans. The handhole cover shall be secured with a cadmium plated allen-head screw and steel locking bar or other tamper resistant device as approved by the Engineer. A 12 mm diameter N.C. by 25 mm long ground lug shall be welded to the inside of the shaft directly opposite the handhole. A hex nut and two flat washers shall be provided on the ground lug.

Octafluted standards and all ferrous accessories shall have a hot-dipped galvanized finish, unless specified otherwise on the plans.

Lighting standards which are fed overhead shall be provided with pole band(s), clevis(es). spool(s) and a mastarm with a 41mm diameter conduit entrance nipple and insulated bushing welded to the underside of the mast arm as indicated in the Standard Plan Details. The connection between the entrance nipple and the mast arm shall form a smooth wireway.

Ornamental poles.--Ornamental poles shall conform to the details shown on the plans and these special provision.

Ornamental poles shall be manufactured by Unique Solutions, Visco, Valmont or equal.

The Contractor shall submit to the Engineer manufacturer's technical data sheets, catalogue cuts, and evidence (certificate or letter) indicating that all ornamental poles to be furnished are acceptable to the City of San Jose.

Ornamental poles shall be cast iron and steel construction, massively tapered with a deep 16 flute pattern and a classic tapered and fluted base. The base material shall be ASTM-A48 Class 30 cast iron, form true to the pattern with complete detail. All hardware shall be tamper resistant stainless steel. The ornamental poles shall be at the height shown on the plans, with a 508 mm diameter base and shall taper from a minimum of 177.8 mm at the top of the base to a minimum of 114.3 mm at the post top. An integral 76.2 mm tenon shall be provided at the top for mounting. The post shall be provided with four 914.4 mm long L type anchor bolts to be installed on a 279.4 mm bolt circle. An access door shall be provided in the base for securing anchor bolts and wiring access. A grounding screw, nut and washer shall be provided as shown on the plans.

Liberty aluminum cross arm assembly of 559 mm high and 838 mm wide from center to center twin luminaires shall be provided in accordance to the details shown on the plans. Cross arm assembly shall be installed perpendicular to street curb as shown on the plans.

Additional arm support and transition piece from pole to cross arm assembly shall be installed to provide the appearance shown on the plans. Luminaire cross arm and other mounting fitting shall provide luminaire mounting height of 588 mm.

The ornamental pole, cross arm assembly, arm support shall be finished with a fused coating of electrostatically applied polyester powder paint conforming to "Powder Coating" elsewhere specified in these special provisions. The finish coating shall be dark green conforming to Color No. 24108 of Federal Standard 595B.

The Contractor shall submit 4 color samples to the Engineer for approval. The samples shall be of the same shape as the light pole or cylindrical, approximately 300mm diameter and 600mm long, and made of the surface material and coated as specified in these special provisions for the light pole. The samples will be used to demonstrate the final finish and color that complies with the plans and specifications. After reviewing the sample, the Engineer may change the color if deemed necessary. The Contractor shall not order the poles until the color are approved by the Engineer

The Contractor shall allow 3 weeks for the Engineer to review the color samples.

SIGNAL STANDARDS

Signal equipment and other devices shall be secured to signal standards using cadmium plated threaded bolts and/or screws. Signal standards shall be drilled and tapped as required to accept such bolts and/or screws. The use of "through-bolts" with nuts to secure equipment to standards is not acceptable.

Signal mast arms shall have the end signal head mounting tenon located on the side of the mast arm, rather than at the tip.

Drilling, tapping and machining of signal standards shall be performed on the job site. Holes in standards shall be cut using drills or hole saws. The use of a cutting torch for the purpose of producing holes in standards will not be permitted unless authorized by the Engineer prior to performing the work.

When modifying signal or lighting equipment on existing signal standards the Contractor shall de-energize and remove circuit conductors prior to drilling, cutting, welding and/or tapping the pole. When performing this work, the Contractor shall schedule a system shutdown in accordance with CTSP Section 86-1.05 "Maintaining Existing and Temporary Electrical Systems."

CONDUIT

Conduit shall be of the sizes and types as shown on the plans or as specified in the specifications or these special provisions.

a. Material.--Conduit and conduit fittings shall be UL or ETL listed and shall be of one of the following types:

1. Galvanized Rigid Steel (GRS)-GRS conduit shall conform to the requirements of UL Publication UL6 for Rigid Metallic Conduit. The zinc coating shall be applied by the hot-dip process and shall conform to the requirements of ASTM Designation: A239.

2. Plastic Coated Galvanized Rigid Steel (PCGRS)-PCGRS conduit shall conform to (1) above and shall have an external coating of polyvinyl chloride. Thermoplastic coating shall have a minimum thickness 40 mils.
3. Rigid Non-Metallic Polyvinyl Chloride (PVC)-PV conduit shall conform to the requirements of the U Standard for Rigid Non-Metallic Conduit Publication 651.

GRS and PCGRS conduit shall be terminated and insulated bonding type ground bushings. PVC conduit shall be terminated with end bell fittings.

All fittings used for installing, supporting, joining and connecting on conduit shall be specifically designed and manufactured for electrical use.

All metal conduit couplings shall have straight non-tapered threads and shall be marked by the manufacturer with an "E" to identify them as being of electrical grade. Tapered plumbing type couplings and couplings with slip joint set screws or running threads will not be permitted for joining conduits.

Conduit that is installed underground or in concrete foundations shall be Schedule 40 PVC or PCGRS. Conduit that is installed as a service riser shall be schedules 80 PVC and shall conform to the requirements of the Pacific Gas and Electric Company. Conduit that is installed in exposed locations or in structures shall be GRS.

Exposed conduit installed on a painted structure shall be painted the same color as the structure as specified in CTSP Section 86-2.16, "Painting."

Conduit runs shall be continuous and uniform in kind and diameter. The existing conduit runs are to be modified or extended, new conduit shall match existing in kind. Reducing couplings shall not be permitted.

Conduit diameter shall be as indicated on the plans or, if not specified, shall be a minimum of the following:

1. 41 mm between an electrolier and pull box.
2. 27 mm between a pedestrian push button post and pull box.
3. 53 mm between a signal standard and pull box.
4. 53 mm for detector lead-in cable runs.
5. 78 mm between a type "M" controller cabinet and pull box.
6. 78 mm (two conduits) between type "P" controller cabinet and pull box.
7. 27 mm between the detector loop termination at the lip-of-gutter and pull box.
8. 78 mm for traffic signal conduits between pull boxes where conduit crosses a roadway.
9. 41 mm for Street lighting systems.
10. 53 mm for traffic signal systems.

b. Installation.--Conduit installed underground shall be installed in open trenches, unless approved otherwise by the Engineer. Trenches for conduit shall be straight and uniform in depth, free of ridges and depressions. Conduit shall not be covered until the installation has been approved by the Engineer.

Trench-laid conduit shall have a minimum of 457 mm of cover in non-roadway area and 610 mm of cover (below finished grade) in roadway areas, including driveways, unless otherwise indicated or approved by the Engineer. Conduit depth shall not apply at locations where conduit slopes upward to pull box or standard.

The minimum cover requirements for trench-laid conduit may be reduced if the conduit is protected in a portland cement concrete encasement. Revisions to the minimum conduit depth requirements will be at the Contractor's expense and will require written approval from the Engineer, prior to conduit placement.

Conduit less than 457 mm below the surface and not encased in concrete or less than 3 meters above the finished surface shall be PCGRS or GRS conduit unless specifically indicated otherwise on the Plans or allowed by the Engineer.

Parallel conduit runs installed in a common trench without concrete encasement shall have a minimum 152 mm of separation between conduits. Where parallel conduit runs installed in a common trench are encased in concrete, a minimum of 152 mm of separation shall be maintained between the conduits and the trench walls and floor and between individual conduits. Conduit spacers and anchors shall be installed as required to ensure a complete and uniform flow of concrete around the conduit. Distances between conduit spacers and between anchors shall not exceed 1.5 m.

Where an underground obstruction is encountered which prevents the installation of a conduit run as shown on the plans the alignment of the conduit run may be revised and/or additional pull box(es) may be installed as required to avoid the obstruction. Such revisions to the conduit alignment and pull box layout will be at Contractor's expense and will require the prior written approval of the Engineer.

Contractor shall at the request of the Engineer, open inspection holes as required to determine compliance with the requirements for trench-laid conduit depth and alignment. Inspection holes shall not be backfilled until the conduit installation has been approved by the Engineer. Upon completion of inspection, inspection holes shall be filled to the satisfaction of the Engineer. The opening and filling of inspection holes shall be at the expense of the Contractor.

Backfilling, compaction and restoration of the surface of trenches shall be in accordance with the provisions of the applicable section of these Specifications.

In traffic signal installations GRS or PCGRS conduit runs may be laid on top of existing pavement within curbed median islands that are to have Portland cement concrete surfacing.

Conduit runs for Streetlighting shall be installed either parallel to or perpendicular to the curb, unless otherwise approved by the Engineer prior to placement. Conduit at an oblique angle to the curb will not be permitted. Conduit runs parallel to the curb shall be located not more than 685 mm not less than 152 mm behind the face of curb, unless otherwise indicated on the Plans or approved by the Engineer.

Conduit shall not be installed by the "impact driving" method.

With the approval of the Engineer, conduit may be installed by either the jacking or drilling method. When a conduit jacking or drilling pit is to be left open overnight, it shall be covered in accordance with the requirements set forth by the Engineer, and/or the American Railway Engineering Association (AREA) Standard Specifications, for railroad crossings.

Conduit installed under a roadway by jacking or drilling shall not be less than 610 mm nor more than 1220 mm below the flow line of the gutter or edge-of-pavement grade where no gutter exists.

Where conduit is installed under a roadway by the drilling method, any excessive voids shall be filled to the satisfaction of the Engineer.

Conduit bends shall be avoided wherever possible and where required shall be of the largest possible radius. Where underground conduit changes direction long radius sweeps shall be used instead of short radius bends.

The radius of conduit bends and elbows entering foundations shall not be less than 12 times the internal conduit diameter. Unless specified otherwise, other conduit heads and elbows shall not have a radius less than 762 mm.

PVC conduit elbows shall be factory manufactured. Field bending of PVC is not permitted.

Conduit bends and elbows shall be free of flattening, kinks and indentations.

No single conduit bend or elbow shall exceed an angle of 90 degrees.

Unless otherwise approved by the Engineer, there shall be no more than the equivalent of :

1. 135 degrees of bends in a conduit run from a pull box to a foundation.
2. 90 degrees of bends in a conduit run from a pull box to a pull box where the conduit is installed parallel to and on the sidewalk side of curb.
3. 270 degrees of bends in a conduit run from a pull box to a pull box where the conduit is installed parallel to and on the streetside of the curb.
4. 180 degrees of bends in a conduit run from a pull box to a pull box where the conduit is installed perpendicular to the curb.

PVC conduit, elbows, coupling and fittings shall be welded. Solvent weld cement shall conform to the requirements of ASTM D2564. In solvent welding of PVC conduit and components, the Contractor shall thoroughly coat the mating surfaces of the joint with cement and, after insertion, shall twist the joint 180 degrees to insure a complete bond.

Conduit in the foundation of a standard or an enclosure shall terminate no more than 53 mm and not less than 27 mm above the top surface of the foundation.

The uppermost 203 mm of conduit terminating in a standard or an enclosure shall be straight and shall be so positioned in the foundation that its prolongation would pass through the handhole opening.

Any conduit elbow stub leaving a foundation shall extend a minimum of 152 mm from the face of the foundation and shall have at least 457 mm of cover. The elbow stub shall exit the foundation in the direction indicated on the Plans and shall be capped until conduit is attached or a bushing is installed.

Conduit between a foundation and an adjacent pull box shall be continuous without couplings from the elbow stub at the foundation to the elbow into the pull box. The conduits entering foundation shall be PVC schedule 40 or PCGRS.

Conduit shall enter a concrete pull box through the short side and shall so positioned that the prolongation of the conduit would pass through the top opening of the pull box. Conduit shall not enter from the bottom or from the long pull box unless otherwise approved by the Engineer. Conduit shall enter a pull box in the direction of the conduit run. Conduit shall terminate not more than 53 mm and not less than 25 mm from the inside wall or bottom of the pull box.

Where a new pull box is installed in an existing metallic conduit run, the conduit shall be cut, threaded, fitted with grounding bushings and bonded. The exterior surface of conduit which will be partially or completely imbedded in concrete structures shall be cleaned before the concrete is placed.

Conduit installed in the structure shall be galvanized rigid steel (GRS), the size as indicated on the plans. All conduit running transversely the bridge deck shall be placed in the running transversely to the side walk will be placed in the rail through the deck. All conduit running longitudely on the bridge shall be laid on top of the deck under the sidewalk or in the cell compartment, where there is no sidewalk. All conduit extending more than 2 m in the cell compartment shall be supported in the cell.

The installation of conduit into a manhole, vault and/or pull box of the Pacific Gas and Electric Company, Pacific Bell Telephone Company or other agency shall conform to the requirements of the respective agency. The Contractor shall contact representatives of those organizations for instructions regarding the preferred location of entry and termination method of such conduit. The conduit shall project into the manhole, vault and/or pull box only far enough for a bushing to be

placed on the conduit end. The opening around the conduit shall be carefully and completely filled with mortar and neatly finished.

A pull rope shall be installed in all conduits which are designated for future use. The pull rope shall be nylon or polypropylene with a minimum tensile strength of 14 kg. At least 0.60 m of pull rope shall be doubled back into the conduit at each termination.

Prior to the installation of conductors or cables in either existing or newly installed conduit, the Contractor shall prove and clean the conduit by pulling a mandrel or wire brush through the conduit or by rodding, then blowing out the conduit with compressed air.

Rodding shall be performed by simultaneously pushing and turning a straight steel or wooden rod through the conduit, taking care not to damage the conduit walls.

The cost of proving conduit shall be considered as included in the price paid for electrical installations and no extra payment shall be made therefor.

Pull Boxes.--Except as noted below, pull boxes shall be installed at the locations shown on the Plans and shall be of the sizes specified. To facilitate his work, the Contractor may at his option and expense, install additional pull boxes or pull boxes of a larger standard size than those shown or specified. The locations additional Pull boxes shall be established by the Engineer.

a. Materials.--Pull boxes extensions and covers for installation in the ground or sidewalk areas shall be constructed of pre-cast reinforced concrete. Pull boxes shall be of the sizes shown on the plans . Pull boxes shall have gray plastic coated rims. Each pull box cover shall be secured with two 3.75 mm brass hold down bolts with brass washers and nuts. Nuts shall be recessed below the surface of the cover.

Pull boxes and extension for installation in areas subject to traffic loads shall be constructed of pre-cast reinforced concrete. Traffic pull boxes shall be of the sizes shown on the plans . Each traffic pull box shall be provided with a checkered steel plate cover, a minimum of 6.35 mm thick conforming to the design indicated on the plans. The steel cover shall be electrically grounded by means of a one meter length of copper braid equivalent to a Number 8 AWG or larger copper conductor. The copper braid shall be attached to a suitable grounding lug welded to the underside of the traffic cover and shall be bonded to the service grounding electrode.

Pull boxes and covers for installation in structures shall be of the sizes and details shown on the plans. In lieu of the structure pull box shown on the plans the Contractor may use a telescoping steel pull box, with interior dimensions conduit entrances and cast iron cover conforming to the details shown on the plans. The design of the steel pull box shall be submitted to the Engineer for approval prior to fabrication.

