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

Caltrans

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS

AND

SPECIAL PROVISIONS

FOR CONSTRUCTION ON STATE HIGHWAY IN

LOS ANGELES COUNTY IN POMONA AND CLAREMONT FROM

ROUTE 10/57/210 SEPARATION TO SAN BERNARDINO COUNTY LINE

DISTRICT 07, ROUTE 10

For Use in Connection with Standard Specifications Dated JULY 1992, and Labor Surcharge and Equipment Rental Rates.

CONTRACT NO. 07-1224U4

07-LA-10-42.4/48.3

Federal Aid Project

***ACIM-010-1(753)42N**

Bids Open: December 14, 2000

Dated: September 11, 2000

QCQA
OSD

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IMPORTANT SPECIAL NOTICES

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

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

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

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

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

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

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

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

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

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

- **SURETY 2000**

  Caltrans is conducting a pilot program in cooperation with Surety 2000, to test electronic bond verification systems. The purpose of the pilot program is to test the use of Surety 2000 for verifying a bidder's bond electronically.

  Surety 2000 is an Internet-based surety verification and security system, developed in conjunction with the surety industry. Surety agents may contact Surety 2000 at 1-800-660-3263.

  Bidders are encouraged to participate in the pilot program. To participate, the bidder is asked to provide the "Authorization Code" provided by Surety 2000, on a separate sheet, together with the standard bidder's bond required by the specifications. The bidder's surety agent may obtain the "Authorization Code" from Surety 2000.

  The Department will use the "Authorization Code" to access the Surety 2000 database, and independently verify the actual bidder's bond and document the functioning of the Surety 2000 system.

  "Authorization Codes" will be used only to verify bidder's bonds, and only as part of the pilot program. The use of "Authorization Codes" will not be accepted in lieu of the bidder's bond or other bidder's security required in the specifications during the pilot study.

  The function of the Surety 2000 system is to provide an easier way for Contractors to protect their bid security, and to discourage fraud. This system is available to all California admitted sureties and surety agents.

  The results of the pilot study will be tabulated, and at some time in the future, the Department may consider accepting electronic bidder's bond verification in lieu of the bidder's bond specified.

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Caltrans is conducting a pilot program in cooperation with Surety 2000, to test electronic bond verification systems. The purpose of the pilot program is to test the use of Surety 2000 for verifying a bidder's bond electronically.

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DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS

CONTRACT NO. 07-1224U4

07-LA-10-42.4/48.3

Sealed proposals for the work shown on the plans entitled:

STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROJECT PLANS FOR CONSTRUCTION ON STATE HIGHWAY IN LOS ANGELES COUNTY IN POMONA AND CLAREMONT FROM ROUTE 10/57/210 SEPARATION TO SAN BERNARDINO COUNTY LINE

will be received at the Department of Transportation, 3347 Michelson Drive, Suite 100, Irvine, CA 92612-1692, until 2 o'clock p.m. on December 14, 2000, at which time they will be publicly opened and read in Room C - 1116 at the same address.

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

STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROPOSAL AND CONTRACT FOR CONSTRUCTION ON STATE HIGHWAY IN LOS ANGELES COUNTY IN POMONA AND CLAREMONT FROM ROUTE 10/57/210 SEPARATION TO SAN BERNARDINO COUNTY LINE

General work description: Existing freeway with structures to be widened. Drainage work and retaining walls.

This project has a goal of 17 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 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 set forth in the books issued for bidding purposes entitled "Proposal and Contract," and in copies of this book that may be examined at the offices described above where project plans, special provisions, and proposal forms may be seen. Addenda to modify the Federal minimum wage rates, if necessary, will be issued to holders of "Proposal and Contract" books. Future effective general prevailing wage rates which have been predetermined and are on file with the California Department of Industrial Relations are referenced but not printed in the general prevailing wage rates.

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

DEPARTMENT OF TRANSPORTATION

Deputy Director Transportation Engineering

Dated September 11, 2000

RRF

COPY OF ENGINEER'S ESTIMATE

(NOT TO BE USED FOR BIDDING PURPOSES)

07-1224U4

Item	Item Code	Item	Unit of Measure	Estimated Quantity
1	070010	PROGRESS SCHEDULE (CRITICAL PATH)	LS	LUMP SUM
2	070015	OVERHEAD	WDAY	600
3	071321	TEMPORARY FENCE (TYPE CL-6)	LF	13 100
4	074019	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	LUMP SUM
5	074020	WATER POLLUTION CONTROL	LS	LUMP SUM
6 (S)	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM
7 (S)	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM
8 (S)	019859	FLASHING ARROW SIGN	EA	14
9 (S)	120120	TYPE III BARRICADE	EA	400
10 (S)	120151	TEMPORARY TRAFFIC STRIPE (TAPE)	LF	19 000
11 (S)	120159	TEMPORARY TRAFFIC STRIPE (PAINT)	LF	18 400
12 (S)	120165	CHANNELIZER (SURFACE MOUNTED)	EA	1470
13 (S)	120300	TEMPORARY PAVEMENT MARKER	EA	320
14 (S)	129000	TEMPORARY RAILING (TYPE K)	LF	192 000
15 (S)	129100	TEMPORARY CRASH CUSHION MODULE	EA	1120
16	150206	ABANDON CULVERT	EA	14
17	019860	ABANDON UNDERDRAIN	EA	2
18	048375	ABANDON PEDESTRIAN UNDERCROSSING LOCATION 1	LS	LUMP SUM
19	048376	ABANDON PEDESTRIAN UNDERCROSSING LOCATION 2	LS	LUMP SUM
20	150224	ABANDON MANHOLE	EA	6

Item	Item Code	Item	Unit of Measure	Estimated Quantity
21	150605	REMOVE FENCE	LF	14 400
22	150662	REMOVE METAL BEAM GUARD RAILING	LF	11 300
23	150667	REMOVE DOUBLE METAL BEAM BARRIER	LF	16 600
24	150668	REMOVE FLARED END SECTION	EA	12
25	150710	REMOVE TRAFFIC STRIPE	LF	506 000
26	019861	REMOVE YELLOW PAINTED TRAFFIC STRIPE	LF	52 800
27	150713	REMOVE PAVEMENT MARKING	SQFT	2760
28	150722	REMOVE PAVEMENT MARKER	EA	70 600
29	150742	REMOVE ROADSIDE SIGN	EA	130
30	150760	REMOVE SIGN STRUCTURE	EA	16
31	150806	REMOVE PIPE	LF	6390
32	150820	REMOVE INLET	EA	120
33	150826	REMOVE MANHOLE	EA	4
34	150829	REMOVE RETAINING WALL	LF	1130
35	019862	REMOVE PARKWAY DRAIN	EA	1
36	150846	REMOVE CONCRETE PAVEMENT	SQYD	7450
37	150857	REMOVE ASPHALT CONCRETE SURFACING	SQYD	2940
38	019863	REMOVE BLOCK WALL	LF	1030
39	019864	REMOVE GRAVITY WALL	LF	5800
40	151581	RECONSTRUCT SIGN STRUCTURE	EA	4

Item	Item Code	Item	Unit of Measure	Estimated Quantity
41	152394	RELOCATE SIGN STRUCTURE	EA	10
42	152430	ADJUST INLET	EA	2
43	152439	ADJUST FRAME AND GRATE TO GRADE	EA	2
44	152440	ADJUST MANHOLE TO GRADE	EA	2
45	152703	REMODEL INLET	EA	6
46	153116	COLD PLANE ASPHALT CONCRETE PAVEMENT (.25' MAXIMUM)	SQYD	22 500
47	153210	REMOVE CONCRETE	CY	2070
48	153221	REMOVE CONCRETE BARRIER	LF	6710
49	153225	PREPARE CONCRETE BRIDGE DECK SURFACE	SQFT	26 500
50	153250	REMOVE SOUND WALL	LF	250
51	153531	ACCESS OPENING, SOFFIT	EA	8
52	155003	CAP INLET	EA	39
53	155009	CAP REINFORCED CONCRETE BOX OPENING	EA	1
54	156585	REMOVE CRASH CUSHION	EA	12
55	048377	CONCRETE CHANNEL REMOVAL	LS	LUMP SUM
56	157561	BRIDGE REMOVAL (PORTION), LOCATION A	LS	LUMP SUM
57	157562	BRIDGE REMOVAL (PORTION), LOCATION B	LS	LUMP SUM
58	157563	BRIDGE REMOVAL (PORTION), LOCATION C	LS	LUMP SUM
59	157564	BRIDGE REMOVAL (PORTION), LOCATION D	LS	LUMP SUM
60	157565	BRIDGE REMOVAL (PORTION), LOCATION E	LS	LUMP SUM

Item	Item Code	Item	Unit of Measure	Estimated Quantity
61	157566	BRIDGE REMOVAL (PORTION), LOCATION F	LS	LUMP SUM
62	157568	BRIDGE REMOVAL (PORTION), LOCATION H	LS	LUMP SUM
63	157569	BRIDGE REMOVAL (PORTION), LOCATION I	LS	LUMP SUM
64	048378	CONCRETE RETAINING WALL REMOVAL	LS	LUMP SUM
65	048379	LOWER BRIDGE, LOCATION A	LS	LUMP SUM
66	048380	LOWER BRIDGE, LOCATION B	LS	LUMP SUM
67	048381	LOWER BRIDGE, LOCATION E	LS	LUMP SUM
68	048382	LOWER BRIDGE, LOCATION F	LS	LUMP SUM
69	160101	CLEARING AND GRUBBING	LS	LUMP SUM
70	019865	MATERIAL WITH AERIALLY DEPOSITED LEAD	CY	101 000
71	190101	ROADWAY EXCAVATION	CY	173 000
72 (F)	192003	STRUCTURE EXCAVATION (BRIDGE)	CY	5684
73 (F)	192037	STRUCTURE EXCAVATION (RETAINING WALL)	CY	141 994
74 (F)	193003	STRUCTURE BACKFILL (BRIDGE)	CY	5272
75 (F)	193013	STRUCTURE BACKFILL (RETAINING WALL)	CY	170 416
76	193114	SAND BACKFILL	CY	1060
77 (S)	200001	HIGHWAY PLANTING	LS	LUMP SUM
78 (S)	204099	PLANT ESTABLISHMENT WORK	LS	LUMP SUM
79	206401	MAINTAIN EXISTING IRRIGATION FACILITIES	LS	LUMP SUM
80 (S)	208000	IRRIGATION SYSTEM	LS	LUMP SUM

Item	Item Code	Item	Unit of Measure	Estimated Quantity
81	220101	FINISHING ROADWAY	LS	LUMP SUM
82	250201	CLASS 2 AGGREGATE SUBBASE	CY	130
83	250401	CLASS 4 AGGREGATE SUBBASE	CY	18 000
84	260201	CLASS 2 AGGREGATE BASE	CY	19 000
85	260210	AGGREGATE BASE (APPROACH SLAB)	CY	100
86	260301	CLASS 3 AGGREGATE BASE	CY	51 500
87	280000	LEAN CONCRETE BASE	CY	36 800
88	390152	ASPHALT CONCRETE	TON	53 900
89	393001	PAVEMENT REINFORCING FABRIC	SQYD	29 900
90	394002	PLACE ASPHALT CONCRETE (MISCELLANEOUS AREA)	SQYD	18 600
91	394040	PLACE ASPHALT CONCRETE DIKE (TYPE A)	LF	5130
92	394044	PLACE ASPHALT CONCRETE DIKE (TYPE C)	LF	740
93	394046	PLACE ASPHALT CONCRETE DIKE (TYPE D)	LF	5140
94	394048	PLACE ASPHALT CONCRETE DIKE (TYPE E)	LF	100
95	394049	PLACE ASPHALT CONCRETE DIKE (TYPE F)	LF	1110
96	401000	CONCRETE PAVEMENT	CY	62 400
97	019867	CONCRETE PAVEMENT (FAST SETTING HYDRAULIC CEMENT CONCRETE)	CY	2160
98	401100	REPLACE CONCRETE PAVEMENT	CY	510
99	019868	REPLACE CONCRETE PAVEMENT (FAST SETTING HYDRAULIC CEMENT CONCRETE)	CY	1860
100	019869	GRIND CONCRETE PAVEMENT	SQYD	50 600

Item	Item Code	Item	Unit of Measure	Estimated Quantity
101	490503	FURNISH STEEL PILING (HP 10 X 42)	LF	9316
102 (S)	490504	DRIVE STEEL PILE (HP 10 X 42)	EA	192
103	490508	FURNISH STEEL PILING (HP 10 X 57)	LF	16 687
104 (S)	490509	DRIVE STEEL PILE (HP 10 X 57)	EA	339
105	490528	FURNISH STEEL PILING (HP 14 X 89)	LF	18 269
106 (S)	490529	DRIVE STEEL PILE (HP 14 X 89)	EA	362
107 (S)	490601	16" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	29 200
108 (S)	490603	24" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	1106
109 (S)	500001	PRESTRESSING CAST-IN-PLACE CONCRETE	LS	LUMP SUM
110 (S)	500010	PRESTRESSING	LS	LUMP SUM
111 (S)	500050	TIEBACK ANCHOR	EA	56
112 (F)	510051	STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	1426
113 (F)	510053	STRUCTURAL CONCRETE, BRIDGE	CY	4725
114 (F)	510060	STRUCTURAL CONCRETE, RETAINING WALL	CY	48 280
115 (F)	510086	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE N)	CY	483
116	510087	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE R)	CY	1024
117 (F)	510102	CLASS A CONCRETE (STRUCTURE)	CY	152
118 (F)	510502	MINOR CONCRETE (MINOR STRUCTURE)	CY	620
119	510504	MINOR CONCRETE (PIPE ENCASEMENT)	CY	2660
120	510800	PAVING NOTCH EXTENSION	CY	23

Item	Item Code	Item	Unit of Measure	Estimated Quantity
121 (F)	511035	ARCHITECTURAL TREATMENT	SQFT	4475
122	511106	DRILL AND BOND DOWEL	LF	3575
123	019870	RETROFIT DOWEL (SMOOTH, EPOXY COATED)	EA	23 300
124 (S)	512205	FURNISH PRECAST PRESTRESSED CONCRETE GIRDER (60'-70')	EA	12
125 (S)	512206	FURNISH PRECAST PRESTRESSED CONCRETE GIRDER (70'-80')	EA	17
126 (S)	512207	FURNISH PRECAST PRESTRESSED CONCRETE GIRDER (80'-90')	EA	13
127 (S)	512208	FURNISH PRECAST PRESTRESSED CONCRETE GIRDER (90'-100')	EA	6
128 (S)	512500	ERECT PRECAST PRESTRESSED CONCRETE GIRDER	EA	48
129	513551	RETAINING WALL STEM (TYPE 6)	SQFT	2470
130	515041	FURNISH POLYESTER CONCRETE OVERLAY	CF	7770
131 (F)	515042	PLACE POLYESTER CONCRETE OVERLAY	SQFT	26 500
132 (S)	515061	CORE CONCRETE (2")	LF	34
133 (F)	517961	SOUND WALL (BARRIER) (MASONRY BLOCK)	SQFT	426 419
134	518201	MASONRY BLOCK WALL	SQFT	460
135 (S)	519085	JOINT SEAL (TYPE B-MR 1")	LF	1141
136 (S)	519086	JOINT SEAL (TYPE B-MR 1 1/2")	LF	58
137 (S)	519092	JOINT SEAL ASSEMBLY (MR 2 1/2")	LF	34
138 (S)	519093	JOINT SEAL ASSEMBLY (MR 3")	LF	17
139 (S)	519094	JOINT SEAL ASSEMBLY (MR 3 1/2")	LF	17
140 (S-F)	520102	BAR REINFORCING STEEL (BRIDGE)	LB	1 459 800

Item	Item Code	Item	Unit of Measure	Estimated Quantity
141 (F)	520103	BAR REINFORCING STEEL (RETAINING WALL)	LB	5 250 537
142 (F)	520107	BAR REINFORCING STEEL (BOX CULVERT)	LB	289 411
143 (F)	530100	SHOTCRETE	CY	110
144 (S-F)	540101	ASPHALT MEMBRANE WATERPROOFING	SQFT	110
145 (S-F)	550110	COLUMN CASING	LB	41 000
146 (F)	560218	FURNISH SIGN STRUCTURE (TRUSS)	LB	218 275
147 (S-F)	560219	INSTALL SIGN STRUCTURE (TRUSS)	LB	218 275
148 (S)	561004	30" CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	LF	170
149 (S)	561005	36" CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	LF	150
150 (S)	561011	48" CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	LF	18
151	562002	METAL (BARRIER MOUNTED SIGN)	LB	4240
152	019871	METAL (WALL MOUNTED SIGN FLUSH)	LB	1200
153	019872	METAL (WALL MOUNTED SIGN)	LB	2900
154	566011	ROADSIDE SIGN - ONE POST	EA	43
155	566012	ROADSIDE SIGN - TWO POST	EA	32
156	568001	INSTALL SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	46
157	568007	INSTALL SIGN OVERLAY	SQFT	270
158	019873	INSTALL ROADSIDE SIGN-TWO POST (LAMINATED WOOD BOX POST)	EA	11
159	620080	15" ALTERNATIVE PIPE CULVERT	LF	720
160	620100	18" ALTERNATIVE PIPE CULVERT	LF	7510

Item	Item Code	Item	Unit of Measure	Estimated Quantity
161	620140	24" ALTERNATIVE PIPE CULVERT	LF	590
162	641107	18" PLASTIC PIPE	LF	360
163	650012	15" REINFORCED CONCRETE PIPE	LF	1630
164	650014	18" REINFORCED CONCRETE PIPE	LF	790
165	650018	24" REINFORCED CONCRETE PIPE	LF	710
166	650022	30" REINFORCED CONCRETE PIPE	LF	1360
167	650026	36" REINFORCED CONCRETE PIPE	LF	600
168	650034	48" REINFORCED CONCRETE PIPE	LF	48
169	650062	90" REINFORCED CONCRETE PIPE	LF	690
170	655324	JACKED 36" REINFORCED CONCRETE PIPE (CLASS III)	LF	630
171	665005	8" CORRUGATED STEEL PIPE (.064" THICK)	LF	71
172	665038	36" CORRUGATED STEEL PIPE (.138" THICK)	LF	48
173	665056	60" CORRUGATED STEEL PIPE (.138" THICK)	LF	32
174	681065	10" PERFORATED PLASTIC PIPE UNDERDRAIN	LF	250
175	019874	10" PERFORATED PLASTIC PIPE RISER (UNDERDRAIN)	EA	2
176	019875	12" PERFORATED PLASTIC PIPE UNDERDRAIN	LF	530
177	019876	15" PERFORATED PLASTIC PIPE UNDERDRAIN	LF	22
178	019877	15" NONPERFORATED PLASTIC PIPE	LF	50
179	681103	3" PLASTIC PIPE (EDGE DRAIN)	LF	50 900
180	681107	3" PLASTIC PIPE (EDGE DRAIN OUTLET)	LF	2340