The covers for pull boxes except ceiling pull boxes shall be clearly marked with a legend that identifies the electrical system served by the pull box. Pull box cover legends shall be as follows:

CSJ TRAFFIC SIGNAL: for traffic signal systems with or without streetlighting systems
CSJ STREET LIGHTING: for street lighting systems only
CSJ COMMUNICATIONS: for traffic signal communications only
CSJ SPRINKLER CONTROL: for sprinkler control systems only
CSJ SERVICE: for service laterals to utility facilities termination Point only
CSJ ELECTRICAL: for combined electrical systems or Miscellaneous systems not mentioned above.

The pull box cover legend shall be formed of capital block letters between 25.4 mm to 76.2 mm in height. The legend may be parallel to either the long or short side of the cover.

Concrete pull box covers shall have the legend cast into the cover at the time of manufacture. The lettering of the legend shall be sharply defined, uniform in depth, evenly spaced and neatly aligned.

Steel pull box covers shall have the legend applied to the cover prior to galvanizing using one of the following methods:

(1) Cast iron strips at least 7 mm thick with the letters raised a minimum 1.58 mm. Strips shall be fastened to covers with 7 mm flathead stainless steel bolts and nuts. Bolts shall be peened after tightening
(2) Sheet steel strips at least 22 Gage with the letters raised a minimum of 1.58 mm above the surrounding surface of the strips. Strips shall be fastened to the covers by spot welding, tack welding, brazing, with 7 mm stainless steel rivets or 7 mm, roundhead stainless steel machine bolts and nuts. Bolts shall be peened after tightening.
(3) Bead welding the letters on the covers. The letters shall be raised at least 2.4 mm.

b. Installation and Use.--Pull boxes shall be installed at the locations shown on the plans. Pull boxes shall not be spaced at intervals over 60 m whether indicated on the plans or not, unless otherwise directed by the Engineer. Pull boxes shall be installed in roadways, driveways, driveway approaches, gutters, or wheelchair ramps.

The bottoms of pull boxes installed in the ground or in sidewalk areas, shall be bedded in washed river drain rock as shown on the plan details, and shall be grouted prior to the installation of conductors. The grout shall be between one and 50 mm thick and shall be sloped toward the drain hole. One layer of roofing paper shall be placed between the grout and the rock sump. A 25.4 mm diameter drain hole shall be provided in the center of the pull box through the grout and the roofing paper.

Existing pull boxes disturbed by the Contractor's operations shall, at Contractor's expense, have drain rock sumps and grouped bottoms installed and shall be reconstructed in conformance with these Specifications, or as directed by the Engineer. Pull boxes shall be CSJ Number 5 minimum for lighting systems traffic signal systems or other systems, unless otherwise specified.

Pull boxes shall be installed with the long dimension parallel to the main conduit run. In the vicinity of curbs, pull boxes shall be placed adjacent to the back of curb. In the vicinity of standards, pull boxes shall be placed alongside the foundation as indicated in the plans. The top of the pull box shall be flush with the surrounding grade or top of adjacent curb unless otherwise indicated.

Where pull boxes are placed in areas subject to traffic loads, (when permitted by the Engineer), they shall be installed on suitable concrete footings.

Conductors.--Conductors shall be copper of the gage shown on the plans, unless specified otherwise.

The minimum wire gages for streetlighting systems shall be as follows: Number 8 AWG for service and feeder conductors from ft service point to the main disconnect and branch circuits. Number 12 AWG for branch circuits from feeder to lamp ballasts, and Number 14 AWG for control circuits from photoelectric-unit (PEU) to contactor.

Copper wire shall conform to-the specifications of ASTM Designations: B3 and B8.

Wire sizes, other than conductors used in loop detector lead-in cable, shall be based on American Wire Gage (AWG), Conductor diameter shall be not less than 98 percent of the specified AWG diameter. Conductors used in loop detector lead-in cable shall conform to the specifications of ASTM Designation: B 286.

Conductors shall be UL or ETL listed and rated for 600-V operation. The insulation for traffic signal conductors installed between a traffic signal controller and related traffic signal appurtenances shall conform to one of the following:

(1) Type UF, with a minimum insulation thickness of 60 mils at any point. for conductor sizes Number 14 AWG through Number 10 AWG.
(2) Type THW or UF. with a minimum insulation thickness of 60 mils at any point, for conductor sizes Number 8 AWG and larger.

The insulation for all conductors other than traffic signal conductors as specified above shall conform to one of the following:

(1) Type THW, with a minimum insulation thickness of 45 mils at any point, for conductor sizes Number 14 AWG through Number 10 AWG.
(2) Type THW or UF with a minimum insulation thickness of 60 mils at any point, for conductor sizes Number 8 AWG and larger.
(3) Type THW polyvinyl chloride conductor insulation shall conform to the requirements of ASTM Designation: D 2220.

a. Conductor Identification.--Conductor identification shall be as follows:

CONDUCTOR TABLE					
		IDENTIFICATION			
		INSULATION COLOR			
CONDUCTOR USE	SIGNAL PHASE OR FUNCTION	BASE	STRIPE	LABEL DESIG-NATION	CONDUCTOR SIZE
Vehicle Signals	2,6	Re,Ye,Br n	Black	2.6	14
	4,8	"	Orange	4,7	14
	1,5	"	None	1,5	14
	3,7	"	Purple	3,7	14
	Overlaps	"	Note 1	OL#	14
Pedestrian Signals	2p, 6p	Red, Brown	Black	2p, 6p	14
	4p, 8p	"	Orange	4p, 8p	14
	1p, 5p	"	None	1p, 5p	14
	3p, 7p	"	Purple	3p, 7p	14
Pedestrian push Buttons	2p, 6p	Blue	Black	pb2, pb6	14
	4p, 8p	"	Orange	pb4, pb8	14
	1p , 5p	"	None	Pb1, pb5	14
	3p, 7p	"	Purple	pb3, pb7	14
Traffic signal Contoller Center	Ungrounded-line 1 Grounded-Neutral	Black White	None	CN1 CNN	As req'd
Streetlighting	Ungrounded-Line1 Ungrounded-Line2 Grounded-Neutral	Black Red White	None None none	SL1 SL2 SLN	As req'd
Lighting Control	Ungrounded to Photoelectric Unit (PEU) Switched leg from PEU unit Grounded-neutral	Black Red White	None None None	C1 C2 C3	14 14 14
Irrigation Control	Undergrounded-Line 1 Grounded-Neutral	Black White	None None	IR1 IR2	As req'd
Service	Undergrounded-Line 1 Undergrounded Line2 Grounded-Neutral	Black Red White	None None None	SR1 SR2 SR3	As req'd

CONDUCTOR TABLE (Cont'd)					
		IDENTIFICATION			
		INSULATION COLOR			
CONDUCTOR USE	SIGNAL PHASE OR FUNCTION	BASE	STRIPE	LABEL DESIG-NATION	CONDUCTOR SIZE
Sign Lighting	Undergrounded -Line1 Undergrounded-Line2	Black Red	None None	SN1 SN2	12 12
Flashing Beacons	Undergrounded between flashing Beacons Grounded Neutral	Red or Yellow White	None None	Flasher Location FLN	14 14
Logic Common	Pedestrian Push buttons	White	Black	None	14
Grounded Neutral	Traffic Signals	White	Black	None	14
Traffic Signal Communication	As Req'd	As req'd	As req'd	Per Sect. 86-2.08	As req'd
Rail Road Pre-emption	As Req'd	Black	None	RR	14
Emergency Vehicle Pre-emption	As Req'd	Black or as req'd	None	EV#1,2,3 as req'd	14 or as req'd
Spares	Traffic Signal Spares	Black	None	None	14
Inductive Loop Detector Circuits	Vehicle Detection	As Req'd	none	Per Sect. 86-5.01A (5)	As req'd

Notes:

1. Conductors for overlap traffic signal shall have their insulation striped for the first signal phase in the designation. For example, a phase (2+3) overlap conductor shall have its insulation striped as phase 2.
2. Conductors for overlap traffic signal phases and other special functions shall be labeled accordingly.

b. Circuitry.--The "common" for pedestrian push button circuits shall be a separate conductor and shall not be used for any other purpose.

c. Installation.--Conductors shall not be pulled into conduits until after pull boxes are set to grade, drain rock sumps installed, conduit grouted in place, bottoms of concrete boxes grouted, and the conduits bonded.

The conduit system shall be complete and approved by the Engineer before any conductors are installed in conduits. All conductors shall be run in conduit except overhead installations or where conductors are installed by means which will not any way damage the conductors or its insulation. Conductors entering conduits shall be carefully fed and positioned to avoid "tangles" and "crossovers." All conductors shall be installed simultaneously.

Conductors and cables in all pull boxes shall be grouped and arranged in a workmanlike manner. Conductors and cables in manholes shall be supported by strapping to the side wall.

A UL or ETL listed inert lubricant such as powdered soapstone or talc shall be used in placing conductors in conduit.

Conductors shall be pulled into conduit by hand. Use of wrenches or other power actuated pulling equipment will not be permitted.

When conductors are to be added to existing conductors in a conduit, all conductors shall be removed; the conduit shall be cleaned as provided in CTSP Section 86-2.05C, "Installation" and all conductors shall be pulled into the conduit as a unit. Traffic signal and streetlighting conductors receiving power from different service points shall not be installed in the same standard, conduit, pull boxes or other enclosures. Service conductors shall not be installed in traffic signal or streetlighting conduits.

Temporary conductors less than 3 m above grade shall be enclosed in flexible or rigid metal conduit.

At least 0.60 m of slack shall be left in traffic signal conductors at each signal or combined lighting/signal standard, where a pull box is not adjacent to the standard and/or there is more than one conduit in the base of the standard. Slack shall be measured by removing the handhole cover on the standard and extending the wire horizontally beyond the handhole opening.

At least 0.60 m of slack shall be left in lighting conductors at each standard to facilitate the removal of fused spliced connectors. Slack shall be measured by removing the handhole cover on the standard and extending the conductors horizontally beyond the handhole opening.

At least 0.92 m of conductor slack shall be left in all conductors, at each pull box. Slack shall be measured by removing the pull box lid and extending the conductors vertically above the pull box grade.

Conductors shall be permanently identified as to function (vehicle signal phase, pedestrian signal phase, streetlight circuit, streetlight controls, irrigation circuit) as detailed in the "Conductor Table" "Conductor Identification." Identification shall be means of encircling individual conductors/cables or functional groups of conductors with a permanent identification label in each pull box and at the termination of the conductors/cables. Labels shall be fastened in such a manner that they will not move along the conductors/cables.

d. Connectors and Terminals.--Conductors shall be joined by means of approved spring-type pressure connectors, crimp style terminal lugs, or by other methods approved by the Engineer. Crimp style terminals shall have continuous barrels or scams shall brazed so they shall not separate during crimping.

Finished connections and terminals shall comply with all UL requirements.

All stranded conductors smaller than number 14 AWG shall be termination in crimp style terminal lugs.

Crimp tools shall be of the type that necessitates a crimp pressure of manufacturer's required value before tool will unlock. Where splices are required to be soldered, they shall be soldered using the hot iron method with rosin core solder. Soldering with open flame will not be allowed.

All joints shall be covered with insulation equivalent to the voltage and temperature rating of the insulation on the conductors as shown on plans.

Split bolt connectors shall not be used except where specifically authorized by the Engineer.

Connectors and terminals for use with aluminum conductors shall be approved for aluminum-to-aluminum or aluminum-to-copper as required, and shall comply with all UL requirements unless otherwise approved by the Engineer.

e. Splicing.--Unless specified otherwise or permitted by the Engineer, splices shall conform to the plans. Conductor splices will not be permitted in controller cabinets. Use of terminal compartments or terminal block on standards shall not be permitted.

Splices will be permitted only in the following types of circuits at the following locations:

1. Grounded conductors and branch signal light neutrals in pull boxes.
2. Pedestrian push button conductors in pull boxes.
3. Multiple lighting and power conductors shall be spliced in a pull box adjacent to the standard.
4. traffic signal conductors shall be spliced in pull boxes on at location shown on the plans.

Ungrounded traffic signal conductors to a signal head on a standard shall be spliced to through conductors of the same phase in the pull box adjacent to the standard.

f. Splice Insulation.--Splice insulation shall be done as shown on the plans. Low voltage tape shall be UL or ETL listed and shall be as follows:

1. Self-fusing, oil and flame-resistant synthetic rubber.
2. Pressure-sensitive, adhesive polyvinyl chloride, 0.017 mm minimum thickness.

Where polyvinyl chloride tape is used for a final layer, an electrical insulating coating, compatible with the tape, shall be used. It shall be fast drying, resistant to oil, acid, alkalis and corrosive atmospheric conditions.

The Contractor may elect to use, with approval of the Engineer, one of the following splice insulation methods:

1. A minimum of 2 thickness of electrical insulating pad, posed of a laminate of 2.15 mm thickness of electrical grade polyvinyl chloride and a 3.175 mm of butyl splicing compound with removable liner. Pads Shall be applied to the splice in accordance with the manufacturer's recommendations. The applied pad shall be wrapped with polyvinyl chloride tape half lapped over the conductor insulation.
2. Heat shrinkable insulating tubing shall be applied after completing the splicing procedure shown on the plans. Insulation over the connector shall consist of a heat shrinkable, mastic lined, heavy wall polyolefin cable sleeve, or cover, to which heat shall be applied at a temperature greater than 120˚C until the sleeve or cover, shrinks and

covers the connector and the mastic material has flowed completely around the cable to form a waterproof insulation.

Where splices are below grade or exposed overhead, the insulation and taping shall be applied between the conductors in such a manner as to provide a watertight joint. The splice shall be capable of satisfactory operation under continuous submersion in water.

Multi-conductor cables shall be spliced and insulated to provide watertight joint and to prevent absorption of moisture by the cable.

g. Fused Splice Connector.--Fused splice connector shall conform with the following:

Fused disconnect splice connectors with fuses shall be installed as shown on the plans.

TRAFFIC SIGNAL COMMUNICATIONS CABLE

Cable intended for use in Traffic Signal Communication shall conform to the provisions of the National Electrical code "Communication Systems", the requirements of the Rural Electrification Administration (REA) specification: PE-89, REA Designation BFCAE, and to the requirements as herein specified:

Conductor Size: Number 22 AWG , solid
Conductor Type: Commercially pure annealed copper
Conductor Insulation, Inner: Expanded Polyethylene
Conductor Insulation Outer: Solid Polyethylene
Core: Gel-Filled with Petrolatum-Polyethylene Compound
Shield: Coated Aluminum

The conductor insulation shall be color coded per REA specifications containing more than 25 pairs shall be assembled in binder-groups. The binder groups shall be identified by spirally applied color coded non-hygroscopic binding tapes. Binder-group assemblies and binding color code shall be per REA specifications.

The outer jacket of the cable shall be black, low-density polyethylene with an ultraviolet ray blocking material to prevent damage to the polyethylene.

The cable shall be factory tested on reels for each pair's mutual capacitance, crosstalk loss, insulation resistance and conductor resistance as per REA specifications. The Contractor shall furnish a certificate report from the cable manufacturer for each cable reel showing compliance, with the REA specifications the factory test results, and the date that the cable was manufactured. Cable manufactured more than one year prior to installation shall not be used.

a. Traffic Signal Communications Cable Installation.--The Traffic Signal Communications cable shall be installed in conduit as specified Precautions shall be taken to ensure that the cable is not damaged during storage or installation. The cable shall not be stepped on by workmen nor run over by any vehicle or equipment. The cable shall not be pulled along the ground, over or around obstructions.

Cable ends shall be kept seated at all times during installation, using an approved cable end cap. Tape shall not be used to seal the cable ends. The cable ends shall remain sealed until termination takes place. Cables that are not immediately terminated shall have a minimum of 1.524M of slack. Slack defined as the length of cable extending out of the traffic signal or termination cabinet opening when the cable is held straight outward.

The cable shall enter controller and termination cabinets, as specified through existing conduit or through new conduit installed in existing or new foundations.

Approved duct seals shall be placed around the communications cable(s) in the end of each conductor.

Communication cables shall be labeled as follows:

(1) In all pull boxes, cables shall be labeled “TS-COM.”
(2) In controller cabinets and termination cabinets, cables shall be suitably labeled with location of origin and destination respectively.

Where communications cable is installed, the cable installer shall not damage the existing cables and shall exercise care during installation of equipment to provide safety to the public and to prevent damage to existing facilities. Should any damage be caused to existing cables and/or equipment, the City shall be immediately notified and repairs shall be made by the Contractor at no cost to the City.

Any existing cables shall be removed as specified in CTSP Section 86-2.09B, "Installation." All cables and other conductors to be installed in a given conduit shall be pulled into the conduit as a unit. Before installation of new cable(s), a

mandrel shall be pulled through all existing conduit and ducts to be used as specified. If the mandrel does not satisfactorily pass through the conduit, the Contractor shall rod and clean the conduit by pulling a stiff bristled wire brush through the conduit. In the event a section of existing conduit or duct is blocked or impassable, the City shall be notified immediately.

Before any communications cable installation is performed, four copies of the cable manufactures recommended and maximum pulling tensions for each cable size and type shall be provided to the City. These pulling tensions shall be specified for pulling from the cable's outer jacket. A list of the cable manufacturer's approved pulling lubricants and application guidelines shall also be provided to the City. Only these lubricants shall be permitted. These lubricants shall be harm less to conduit, duct, jackets. and insulation.

The allowable pulling tension shall be the smaller of the cable manufacturer's recommended pulling tension for that cable for pulling by the outer jacket, or 80 percent of the manufacturer's maximum pulling tension for pulling by the outer jacket. The Contractor shall ensure that the allowable pulling tension is not exceeded at anytime during cable installation by using one of the following methods, as approved by the Engineer:

(1) Pulling the cable by hand.
(2) Using a winch with an adjustable clutch for taking up the pulling line. The clutch shall be set such that the clutch slips and the winch immediately ceases taking up the pulling line, whenever the allowable pulling tension of the cable is exceeded. The proper operation of the winch/clutch assembly shall be demonstrated to the Engineer for approval prior to any cable installation, and at any time during cable installation as may be directed by the Engineer.

Cables shall be attached to the pulling line with one of the following method:

(1) For cable sizes 25 pairs or less a cable grip designee to provide a firm hold on the exterior covering of the cable and with heat shrinkable end caps placed on the cable ends.
(2) For cable sizes greater than 25 pairs - cable shall be ordered in the proper cut lengths (i.e. termination to termination distances plus additional length for terminations) with factory equipped pulling eyes.

The pulling eye/cable grip shall be attached to the pulling line by means of a "B" swivel of 19.05 mm links minimum.

To prevent damage to the cable, voice communications shall be established and maintained between the cable feeding location and the cable pulling equipment location prior to, and during all pulling operations. A qualified person shall be stationed at the "feed" end at all times during the cable pulling operation. The cable reels shall be set up on the same side of the junction box as the conduit section in which the cable is to be placed. The reel axle shall be made level and brought into proper alignment with the conduit section such that the cable shall pass from the top of the reel in a long smooth bend into the duct without twisting. The cable shall not be pulled from the bottom of the reel. The cable shall be fed by manually rotating the reel.

The cable shall not be pulled through any intermediate junction box, pull box, handhole, or any other opening in the conduit not shown on the plans unless specifically approved by the Engineer. Once the installation of a necessary length of cable to be pulled from a cabinet to the immediate next downstream cabinet begins. The cable installation shall be completed that same work day. Cable that has to be temporarily stored during the work day shall be carefully stored in a manner that is not hazardous to pedestrian or vehicular traffic, and which ensures that no damage to the cable shall occur. When cable is stored temporarily it shall be in a manner that allows that length of cable to be safely pulled into the next conduit directly from the cable reel or storage rack. Cable shall not be stored on the job site overnight unless approved by the Engineer.

The Contractor shall determine the length of cable necessary to reach from termination point to termination point. Splicing of cable at any location other than controller cabinets and termination cabinets shown on the plans is not permitted. Splicing of cable in conduit, pull boxes, junction boxes, or handholes is not permitted.

A cable feeder guide designed for the purpose shall be used between the cable reel or storage stack and the face of the duct to protect the cable, and to guide the cable into the conduit as it is paid off the reel or from the storage stack. The dimensions and set-up of the feeder guide shall be such that the cable does not bend at any location to a radius less than 10 times the diameter of the cable's outside dimensions. This minimum bending radius of the cable shall not be exceeded at any time during cable installation. The cable shall not be pulled over edges or comers, over or around obstructions, or through unnecessary curves or bends. Cables shall be looped in and out of pull boxes to provide adequate slack and the least amount of stress on conductors.

A lubricant approved for the installation, in the amount recommended by the cable manufacturer shall be used to facilitate pulling the cable. The cable shall be lubricated as it is rolled off the cable reel or storage stack into the cable feeder. An approved cable lubricator (funnel) shall be placed around the cable just ahead of the cable feeder to facilitate proper lubrication of the cable. After the cable has been installed, the exposed cable in a pull box or cabinet must be wiped clean of cable lubricant with a cloth before leaving the pull box or cabinet.

At the start of the pull, tension shall be kept on both the cable and the pulling line. As far as possible, the cable shall be pulled without stopping until the required amount of cable is at the downstream pull box or cabinet. If for any reason the pulling operation is halted between pull boxes and/or cabinets, the tension shall not be released. In restarting the pulling

operation, the inertia of the cable shall be overcome by gradually increasing the tension, in small steps a few seconds apart, until the cable is once again in motion.

b. Traffic Signal Communications Cable Terminations.--All communications cable entering controller cabinets and termination cabinets shall be terminated by the City.

c. Traffic Signal Communications Cable Testing.--The ultimate acceptance of the cables shall be determined by testing performed by the Engineer. The Engineer will perform a DC characteristics test and a signal level test. The DC characteristics test will be performed within 30 days after the installation of the cables. The signal level test will be performed after the cables are terminated and operationally complete back to the central computer. The Engineer will use the following testing specifications for performing the prescribed acceptance tests.

(1) DC Characteristics Test

a. Insulation resistance of the cable shield and all conductors shall exceed 500 megohm. Insulation resistance testing will be performed with the shield bonded to ground. Test will be between shield or ground and to each conductor and each conductor to every other conductor.
b. Continuity shall be less than 18 ohms per 304 m per one cable pair.

(2) Signal Level Test - test frequencies 1200, 1700, 2200, Hz.

a. The total attenuation at each frequency shall not be greater than 3 dB per cable mile.
b. The communications channel shall have a differential signal level less than 6 dB between 1200 and 2200 Hz.

Prior to cables being accepted, they shall meet or exceed these test values. If the cable is determined to be defective or damaged, the Contractor shall replace the cable with new cable at no cost to the State and testing shall be repeated accordingly.

BONDING AND GROUNDING

Metallic cable sheaths, metal pull box covers, metal conduit, equipment grounding conductors, ballast and transformer cases, service equipment, sign switches, anchor bolts, metal poles and pedestals shall be made mechanically and electrically secure to form a continuous system, and shall be effectively grounded.

Bonding and grounding jumpers shall be Number 8 AWG or larger copper wire o copper braid, except where bonding and grounding wire is provided as an integer part of manufacturer's splice kit and is in conformance with the Code. Equipment grounding conductors shall be color coded to Code requirements or may be bare.

Bonding of standards and pedestals with handholes shall be by means of a 9.5 mm or larger non corrosive grounding lug installed in the lower portion of the pole shaft as indicated in the plans. Standards without handholes shall be bonded by a Number 8 AWG minimum jumper, attached to all anchor bolts and run to the conduit or bonding wire in the adjacent pull box. The grounding jumper shall be visible after tile foundation cap has been placed on the foundation.

Where a pull box is located adjacent to the standard the grounding electrode shall be driven in the pull box. Grounding electrodes in foundations shall be set obliquely through the foundation and shall extend above the finish foundation sufficiently to attach a ground clamp and bare copper wire ground conductor. Ground rod identifying marks shall be visible. Both the bolt and ground rod clamp shall be visible from the door or handhole.

Grounding of metal conduit, service equipment and the grounded conductor at service point shall be accomplished as required by the Code and the serving utility except that the grounding electrode conductor shall be Number 6 AWG minimum for Type III service cabinets and Number 8 AWG minimum for all other service types.

Bonding to grounding electrodes shall be by use of UL approved ground clamps or as approved by the Engineer.

A Number 8 AWG or larger stranded copper equipment grounding conductor shall be provided in all conduits carrying traffic signal and/or streetlight conductors. The equipment grounding conductor shall not be required under the following conditions:

(1) Where a conduit is to be left empty for future use, provided that the conduit is terminated in pull box(es) that do not have metallic covers or components.
(2) Where a conduit contains only detector lead-in cable(s) and/or signal communication cable(s) provided that the conduit is terminated in pull box(es) that do not have metallic covers or components.

The equipment grounding conductors shall be bonded in accordance with thePlans.At each multiple service point and at each pole or within 3 m of each pole a grounding electrode shall be furnished and installed.

Grounding electrodes shall be 15 mm round x 3 m copper clad or 19 mm x 3 m galvanized steel rod; resistance to ground shall not exceed 25 Ω. Grounding electrodes shall be installed in accordance with the provisions of the Code.

On wood poles, all metallic equipment mounted less than 2.43 m above ground surface shall be grounded.

Bonding of metallic conduit shall be by means of galvanized or bronze grounding bushings and bonding jumpers.

Bonding of metallic conduit in steel pull boxes shall be by means of lockouts one inside and one outside of the box.

SERVICE

The conductors between the service equipment and the utility company service connection point shall be continuous and shall not be spliced. When these conductors pass through pull boxes, they shall be looped one complete loop in the pull box following the perimeter of the pull box tightly before exiting.

The Contractor shall install pull boxes, conduit and conductors between the utility company service point and the service equipment. Where the service point is a utility-owned pole, the Contractor shall install a 53 mm service conduit riser up the pole 254 mm above grade in the quadrant assigned by the serving utility company and shall also install a pull box at the base of the utility pole in accordance with the utility company requirements.

Service cabinets and related equipment shall be UL listed as suitable for use as service equipment.

Service equipment enclosures shall be "Type III M" (metered), suitable for outdoor installation, NEMA 3R construction and shall conform to the provisions of CTSP Section 86-1.02. "Regulations and Code." Equipment enclosures shall be fabricated from cold rolled sheet steel, 12 gauge exterior, 14 gauge interior, welded by the wire fed inert gas process. All welds shall be around smooth. Doors shall be padlockable and vandal resistant. Door hinges shall be continuous stainless steel piano type. No screws, rivets, or bolts shall be visible outside the enclosure. Measurements of the enclosure shall conform to those shown on the plans. Inside dead-front door and back panel shall be white.

Service Cabinet Painting.--All controller cabinets shall be painted City of San Jose approved white.

The controller cabinets shall have a minimum of 3 mils of an aliphatic urethane self priming color coat followed by a minimum of 1 mil aliphatic urethane Wasser Mc-Antigraffiti clear coating or an approved equivalent. Use over a phosphatized treated or abraded surface. All coatings shall be compliant to the current VOC requirements.

Each service equipment enclosure shall be factory pre-wired conforming to the plans and specifications and delivered to the job site ready to bolt to the foundation and connect to service and load wires. The Contractor shall furnish 3 sets of wiring diagrams showing location and describing components and wiring connections. One set shall be scaled in plastic and attached to the inside of the cabinet door.

Circuit breakers shall be installed in dead-front panels. For service cabinets, which have both unmetered and metered sections, provide a separate main disconnect means for the metered and the unmetered service sections of thc cabinet. Service disconnecting means shall be designed to disconnect all undergrounded conductors simultaneously.

Service equipment enclosure wiring shall conform to NEMA class II C. Wiring troughs shall be provided in thc enclosure as necessary. Control wiring shall be 7 strand copper, Number 14 AWG with type TW insulation, except for hinge wiring, which shall be 19 strand copper, Number 14 AWG with type THWN insulation. Wiring shall be arranged so that any piece of apparatus. All wiring shall be marked with permanent clip sleeve wire markers, felt, pencil, or stick back marker will not be acceptable.

The nameplates shall be phenolic, black background with white lettering except main breaker(s) which shall be red with white lettering. If an alternate design is proposed for the service equipment enclosure, plans of such design shall be submitted to the Engineer for review and approval.

For service cabinets which have both unmetered and metered sections, provide a separate main disconnect means for the metered and unmetered service sections of the cabinet. Service disconnecting means shall be designed to disconnect all ungrounded conductor simultaneously.

Service equipment enclosure wiring shall conform to NEMA class II C. Wiring troughs shall be provided in the enclosure as necessary. Control wiring shall be 7 strand copper, Number 14 AWG with type TW insulation except for hinge wiring, which shall be 19 strand copper, number 14 AWG with type THWN insulation. 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. All wiring shall be marked with permanent clip sleeve wire markers. Felt, pencil or stick markers will not be acceptable.

The name plate shall be phenolic, black background with white lettering except main breaker(s) which shall be red with white lettering. If an alternate design is proposed for the service equipment enclosure, plans of such design shall be submitted to the Engineer for review and approval.

PAINTING

All service and controller cabinets and Ornamental Lighting Standards shall be painted.

Two applications of painting shall be applied to the equipment mentioned above.

The Contractor shall submit 4 color samples to the Engineer for approval. The samples shall be of the same shape as the light pole or cylindrical, approximately 300 mm diameter and 600 mm long, and made of the surface material and coated as

specified in these special provisions for the light pole. The samples will be used to demonstrate the final finish and color that complies with the plans and specifications. After reviewing the sample, the Engineer may change the color if deemed necessary. The Contractor shall not order the poles until the color are approved by the Engineer.

The Contractor shall allow 3 weeks for the Engineer to review the color samples.

The ornamental pole, cross arm assembly, arm support shall be finished with a fused coating of electrostatically applied polyester powder paint conforming to "Powder Coating" elsewhere specified in these special provisions. The finish coating shall be dark green conforming to Color No. 24108 of Federal Standard 595B.

Reused equipment previously finished as specified in CTSS Section 86-2.16 except for galvanized standards shall be given a spot finishing application on newly primed areas, followed by one finishing application over the entire surface.

Equipment number shall be applied to standards through the use of adhesive labels in accordance with the details indicated in "Standards" elsewhere in these special provisions, after all finish painting or galvanizing has been formed. The number designation will be by the Engineer.

CONTROLLER ASSEMBLIES

Traffic Signal Controller/Cabinet Assemblies

The Contractor shall furnish the controller/cabinet assemblies required on this project.

The traffic signal controller/cabinet assemblies shall be IDC Traconex Multisonics Model 28025225-004 or an approved equivalent. Assemblies shall conform to the specifications contained herein.

If the Contractor proposes to supply IDC Traconex MulitsonicsModel 28025225-004 traffic signal controller/cabinet assemblies, all required assemblies shall, within 60 calendar days of the award of contract, be delivered to the Department of Transportation Signal Maintenance Section located at 1404 Mabury Road.

If the Contractor proposes to supply traffic signal controller/cabinet assemblies other than IDC Traconex Multisonics Model 28025225-004, City approval will be required. In such event, the Contractor shall, within 60 calendar days of the award of contract, deliver to the Department of Transportation's Signal Maintenance Section a sample assembly for evaluation. The City will notify the Contractor of the results of its evaluation of the sample assembly within 15 calendar days of its receipt by the City.

Should the sample assembly be approved by the City, the Contractor shall, within 60 calendar days of notification, deliver to the City the balance of the assemblies required under the contract.