Item	Item Code	Item	Unit of Measure	Estimated Quantity
181	019878	PARKWAY DRAIN	EA	5
182	703210	12" CORRUGATED STEEL PIPE RISER (.064" THICK)	LF	20
183	703216	18" CORRUGATED STEEL PIPE RISER (.064" THICK)	LF	4
184	719300	MANHOLE	EA	22
185	720002	ROCK SLOPE PROTECTION (DRAINAGE OUTLET)	CY	17
186	729010	ROCK SLOPE PROTECTION FABRIC	SQYD	16
187	731502	MINOR CONCRETE (MISCELLANEOUS CONSTRUCTION)	CY	1890
188 (F)	731517	MINOR CONCRETE (GUTTER)	CY	468
189 (F)	750001	MISCELLANEOUS IRON AND STEEL	LB	101 893
190 (S-F)	750499	MISCELLANEOUS METAL (RESTRAINER - ROD TYPE)	LB	6250
191 (S-F)	750501	MISCELLANEOUS METAL (BRIDGE)	LB	66 730
192 (S)	800360	CHAIN LINK FENCE (TYPE CL-6)	LF	2650
193 (S)	800400	CHAIN LINK FENCE (TYPE CL-8)	LF	34
194 (S)	802510	5' CHAIN LINK GATE (TYPE CL-6)	EA	47
195 (S)	019879	12' CHAIN LINK GATE (TYPE CL-8)	EA	3
196 (S)	019880	16' CHAIN LINK GATE (TYPE CL-8)	EA	1
197 (S)	802901	4' CHAIN LINK GATE (TYPE CL-8)	EA	1
198	810110	SURVEY MONUMENT	EA	1
199	820107	DELINEATOR (CLASS 1)	EA	78
200	820180	INSTALL MEDIAN MILEAGE PANEL	EA	60

Item	Item Code	Item	Unit of Measure	Estimated Quantity
201 (S)	832003	METAL BEAM GUARD RAILING (WOOD POST)	LF	4340
202 (S)	833020	CHAIN LINK RAILING	LF	530
203 (F)	833085	PIPE HANDRAILING	LF	391
204	833159	CONCRETE BARRIER (TYPE 27A MODIFIED)	LF	29 000
205 (F)	833160	CONCRETE BARRIER (TYPE 27)	LF	2484
206 (F)	833161	CONCRETE BARRIER (TYPE 27A)	LF	337
207	833162	CONCRETE BARRIER (TYPE 27B)	LF	760
208	833165	CONCRETE BARRIER (TYPE 27B MODIFIED)	LF	720
209	833183	CONCRETE BARRIER (TYPE 27SV)	LF	890
210	833184	CONCRETE BARRIER (TYPE 27SV MODIFIED)	LF	4860
211 (F)	833187	CONCRETE BARRIER (TYPE 27 MODIFIED)	LF	1424
212	833493	CONCRETE BARRIER (TYPE 50F)	LF	100
213	839473	CONCRETE BARRIER (TYPE 50W MODIFIED)	LF	600
214 (F)	839483	CONCRETE BARRIER (TYPE 50A)	LF	60
215	839487	CONCRETE BARRIER (TYPE 50C)	LF	5
216 (F)	839521	CABLE RAILING	LF	8257
217 (S)	839565	TERMINAL SYSTEM (TYPE SRT)	EA	10
218 (S)	839568	TERMINAL ANCHOR ASSEMBLY (TYPE SFT)	EA	10
219 (S)	019881	CRASH CUSHION (TYPE REACT 9SCBS)	EA	14
220 (F)	839701	CONCRETE BARRIER (TYPE 60)	LF	6322

Item	Item Code	Item	Unit of Measure	Estimated Quantity
221	839703	CONCRETE BARRIER (TYPE 60C)	LF	6690
222 (F)	839704	CONCRETE BARRIER (TYPE 60D)	LF	10 847
223	019882	CONCRETE BARRIER (TYPE 60 MOD)	LF	3750
224	019883	CONCRETE BARRIER (TYPE 60C MOD)	LF	110
225	019884	CONCRETE BARRIER (TYPE 60R)	LF	2150
226	019885	CONCRETE BARRIER (TYPE 60W)	LF	2930
227	019886	CONCRETE BARRIER (TYPE 60W MOD)	LF	6290
228	019887	CONCRETE BARRIER (TYPE 732A MOD)	LF	2120
229	019888	CONCRETE BARRIER (TYPE 732B MOD)	LF	100
230	019889	CONCRETE BARRIER (TYPE 736A MOD)	LF	1960
231	019890	CONCRETE BARRIER (TYPE 736B MOD)	LF	490
232 (S)	840504	4" THERMOPLASTIC TRAFFIC STRIPE	LF	164 000
233 (S)	840506	8" THERMOPLASTIC TRAFFIC STRIPE	LF	78 800
234 (S)	840508	8" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 12-3)	LF	11 100
235 (S)	840515	THERMOPLASTIC PAVEMENT MARKING	SQFT	10 000
236 (S)	840526	4" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 17-7)	LF	4330
237 (S)	840550	8" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 36-12)	LF	7810
238 (S)	840656	PAINT TRAFFIC STRIPE (2-COAT)	LF	401 000
239	840666	PAINT PAVEMENT MARKING (2-COAT)	SQFT	1300
240 (S)	850101	PAVEMENT MARKER (NON-REFLECTIVE)	EA	36 100

Item	Item Code	Item	Unit of Measure	Estimated Quantity
241 (S)	850102	PAVEMENT MARKER (REFLECTIVE)	EA	200
242 (S)	850111	PAVEMENT MARKER (RETROREFLECTIVE)	EA	21 400
243 (S)	019891	SIGNAL AND LIGHTING (LOCATION 1, MODIFY)	LS	LUMP SUM
244 (S)	019892	SIGNAL AND LIGHTING (LOCATION 2, MODIFY)	LS	LUMP SUM
245 (S)	019893	SIGNAL AND LIGHTING (LOCATION 3, MODIFY)	LS	LUMP SUM
246 (S)	019894	SIGNAL AND LIGHTING (LOCATION 4, MODIFY)	LS	LUMP SUM
247	019895	SIGNAL AND LIGHTING (LOCATION 5, MODIFY)	LS	LUMP SUM
248	019896	SIGNAL AND LIGHTING (LOCATION 6, MODIFY)	LS	LUMP SUM
249 (S)	019897	LIGHTING (MODIFY)	LS	LUMP SUM
250 (S)	019898	LIGHTING (CITY)	LS	LUMP SUM
251 (S)	019899	BRIDGE LIGHTING	LS	LUMP SUM
252 (S)	860460	LIGHTING AND SIGN ILLUMINATION	LS	LUMP SUM
253 (S)	019900	LIGHTING AND SIGN ILLUMINATION ELECTRIC SERVICE (IRRIGATION)	LS	LUMP SUM
254 (S)	019901	MODIFY HAR SIGN AND FLASHING BEACON (LOCATION SB459)	LS	LUMP SUM
255	019902	CHANGEABLE MESSAGE SIGN ELECTRICAL SYSTEM, CMS #80 RELOCATION	LS	LUMP SUM
256	019903	2" CONDUIT (TRENCHED IN SOIL)	LF	1320
257	019904	2" RIGID STEEL CONDUIT (JACKED)	LF	670
258	019905	3" CONDUIT (TRENCHED IN SOIL)	LF	230
259	019906	3" CONDUIT (TRENCHED IN ASPHALT)	LF	460
260	019907	TWO 4" CONDUIT (TRENCHED IN ASPHALT)	LF	29 000

Item	Item Code	Item	Unit of Measure	Estimated Quantity
261	019908	TWO 4" RIGID STEEL CONDUIT (JACKED)	LF	1180
262	019909	3" RIGID STEEL CONDUIT (JACKED)	LF	320
263	019910	4" RIGID STEEL CONDUIT (JACKED)	LF	200
264	019911	TWO 3" CONDUIT (TRENCHED IN SOIL)	LF	70
265	019912	TWO 3" RIGID STEEL CONDUIT (JACKED)	LF	60
266	019913	CONDUIT MARKER	LS	LUMP SUM
267	860790	1 1/4" INNERDUCT	LF	32 900
268 (S)	019914	TRAFFIC MONITORING STATION (LOCATION 2560, MODIFY)	LS	LUMP SUM
269 (S)	019915	TRAFFIC MONITORING STATION AND ELECTRIC SERVICE (IRRIGATION) (LOCATION 2107, 2108, MODIFY)	LS	LUMP SUM
270 (S)	019916	TRAFFIC MONITORING STATION (LOCATION 2109, MODIFY)	LS	LUMP SUM
271 (S)	019917	TRAFFIC MONITORING STATION (LOCATION 2129, MODIFY)	LS	LUMP SUM
272 (S)	019918	TRAFFIC MONITORING STATION (LOCATION 2128)	LS	LUMP SUM
273 (S)	019919	AUTOMATION VEHICLE CLASSIFICATION (LOCATION 054, MODIFY)	LS	LUMP SUM
274 (S)	019920	VIDEO NODE, DATA NODE AND CCTV CAMERA (LOCATION SB425)	LS	LUMP SUM
275	019921	CABLE NODE (LOCATION SB425)	LS	LUMP SUM
276 (S)	019922	CCTV CAMERA (LOCATION SB429)	LS	LUMP SUM
277 (S)	019923	CCTV CAMERA (LOCATION SB442)	LS	LUMP SUM
278 (S)	019924	CCTV CAMERA (LOCATION SB451)	LS	LUMP SUM
279 (S)	019925	CCTV CAMERA (LOCATION SB465)	LS	LUMP SUM
280 (S)	019926	CCTV CAMERA AND DATA NODE (LOCATION SB478)	LS	LUMP SUM