Should the sample assembly not be approved by the City, it will be returned to the Contractor. The City may then, at its option, either revoke the bid item for the traffic signal controller/cabinet assemblies or require the Contractor to submit an alternative sample assembly. This procedure may be repeated as many times as necessary until an approved assembly is submitted. The price paid for the approved assemblies shall be that of the original bid item price. Any additional product cost incurred between the initial submittal and the ultimately approved controller/cabinet assemblies shall be borne by the Contractor.

When all required traffic signal controller/cabinet assemblies have been received, the City will test the assemblies and prepare them for installation as outlined below.

The Contractor shall furnish anchor bolts and shall construct the foundations for the cabinets. The Contractor shall, upon notification of completion of testing, pick up the empty cabinets (minus controllers and auxiliary equipment) from the Department of Transportation's Signal Maintenance Section. The Contractor shall deliver the cabinets to the job site, install them on the foundations and make all field wiring connections to the terminal blocks. City forces will, immediately prior to signal activation, deliver the controllers and auxiliary equipment to the job site and install them in the cabinets.

Type 'P' Cabinet Specifications

Description of Cabinets - The traffic signal controller cabinets shall be wired for eight phases, such that they are compatible with NEMA Type 90 controllers. Cabinets shall be provided with all auxiliary equipment necessary for eight-phase operation including conflict monitor, flasher, flash relays, detectors and load switches. Typical cabinets can be inspected by contacting the Electrical Maintenance Foreman, at (408) 277-5515.

Cabinet wiring shall conform to all applicable parts of section 86 of the State of California 1988 Standard Specifications and these Special Provisions. In the event of a conflict between the Standard Specifications and these Special Provisions, these Special Provisions shall apply.

Component designations refer to the City of San Jose "P" cabinet Load Bay Assembly drawing. All wiring shall be in accordance with this drawing, except as required for system interface termination panel.

Each cabinet shall be furnished with a system interface termination panel installed as described in these Special Provisions.

Wiring - Flat ribbon type cable shall not be used in lieu of individual conductors for any of the cabinet wiring.

All conductors used in the cabinet shall be at least No. 22 AWG, with a minimum of 19 wire strands. These conductors shall meet military specification MIL-W-16878D type BN. Conductors larger than No. 14 AWG may be UL type THHN, with a minimum of 7 copper strands.

Two No. 10 AWG conductors will supply AC power to the load switch sockets.

The load switch sockets shall be supplied alternately (every other socket) by each conductor.

All cabling and wiring shall be neat, firm and routed to minimize electrical interference. Whenever possible, DC signal conductors shall be separate from AC wiring.

All unsoldered terminations shall be labeled with the proper terminal number.

Whenever more than two unsoldered terminations occur at the same point, appropriate stacking terminals shall be used.

All termination points on the terminal blocks shall be labeled with the designation on the cabinet wiring drawing. This can be done by either engraved strips mounted on the terminal blocks or silk-screening these designations next to the terminal blocks. All labeling shall be visible after wiring is installed.

All conductors, terminals or parts which could be electrically hazardous to maintenance personnel shall be protected with suitable insulating material.

There shall be no conflict monitor disabling switch installed.

Each cabinet shall have a separate door-actuated switch (SW24) that will monitor and report to the controller the status of the cabinet door, open or closed.

Sub-Assemblies

General - All wiring and harnesses entering or leaving these sub-assemblies shall be jacketed in cloth or other suitable material.

All terminal strips shall be mounted on metal plates of a minimum 0.13 inch thickness. All terminal strips, with the exception of the feed-thru for terminals 249-260, shall be the dual-inline barrier-type with two terminal positions and a shorting bar per pole.

All dual in-line terminal strips, except for those noted on the print with solid black dots, shall have links between the A and B sides.

Power Sub-Assembly

Material:

1) 1 ea. 50 Amp Circuit Breaker (CB-1)
2) 1 ea. 15 Amp Circuit Breaker (CB-2)
3) 1 ea. 50 Amp Suppressor (RIS)
4) 1 ea. Mercury Contactor (MC)
5) 1 ea. Surge Suppressor
6) 1 ea. MOV, GE-v130LA, 20 Amp
7) 2 ea. Copper Bus (GB-1,GB-2)

GB-1 shall be insulated from the panel and the controller cabinet. GB-2 shall be bonded to the cabinet. Both bus bars shall be 6.875" x 0.5" x 0.25" inches solid copper. Bus bars shall be drilled and tapped to accept a minimum of 12, 10/32X1" inch truss head screws. These screws shall be provided as part of the sub-assembly.

The Power Panel and associated components shall have a transparent, easily removable cover over the face, top and sides to prevent accidental contact with energized electrical parts. The cover shall be at least 0.125 inches thick. The cover shall not interfere with the normal operation of any components and shall not inhibit visual confirmation of the operational status of the breakers.

All wire terminations shall be visible for maintenance inspection without the removal of any components or covers.

All breakers shall have a minimum interrupting capacity of 10,000 amperes, RMS.

Fan and Light Sub-Assembly

Material:

1) 1 ea. Terminal Block, 4 position, medium duty
2) 1 ea. Dual Fuse Block
3) 2 ea. 1 Amp Fuse, AGC-1
4) 1 ea. Thermostat, Therm-O-Disk AF-1 or equivalent

5) 2 ea. RC Network, Rifa PMR-2022 or equivalent
6) 1 ea. 15 watt Fluorescent Fixture, with rapid start lamp and ballast.
7) 1 ea. Fan, Rotron # 028-021 or equivalent
8) 1 ea. Pushbutton Door Switch (SW23)

The cabinet light fixture shall be located so that the detector amplifiers on the top shelf of the controller cabinet are accessible and easily removed.

The door switch (SW23) shall be mounted on the cabinet so that complete closure of the cabinet door shall actuate it, turning off the cabinet light.

The fan shall be located on the mountings provided in the cabinet. The fan shall be positioned such that air will be exhausted from the cabinet.

Test/Police Panel Sub-Assembly

Material:

1) 16 ea. Pushbutton Switches (SW7-22)
2) 2 ea. SPDT Switch, on-on (SW4-5)
3) 1 ea. DPDT Switch, on-on (SW2)
4) 1 ea. SPST Switch, on-off-on (SW3)
5) 1 ea. DPDT Signals Switch, on-off (SW1)
6) 2 ea. SPST Door Switch, Momentary Normally Closed (SW23-24)

The following switches shall be rated at a minimum of 6 amps at 125 volts: SW7-22, SW3.

The following switches shall be rated at a minimum of 15 amps at 250 volts: SW1-2, SW4-5.

The following switches shall be rated at a minimum of 6 amps at 125 volts and shall have a minimum of 1/4" overtravel: SW23, SW24.

The Test/Police panel sub-assembly shall be located directly behind the cabinet police door. All devices shall be labeled with the identification on the load bay assembly print using epoxy ink silk-screening.

All switches in the police and maintenance panel shall be individual switches. They shall be hand wired and the wires shall be directly soldered to the switches.

Detector Panel Sub-Assembly

Material:

1) 9 ea. 12 position terminal strip, Marathon #1512DJ or equivalent
2) 1 ea. Copper Bus (GB-3)

GB-3 shall be mounted on the lowest detector terminal panel. A No. 12 AWG copper conductor shall be used to connect GB-2 with GB-3. GB-3 shall be constructed the same as GB-1 and GB-2.

Detector Rack Sub-Assembly - All Detectors shall be rack mounted NEMA type TS1-1989 Section 15.2.28.3 and shall conform to the rest of NEMA standards for Traffic Control Systems, Publication TS1- 1989 Section 15.

Each "P" cabinet shall be capable of a minimum of 36 channels of detection, (24 vehicle detectors and 12 system detectors). This shall be accomplished through three detector racks. Detector racks No. 1 & 2 shall be for vehicle call detectors and pedestrian calls. Detector rack No. 3 shall be for system detectors and pre-emption .

The racks shall be securely mounted on the top cabinet shelf, in the following order viewed from the front of the cabinet, from left to right, detector rack No. 1 - 2 - 3.

Each detector rack shall be constructed and wired to accommodate any arrangement of two and four channel detector modules totaling a minimum of 12 detector channels. Also racks No. 1 & 2 shall have 4 channels for pedestrian calls. And rack No. 3 shall have two channels of pre-emption, one for RR1 and one for EV1.

Detector racks No. 1 & 2 shall be wired to accommodate phase green signal conditioning as required by delay or extension timing type detectors.

All the wiring to the detector racks shall be plug removable.

Detector rack sockets shall be hand wired and not printed circuit board mounted. The wires between the terminal block and the sockets shall have a minimum of three twists per foot to eliminate interference.

The connectors for the programming card, detectors, 244 isolation module, 252 isolation module, shall mate with a 44 terminal, double row, 0.156 inch contact spacing, Cinch-Jones card edge connector #50-44a-30M, or equivalent.

The card guides shall conform to the State of California Standard Specifications section 86-3.09. In detector racks No. 1 & 2 the extreme right position in the rack as viewed from the front shall be constructed and wired for a 244 four channel DC isolation module. The four channels shall be wired to the following.

RACK NO. 1

Channel 1 = Ped call phase 2
Channel 2 = Ped call phase 4
Channel 3 = Ped call phase 6
Channel 4 = Ped call phase 8

RACK NO. 2

Channel 1 = Ped call phase 1
Channel 2 = Ped call phase 3
Channel 3 = Ped call phase 5
Channel 4 = Ped call phase 7

In detector rack No. 3 the extreme right position in the rack as viewed from the front shall be constructed and wired for a 252 two channel AC isolation module. The two channels shall be wired to the following.

RACK NO. 3

Channel 1 = RR1
Channel 2 = EV1

A detector programming card shall be provided and used in detector racks No. 1 & 2. The program card shall occupy the extreme left (Slot No. 1) position in each rack as viewed from the front.

The program card shall be constructed so any of the detector outputs for the detector rack can be wired to any of the controller vehicle detector inputs by installing soldered wire jumpers on the program card. In addition, any detector channel's Delay/Extension enabling input shall be able to be wired to any vehicle phase green output driver from the controller by installing soldered wire jumpers on the program card.

DETECTOR RACKS No. 1 & 2 PROGRAM CARD PIN USAGE

Pin	Functions
1	Controller phase 1 vehicle call detector input
2	Controller phase 2 vehicle call detector input
3	Controller phase 3 vehicle call detector input
4	Controller phase 4 vehicle call detector input
5	Controller phase 5 vehicle call detector input
6	Controller phase 6 vehicle call detector input
7	Controller phase 7 vehicle call detector input
8	Controller phase 8 vehicle call detector input
9	Phase 2 vehicle green output driver from controller
10	Phase 6 vehicle green output driver from controller
11	Detector rack slot 2 channel 1 DEL/EXT enable input
12	Detector rack slot 2 channel 2 DEL/EXT enable input
13	Detector rack slot 3 channel 1 DEL/EXT enable input
14	Detector rack slot 3 channel 2 DEL/EXT enable input
15	Detector rack slot 4 channel 1 DEL/EXT enable input
16	Detector rack slot 4 channel 2 DEL/EXT enable input
17	Detector rack slot 5 channel 1 DEL/EXT enable input
18	Detector rack slot 5 channel 2 DEL/EXT enable input
19	Detector rack slot 6 channel 1 DEL/EXT enable input
20	Detector rack slot 6 channel 2 DEL/EXT enable input
21	Detector rack slot 7 channel 1 DEL/EXT enable input
22	Detector rack slot 7 channel 2 DEL/EXT enable input

A	Detector rack slot 2 channel 1 detector output
B	Detector rack slot 2 channel 2 detector output
C	Detector rack slot 3 channel 1 detector output
D	Detector rack slot 3 channel 2 detector output
E	Detector rack slot 4 channel 1 detector output
F	Detector rack slot 4 channel 2 detector output
H	Detector rack slot 5 channel 1 detector output
J	Detector rack slot 5 channel 2 detector output
K	Detector rack slot 6 channel 1 detector output
L	Detector rack slot 6 channel 2 detector output
M	Detector rack slot 7 channel 1 detector output
N	Detector rack slot 7 channel 2 detector output
P	Unassigned
R	Unassigned
S	Unassigned
T	Unassigned
U	Phase 1 vehicle green output driver from controller
V	Phase 3 vehicle green output driver from controller
W	Phase 4 vehicle green output driver from controller
X	Phase 5 vehicle green output driver from controller
Y	Phase 7 vehicle green output driver from controller
Z	Phase 8 vehicle green output driver from controller

The program card shall be compatible in regard to the physical dimensions and card connector pin usage with the program cards presently used by the City of San Jose. The following is a list of the Program Card Pin Usage.

In detector rack No. 3, no program card shall be required. Instead, the detector outputs shall be wired to the system interface termination panel as follows:

Detector Rack Position	System Detector Number
Slot 2/Channel 1	1
Slot 2/Channel 2	2
Slot 3/Channel 1	3
Slot 3/Channel 2	4
Slot 4/Channel 1	5
Slot 4/Channel 2	6
Slot 5/Channel 1	7
Slot 5/Channel 2	8
Slot 6/Channel 1	9
Slot 6/Channel 2	10
Slot 7/Channel 1	11
Slot 7/Channel 2	12

DETECTOR RACK AUXILIARY POWER SUPPLY

The power supply shall be plug removable and shall have a MS3106A-18-1P connector.

Pin Assignments

A	Chassis ground
B	-24 VDC logic ground
C	AC + 120 volts, Hot
G	+24 VDC output
H	AC - 120 volts, Neutral

The power supply shall be series-regulating type. It shall provide positive 24 (+ 0.5) volts DC output with one (1) % regulation or better over an AC line voltage variation from 95 to 135 volts and from no-load to full-load. Current capability

shall be a minimum of four (4) amperes continuous, and with less than 0.5 volts peak-to-peak ripple. It shall be fused and the fuse shall be located on the power supply. It shall be possible to replace the fuse without removing the case.

Loadbay Sub-Assembly

Material:

1) 9 ea. 20-Position feed-thru terminal strip, Kulka #601-2104-20 or equivalent
2) 4 ea. 12-Position terminal strip, Marathon #1512DJ or equivalent
3) 1 ea. 12-Position feed-thru terminal strip, Kulka #601-2104-12 or equivalent
4) 1 ea. 12-Position feed-thru single line terminal strip, Kulka #1691A
5) 14 ea. 12-Position socket, Beau #S-4412AB or equivalent
6) 5 ea. 8-Position socket, Beau #S-4408AB or equivalent
7) 1 ea. 6-Position socket, Beau #S-4406AB or equivalent
8) 2 ea. 8-Position round socket, for KRP type relay
9) 1 ea. RC Network, Rifa PMR-2022 or equivalent

Controller cabinet Type P shall have a minimum of 14 load switch positions.

The loadbay sub-assembly shall be mounted in the cabinet so as to allow easy access to the back of the panel. The loadbay shall be fastened with hinges near the bottom rear of its point of attachment to the cabinet. It shall be possible, by removing no more than two fasteners at the top of the loadbay, to swing the loadbay downward and gain access to the rear of the loadbay and its wiring.

A support for the 14 load switches and flasher shall be provided. The controller and conflict monitor harnesses shall have the appropriate connectors for a standard NEMA Type 90 controller (A,B,C) and NEMA Type 12 conflict monitor (CM-1,CM-2).

All controller harnesses shall be wired to terminal blocks on the loadbay assembly. All wiring, with the exception of the field wiring shall be done on the rear of the assembly.

The conflict monitor (Green, Yellow, Red, Walk) wiring shall be wired to the field wiring terminals.

All equipment connecting cables shall have full length conductors on each connector pin, and all unused or spare conductors shall be labeled with the connector origin and appropriate pin designation.

Convenience Receptacle - The convenience receptacle shall be a duplex receptacle GFCI 20 amp specification grade minimum. The receptacle shall be mounted in a readily accessible location inside the right lower half of the cabinet.

Filter - Filter size shall be 12" x 16" x 1". The filter media shall be self-extinguishing non-woven cotton and synthetic fibers. The media shall be bonded to a 28 gauge corrosion resistant, expanded metal support grid with a 95% open face area.

The media grid shall be bonded to the "high wet strength" beverage board frame. There shall be a minimum of 12 pleats per lineal foot, and shall contain not less than 1.6 square feet of effective filtering media per foot of face area.

Filters shall have a rated efficiency of 30 to 35% and an average arrestance of 90-93%.

Cabinet Construction and Painting - All controller cabinets shall be aluminum and shall be painted City of San Jose approved white.

The controller cabinets shall have a minimum of 3 mils of an aliphatic urethane self priming color coat followed by a minimum of 1 mil aliphatic urethane Wasser Mc-Antigraffiti clear coating or an approved equivalent. Use over a phosphatized treated or abraded surface. All coatings shall be compliant to the current VOC requirements.

Prints - Each cabinet shall be supplied with two complete sets of cabinet prints and necessary drawings, schematics and manuals. After the completion of testing and the installation of the cabinets, the contractor shall supply two complete corrected sets of cabinet prints, drawings, schematics and manuals of any of the changes made to any of the equipment. The contractor shall supply a mylar master of the corrected cabinet prints.

System Interface Termination Panel Specifications

General - Facilities shall be provided in each controller cabinet for termination of communications and interface connections as required for system operation. These terminations shall be made on a separate panel which shall be furnished and installed in cabinets provided under this contract.

Each termination panel provided shall include all wiring harnesses necessary for connection to the controller's system interface connector(s), and any other wiring from the controller that is not part of the standard NEMA A, B, and C harnesses.

A panel layout indicating all required facilities and panel size is shown in Figure 1. Prior to fabrication of these panels, shop drawings shall be submitted by the Contractor and approved by the City.

System Interface Terminations - The termination panel shall have provisions for termination of all interface signals external to the controller. These shall include, but not be limited to, the following:

System Detector 1	System Detector 2
System Detector 3	System Detector 4
System Detector 5	System Detector 6
System Detector 7	System Detector 8
System Detector 9	System Detector 10
System Detector 11	System Detector 12
System Special Function 1 (In)	System Special Function 1 (Out)
System Special Function 2 (In)	System Special Function 2 (Out)
Modem Transmit (Tip)	Modem Transmit (Ring)
Modem Receive (Tip)	Modem Receive (Ring)
Modem Transmit Data	Modem Receive Data
Modem Request-to-Send	Modem Clear-to-Send
Modem Carrier Detect	Local Special Function 1
Local Special Function 2	Local Special Function 3
Cabinet Door Switch	Cabinet Flash Monitor
Conflict Flash Monitor	Logic Common (Gnd)

Communication Terminations - In addition to the system interface terminations, the panel shall have provisions for communications terminations. The panel shall include a 50-position 66-block for communications cable termination/splicing, surge protection for the active data and voice pairs, barrier strip termination of all active pairs, and two voice jacks.

Construction

Panel - The termination panel backplate shall be constructed of 5052 sheet aluminum alloy with a minimum thickness of 0.125." The backplate shall be prepared from a single sheet of material. No seams or joints of any kind will be permitted. All edges and holes shall be smooth and free of burrs. The backplate shall be painted as described for the cabinet interior elsewhere in these Special Provisions. The backplate will be drilled as necessary to mount the barrier strips and other attachments.

Screw-Type Terminal Blocks - All system interface terminations shall be made on terminal blocks mounted on the termination panel. The terminal blocks shall be dual in-line barrier type, with two terminal positions and a shorting bar per pole. All terminal blocks shall be provided with nickel, silver or cadmium plated brass binder head screw terminals on 7/16" centers. All terminal blocks shall have a closed back design to prevent accidental contact with the panel backplate.

Quick-Clip Terminal Blocks - The communications cable terminal block shall be a 66-type connecting block with quick clip connections. The block shall have side mounting ears to minimize the height of the block. The block shall be sized 50 rows by 6 clips, with the clips split electrically and mechanically into two sets of three clips in each row

Fifty (50) bridging clips shall be supplied with each block (not installed).

Surge Protection Modules - The surge protection modules shall be the EDCO PC-642 or approved equivalent with associated mounting sockets. Each module shall provide protection for two pair. One module shall be provided the active data communications pairs and one module shall be provided for the voice pairs.

The data pair modules shall provide two-stage protection with a clamp voltage of 8 volts and a line-to-line second stage clamp. The voice pair modules shall provide single-stage gas tube protection with a clamp voltage of 240 volts.

The surge protector mounting bases shall be wired on the panel for the appropriate terminal, harness, and voice jack connections.

Voice Communication Jacks - Two voice communications jacks shall be provided on each panel. The jacks shall accept standard 0.25" phone plugs and shall have silver-plated contacts. The jacks shall be mounted such that the tip and ring of each jack are isolated from ground. The jacks shall be enclosed with a molded body. The jacks shall be prewired to the appropriate terminals for connection to the surge-protected voice pairs.

Terminal Identification - All terminals shall be labeled as to signal and/or function, using black enamel in a silk-screen process upon a properly prepared panel surface. The legends shall be in alignment with the terminal strips, and shall consist of block letters at least 0.1" in height.

Wiring Specifications - All wiring used on the termination panel and in the harnesses shall comply with the minimum requirements for cabinet wiring contained elsewhere in these specifications.

Signal Controller Specifications

Solid State Traffic Actuated Controllers - Solid state traffic actuated controller units shall conform to the Standard Specifications and these special provisions.

A. Integrated circuit components, excepting those on the front panel of the controller unit, shall be socket mounted. Direct mounting of these components to any other printed circuit board is not acceptable. All IC mounting sockets shall be machined, not stamped. All printed circuit boards shall be conformal coated. Solder mask is not acceptable as "conformal coating."

B. Circuits, components and software shall exist in the unit to allow for full expansionability, including, but not limited to, internal coordination, internal time based coordination, internal preemption, detector data acquisition from up to 16 local detectors.

C. The unit shall incorporate and include an internal 202, 1200 Baud rate, two channel communications modem. Both channels of communication will be active during normal controller operation.

D. Printed circuit board connectors shall be of the DIN type and conform to Mil C 55302. They shall be located so that it shall not be possible to insert the module upside down.

E. The controller housing shall consist of a two-piece die cast "NORYL" high impact plastic case separable by use of a screwdriver.

F. The controller shall be capable of providing the following on a per phase basis:

   a. All NEMA intervals and operations.

   b. Conditional Service.

   c. Four programmable overlaps.

   d. Soft recall, dimming by color, by phase, and by selectable percentages.

   e. Two Separate Max timings per phase plus conditional minimum timing during conditional service, plus coordination MAX timing during coordination.

   f. Dynamic Split Adjustment (DSA)

   g. Front panel selectable NEMA overlaps with auxiliary timing.

   h. Detector delay or extension functions as well as system detector disconnect functions shall be internally programmable in the controller.

G. The controller shall have the following capabilities when operating as a local controller in a system mode.

   a. The unit shall revert to standby back-up coordination which will be enabled after two consecutive invalid commands from the master.

   b. The back-up coordination parameters will be stored in the time of day plans, (TOD).

   c. The unit shall revert back to system control upon receipt of two valid commands from the master.

H. The controller shall have an integral traffic surveillance capability as a standard feature.

I. The controller shall be capable of monitoring the operation of system detectors and storing the failure data for system retrieval.

J. Controller unit shall have a selectable feature that shall enable termination of a phase by NEMA phase maximum timer rather than by phase split division while operating in coordinated mode.

TRAFFIC SIGNAL FACES AND FITTINGS

Traffic Signal Equipment.--Traffic signal equipment shall include the traffic signal head (vehicular and pedestrian) consisting of an assembly containing one or more signal faces together with optical units, the assembly housing, mountings, and other appurtenant devices.

Signal assemblies shall meet the requirements of the latest edition of FM Publication "Adjustable Face Vehicular Traffic Control Signal Heads," in addition to the requirements contained herein.

Vehicle Signal Faces.-- The type of mountings to be used shall be as indicated on the Plans.

Signal sections shall be metal. Plastic signal sections shall not be allowed. Vehicle signal heads mounted on mastarms shall have 300 mm sections. Vehicle signal heads for left turn indications shall have all 300 mm arrows.

Signal faces shall be the adjustable, colored light, vertical type with the number and type of lights (faces) shown on the plans. Each signal face shall provide an indication in one direction only.

Optical Units.--Each reflector, lens, and hood shall be designed in such a manner as to reduce sun phantom to a minimum. The lens design shall produce high illumination transmission, and outward and downward distribution, with minimum of light distributed above the horizontal. Lamp receptacle openings in reflectors shall be designed so that there will be no dark spots cast on the lens.

LED Modules and lamps for signal assemblies shall be State-furnished as provided under "Materials" of these special provisions.

Signal Sections.--Each signal section housing shall be either die-cast or permanent mold-cast aluminum conforming to ANSI Standard: D-10.1. Plastic signal sections shall not be used.

Each signal section shall be constructed in such a manner that structural failure of the housing will not occur with a wind load pressure of 70 kg per square meter on the projected area of the complete signal face housing, including back plate and visors.

A sample, consisting of a complete signal section assembly, with the optical unit. shall be submitted for testing prior to acceptance of any design or fabrication method not previously tested and accepted by the City.

The signal face housing, or case shall consist of an assembly of separate interchangeable sections, expansible type for vertical mounting without tie rods, substantially secured together in a water tight manner to form a unit. Each section shall house an individual optical unit.

Each section shall be complete with a one-piece, hinged door mounting for the lens and other parts of the optical system, watertight gaskets, and simple door locking device. The optical system shall be so mounted that the various parts may be swung open for ready access or removal. The sections shall be interchangeable and so constructed that sections can be removed or added.

Electrical Components.--Lamp receptacles shall have a heat resistant molded phenolic housing and shall be designed to accommodate standard traffic signal lamps, ANSI Designation A21 or P25. The lamp receptacle shall be capable of positioning the lamp at the exact focal point of the reflector. The lamp receptacle shall provide proper lamp filament orientation without affecting lamp focus.

The lamp receptacle conductors shall be connected to the shell of the lamp receptacle by an approved mechanical method. Solder shall not be used for the only means of conductor attachment to the lamp receptacle shell.

Visors.--Each signal section shall be provided with a removable metal visor conforming to ANSI Standard D-10.1. Plastic visors shall not be used.

Backplates.--Metal backplates shall be furnished and installed on all vehicle signal faces. Plastic backplates shall not be used.

Backplates shall be constructed of 5052-H32 aluminum alloy sheet 1.3 mm minimum thickness, and of the dimensions shown on the plans.

Pedestrian Signal Faces.--Pedestrian signal faces shall be type A. Type B and C shall not be used.

a. Type A.--Each message plate shall be one piece and shall be made of 4.7 mm tempered glass. Polycarbonate plastic shall not be used. Lamps for pedestrian signal assemblies shall be incandescent, ANSI Designation A21, suitable for horizontal operation with medium base, 130-volt, 8,000 hour rated life, clear traffic signal lamps with an initial rated output of 685 lumens.

b. Front Screen.--A front screen shall be provided on each Type A signal face. The front screen shall be of the 41 mm deep eggcrate or Z-crate type. Aluminum honeycomb screens shall not be used. The screen and frame shall be fabricated from aluminum anodized flat black or finished with flat black enamel Flat black plastic shall not be used.

Signal Mounting Assemblies.--Signal mounting assemblies shall conform to CTSP 86-4.06 Signal Mounting Assemblies. All mounting assemblies shall be painted as specified in"Painting" elsewhere in these specifications.

DETECTORS

Vehicle Detectors.--Circuitry shall be solid state including the output circuit. Relays shall not be used. The detector delay/extension enable circuit, when activated with a "low" state voltage, shall inhibit the delay detector operation.

Splices shall be insulated by City Street method C handcrafted insulation only. Methods A and B shall not be used.

Detector lead-in cables shall be continuous without splices, from the controller cabinet detector panel terminal block to the loop termination pull box.

Construction Materials.--Conductors for inductive detector shall be continuous and unspliced and shall be Type 1 loop wire. Type 2 loop wire shall not be used. Loop detector lead in-cables shall be Type B, unless specified otherwise.

Installation Details.--Installation and testing shall conform to the details and notes shown in the plans, CTSS Section 86-2.14 "Testing " and these specifications.

Unless specified otherwise, each loop shall consist of the number of turns of conductor as shown in the plans and shall be constructed of the material as specified in CTSS Section 86-5.O1A(4), "Construction Materials."

All detectors to be installed in the structure, shall be preformed loops.

For detectors to be installed in the ground, sawcut slots shall be cut into the pavement to the depth and width shown on the plans and at the location laid out by the Engineer. Sawcuts shall be overlapped at all corners so that slots are full depth at the corners. The bottom of the sawcut slots shall be smooth and even.

After conductors are installed in the slots cut in the pavement, 4 mm strips of diameter foam backer rod shall be inserted in the slot over the loop wires, spaced as necessary, but not more than 1.52 meters apart to prevent the loop wires from rising up in the slot when the slots are being filled with sealant. The slots shall be filled with sealant to within 3.1 mm of the pavement surface. The sealant shall be a minimum of 35 mm thick above the top conductor in the slot. Conductors in asphalt concrete pavement and within 1.2 meters of the lip of the gutter shall have a minimum cover of 78 mm. Before setting, surplus sealant shall be removed from the adjacent road surfaces without the use of solvents. The sealant for filling slots shall conform to the following:

a. Elastomeric Sealant.--Elastomeric Sealant shall conform to the requirements of CTSS Section 86-5.01A(5) "Installation Details". Elastomeric sealant shall be used only in Portland Cement concrete.

b. Asphaltic Emulsion Sealant.--Asphaltic Emulsion Sealant shall conform to the requirements of CTSS Section 86-5.01A(5), "Installation Details".

Loop conductors shall be installed without splices and shall terminate in the pull box indicated on the Plans. The loop conductors shall be spliced to the lead-in cables in the termination pull box adjacent to the loops. Each loop shall be provided with its own detector lead-in cable. Detector lead-in cables shall be continuous without splices between the loop termination pull box and detector panel terminal block in the controller cabinet. The shield and drain wire of the detector lead-in cable shall be grounded in the traffic signal controller cabinet only.

The start (S) and finish (F) conductors of each loop shall be permanently labeled with a (S) on the start conductor and a (F) on the finish conductor and then grouped together as a pair. The start (S) loop conductor shall be spliced to the black conductor in the lead-in cable and the finish (F) loop conductor to the white conductor in the lead-in cable. Each loop pair and lead-in cable shall be identified as to direction lane and signal phase in all pull boxes and in controller cabinets. Labeling shall conform to the provisions in CTSS Section 86-2.09B, "Installation."

The end of the lead-in cable shall be taped and waterproofed prior to installing in conduit to prevent moisture from entering the cable. Where loop conductors are not immediately to be spliced to a lead-in cable, the ends of both the loop

conductors and lead-in cable shall be taped and waterproofed with an electrical insulating coating. If the ends of the loop and lead-in cable are left not taped and waterproofed for more than 24 hours the loop and the lead-in cable shall both be replaced at the Contractors expense.

All adjacent loops shall be wound in the same direction. No more than 4 loop conductors (2 twisted pairs) shall be installed in one home-run slot. Loop conductors for more than one signal phase shall not be combined in a common home-run slot.