Item	Item Code	Item	Unit of Measure	Estimated Quantity
281 (S)	019927	RAMP METERING SYSTEM (LOCATION 0762, MODIFY)	LS	LUMP SUM
282 (S)	019928	RAMP METERING SYSTEM AND ELECTRIC SERVICE (IRRIGATION) (LOCATION 0772, MODIFY)	LS	LUMP SUM
283 (S)	019929	RAMP METERING SYSTEM AND ELECTRIC SERVICE (IRRIGATION) (LOCATION 0763/0771, MODIFY)	LS	LUMP SUM
284 (S)	019930	RAMP METERING SYSTEM (LOCATION 0770, MODIFY)	LS	LUMP SUM
285 (S)	019931	RAMP METERING SYSTEM AND ELECTRIC SERVICE (IRRIGATION) (LOCATION 0769, MODIFY)	LS	LUMP SUM
286 (S)	019932	RAMP METERING SYSTEM AND ELECTRIC SERVICE (IRRIGATION) (LOCATION 0764, MODIFY)	LS	LUMP SUM
287 (S)	019933	RAMP METERING SYSTEM (LOCATION 0765, MODIFY)	LS	LUMP SUM
288 (S)	019934	RAMP METERING SYSTEM (LOCATION 0768, MODIFY)	LS	LUMP SUM
289 (S)	019935	RAMP METERING SYSTEM AND ELECTRIC SERVICE (IRRIGATION) (LOCATION 0766, MODIFY)	LS	LUMP SUM
290 (S)	019936	RAMP METERING SYSTEM AND ELECTRIC SERVICE (IRRIGATION) (LOCATION 0767, MODIFY)	LS	LUMP SUM
291	867011	2 SINGLE FIBER OPTIC CABLE	LF	1400
292 (S)	867015	24 SINGLEMODE FIBER OPTIC CABLE	LF	470
293	019938	60 SINGLEMODE FIBER OPTIC CABLE (60SMFO)	LF	32 400
294	019939	12 SINGLEMODE FIBER OPTIC CABLE	LF	33 100
295	867113	8 MULTIMODE FIBER OPTIC CABLE	LF	33 100
296	867130	FIBER OPTIC SPLICE CLOSURE	EA	7
297	867135	TWISTED PAIR SPLICE CLOSURE	EA	32
298	869025	TWISTED PAIR CABLE (6 PAIR)	LF	5900
299	869029	TWISTED PAIR CABLE (50 PAIR)	LF	31 000
300 (S)	869035	NO. 5 PULL BOX	EA	18

Item	Item Code	Item	Unit of Measure	Estimated Quantity
301 (S)	869036	NO. 6 PULL BOX	EA	6
302	869039	COMMUNICATION PULL BOX	EA	69
303	869042	ADJUST PULL BOX	EA	2
304	869047	SPLICE VAULT	EA	19
305	869075	SYSTEM TESTING AND DOCUMENTATION	LS	LUMP SUM
306 (S)	019940	COMMUNICATION HUB EQUIPMENT	LS	LUMP SUM
307 (S)	019941	CABLE NODE (LOCATION SB 425)	LS	LUMP SUM
308 (S)	019942	CABLE NODE (LOCATION SB 482)	LS	LUMP SUM
309 (S)	019943	EQUIPMENT AT VIDEO NODE (LOCATION SB 425)	LS	LUMP SUM
310 (S)	019944	EQUIPMENT AT DATA NODE (LOCATION SB 425)	LS	LUMP SUM
311 (S)	019945	EQUIPMENT AT DATA NODE (LOCATION SB 478)	LS	LUMP SUM
312	019946	TELEPHONE BRIDGES (EXISTING CONTROLLERS)	EA	15
313	999990	MOBILIZATION	LS	LUMP SUM

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISIONS

Annexed to Contract No. 07-1224U4

SECTION 1. SPECIFICATIONS AND PLANS

The work embraced herein shall conform to the provisions in the Standard Specifications dated July 1992, and these special provisions.

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

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

SECTION 2. PROPOSAL REQUIREMENTS AND CONDITIONS

2-1.01 GENERAL

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

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

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

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

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

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

2-1.015 FEDERAL LOBBYING RESTRICTIONS

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

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

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

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

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

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

2-1.02 DISADVANTAGED BUSINESS ENTERPRISE (DBE)

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

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

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

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

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

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

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

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

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

1. The DBE must be responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract, and there cannot be a contrived arrangement for the purpose of meeting the DBE goal.
2. The DBE must itself own and operate at least one fully licensed, insured, and operational truck used on the contract.
3. The DBE receives credit for the total value of the transportation services it provides on the contract using trucks 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): 17 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.

Section 3-1.01, "Award of Contract," of the Standard Specifications is amended to read:

3-1.01 Award of Contract—The right is reserved to reject any and all proposals.

The award of the contract, if it be awarded, will be to the lowest responsible bidder whose proposal complies with all the requirements prescribed. Such award, if made, will be made within 30 days after the opening of the proposals. This period will be subject to extension for such further period as may be agreed upon in writing between the Department and the bidder concerned.

All bids will be compared on the basis of the Engineer's Estimate of the quantities of work to be done.

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

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

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

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

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

The work (except plant establishment work) shall be diligently prosecuted to completion before the expiration of **600 WORKING DAYS** beginning on the fifteenth calendar day after approval of the contract.

The Contractor shall pay to the State of California the sum of $4200 per day, for each and every calendar day's delay in finishing the work (except plant establishment work) in excess of the number of working days prescribed above.

The Contractor shall diligently prosecute all work (including plant establishment) to completion before the expiration of **850 WORKING DAYS** beginning on the fifteenth calendar day after approval of the contract.

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

In no case will liquidated damages of more than $4200 per day be assessed.

SECTION 5. GENERAL

SECTION 5-1. MISCELLANEOUS

5-1.00 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.

5-1.002 LABORATORY

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

5-1.005 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 the following:

1. One hundred percent of the total amount payable by the terms of the contract when the total amount payable does not equal or exceed five million dollars ($5,000,000).
2. Fifty percent of the total amount payable by the terms of the contract when the total amount payable is not less than five million dollars ($5,000,000) and does not exceed ten million dollars ($10,000,000).
3. Twenty-five percent of the total amount payable by the terms of the contract when the total amount payable exceeds ten million dollars ($10,000,000).

5-1.01 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 $5,000 or more.

5-1.02 LABOR CODE REQUIREMENTS

Section 7-1.01A(1), "Hours of Labor," of the Standard Specifications is amended to read:

7-1.01A(1) Hours of Labor.— Eight hours labor constitutes a legal day's work. The Contractor or any subcontractor under the Contractor shall forfeit, as a penalty to the State of California, $25 for each worker employed in the execution of the contract by the respective Contractor or subcontractor for each calendar day during which that worker is required or permitted to work more than 8 hours in any one calendar day and 40 hours in any one calendar week in violation of the provisions of the Labor Code, and in particular, Section 1810 to Section 1815, thereof, inclusive, except that work performed by employees of Contractors in excess of 8 hours per day, and 40 hours during any one week, shall be permitted upon compensation for all hours worked in excess of 8 hours per day at not less than one and one-half times the basic rate of pay, as provided in Section 1815 thereof.

Section 7-1.01A(2), "Prevailing Wage," of the Standard Specifications is amended to read:

7-1.01A(2) Prevailing Wage.— The Contractor and any subcontractor under the Contractor shall comply with Labor Code Sections 1774 and 1775. Pursuant to Section 1775, the Contractor and any subcontractor under the Contractor shall forfeit to the State or political subdivision on whose behalf the contract is made or awarded a penalty of not more than fifty dollars ($50) for each calendar day, or portion thereof, for each worker paid less than the prevailing rates as determined by the Director of Industrial Relations for the work or craft in which the worker is employed for any public work done under the contract by the Contractor or by any subcontractor under the Contractor in violation of the provisions of the Labor Code and in particular, Labor Code Sections 1770 to 1780, inclusive. The amount of this forfeiture shall be determined by the Labor Commissioner and shall be based on consideration of the mistake, inadvertence, or neglect of the Contractor or subcontractor in failing to pay the correct rate of prevailing wages, or the previous record of the Contractor or subcontractor in meeting their respective prevailing wage obligations, or the willful failure by the Contractor or subcontractor to pay the correct rates of prevailing wages. A mistake, inadvertence, or neglect in failing to pay the correct rate of prevailing wages is not excusable if the Contractor or subcontractor had knowledge of the obligations under the Labor Code. In addition to the penalty and pursuant to Labor Code Section 1775, the difference between the prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing wage rate shall be paid to each worker by the Contractor or subcontractor. If a worker employed by a subcontractor on a public works project is not paid the general prevailing per diem wages by the subcontractor, the prime contractor of the project is not liable for the penalties described above unless the prime contractor had knowledge of that failure of the subcontractor to pay the specified prevailing rate of wages to those workers or unless the prime contractor fails to comply with all of the following requirements:

1. The contract executed between the contractor and the subcontractor for the performance of work on the public works project shall include a copy of the provisions of Sections 1771, 1775, 1776, 1777.5, 1813, and 1815 of the Labor Code.
2. The contractor shall monitor the payment of the specified general prevailing rate of per diem wages by the subcontractor to the employees, by periodic review of the certified payroll records of the subcontractor.
3. Upon becoming aware of the subcontractor's failure to pay the specified prevailing rate of wages to the subcontractor's workers, the contractor shall diligently take corrective action to halt or rectify the failure, including, but not limited to, retaining sufficient funds due the subcontractor for work performed on the public works project.
4. Prior to making final payment to the subcontractor for work performed on the public works project, the contractor shall obtain an affidavit signed under penalty of perjury from the subcontractor that the subcontractor has paid the specified general prevailing rate of per diem wages to the subcontractor's employees on the public works project and any amounts due pursuant to Section 1813 of the Labor Code.