Loops shall be set back 0.60 m from stop bar and shall be centered in lanes except for curb lanes greater than 3.6 meters where they shall be installed 9 mm from the lane line, unless specified otherwise. The distance between the side of the loop and the home-run saw cut from the adjacent loops shall be 6 meters minimum. The distance between home-run saw cuts shall be 152 mm minimum. Loop conductors shall be installed a minimum of 9 mm from any metal obstacles in the street such as metal manhole covers unless otherwise approved by the Engineer prior to installation.

If loops are to be installed in asphalt concrete pavement, the loop conductors may, at the Contractor's discretion, be installed either in the finished surface layer of asphalt concrete or in the compacted layer of asphalt concrete immediately below the uppermost layer.

Before installing loop conductors in the sawed slots, the slots shall be thoroughly washed with water and then blown out with compressed air and allowed to dry thoroughly.

The loop conductor shall be installed into the slot using a 1.8 mm to 6.35 mm thick wood paddle or roller designed and approved for the purpose. The conductors shall be carefully installed in the sawcut slots to prevent insulation damage. The loop conductors shall be loosely installed around the sawcut slot comers to prevent tension from being placed on the conductors at the corners.

The loop shall be wound in accordance with the plans unless otherwise specified.

1.22 meters of loop conductor slack for each loop, shall be left in the loop termination pull box.

The loop conductor home-run for each loop shall have its start (S) and finish (F) conductors twisted together into a pair (at least 3 turns per 0.3 m) before being placed in the home-run slot, conduit, and termination pull box.

Each loop shall be tested at the termination pull box before the slots are filled with sealant. Each loop shall not exceed 0.5 Ω circuit resistance and shall not measure less than 200 MΩ insulation resistance as measured with a 500 VDC megger.

The loop conductors shall be spliced to the detector lead-in cables using non-insulated crimp style butt splice connectors and soldered in accordance CTSS Section 86-2.09C "Connectors and Terminals."

In the loop termination pull box the outer jacket of detector lead-in cable shall be removed a maximum of 100 mm. The loop conductor to lead-in cable splices and the lead-in cable conductors back to and over to the lead-in cable jacket ending point shall be taped and water-proofed in accordance with CTSS Sec 86-5.01, "Vehicle Detectors," method C. The tape and waterproofing shall overlap the ending point of the outer jacket of the lead-in cable a minimum of 51 mm.

In the controller cabinet the outer jacket of the detector lead-in cable be removed between the cable termination point on the detector panel to the bottom of the controller cabinet.

Care shall be taken not to nick or otherwise damage the detector lea cable conductor insulation while removing the outer jacket.

The detector lead-in cable drain wire shall be terminated on the detector panel ground bus using spade lug terminals. Only one drain wire shall connected to each spade lug terminal.

All detector loop circuits shall be tested for circuit resistance, insulation resistance, and inductance at the controller cabinet with the drain wires terminate before final termination of the detector lead-in cable to detector panel terminal blocks.

The detector loop circuit resistance shall not exceed 0.5 Ω plus 0.35 Ω per 30 m of lead-in cable. The complete detector loop circuit insulation resistance shall not be lower than 100 meg-ohms between any conductor and ground. The complete detector loop circuit inductance shall be between 250 and 450 micro-henries for Type "C" loops and between 150 and 300 micro-henries Type "Q" loops.

The detector lead-in cables shall be terminated in the controller cabinet using non-insulated crimp style spade lugs and then soldered in accordance with CTSS Section 86-2.09C "Connectors and Terminals." The detector lead-in cable conductors shall be twisted together into a pair (at least 3 turns per 0.3 m) before termination on the detector panel terminal blocks.

Pedestrian Push Buttons.--Pedestrian push buttons shall be Type B as shown in CTSP. Types A and C shall not be used.

Pedestrian push buttons signs shall be porcelain enameled metal. Structural plastic signs shall not be used.

Pedestrian push-button housings shall be either die-cast or permanent mold cast aluminum. They shall be installed in sidewalk areas at the height of 1 meter. Where installed on the raised island with wheelchair openings, they shall be mounted .76 meter above the base of the pole.

LIGHTING

Low Pressure Sodium Luminaires.--All luminaires shall conform to ANSI performance standards and the provisions as specified herein.

Low pressure sodium luminaires shall be completely assembled and shall consist of a housing, reflector, refractor or lens, lamp socket, lamp support, integral ballast and removable ballast tray, terminal block, slip fitter and lamp.

Luminaires shall be of the enclosed type with a horizontal burning lamp. Luminaries shall be the semi cut-off type as classified by the IES, with a minimum total downward coefficient of utilization of 67 percent for 55 W luminaires and 59 percent for 90 W luminaires.

Luminaires shall be manufactured by a manufacturer who is now regularly engaged in the manufacture of street fighting luminaires.

Housing shall be of corrosion resistant die cast aluminum 1.6 mm minimum thickness, corrosion resistant aluminum sheet and plate with concealed continuous welds, or acrylonitrile butadiene styrene sheet material 2.38 mm minimum wall thickness, in a cast aluminum frame that provides mounting for all electrical components and slipfitter. The housing shall be divided into optical and power compartments that are individually accessible for service and maintenance. Positioning and clamping of the luminaire to the pipe tenon shall be accomplished by tightening mounting bolts.

Housings shall be painted with a fused coating of electrostatically applied polyester powder paint or other ultraviolet inhibiting film. Color shall be aluminum gray.

A high temperature neoprene, or equal, sealing ring shall be installed in the pipe tenon opening to prevent entry of water and insects into the power and optical compartments.

Access to the power unit assembly shall be through a weathertight hinged cover secured with spring type latches or captive screws to the luminaire housing.

Hardware shall be stainless steel or cadmium plated. Machine screws or bolts shall be used to secure removable components. Sheet metal screws shall not be used.

Reflectors shall have a minimum reflection factor of 88 percent.

Refractors or lenses shall be one piece polycarbonate of 2.38 mm minimum thickness cons-tructed to rigid maintain its shape, and hinged and secured to the luminaire housing with captive latches.

The refractor shall be capable of producing the light pattern and optical characteristics specified. The optical system shall produce the maximum usable light with minimum glare. Light distribution obtainable shall conform to IES standards.

Conductor insulations shall be a high temperature formulation suitable for use in street lighting luminaires.

All wiring connections shall be at terminals or made with quick-disconnect plugs that are polarized or keyed to prevent incorrect connections.

All luminaires shall have wiring diagrams, voltage ratings, lamp wattage and all other pertinent electrical data prominently and permanently displayed on a durable label in each luminaire. The label shall be conspicuous when the luminaire is open for servicing.

All parts shall be smooth and free of sharp edges. All mating parts shall fit together easily and without strain and wiring shall be neatly arranged.

No lurminaire supplied under this specification shall have appearance incompatible with those already in use in San Jose nor shall it have any feature making it impractical, unsafe or expensive to use and maintain.

Lamp socket of high temperature flame retardant material with self-wiping silver plated copper alloy contacts, shall be rated for 660 watts and 1,000 volts.

Lamp support shall maintain Positive lamp retention and position.

Terminal block shall be mounted to the inner support frame within the ballast compartment, pre-wired to the ballast and other integral controls if required and provide for quick disconnect for the removal of the integral ballast tray.

Integral ballast tray shall be removable and replaceable without the use of tools, and provide a single multi-circuit connector for quick and easy disconnection of the ballast tray.

Slipfitter shall mount onto standard 35 mm to 53 mm diameter by 172 mm long tenon and provide plus or minus 5 degree leveling with positive mounting lamps.

Low Pressure Sodium Lamp Ballasts.--Each ballast shall be designed for the type, characteristics and wattage of the lamp it is to operate and shall provide the proper starting and operating waveforms, voltage and current.

Ballasts shall be autotransformer or high reactance type. Ballast shall be multi-tap type for different voltage ranges. Ballast shall be an integral part of the luminaire and held securely in place with devices that allow easy and safe removal and replacement in the field without the necessity of removing the luminaire from the bracket arm.

The Power factor shall not be less than 90 percent when the ballast is operated at nominal line voltage.

Lamp wattage regulation shall not vary by more than plus or minus 6 percent for plus or minus 10 percent input voltage variation.

Lamp current crest factor shall not exceed 1.8 at line voltage.

Low Pressure Sodium Lamps.--Low Pressure Sodium shall conform to the applicable ANSI Standard for Lamp Designation L74-RF 135.

Lamps shall be:

55 W with minimum initial output of 8 000 lumens, or
90 W with minimum initial Output of 13,500 lumens or
135 W with minimum initial Output of 22,500 lumens
180 W minimum initial output of 33,500 lumens

Lamps shall have an average rated life of 18,000 hours operating a minimum of 10 hours per start. Lamp depreciation over life shall not exceed 2 percent.

Operating Position shall be horizontal plus or minus 20 degree.

Ornamental luminaires.--Ornamental luminaires shall be styled to replicate the Acorn luminaire and conform to the details shown on the plans and these special provisions.

The luminaire shall be a post mounted 55 Wwatt low pressure sodium lamp fixture. Luminaires shall be manufactured by Unique Solutions, Hadco, Ameron or equal.

The Contractor shall submit to the Engineer manufacturer's technical data sheets, catalogue cuts, and evidence (certificate or letter) indicating that all ornamental poles to be furnished are acceptable to the City of San Jose.

Each luminaire shall consist of a housing, an integral ballast assembly, and the optical assembly.

The optical assembly shall be molded thermal resistant borosillicate glass or polycarbonate reflector and refractor. The upper portion of the system shall incorporate a series of reflecting prisms that redirect over 50% of the upward light into the controlling refractor while allowing a soft upright component to define the traditional acorn shape. The lower position shall use precisely molded refracting prisms to control the distribution of light to maximize utilization, uniformity, and luminaire spacing. The very top of the assembly may be a removable spring loaded prismatic glass or polycarbonate cover with decorative finial for toolless entry into the lamp chamber. The luminaire shall come with a solid finial with a gold finish, 4 gold medallions and a decorative band with a gold finish as shown on the plans. The minimum coefficient of utilization shall be 0.320 for 55 W at five mounting heights in a direction toward the street side. The minimum footcandle shall be 0.009 for 55 W at five mounting heights in a direction perpendicular to the street side aiming direction. Asymmetric refractor for IES Type III distribution shall be used.

The luminaire housing shall be a decorative leaf style cast aluminum assembly and provides an enclosure for the plug-in electrical module including the ballast. The nickel plated lamp grip socket and the three station incoming line terminal block shall be prewired to a five conductor receptacle for ease in connecting the lamp ballast. A slipfitter shall mount onto a 76.2 mm high by 73 mm to 79 mm O.D. pipe tenon.

The decorative leaf style cast iron luminaire housing door shall contain the ballast components and is held in place by two captive Y4-20 stainless steel screws. A matching six conductor keyed connector shall connect to the receptacle mounted in the luminaire housing to complete the wiring. The door shall have a means to support itself on the luminaire which allows both hands to be free while making or breaking connections. Wiring shall not be directly exposed to light from the lamp or from the sun through the refractor, and shall be routed together through housing and lamp assembly socket support.

Low pressure sodium lamps shall conform to the following:

a. The lamps shall conform to the applicable ANSI Standard for Lamp Designation L-74-RF-135.

Low pressure sodium lamps shall have a minimum of 93 percent maintenance of initial lumens during rated life and shall comply with the following minimum performance requirements:

Lamp Designation ANSI Code: L-74-RF-135
Nominal Watts: 55
Initial Lumens: 8000
Rated Average Life (@ 10 Hrs/Start) : 18,000 hrs
Operating Position: Horizontal ±20°

Ballasts for ornamental luminaires shall be the autotransformer or high reactance type. Ballast shall be the multi-tap types for different voltage ranges. Ballast shall be the integral part of the luminaire and held securely in place with devices that allow easy and safe removal and replacement in the field without the necessity of removing the luminaire from the bracket arm.

When operated with the lamp, the ballast shall have the following characteristics and maintain the following lamp operation:

a. The power factor shall be not less than 90 percent when the ballast is operated at nominal line voltage.

Lamp wattage regulation spread, at any lamp voltage from nominal through life, shall not vary by more than ± 6 percent for ± 10 percent input voltage variation.

The lamp current crest factor shall not exceed 1.8 at nominal line voltage.

The luminaire housing shall be finished with a fused coating of electrostatically applied polyester powder paint after a seven stage pretreatment process. Color shall be dark green conforming to Color No. 24108 of Federal Standard 595B. All castings shall utilize alloy #356 copper free aluminum and all hardware shall be stainless steel.

Photoelectric Controls.--Streetlighting systems shall be switched as indicated on the plans. The control circuit wiring between the photoelectric unit and the contactor shall be installed as indicated on the plans. The photoelectric unit shall be normally oriented north or as directed by the Engineer.

Photoelectric Unit.--The supply voltage rating shall be 60 Hz, 105-130, 210-240 volts as specified or as required.The supply voltage rating shall be 60 Hz, 105-130, 210-240 V as specified or as required.

The load rating shall be 1800 W minimum, high pressure sodium or low pressure sodium.

Contactor.--The contactor shall have 4 normally open poles rated to switch the breaking any specified lighting load rated 600 V, 60 Hz industrial duty or as indicated. The contacts shall be rated to switch the actual connected load, and not less than 30 A per contact. Contractors shall be capable of making and breaking any load within its rating without the assistance of auxiliary arcing contacts; arcing contacts are not permitted. All contacts must be removable without disturbing line or load wiring.

Contactor shall be electrically held with coil operating on 120 V and rated for continuous load. The contactor coil shall be fully encapsulated.

10-3.49 REMOVING, REINSTALLING OR SALVAGING ELECTRICAL EQUIPMENT

Salvaged electrical materials shall be hauled to Caltrans Electrical Maintenance Station, 30 Rickard Street, San Francisco, CA 94134, (415) 330-6509 and stockpiled.

The Contractor shall provide the equipment, as necessary, to safely unload and stockpile the material. A minimum of 2 working days' notice shall be given prior to delivery.

10-3.50 PAYMENT

The contract lump sum prices paid for signal and lighting shall include highway lighting at intersections in connection with signals only.

Other roadway lighting on the project shall be considered as included in the contract lump sum price paid for lighting and sign illumination.

Full compensation for hauling and stockpiling electrical materials shall be considered as included in the contract price paid for the item requiring the material to be salvaged and no additional compensation will be allowed therefor.

The contract lump sum price paid for traffic operations system shall include full compensation for furnishing all labor, materials (except items covered by other bid items), tools, equipment, and incidentals, and for doing all the work involved in installing traffic operations system, complete in place, including all the foundations (except for the changeable message sign), poles, manuals and testing, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract unit price paid for each of the following items shall include full compensation for furnishing all materials, tools, equipment, and incidentals, as shown on the plans, as specified in these special provisions, and as directed by the Engineer:

1. Camera unit.
2. Pan/tilt unit.
3. Camera control unit (CCU).
4. Video encoder unit. (VEU)
5. Integrated services digital network terminal adapter (ISDN TA).
6. Extinguishable message sign panel (LED) with radio controller assembly
7. Dial-up modem

8. Microwave vehicle detection sensor system
9. Wireless radio modem

Full compensation for flashing beacon system, city lighting and electric service (irrigation) shall be considered as included in the contract lump sum price paid for lighting and sign illumination and no separate payment compensation 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 and these special provisions.

39-3 ASPHALT CONCRETE MIX DESIGN PROPOSAL AND REVIEW

39-3.01 CONTRACTOR MIX DESIGN PROPOSAL

The Contractor shall submit for the Engineer's review a proposed asphalt concrete mix design for each asphalt concrete mixture to be used at least 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 aggregateto 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 ofthis 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	375	0.8%
Test Maximum Density		0.03 g/cc

If quality control test results are not verified, the Contractor will be notified of the difference. The Engineer will sample asphalt concrete production at a more frequent interval. Resolution of the problem shall be in conformance with the provisions in Section 39-6, "Dispute Resolution," of this Section 11-1.

39-6 DISPUTE RESOLUTION

39-6.01 GENERAL

The Contractor and the Engineer shall work together to avoid potential conflicts and to resolve differences that may arise from a disagreement regarding test result comparisons.

Should the results of the testing fail to meet the criteria of the stage at which the disagreement arose, production shall be suspended. Production shall not start or resume nor shall asphalt concrete be accepted until the differences have been

resolved and the Engineer is assured that the asphalt concrete conforms to this Section 11-1, "Quality Control / Quality Assurance."

When the Engineer and the Contractor, together or separately, are unable to determine the source of error, an Independent Third Party shall act as witness and referee.

In disagreements, if the Engineer's testing process meets the requirements of this Section 11-1, costs related to the review shall be borne by the Contractor. The Contractor's sampling and testing program shall be modified as necessary. New test results shall be submitted to the Engineer. Test results judged to be in error shall be removed from consideration and the new test results shall be substituted. If split samples are not available and retesting is not possible, that portion of the asphalt concrete produced or placed prior to and during the disagreement will be evaluated based on the results of the Engineer's verification test results.

In disagreements, if the Engineer's testing process fails to meet the requirements of this Section 11-1, costs related to the review shall be borne by the State. The Engineer's sampling and testing program will be modified as necessary. Test results judged to be in error shall be removed from consideration and the new test results shall be substituted. Contractor's retesting due to errors in the Engineer's testing will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. If, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of delays or errors in the Engineer's testing, the delay will be considered a right of way delay as provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

In disagreements, if both the Contractor's and the Engineer's testing processes have failed to meet the requirements of this Section 11-1 or if the cause cannot be determined, each party will bear the costs related to their own review. When appropriate, the Contractor's and the Engineer's sampling and testing programs shall be modified as necessary, split samples of the Contractor's quality control samples or the Engineer's verification samples shall be retested, and the new quality control test results shall be submitted to the Engineer. Test results judged to be in error shall be removed from consideration and the new test results shall be substituted. If split samples of aggregates or asphalt concrete mixture from the Contractor's testing are not available where retesting is required, that portion of the asphalt concrete produced prior to and during the disagreement will be evaluated based on the results of the Engineer's verification test results.

39-6.02 DURING THE ASPHALT CONCRETE MIX DESIGN REVIEW

During the asphalt concrete mix design review, if the Engineer's review does not confirm that one or more of the aggregate or the asphalt concrete mixture qualities comply with this Section 11-1, "Quality Control / Quality Assurance," both parties will review their sampling, testing, and test results and shall share their findings. Testers and laboratories shall be made available for witnessing. Calculations and test results shall be made available for review. If an error in the Contractor's testing is detected during this review, the Contractor shall, as is appropriate, recalculate or retest. The new test results shall be submitted to the Engineer. If an error in the Engineer's testing is detected, the Engineer will, as is appropriate, recalculate or retest.

If the Contractor's and Engineer's review does not reveal the source of conflict, the Contractor's and the Engineer's sampling and testing processes shall be witnessed by the Independent Third Party. Testing to resolve the dispute in results for the mix design shall be performed using samples that were obtained and split while being witnessed by the Independent Third Party. Review of sample preparation and testing will be performed at both the Contractor's and the Engineer's laboratory on a portion of the split material while being witnessed by the Independent Third Party. The resulting mix design shall be used for production.

39-6.03 DURING THE PRODUCTION START-UP EVALUATION

When the Contractor's and Engineer's test results during production start-up fail to meet the provisions in Section 39-10.02, "Production Start-Up Evaluation and Nuclear Density Test Strips," both parties will review their sampling, testing, and test results, and shall share their findings. Testers and laboratories shall be made available for witnessing. Calculations and test results shall be made available for review. If an error in the Contractor's testing is detected during this review, the Contractor shall, as is appropriate, recalculate or retest. The new test results shall be submitted to the Engineer. If an error in the Engineer's testing is detected, the Engineer will, as is appropriate, recalculate or retest.

If the Contractor's and the Engineer's review does not resolve the differences, the Contractor's and the Engineer's testing processes shall be witnessed by the Independent Third Party using the 2 remaining portions of the split samples. If necessary, a 250-tonne to 500-tonne quantity of asphalt concrete shall be placed at a location agreed to by the Engineer to provide asphalt concrete and ingredients for sampling and testing for the Independent Third Party review.

If an error in the Contractor's testing is detected by the Independent Third Party, the Contractor shall take corrective action and, as appropriate, recalculate or retest the split portion of the trial quantity of asphalt concrete in question. The new test results shall be submitted to the Engineer. If an error in the Engineer's testing is detected by the Independent Third Party, the Engineer will take corrective action and, as appropriate, recalculate or retest the split portion of the first trial quantity.

Production shall not start nor shall asphalt concrete be accepted until the differences have been resolved and the test results meet the provisions in Section 39-10.02, "Production Start-Up Evaluation and Nuclear Density Test Strips," of this Section 11-1.

39-6.04 DURING PRODUCTION

When it is determined that the quality control test results could not be verified, both parties will review their sampling, testing, and test results, and shall share their findings. Testers and laboratories will be made available for witnessing. Calculations and results will be made available for review.

If an error in the quality control sampling or testing is detected during the Contractor's or the Engineer's review, the Contractor shall either recalculate or, if appropriate, retest using the reserved split portions of the quality control samples. These new test results shall be submitted to the Engineer. If an error in the verification sampling or testing is detected, the Engineer will recalculate or, if appropriate, retest using a reserved split portion of the verification samples. Using the new test results, the Engineer will repeat the calculation of the *t*-test and will determine if the means of the quality control tests and the verification test results are within the allowable testing difference as specified in Section 39-5.03, "Verification," of this Section 11-1.

When the verification test results do not verify the quality control test results 3 consecutive times, both the Contractor's and the Engineer's testers shall be witnessed by the Independent Third Party while sampling, splitting, and testing samples from the production unit or from the mat . The Contractor may produce and place up to 1000 tonnes of asphalt concrete to provide materials and sampling opportunities. Production and placement of asphalt concrete will be suspended until the Independent Third Party has completed the review of the Contractor's and the Engineer's sampling and testing and resolved the differences.

If an error in the Contractor's testing is detected by the Independent Third Party, the Contractor shall take corrective action and, as appropriate, recalculate or retest the split portion of the quality control samples. The new test results shall be submitted to the Engineer. If an error in the Engineer's testing is detected by the Independent Third Party, the Engineer will take corrective action and, as appropriate, recalculate or retest a split portion of the verification samples. When the error has been detected and corrected, production shall resume and the services of the Independent Third Party will be discontinued.

If a problem is not identified during the Independent Third Party review, the Independent Third Party shall be retained for the duration of the project or until a problem has been identified. Until all asphalt concrete has been produced and placed, the Contractor shall sample and split quality control samples in the presence of the Independent Third Party. One portion of each sample shall be tested by the Contractor in conformance with the intervals specified in Table 39-9, "Minimum Quality Control Requirements," of this Section 11-1, and the other portion shall be delivered to the Engineer by the Independent Third Party. The Engineer will test at least one of every 5 of the split samples for verification purposes. A new lot will be designated for asphalt concrete produced since the Independent Third Party was consulted. The pay factor for this lot will be determined in conformance with Section 39-11.02, "Statistical Evaluation and Determination of Pay Factor," of this Section 11-1 with the exception that both the Contractor's quality control test results and the Engineer's verification test results will be combined and will be the basis for acceptance of that portion of the work. The pay factor for the lot of asphalt concrete which brought about the dispute resolution shall be determined in conformance with Section 39-11.02, "Statistical Evaluation and Determination of Pay Factor," of this Section 11-1 with the exception that both the Contractor's quality control test results and the Engineer's verification test results will be combined and will be the basis for acceptance of that portion of the work.

39-7 STORING, PROPORTIONING AND MIXING MATERIALS

39-7.01 STORAGE

The Contractor shall store the aggregate for asphalt concrete so that separately sized aggregates will not be intermingled and shall store asphalt binder so that different grades of asphalt will not be intermingled. Aggregate that has been intermingled with aggregate of another size shall be removed by the Contractor and replaced with aggregate of specified grading.

When the Contractor adds supplemental fine aggregate, each supplemental fine aggregate used shall be stored separately and kept thoroughly dry.

The measurement and storage provisions of this Section shall not apply to the dust collected in skimmers and expansion chambers (knock-out boxes) or to the dust collected in centrifugal (cyclone) collectors. Dust from these collectors may be returned to the aggregate without being measured or stored separately, provided the dust is returned uniformly at a point in advance of the sampling device in batch-mixing plants or is returned at or before mixing in continuous mixing plants.

Aggregate and asphalt binder shall be stored in conformance with the following requirements.

39-7.01A Aggregate Cold Storage

Material shall be fed from storage with a mechanical feeder. Before being fed to the drier, aggregate shall be separated into 3 or more sizes and stored separately.

39-7.01B Aggregate Hot Storage

Aggregate for asphalt concrete to be mixed in batch mixing plants shall be stored, after being dried, in conformance with the following requirements:

1. Aggregates for asphalt concrete shall be separated into 3 or more sizes.
2. After the aggregate is separated, each size shall be stored in a separate bin, and shall be recombined in conformance with the provisions in Section 39-7.03A, "Proportioning for Batch Mixing," of this Section 11-1 in order to conform to the gradings specified in Section 39-2, "Materials," of this Section 11-1. Storage bins shall be provided with chutes to prevent overflow into adjacent bins.

39-7.01C Asphalt Binder Storage

Asphalt to be used as a binder for asphalt concrete shall be stored in heated tanks.

A suitable sampling device shall be provided in asphalt feed lines connecting plant storage tanks to the asphalt weighing system or spray bar. The sampling device shall consist of a valve with a nominal diameter between 10 mm and 20 mm, constructed in such a manner that a one-liter sample may be slowly withdrawn during plant operations. The valve shall be maintained in good condition and, if the valve fails to function properly, the valve shall be replaced. The sampling device shall be readily accessible and in an area free of dangerous obstructions and shall be between 600 mm and 750 mm above the platform. A drainage receptacle shall be provided for flushing the device prior to sampling.

The discharge end of the asphalt binder circulating pipe shall be maintained below the surface of the asphalt binder in the storage tank to prevent discharging hot asphalt binder into open air.

A temperature sensing device shall be installed in the asphalt feed line. The device shall measure the temperature of the asphalt and shall be accurate to 5˚C increments. An automatic, continuous recording device shall be provided and used to maintain accurate records of the asphalt temperature during production. Where the plant controller has the capability of capturing production data electronically, including ingredient temperatures, and when this data represents the temperature at the time of production and is captured at intervals of not greater than 5 minutes, this process will be considered to be continuous recording. Captured data shall be retained for the duration of the contract and shall be submitted to the Engineer on request.

39-7.02 DRYING

Aggregate shall be fed directly to a drier-drum mixer or to a drier at a uniform rate.

Aggregate shall be dried such that, at the time of spreading, the moisture content of the completed asphalt concrete mixture shall not exceed 1.0 percent and the minimum and maximum asphalt concrete mixture temperatures are not exceeded. Moisture content will be determined in conformity with the requirements of California Test 370.

The drier or drier-drum mixer shall be provided with a device that senses the temperature of the material leaving the drier or the drier-drum mixer. The temperature-sensing device shall be accurate to the nearest 5˚C. The indicator shall be located and maintained at the point where the proportioning operations are controlled. An automatic continuous recording device shall be provided and used to maintain accurate records of the temperatures during production. Where the plant controller has the capability of capturing production data electronically, including ingredient temperatures, and when this data represents the temperature at the time of production and is captured at intervals of not greater than 5 minutes, this process will be considered to be continuous recording. Captured data shall be retained for the duration of the contract and shall be submitted to the Engineer on request.

The burner used for heating the aggregate shall achieve complete combustion of the fuel.

39-7.03 PROPORTIONING

Proportioning shall be either by hot-feed control or cold-feed control. Hot-feed control and cold-feed control indicate the location of the measuring devices or controls.

The Contractor's mixing equipment shall be equipped with a suitable, safe sampling device that will provide a sample, representative of actual production, of the aggregate being incorporated into the asphalt concrete. The delivery point of samples shall be safe and convenient. When samples are taken from a location above ground level, a means shall be provided for lowering the aggregate samples to the ground.

39-7.03A Proportioning for Batch Mixing

When the Contractor elects to use batch mixing equipment, each aggregate hot storage bin shall be equipped with a sampling device that will provide a sample of the aggregate discharged into the weigh hopper.

Fine material collected in dust control systems, other than centrifugal collectors or knock-out boxes, shall be considered to be supplemental fine aggregate. When supplemental fine aggregate is used, it shall be proportioned by mass.

A sampling device for supplemental fine aggregate shall be installed in each feed line or surge tank preceding the weigh hopper.

39-7.03A(1) Batching Tolerances

Aggregate and asphalt shall be proportioned by mass as follows:

A. The zero tolerance for aggregate scales shall be 0.5-percent of the total batch mass of the aggregate. The zero tolerance for separate scales for weighing supplemental fine aggregate or asphalt binder shall be 0.05-percent of the total batch mass of the aggregate.
B. Unless otherwise approved by the Engineer, the indicated mass of material drawn from storage shall not vary from the preselected scale setting as defined by target values of the approved mix design by more than the following percentages of the total batch mass of the aggregate:

    1. Aggregate shall be within one percent, except that when supplemental fine aggregate is used and is weighed cumulatively with the aggregate, the draft of aggregate drawn immediately before the supplemental fine aggregate shall be within 0.5-percent.
    2. Supplemental fine aggregate shall be within 0.5-percent.
    3. Asphalt binder shall be within 0.1-percent.

The asphalt binder shall be measured by a tank scale.

39-7.03A(2) Automatic Controls

Batch proportioning shall be by an automatic plant controller. The proportioning devices shall be automatic to the extent that the only manual operation required for proportioning materials for one batch shall be a single operation of a switch or starter.

Proportioning devices shall be of a type in which materials discharged from the several bins are controlled by gates or by mechanical conveyors. The batching devices shall be so interlocked that no new batch may be started until weigh hoppers are empty, the scales are at zero, and the discharge gates are closed. The means of withdrawal from the bins and of discharge from the weigh box shall be interlocked so that not more than one bin can discharge onto a given scale at one time, and so that the weigh box cannot be tripped until the required quantity from each of the bins has been deposited therein. In addition, automatic proportioning devices shall be interlocked so that the weighing cycle will be interrupted whenever the amount of material drawn from storage varies from the pre-selected amount by more than the tolerances specified in this Section 11-1. Whenever the weighing cycle is interrupted, that specific batch shall not be used in the work unless it can be manually adjusted to meet the specified tolerances based on the total mass of the batch. When partial batches are batched, the interlock tolerances, except the zero tolerance, shall apply to the total mass of aggregate in the partial batch.

Proportioning devices shall be operated so that all mass increments required for a batch are preset at the same time. Controls shall be designed so that these settings may be changed without delay and the order of discharge from the several bins can be changed.

Proportioning controls shall be equipped with the means for inspection of the interlock tolerance settings. Instructions for performing the inspection shall be available at the point of operation.

The necessary means shall be provided to check the mass of various proportioned amounts on a separate vehicle scale located at the plant site.

39-7.03B Proportioning for Continuous Mixing

Asphalt binder shall be introduced into the mixer through a meter conforming to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications. The asphalt meter shall automatically compensate for changes in the asphalt temperature, unless the meter is the mass flow, coriolis effect, type. The system shall be capable of varying the rate of delivery of binder proportionate with the delivery of aggregate. During a day's run, the temperature of asphalt binder shall not vary more than 30˚C. The meter and lines shall be heated and insulated. The binder storage shall be equipped with a device for automatic plant cut-off when the level of binder is lowered sufficiently to expose the pump suction line.