Pursuant to Section 1775 of the Labor Code, the Division of Labor Standards Enforcement shall notify the Contractor on a public works project within 15 days of the receipt by the Division of Labor Standards Enforcement of a complaint of the failure of a subcontractor on that public works project to pay workers the general prevailing rate of per diem wages. If the Division of Labor Standards Enforcement determines that employees of a subcontractor were not paid the general prevailing rate of per diem wages and if the Department did not retain sufficient money under the contract to pay those employees the balance of wages owed under the general prevailing rate of per diem wages, the contractor shall withhold an amount of moneys due the subcontractor sufficient to pay those employees the general prevailing rate of per diem wages if requested by the Division of Labor Standards Enforcement. The Contractor shall pay any money retained from and owed to a subcontractor upon receipt of notification by the Division of Labor Standards Enforcement that the wage complaint has been resolved. If notice of the resolution of the wage complaint has not been received by the Contractor within 180 days of the filing of a valid notice of completion or acceptance of the public works project, whichever occurs later, the Contractor shall pay all moneys retained from the subcontractor to the Department. These moneys shall be retained by the Department pending the final decision of an enforcement action.

Pursuant to the provisions of Section 1773 of the Labor Code, the Department has obtained the general prevailing rate of wages (which rate includes employer payments for health and welfare, pension, vacation, travel time, and subsistence pay as provided for in Section 1773.8 of the Labor Code, apprenticeship or other training programs authorized by Section 3093 of the Labor Code, and similar purposes) applicable to the work to be done, for straight time, overtime, Saturday, Sunday and holiday work. The holiday wage rate listed shall be applicable to all holidays recognized in the collective bargaining agreement of the particular craft, classification or type of workmen concerned. The general prevailing wage rates and any applicable changes to these wage rates are available at the Labor Compliance Office at the offices of the District Director of Transportation for the district in which the work is situated. For work situated in District 9, the wage rates are available at the Labor Compliance Office at the offices of the District Director of

Transportation for District 6, located at Fresno. General prevailing wage rates are also available from the California Department of Industrial Relations' Internet Web Site at: http://www.dir.ca.gov.

The wage rates determined by the Director of Industrial Relations for the project refer to expiration dates. Prevailing wage determinations with a single asterisk after the expiration date are in effect on the date of advertisement for bids and are good for the life of the contract. Prevailing wage determinations with double asterisks after the expiration date indicate that the wage rate to be paid for work performed after this date has been determined. If work is to extend past this date, the new rate shall be paid and incorporated in the contract. The Contractor shall contact the Department of Industrial Relations as indicated in the wage rate determinations to obtain predetermined wage changes.

Pursuant to Section 1773.2 of the Labor Code, general prevailing wage rates shall be posted by the Contractor at a prominent place at the site of the work.

Changes in general prevailing wage determinations which conform to Labor Code Section 1773.6 and Title 8 California Code of Regulations Section 16204 shall apply to the project when issued by the Director of Industrial Relations at least 10 days prior to the date of the Notice to Contractors for the project.

The State will not recognize any claim for additional compensation because of the payment by the Contractor of any wage rate in excess of the prevailing wage rate set forth in the contract. The possibility of wage increases is one of the elements to be considered by the Contractor in determining the bid, and will not under any circumstances be considered as the basis of a claim against the State on the contract.

7-1.01A(2)(a) Travel and Subsistence Payments.— Attention is directed to the requirements of Section 1773.8 of the Labor Code. The Contractor shall make travel and subsistence payments to each workman, needed to execute the work, in accordance with the requirements in Labor Code Section 1773.8.

The first and second paragraphs of Section 7-1.01A(3), "Payroll Records," of the Standard Specifications are amended to read:

7-1.01A(3) Payroll Records.— Attention is directed to the provisions of Labor Code Section 1776, a portion of which is quoted below. Regulations implementing Labor Code Section 1776 are located in Sections 16016 through 16019 and Sections 16207.10 through 16207.19 of Title 8, California Code of Regulations.

"1776. (a) Each contractor and subcontractor shall keep accurate payroll records, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work. Each payroll record shall contain or be verified by a written declaration that it is made under penalty of perjury, stating both of the following:

(1) The information contained in the payroll record is true and correct.

(2) The employer has complied with the requirements of Sections 1771, 1811, and 1815 for any work performed by his or her employees on the public works project.

"(b) The payroll records enumerated under subdivision (a) shall be certified and shall be available for inspection at all reasonable hours at the principal office of the contractor on the following basis:

(1) A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or his or her authorized representative on request.

(2) A certified copy of all payroll records enumerated in subdivision (a) shall be made available for inspection or furnished upon request to a representative of the body awarding the contract, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations.

(3) A certified copy of all payroll records enumerated in subdivision (a) shall be made available upon request by the public for inspection or for copies thereof. However, a request by the public shall be made through either the body awarding the contract, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to paragraph (2), the requesting party shall, prior to being provided the records, reimburse the costs of preparation by the contractor, subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of the contractor.

"(c) The certified payroll records shall be on forms provided by the Division of Labor Standards Enforcement or shall contain the same information as the forms provided by the division.

"(d) A contractor or subcontractor shall file a certified copy of the records enumerated in subdivision (a) with the entity that requested the records within 10 days after receipt of a written request.

"(e) Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the awarding body, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement shall be marked or obliterated in a manner so as to prevent disclosure of an individual's

name, address, and social security number. The name and address of the contractor awarded the contract or the subcontractor performing the contract shall not be marked or obliterated.

"(f) The contractor shall inform the body awarding the contract of the location of the records enumerated under subdivision (a), including the street address, city and county, and shall, within five working days, provide a notice of a change of location and address.

"(g) The contractor or subcontractor shall have 10 days in which to comply subsequent to receipt of a written notice requesting the records enumerated in subdivision (a). In the event that the contractor or subcontractor fails to comply within the 10-day period, he or she shall, as a penalty to the state or political subdivision on whose behalf the contract is made or awarded, forfeit twenty-five dollars ($25) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due. A contractor is not subject to a penalty assessment pursuant to this section due to the failure of a subcontractor to comply with this section."

The penalties specified in subdivision (g) of Labor Code Section 1776 for noncompliance with the provisions of Section 1776 may be deducted from any moneys due or which may become due to the Contractor.

5-1.03 CONTRACTOR'S LICENSING LAWS

The third paragraph of Section 7-1.01C, "Contractor's Licensing Laws," of the Standard Specifications is amended to read:

Attention is also directed to the requirements in Public Contract Code Section 10164. In all projects where Federal funds are involved, the Contractor shall be properly licensed at the time the contract is awarded.

5-1.035 INDEMNIFICATION AND INSURANCE

Section 7-1.12, "Responsibility for Damage," of the Standard Specifications is deleted.

The Standard Specifications is amended by adding the following Section 7-1.121, "Indemnification," and Section 7-1.122, "Insurance," before Section 7-1.125, "Legal Action Against the Department."

7-1.121 Indemnification.—With the exception that this section shall in no event be construed to require indemnification by the Contractor to a greater extent than permitted by law, the Contractor shall defend, indemnify and save harmless the State, including its officers, directors, agents (excluding agents who are design professionals), and employees, and each of them (Indemnitees), from any and all claims, demands, causes of action, damages, costs, expenses, actual attorneys' fees, losses or liabilities, in law or in equity, of every kind and nature whatsoever (Claims), arising out of or in connection with the Contractor's performance of this contract for:

A. Bodily injury including, but not limited to, bodily injury, sickness or disease, emotional injury or death to persons, including, but not limited to, the public, any employees or agents of the Contractor, State, Department, or any other contractor and;
B. Damage to property of anyone including loss of use thereof;

caused or alleged to be caused in whole or in part by any negligent or otherwise legally actionable act or omission of the Contractor or anyone directly or indirectly employed by the Contractor or anyone for whose acts the Contractor may be liable.

Except as otherwise provided by law, the indemnification provisions above shall apply regardless of the existence or degree of fault of Indemnitees. The Contractor, however, shall not be obligated to indemnify Indemnitees for Claims arising from conduct delineated in Civil Code section 2782. Further, the Contractor's indemnity obligation shall not extend to Claims to the extent they arise from any defective or substandard condition of the roadway which existed at or prior to the time the Contractor commenced work, unless this condition has been changed by the work or the scope of the work requires the Contractor to maintain existing Roadway facilities and the claim arises from the Contractor's failure to maintain. The Contractor's indemnity obligation shall extend to Claims arising after the work is completed and accepted only if these Claims are directly related to alleged acts or omissions of the Contractor which occurred during the course of the work. No inspection by the Department, its employees or agents shall be deemed a waiver by the Department of full compliance with the requirements of this section.

The Contractor's obligation to defend and indemnify shall not be excused because of the Contractor's inability to evaluate liability or because the Contractor evaluates liability and determines that the Contractor is not liable to the claimant. The Contractor will respond within 30 days to the tender of any claim for defense and indemnity by the State,

unless this time has been extended by the State. If the Contractor fails to accept or reject a tender of defense and indemnity within 30 days, in addition to any other remedy authorized by law, so much of the money due the Contractor under and by virtue of the contract as shall reasonably be considered necessary by the Department, may be retained by the State until disposition has been made of the claim or suit for damages, or until the Contractor accepts or rejects the tender of defense, whichever occurs first.

With respect to third party claims against the Contractor, the Contractor waives any and all rights of any type to express or implied indemnity against the State, its directors, officers, employees, or agents (excluding agents who are design professionals).

7-1.122 Insurance.—Insurance shall conform to the following requirements:

7-1.122A Casualty Insurance.—The Contractor shall, at the Contractor's expense, procure and maintain insurance on all of its operations with companies acceptable to the Department as follows. All insurance shall be kept in full force and effect from the beginning of the work through final acceptance by the State. In addition, the Contractor shall maintain completed operations coverage with a carrier acceptable to the Department through the expiration of the patent deficiency in construction statute of repose set forth in Section 337.1 of the Code of Civil Procedure.