When supplemental fine aggregate is used, it shall be proportioned by a method that uniformly feeds the material within 2 percent of the required amount. Supplemental fine aggregate shall be discharged from the proportioning device directly into the mixer.

The supplemental fine aggregate proportioning system shall function with a degree of accuracy such that, when operated between 30 percent and 100 percent of maximum operating capacity, the average difference between the indicated mass of material delivered and the actual mass delivered shall not exceed one percent of the actual mass for three individual 15-minute runs. For the 3 individual 15-minute runs, the indicated mass of material delivered shall not vary from the actual mass delivered by more than 2 percent of the actual mass.

The fine material collected in dust control systems may be returned to the aggregate production stream without proportioning if returned at a rate commensurate with overall plant production, and if returned at or before the mixer. A return rate of less than 100 percent of the collection rate shall be metered as specified above for supplemental fine aggregate.

The asphalt feeder, each of the aggregate feeders, the supplemental fine aggregate feeder, if used, and the combined aggregate feeder shall be equipped with devices by which the rate of feed can be determined while the plant is in full operation.

The combined aggregate shall be weighed using a belt scale. The belt scale shall be of such accuracy that, when the plant is operating between 30 percent and 100 percent of belt capacity, the average difference between the indicated mass of material delivered and the actual mass delivered shall not exceed one percent of the actual mass for three individual 3-minute runs. For the 3 individual 3-minute runs, the indicated mass of material delivered shall not vary from the actual mass delivered by more than 2 percent of the actual mass.

The actual mass of material delivered for proportioning device calibrations shall be determined by a vehicle scale located at the plant site conforming to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications. The vehicle scale shall be error checked within 24 hours of checking the plant's proportioning devices. The plant shall be equipped so that this accuracy check can be made prior to the first production operation for a project and at other times when requested by the Engineer.

The belt scale for the combined aggregate, the proportioning devices for supplemental fine aggregate, if used, and the asphalt proportioning meter shall be interlocked so that the rates of feed of the aggregates and asphalt will be adjusted automatically (at all production rates and production rate changes) to maintain the asphalt ratio (kilograms of asphalt per 100 kg of dry aggregate including supplemental fine aggregate, if used) designated in the mix design in conformance with the provisions in Section 39-2.03, "Asphalt Concrete Mixture," of this Section 11-1. The plant shall not be operated unless this automatic system is functioning and in good working condition.

Asphalt meters and aggregate belt scales used for proportioning aggregates and asphalt shall be equipped with rate-of-flow indicators to show the rates of delivery of asphalt and aggregate. Meters and scales shall be equipped with resettable totalizers so that the total amounts of asphalt and aggregate introduced into the asphalt concrete mixture can be determined. Rate-of-flow indicators and totalizers for like materials shall be accurate within one percent when compared directly. The asphalt cement totalizer shall not register when the asphalt metering system is not delivering material to the mixer.

The bin or bins containing the fine aggregate and supplemental fine aggregate, if used, shall be equipped with vibrating units or other equipment that will prevent hang-up of material while the plant is operating. Each belt feeder shall be equipped with a device to monitor the depth of aggregate between the troughing rollers. The device for monitoring depth of aggregate shall automatically shut down the plant whenever the depth of aggregate is less than 70 percent of the target depth. To avoid erroneous shut down by normal fluctuations, a delay between sensing less than 70 percent flow and shutdown of the plant will be permitted, as determined by the Engineer, at the time of the initial California Test 109. A second device shall be located either in the stream of aggregate beyond the belt or where it will monitor movement of the belt by detecting revolutions of the tail pulley on the belt feeder. The device for monitoring no-flow or belt movement, as the case may be, shall stop the plant automatically and immediately when there is no flow. The plant shall not be operated unless both low-flow and no-flow monitoring devices are in good working condition and functioning properly.

For continuous pugmill mixing plants, an aggregate sampling device that will provide a 25-kg to 40-kg sample of the combined aggregate while the plant is in full operation shall be provided in advance of the point where the aggregate enters the mixer.

For drier-drum mixing plants, an aggregate sampling device that will provide a 25-kg to 40-kg sample of the combined aggregate while the plant is in full operation shall be provided in advance of the point where the aggregate enters the drier-drum mixer.

When supplemental fine aggregate is used, a sampling device shall be installed in each feed line or surge tank preceding the proportioning device for the supplemental fine aggregate.

39-7.04 (BLANK)

39-7.05 MIXING

Aggregate, supplemental fine aggregate, and asphalt binder shall be mixed in a batch mixer, continuous mixing pugmill mixer, or continuous mixing drier-drum. The charge in a batch mixer, or the rate of feed to a continuous mixer, shall not exceed that which will permit complete mixing of the material. Dead areas in the mixer, in which the material does not move or is not sufficiently agitated, shall be corrected by a reduction in the volume of material or by other adjustments.

Asphalt binder shall be at a temperature of not less than 120°C nor more than 190°C when added to the aggregate.

The temperature of the aggregate before adding the binder shall not be more than 165°C.

39-7.05A Batch Mixing

When asphalt concrete is produced by batch mixing, the mixer shall be equipped with a sufficient number of paddles of a type and arrangement so as to produce a properly mixed batch.

The binder shall be introduced uniformly into the mixer along the center of the mixer parallel to the mixer shafts, or by pressure spraying. When a pan is used, it shall be equipped with movable vanes in order that the flow of binder may be directed across the width of the pan, as desired. The vanes shall be equipped with a means for quick adjustment, and a positive lock to prevent shifting.

The mixer platform shall be of ample size to provide safe and convenient access to the mixer and other equipment. The mixer housing and weighbox housing shall be equipped with gates of ample size to permit ready sampling of the discharge of aggregate from each of the plant bins and from each feed line or surge tank of supplemental fine aggregate, if used. The Contractor shall provide a sampling device capable of delivering a representative sample of sufficient size to permit the required tests.

The mixer shall be equipped with a timing device that will indicate by a definite audible or visual signal the expiration of the mixing period. The device shall measure the time of mixing within 2 seconds.

The time of mixing a batch shall begin on the charging stroke of the weighhopper dumping mechanism and shall end when discharge is started. Mixing shall continue until a homogeneous asphalt concrete mixture of uniformly distributed and properly coated aggregates of unchanging appearance is produced. The time of mixing shall be not less than 30 seconds.

An interval timer shall control the time of mixing. The interval timer shall be interlocked so that the mixer cannot be discharged until the materials have been mixed for the full amount of time specified.

39-7.05B Continuous Mixing

Continuous mixing plants shall utilize pugmill or drier-drum mixers.

When asphalt concrete is produced by pugmill mixing, the mixer shall be equipped with paddles of a type and arrangement to provide sufficient mixing action and movement to the asphalt concrete mixture to produce properly mixed asphalt concrete. The combined aggregate shall be fed directly from the drier to the mixer at a uniform and controlled rate.

Mixing shall continue until a homogeneous asphalt concrete mixture of thoroughly and uniformly coated aggregates of unchanging appearance is produced at the discharge point from the mixer.

The temperature of the completed asphalt concrete mixture shall not exceed 165°C upon discharge from the mixer.

The mixer shall discharge into a storage silo with a capacity of not less than that specified in Section 39-7.06, "Asphalt Concrete Storage," of this Section 11-1. The Contractor shall provide a means of diverting the flow of asphalt concrete away from the silo to prevent incompletely mixed portions of the asphalt concrete mixture from entering the silo.

39-7.06 ASPHALT CONCRETE STORAGE

When asphalt concrete is stored, it shall be stored only in silos. Asphalt concrete shall not be stockpiled. The minimum quantity of asphalt concrete in a silo during mixing shall be 18 tonnes except for the period immediately following a shut-down of the plant of 2 hours or more. A means shall be provided to indicate that storage in each silo is being maintained as required.

Storage silos shall be equipped with a surge-batcher sized to hold a minimum of 1800 kg of material. A surge-batcher consists of equipment placed at the top of the storage silo that catches the continuous delivery of the completed asphalt concrete mix and changes it to individual batch delivery to prevent the segregation of product ingredients as the completed asphalt concrete mix is placed into storage. The surge-batcher shall be center loading and shall be constructed to prevent material buildup. Rotary chutes shall not be used as surge-batchers.

The surge-batcher shall be independent and distinct from conveyors or chutes used to collect or direct the completed asphalt concrete mixture being discharged into storage silos and shall be the last device to handle the material before it enters the silo. Multiple storage silos shall be served by an individual surge-batcher for each silo. Material handling shall be free of oblique movement between the highest elevation (conveyor outfall) and subsequent placement in the silo. Discharge gates on surge-batchers shall be automatic in operation and shall discharge only after a minimum of 1800 kg of material has been collected and shall close before the last collected material leaves the device. Discharge gate design shall prevent the deflection of material during the opening and closing operation.

Asphalt concrete stored in excess of 18 hours shall not be used in the work. Asphalt concrete mixture containing hardened lumps shall not be used. A storage facility that contained the material with the hardened lumps shall not be used for further storage until the cause of the lumps is corrected.

39-7.07 ASPHALT CONCRETE PLANTS

Plants, including commercial plants, that produce asphalt concrete subject to these specifications shall conform to the provisions in Section 7-1.01F, "Air Pollution Control," of the Standard Specifications, and shall be equipped with a wet-tube dust washer or equal and other devices that will reduce the dust emission to the degree that adjacent property is not damaged. The washer and other equipment shall function efficiently when the plant is in operation.

During production, petroleum products such as diesel fuel and kerosene shall not be used as a release agent on belts, conveyors, hoppers, or hauling equipment.

Plants shall be equipped with an inspection dock constructed so that a quality control technician or inspector standing on the dock can inspect the completed asphalt concrete mixture and take samples, as necessary, from the hauling vehicle before the vehicle leaves the plant site. This inspection dock shall allow the hauling vehicle to pull alongside and shall meet applicable safety requirements of the California Division of Occupational Safety and Health. Haul vehicle drivers shall be instructed to stop at the dock whenever a quality control technician or inspector is on the dock and to remain there until directed to leave by that individual.

39-8 SUBGRADE, PRIME COAT, PAINT BINDER (TACK COAT), AND PAVEMENT REINFORCING FABRIC

39-8.01 SUBGRADE

Immediately prior to applying prime coat or paint binder (tack coat), or immediately prior to placing the asphalt concrete when a prime coat or paint binder (tack coat) is not required, the subgrade to receive asphalt concrete shall conform to the compaction requirement and elevation tolerances specified for the material involved and shall be free of loose or extraneous material. If the asphalt concrete is to be placed on an existing base or pavement that was not constructed as part of the contract, the surface shall be cleaned by sweeping, flushing or other means to remove loose particles of paving, dirt, and other extraneous material immediately before applying the prime coat or paint binder (tack coat).

39-8.02 PRIME COAT AND PAINT BINDER (TACK COAT)

A prime coat of liquid asphalt shall be applied to the areas to be surfaced when there is a contract item for the work or when the work is required in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

Prime coat shall be applied only to those areas designated by the Engineer.

Prime coat shall be applied at the approximate total rate of 1.15 L per square meter of surface covered. The exact rate and number of applications will be determined by the Engineer.

Prime coat shall be applied at a temperature conforming to the range of temperatures specified in Section 93-1.03, "Mixing and Applying," of the Standard Specifications for distributor application of the grade of liquid asphalt being used.

A paint binder (tack coat) of asphaltic emulsion shall be furnished and applied in conformance with the provisions in Section 94, "Asphaltic Emulsions," of the Standard Specifications and shall be applied to vertical surfaces of existing pavement, curbs, gutters, and construction joints in the surfacing against which additional material is to be placed, to a pavement to be surfaced, and to other surfaces designated in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

Paint binder (tack coat) shall be applied in one application at a rate of from 0.10-L to 0.45-L per square meter of surface covered. The exact rate of application will be determined by the Engineer.

At the Contractor's option, paving asphalt may be used for paint binder (tack coat) instead of asphaltic emulsion. If paving asphalt is used, the grade to be used and the rate of application will be determined by the Engineer. The paving asphalt shall be applied at a temperature of not less than 140°C or more than 175°C.

Prime coat or paint binder (tack coat) shall be applied in advance of placing the surfacing only as far as shall be approved by the Engineer. When asphaltic emulsion is used as a paint binder (tack coat), the asphalt concrete shall not be placed until the asphaltic emulsion has cured.

Immediately in advance of placing asphalt concrete, additional prime coat or paint binder (tack coat) shall be applied as directed by the Engineer to areas where the prime coat or paint binder (tack coat) has been damaged. Loose or extraneous material shall be removed and no additional compensation will be allowed therefor.

39-8.03 PAVEMENT REINFORCING FABRIC

Pavement reinforcing fabric shall be placed on existing pavement to be surfaced or between layers of asphalt concrete when such work is shown on the plans, or specified in "Asphalt Concrete" in Section 10-1, of these special provisions, or ordered by the Engineer.

Immediately prior to placing binder, pavement reinforcing fabric, and asphalt concrete surfacing, the pavement shall be cleaned of loose and extraneous materials such as, but not limited to, vegetation, sand, dirt, gravel and water.

Before placing the pavement reinforcing fabric, a binder of paving asphalt Grade AR-8000 shall be applied uniformly to the surface to receive the pavement reinforcing fabric at a rate of not less than 1.15 L per square meter of surface covered.

Pavement reinforcing fabric shall not be placed in areas of conform tapers when the thickness of the overlying asphalt concrete will be 40 mm or less. When pavement reinforcing fabric is placed in areas of conform tapers the binder shall be spread at the approximate rate of 1.4 L 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.

Asphaltic emulsion shall not be substituted for paving asphalt binder for pavement reinforcing fabric.

Before applying binder, large cracks, spalls, and depressions in existing pavement shall be repaired as directed by the Engineer and, if not included in the item, the repair work will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

The pavement reinforcing fabric shall be aligned and placed with no wrinkles that lap. The test for lapping shall be made by gathering together the pavement reinforcing fabric in a wrinkle. If the height of the doubled portion of extra fabric is 15 mm or more, the fabric shall be cut to remove the wrinkle, then lapped in the direction of paving. Lap in excess of 50 mm shall be removed.

If manual laydown methods are used, the pavement reinforcing fabric shall be unrolled, aligned, and placed in increments of approximately 9 m.

Adjacent borders of the pavement reinforcing fabric shall be lapped 50 mm to 100 mm. The preceding roll shall be lapped 50 mm to 100 mm over the following roll in the direction of paving at ends of rolls or at a break. At pavement reinforcing fabric overlays, both the binder and the fabric shall overlap previously placed fabric by the same amount.

Seating of the pavement reinforcing fabric with rolling equipment after placing will be permitted. Turning of the paving machine and other vehicles shall be gradual and kept to a minimum to avoid damage to the fabric.

A small quantity of asphalt concrete, to be determined by the Engineer, may be spread over the pavement reinforcing fabric immediately in advance of placing asphalt concrete surfacing in order to prevent fabric from being damaged by construction equipment.

Pavement reinforcing fabric shall not be exposed to public traffic, Contractor's equipment or elements that will damage the fabric prior to placement of asphalt concrete surfacing, as determined by the Engineer. Public access cross traffic may be allowed to cross the fabric under traffic control after the Contractor has placed a small quantity of asphalt concrete over the fabric.

Care shall be taken to avoid tracking binder material onto the pavement reinforcing fabric or distorting the fabric during seating of the fabric with rolling equipment. If necessary to protect the pavement reinforcing fabric, exposed binder material may be covered lightly with sand.

39-9 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);

$$s = \sqrt{\frac{n\square(x^2)-(\square x)^2}{n(n-1)}}$$

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 12. (BLANK)

SECTION 13. (BLANK)

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.