7-1.122A(1) Workers' Compensation and Employer's Liability Insurance.—Workers' Compensation insurance shall be provided as specified in Section 7-1.01A(6), "Workers' Compensation." Employer's Liability Insurance shall be provided in amounts not less than:

(a) $1,000,000 for each accident for bodily injury by accident.
(b) $1,000,000 policy limit for bodily injury by disease.
(c) $1,000,000 for each employee for bodily injury by disease.

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

7-1.122A(2) Liability Insurance.—The Contractor shall carry General Liability and Umbrella or Excess Liability Insurance covering all operations by or on behalf of the Contractor providing insurance for bodily injury liability, and property damage liability for the limits of liability indicated below and including coverage for:

(a) premises, operations and mobile equipment
(b) products and completed operations
(c) broad form property damage (including completed operations)
(d) explosion, collapse and underground hazards
(e) personal injury
(f) contractual liability

7-1.122A(3) Liability Limits/Additional Insureds.—The limits of liability shall be at least:

(a) $1,000,000 for each occurrence (combined single limit for bodily injury and property damage).
(b) $2,000,000 aggregate for products-completed operations.
(c) $2,000,000 general aggregate. This general aggregate limit shall apply separately to the Contractor's work under this Agreement.
(d) $5,000,000 umbrella or excess liability. For projects over $25,000,000 only, an additional $10,000,000 umbrella or excess liability (for a total of $15,000,000). Umbrella or excess policy shall include products liability completed operations coverage and may be subject to $5,000,000 or $15,000,000 aggregate limits. Further, the umbrella or excess policy shall contain a clause stating that it takes effect (drops down) in the event the primary limits are impaired or exhausted.

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

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

The policy shall stipulate that the insurance afforded the additional insureds shall apply as primary insurance. Any other insurance or self insurance maintained by the Department or State will be excess only and shall not be called upon to contribute with this insurance. Such additional insured coverage shall be provided by a policy provision or by an endorsement providing coverage at least as broad as Additional Insured (Form B) endorsement form CG 2010, as published by the Insurance Services Office (ISO).

7-1.122B Automobile Liability Insurance.—The Contractor shall carry automobile liability insurance, including coverage for all owned, hired and non-owned automobiles. The primary limits of liability shall be not less than $1,000,000 combined single limit each accident for bodily injury and property damage. The umbrella or excess liability coverage required under Section 7-1.122A(3), "Liability Limits/Additional Insureds," shall also apply to automobile liability.

7-1.122C Policy Forms, Endorsements and Certificates.—The Contractor's General Liability Insurance shall be provided under Commercial General Liability policy form no. CG0001 as published by the Insurance Services Office (ISO) or under a policy form at least as broad as policy form no. CG0001.

Evidence of insurance in a form acceptable to the Department, including the required "additional insured" endorsements, shall be furnished by the Contractor to the Department at or prior to the pre-construction conference. The evidence of insurance shall provide that there will be no cancellation, lapse, or reduction of coverage without thirty (30) days' prior written notice to the Department. Certificates of Insurance, as evidence of required insurance, for the General Liability, Auto Liability and Umbrella-Excess Liability policies shall set forth deductible amounts applicable to each policy and all exclusions which are added by endorsement to each policy. The Department may expressly allow deductible clauses, which it does not consider excessive, overly broad, or harmful to the interests of the State. Standard ISO form CG 0001 or similar exclusions will be allowed provided they are not inconsistent with the requirements of this section. Allowance of any additional exclusions is at the discretion of the Department. Regardless of the allowance of exclusions or deductions by the Department, the Contractor shall be responsible for any deductible amount and shall warrant that the coverage provided to the Department is consistent with the requirements of this section.

7-1.122D Enforcement.—The Department may take any steps as are necessary to assure Contractor's compliance with its obligations. Should any insurance policy lapse or be canceled during the contract period the Contractor shall, within thirty (30) days prior to the effective expiration or cancellation date, furnish the Department with evidence of renewal or replacement of the policy. Failure to continuously maintain insurance coverage as herein provided is a material breach of contract. In the event the Contractor fails to maintain any insurance coverage required, the Department may, but is not required to, maintain this coverage and charge the expense to the Contractor or terminate this Agreement. The required insurance shall be subject to the approval of Department, but any acceptance of insurance certificates by the Department shall in no way limit or relieve the Contractor of the Contractor's duties and responsibilities under the Contract to indemnify, defend and hold harmless the State, its officers, agents, and employees. Insurance coverage in the minimum amounts set forth herein shall not be construed to relieve the Contractor for liability in excess of such coverage, nor shall it preclude the State from taking other actions as is available to it under any other provision of the contract or law. Failure of the Department to enforce in a timely manner any of the provisions of this section shall not act as a waiver to enforcement of any of these provisions at a later date.

7-1.122E Self-Insurance.—Self-insurance programs and self-insured retentions in insurance policies are subject to separate annual review and approval by the State of evidence of the Contractor's financial capacity to respond. Additionally, self-insurance programs or retentions must provide the State with at least the same protection from liability and defense of suits as would be afforded by first-dollar insurance.

7-1.122F Miscellaneous.—Nothing contained in the Contract is intended to make the public or any member thereof a third party beneficiary of the Insurance or Indemnity provisions of these Standard Specifications, nor is any term, condition or other provision of the Contract intended to establish a standard of care owed to the public or any member thereof.

5-1.04 ARBITRATION

The last paragraph in Section 9-1.10, "Arbitration," of the Standard Specifications is amended to read:

Arbitration shall be initiated by a Complaint in Arbitration made in compliance with the requirements of those regulations. A Complaint in Arbitration by the Contractor shall be made not later than 90 days after the date of service in person or by mail on the Contractor of the final written decision by the Department on the claim.

5-1.05 NOTICE OF POTENTIAL CLAIM

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

9-1.04 Notice of Potential Claim.--The Contractor shall not be entitled to the payment of any additional compensation for any act, or failure to act, by the Engineer, including failure or refusal to issue a change order, or for the happening of any event, thing, occurrence, or other cause, unless he shall have given the Engineer due written notice of potential claim as hereinafter specified. Compliance with this Section 9-1.04 shall not be a prerequisite as to matters within the scope of the protest provisions in Section 4-1.03, "Changes," or Section 8-1.06, "Time of Completion," or the notice provisions in Section 5-1.116, "Differing Site Conditions," or Section 8-1.07, "Liquidated Damages," or Section 8-1.10, "Utility and Non-Highway Facilities," nor to any claim which is based on differences in measurements or errors of computation as to contract quantities.

The written notice of potential claim shall be submitted to the Engineer prior to the time that the Contractor performs the work giving rise to the potential claim for additional compensation, if based on an act or failure to act by the Engineer, or in all other cases within 15 days after the happening of the event, thing, occurrence, or other cause, giving rise to the potential claim.

The written notice of potential claim shall be submitted on Form CEM-6201 furnished by the Department and shall be certified with reference to the California False Claims Act, Government Code Sections 12650 - 12655. The notice shall set forth the reasons for which the Contractor believes additional compensation will or may be due and the nature of the costs involved. Unless the amount of the potential claim has been stated in the written notice, the Contractor shall, within 15 days of submitting said notice, furnish an estimate of the cost of the affected work and impacts, if any, on project completion. Said estimate of costs may be changed or updated by the Contractor when conditions have changed. When the affected work is completed, the Contractor shall submit substantiation of his actual costs. Failure to do so shall be sufficient cause for denial of any claim subsequently filed on the basis of said notice of potential claim.

It is the intention of this Section 9-1.04 that differences between the parties arising under and by virtue of the contract be brought to the attention of the Engineer at the earliest possible time in order that such matters may be settled, if possible, or other appropriate action promptly taken. The Contractor hereby agrees that he shall have no right to additional compensation for any claim that may be based on any such act, failure to act, event, thing or occurrence for which no written notice of potential claim as herein required was filed.

Should the Contractor, in connection with or subsequent to the assertion of a potential claim, request inspection and copying of documents or records in the possession of the Department that pertain to the potential claim, Contractor shall make its records of the project, as deemed by the Department to be pertinent to the potential claim, available to the Department for inspection and copying.

5-1.06 PARTIAL PAYMENTS

The last paragraph of Section 9-1.06, "Partial Payments," of the Standard Specifications is amended to read:

Attention is directed to the prohibitions and penalties pertaining to unlicensed contractors as provided in Business and Professions Code Sections 7028.15(a) and 7031.

5-1.07 PAYMENT OF WITHHELD FUNDS

Section 9-1.065, "Payment of Withheld Funds," of the Standard Specifications, is amended by adding the following after the third paragraph:

Alternatively, and subject to the approval of the Department, the payment of retentions earned may be deposited directly with a person licensed under Division 6 (commencing with Section 17000) of the Financial Code as the escrow agent. Upon written request of an escrow agent that has not been approved by the Department under subdivision (c) of Section 10263 of the Public Contract Code, the Department will provide written notice to that escrow agent within 10 business days of receipt of the request indicating the reason or reasons for not approving that escrow agent. The payments will be deposited in a trust account with a Federally chartered bank or savings association within 24 hours of receipt by the escrow agent. The Contractor shall not place any retentions with the escrow agent in excess of the coverage provided to that escrow agent pursuant to subdivision (b) of Section 17314 of the Financial Code. In all

respects not inconsistent with subdivision (c) of Section 10263 of the Public Contract Code, the remaining provisions of Section 10263 of the Public Contract Code shall apply to escrow agents acting pursuant to subdivision (c) of Section 10263 of the Public Contract Code.

5-1.08 FINAL PAYMENT AND CLAIMS

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

9-1.07B Final Payment and Claims.--After acceptance by the Director, the Engineer will make a proposed final estimate in writing of the total amount payable to the Contractor, including therein an itemization of said amount, segregated as to contract item quantities, extra work and any other basis for payment, and shall also show therein all deductions made or to be made for prior payments and amounts to be kept or retained under the provisions of the contract. All prior estimates and payments shall be subject to correction in the proposed final estimate. The Contractor shall submit written approval of the proposed final estimate or a written statement of all claims arising under or by virtue of the contract so that the Engineer receives such written approval or statement of claims no later than close of business of the thirtieth day after receiving the proposed final estimate. If the thirtieth day falls on a Saturday, Sunday or legal holiday, then receipt of such written approval or statement of claims by the Engineer shall not be later than close of business of the next business day. No claim will be considered that was not included in the written statement of claims, nor will any claim be allowed as to which a notice or protest is required under the provisions in Sections 4-1.03, "Changes," 8-1.06, "Time of Completion," 8-1.07, "Liquidated Damages," 5-1.116, "Differing Site Conditions," 8-1.10, "Utility and Non-Highway Facilities," and 9-1.04, "Notice of Potential Claim," unless the Contractor has complied with the notice or protest requirements in said sections.

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

If the Contractor within said period of 30 days files claims, the Engineer will issue a semifinal estimate in accordance with the proposed final estimate submitted to the Contractor and within 30 days thereafter the State will pay the sum so found to be due. Such semifinal estimate and payment thereon shall be conclusive and binding against both parties to the contract on all questions relating to the amount of work done and the compensation payable therefor, except insofar as affected by the claims filed within the time and in the manner required hereunder and except as otherwise provided in Sections 9-1.03C, "Records," and 9-1.09, "Clerical Errors."

Claims filed by the Contractor shall be in sufficient detail to enable the Engineer to ascertain the basis and amount of said claims. If additional information or details are required by the Engineer to determine the basis and amount of said claims, the Contractor shall furnish such further information or details so that the information or details are received by the Engineer no later than the fifteenth day after receipt of the written request from the Engineer. If the fifteenth day falls on a Saturday, Sunday or legal holiday, then receipt of such information or details by the Engineer shall not be later than close of business of the next business day. Failure to submit such information and details to the Engineer within the time specified will be sufficient cause for denying the claim.

The Contractor shall keep full and complete records of the costs and additional time incurred for any work for which a claim for additional compensation is made. The Engineer or any designated claim investigator or auditor shall have access to those records and any other records as may be required by the Engineer to determine the facts or contentions involved in the claims. Failure to permit access to such records shall be sufficient cause for denying the claims.

Claims submitted by the Contractor shall be accompanied by a notarized certificate containing the following language:

Under the penalty of law for perjury or falsification and with specific reference to the California False Claims Act, Government Code Section 12650 et. seq., the undersigned,

_____
(name)
_____ of
(title)
_____
(company)

hereby certifies that the claim for the additional compensation and time, if any, made herein for the work on this contract is a true statement of the actual costs incurred and time sought, and is fully documented and supported under the contract between parties.

Dated _____

/s/ _____

Subscribed and sworn before me this _____day

of _____

_____
Notary Public
My Commission Expires _____

Failure to submit the notarized certificate will be sufficient cause for denying the claim.

Any claim for overhead type expenses or costs, in addition to being certified as stated above, shall be supported by an audit report of an independent Certified Public Accountant. Any such overhead claim shall also be subject to audit by the State at its discretion.

Any costs or expenses incurred by the State in reviewing or auditing any claims that are not supported by the Contractor's cost accounting or other records shall be deemed to be damages incurred by the State within the meaning of the California False Claims Act.

The District Director of the District which administers the contract will make the final determination of any claims which remain in dispute after completion of claim review by the Engineer. A board or person designated by said District Director will review such claims and make a written recommendation thereon to the District Director. The Contractor may meet with the review board or person to make a presentation in support of such claims.

Upon final determination of the claims, the Engineer will then make and issue his final estimate in writing and within 30 days thereafter the State will pay the entire sum, if any, found due thereon. Such final estimate shall be conclusive and binding against both parties to the contract on all questions relating to the amount of work done and the compensation payable therefor, except as otherwise provided in Sections 9-1.03C, "Records," and 9-1.09, "Clerical Errors."

5-1.09 INTEREST ON PAYMENTS

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

1. Unpaid progress payments, payment after acceptance and final payments shall begin to accrue interest 30 days after the Engineer prepares the payment estimate.
2. Unpaid extra work bills shall begin to accrue interest 30 days after preparation of the first pay estimate following the 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 accordance with the requirements of 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.
3. The rate of interest payable for unpaid progress payments, payments after acceptance, final payments and extra work payments shall be 10 percent per annum.

4. 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.

5-1.10 PUBLIC SAFETY

The Contractor shall provide for the safety of traffic and the public in accordance 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 any lane carrying public traffic and any excavation, obstacle, or storage area when the following conditions exist:

(1) Excavations.--Any excavation, the near edge of which is 12 feet or less from the edge of the lane, except:

(a) Excavations covered with sheet steel or concrete covers of adequate thickness to prevent accidental entry by traffic or the public.
(b) Excavations less than one foot deep.
(c) Trenches less than one foot wide for irrigation pipe or electrical conduit, or excavations less than one foot in diameter.
(d) Excavations parallel to the lane for the purpose of pavement widening or reconstruction.
(e) Excavations in side slopes, where the slope is steeper than 4:1.
(f) Excavations protected by existing barrier or railing.

(2) Temporarily Unprotected Permanent Obstacles.--Whenever 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 whenever the Contractor, for his 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.

(3) Storage Areas.--Whenever material or equipment is stored within 12 feet of the lane and such storage is not otherwise prohibited by the specifications.

The approach end of temporary railing (Type K), installed in accordance with the requirements in this section "Public Safety" and in Section 7-1.09, "Public Safety," of the Standard Specifications shall be offset a minimum of 15 feet 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 one foot transversely to 10 feet longitudinally with respect to the edge of the traffic lane. If the 15-foot minimum offset cannot be achieved, the temporary railing 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 1995 Standard Plan T3 or 1997 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.

The fourteenth paragraph of Section 12-3.08, "Temporary Railing (Type K)," of the Standard Specifications is amended to read:

Each rail unit placed within 10 feet of a traffic lane shall have a reflector installed on top of the rail as directed by the Engineer. A Type P marker panel shall also be installed at each end of railing installed adjacent to a two-lane, two-way highway and at the end facing traffic of railing installed adjacent to a one-way roadbed. If the railing is placed on a skew, the marker shall be installed at the end of the skew nearest the traveled way. Type P marker panels shall conform to the provisions in Section 82, "Markers and Delineators," except that the Contractor shall furnish the marker panels.

Reflectors on temporary railing (Type K) shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials," of these special provisions.

Temporary crash cushion modules shall conform to the provisions in "Temporary Crash Cushion Module" elsewhere in 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 specifications:

Approach speed of public traffic (Posted Limit) (Miles Per Hour)	Work Areas
Over 45	Within 6 feet of a traffic lane but not on a traffic lane.
35 to 45	Within 3 feet 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 traffic lane, the line of cones or delineators shall be considered to be the edge of traffic lane, however, the Contractor shall not reduce the width of an existing lane to less than 10 feet 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 requirements 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.

5-1.11 SURFACE MINING AND RECLAMATION ACT

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

Material from mining operations furnished for this project shall only come from permitted sites in compliance with the Surface Mining and Reclamation Act of 1975.

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

5-1.12 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, and shall immediately cease work in the affected area and report the condition to the Engineer in writing.

In accordance with Section 25914.1 of the Health and Safety Code, all such removal of asbestos or hazardous substances including any 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 as provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

5-1.13 FINAL PAY QUANTITIES

Section 9-1.015, "Final Pay Quantities," of the Standard Specifications is amended to read:

9-1.015 Final Pay Items.—When an item of work is designated as (F) or (S-F) in the Engineer's Estimate, the estimated quantity for that item of work shall be the final pay quantity, unless the dimensions of any portion of that item are revised by the Engineer, or the item or any portion of the item is eliminated. If the dimensions of any portion of the item are revised, and the revisions result in an increase or decrease in the estimated quantity of that item of work, the final pay quantity for the item will be revised in the amount represented by the changes in the dimensions, except as otherwise provided for minor structures in Section 51-1.22, "Measurement." If a final pay item is eliminated, the estimated quantity for the item will be eliminated. If a portion of a final pay item is eliminated, the final pay quantity will be revised in the amount represented by the eliminated portion of the item of work.

The estimated quantity for each item of work designated as (F) or (S-F) in the Engineer's Estimate shall be considered as approximate only, and no guarantee is made that the quantity which can be determined by computations, based on the details and dimensions shown on the plans, will equal the estimated quantity. No allowance will be made in the event that the quantity based on computations does not equal the estimated quantity.

In case of discrepancy between the quantity shown in the Engineer's Estimate for a final pay item and the quantity or summation of quantities for the same item shown on the plans, payment will be based on the quantity shown in the Engineer's Estimate.

5-1.14 YEAR 2000 COMPLIANCE

This contract is subject to Year 2000 Compliance for automated devices in the State of California. Year 2000 compliance is defined as follows:

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 must also operate accurately in the manner in which it was intended for date operation without requiring manual intervention.

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

5-1.145 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 accordance 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 any other coating that protects or enhances 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 also 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%) of the total contract cost or $2,500, whichever is greater. The Contractor shall furnish the Engineer acceptable documentation of the quantity and value of any foreign steel and iron prior to incorporating the materials into the work.

5-1.15 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).

5-1.152 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.

5-1.155 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.

5-1.16 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.

The second sentence of the third paragraph in said Section 8-1.01 is amended to read:

When items of work in the Engineer's Estimate are preceded by the letters (S) or (S-F), said items are designated as "Specialty Items."

Section 8-1.01 of the Standard Specifications is amended by adding the following before the sixth paragraph:

Pursuant to the provisions of Section 6109 of the Public Contract Code, the Contractor shall not perform work on a public works project with a subcontractor who is ineligible to perform work on the public works project pursuant to Section 1777.1 or 1777.7 of the Labor Code.

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.

The DBE information furnished under Section 2-1.02B, "Submission of DBE Information," of these special provisions is in addition to the subcontractor information required to be furnished under Section 8-1.01, "Subcontracting," and Section 2-1.054, "Required Listing of Proposed Subcontractors," of the Standard Specifications.

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.

5-1.162 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.

5-1.164 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.

5-1.17 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 will be to maintain cooperative communication and mutually resolve conflicts at the lowest possible management level.

The Contractor may request the formation of such 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.

The costs involved in providing a facilitator and a workshop site will be borne equally by the State and the Contractor. The Contractor shall pay all compensation for the wages and expenses of the facilitator, and of the expenses for obtaining the workshop site. The State's share of such costs will be reimbursed to the Contractor in a change order written by the Engineer. Markups will not be added. All other costs associated with the "Partnering" relationship will be borne separately by the party incurring the costs.

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.

5-1.18 DISPUTES REVIEW BOARD

To assist in the resolution of disputes or potential claims arising out of the work of this project, a Disputes 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 set forth in the provisions of Section 9-1.04, "Notice of Potential Claim," and Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications. The DRB shall not be considered to serve as a substitute for any requirements in the specifications in regard to filing of potential claims. The requirements and procedures established in this special provision shall be considered as an essential prerequisite to filing a claim, for arbitration or for litigation prior or subsequent to project completion.

The DRB shall be utilized when dispute or potential claim resolution at the job level is unsuccessful. The DRB shall function until the day of acceptance of the contract, at which time the work of the DRB will cease except for completion of unfinished dispute hearings and reports. After acceptance of the contract any disputes or potential claims that the Contractor wants to pursue that have not been settled, shall be stated or restated, by the Contractor, in response to the Proposed Final Estimate within the time limits provided in Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications. The State will review those claims in accordance with Section 9-1.07B, of the Standard Specifications. Following the completion of the State's administrative claims procedure, the Contractor may resort to arbitration as provided in Section 9-1.10, "Arbitration," of the Standard Specifications.

Disputes, as used in this section, shall include all differences of opinion, properly noticed as provided hereinafter, between the State and Contractor on matters related to the work and other subjects considered by the State or Contractor, or by both, to be of concern to the DRB on this project, except matters relating to Contractor, subcontractor or supplier claims not actionable against the State as specified in these special provisions. Whenever the term "dispute" or "disputes" is used herein, it shall be deemed to include potential claims as well as disputes.

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

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

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

No DRB member shall have prior direct involvement in this contract, and 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:

1. Compensation for services on this DRB.
2. 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.
3. Service as a member of other Disputes Review Boards on other contracts.
4. Retirement payments or pensions received from a party that are not tied to, dependent on or affected by the net worth of the party.
5. The above provisions apply to any party having a financial interest in this contract; including but not limited to contractors, subcontractors, suppliers, consultants, and legal and business services.

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

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

Before their appointments are final, the first two prospective DRB members shall submit complete disclosure statements to both the State and the Contractor. The statement shall include a resume of the prospective member's experience, together with a declaration describing all past, present and anticipated or planned future relationships, including indirect relationships through the prospective member's primary or full-time employer, to this project and with all parties involved in this

construction contract; including, but not limited to, any relevant subcontractors or suppliers to the parties, the parties' principals or the parties' counsel. The DRB members shall also include a full disclosure of close professional or personal relationships with all key members of all parties to the contract. Either the Contractor or the State may object to the others nominee and that person will not be selected for the DRB. No reason need be given for the first objection. Objections to subsequent nominees must be based on a specific breech or violation of nominee responsibilities under this specification. A different person shall then be nominated within 14 Days. The third DRB member shall supply a full disclosure statement to the first two DRB members and to the parties prior to appointment. Either party may reject any of the three prospective DRB members who fail to fully comply with all required employment and financial disclosure conditions of DRB membership as described in the Disputes Review Board Agreement and elsewhere herein. A copy of the Disputes Review Board Agreement is included in this special provision.

The first duty of the State and Contractor selected members of the DRB is to select and recommend prospective third member(s) to the parties for final selection and approval. The first two 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 21 days of the notification.

An impasse shall be considered to have been reached if the parties are unable to approve a third member within 14 days of receipt of the recommendation of the first two DRB members, or if the first two members are unable to agree upon a recommendation within the 14 day time limit allowed in the preceding paragraph. In the event of an impasse in selection of the third DRB member, the State and the Contractor shall each propose three candidates for the third position. The parties shall select all 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 two DRB members shall then select one of the 6 proposed candidates in a blind draw.

The Contractor, the State, and all three members of the DRB shall complete and adhere to the Disputes Review Board Agreement in administration of this DRB within 14 days of the parties' concurrence in the selection of the third member. The State authorizes the Engineer to execute and administer the terms of the Agreement. The person(s) designated by the Contractor as authorized to execute Contract Change Orders shall be authorized to execute and administer the terms of this agreement, or to delegate the authority in writing. The operation of the DRB shall be in conformance with the terms of the Disputes Review Board Agreement.

The State and the Contractor shall bear the costs and expenses of the DRB equally. Each DRB board member shall be compensated at an agreed rate of $1,000.00 per day if time spent per meeting, including all on-site time plus one hour of travel time, is greater than four hours. Each DRB board member shall be compensated at an agreed rate of $600.00 per day if time spent per meeting, including all on-site time plus one hour of travel time, is less than or equal to four hours. The agreed rates shall be considered full compensation for on-site time, travel expenses, transportation, lodging, time for travel and incidentals for each day, or portion thereof, that the DRB member is at an authorized DRB meeting. No additional compensation will be made for time spent by DRB members in review and research activities outside the official DRB meetings unless that time, (such as time spent evaluating and preparing recommendations on specific issues presented to the DRB), has been specifically agreed to in advance by the State and Contractor. Time away from the project, that has been specifically agreed to in advance by the parties, will be compensated at an agreed rate of $100.00 per hour. The agreed amount of $100.00 per hour shall include all incidentals including any expenses for telephone, fax and computer services. Members serving on more than one DRB, regardless of the number of meetings per day, shall not be paid more than the all inclusive rate per day or rate per hour for an individual project. The State will provide, at no cost to the Contractor, administrative services such as conference facilities and secretarial services to the DRB. These special provisions and the Disputes Review Board Agreement state provisions for compensation and expenses of the DRB. All 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 any expenses connected with the DRB, either by the DRB members or by the Contractor when requesting payment of the State's share of DRB expenses.

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

1. The State may terminate service of the State appointed member.
2. The Contractor may terminate service of the Contractor appointed member.
3. Upon the written recommendation of the State and Contractor members for the removal of the third member.
4. Upon resignation of a member.

When a member of the DRB is replaced, the replacement member shall be appointed in the same manner as the replaced member was appointed. The appointment of a replacement DRB member will begin promptly upon determination of the need for replacement and shall be completed within 14 days. Changes in either of the DRB members chosen by the two parties will not require re-selection of the third member, unless both parties agree to such re-selection in writing. The Disputes Review Board Agreement shall be amended to reflect the change of a DRB member.

The following procedure shall be used for dispute resolution:

1. If the Contractor objects to any decision, act or order of the Engineer, the Contractor shall give written notice of potential claim as specified in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications, including provision of applicable cost documentation; or file written protests or notices pursuant to Sections 4-1.03A, "Procedure and Protest", 8-1.06, "Time of Completion", 8-1.07, "Liquidated Damages", or 8-1.10, "Utility and Non-Highway Facilities" of the Standard Specifications.
2. The Engineer will respond, in writing, to the Contractor's written protest or notice within 14 days of receipt of the written protest or notice.
3. Within 14 days after receipt of the Engineer's written response, the Contractor shall, if the Contractor still objects, file a written reply with the Engineer, stating clearly and in detail the basis of the objection.
4. 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.
5. The Contractor, by failing to submit the written notice of referral of the matter to the DRB within 21 days after receipt of the State’s written reply, waives any future claims on the matter in contention.
6. 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 any written evidence or documentation to the DRB must furnish copies of such information to the other party a minimum of 14 days prior to the date the DRB is scheduled to convene the hearing for the dispute. Either party shall produce such additional evidence as the DRB may deem necessary to reach an understanding and determination of the dispute. The party furnishing additional evidence shall furnish copies of such additional evidence to the other party at the same time the evidence is provided to the DRB. The DRB will not consider any evidence not furnished in accordance with the terms specified herein.
7. The DRB shall furnish a report, containing findings and recommendations as described in the Disputes Review Board Agreement, in writing to both the State and the Contractor. The DRB shall complete its reports, including minority opinion if any, and submit them to the parties within 30 days of the DRB hearing, except that time extensions may be granted at the request of the DRB with the written concurrence of both parties. The report shall include the facts and circumstances related to the matters under consideration, applicable laws and regulations, the pertinent provisions of the Contract and the actual costs and time incurred as shown on the Contractor's cost accounting records.
8. Within 30 days after receiving the DRB's report, both the State and the Contractor shall respond to the DRB in writing signifying that the dispute is either resolved or remains unresolved. Failure to provide the written response within the time specified, or a written rejection of the DRB's recommendation presented in the report by either party, shall conclusively indicate that the party(s) failing to respond accepts the DRB recommendation. Immediately after responses have been received by both parties, the DRB will provide copies of both responses to the parties simultaneously. Either party may request clarification of elements of the DRB's report from the DRB prior to responding to the report. The DRB will consider any clarification request only if submitted within 10 days of receipt of the DRB's report, and if submitted simultaneously in writing to both the DRB and the other party. Each party may submit only one request for clarification for any individual DRB report. The DRB shall respond, in writing, to requests for clarification within 10 days of receipt of such requests.
9. 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 any individual DRB recommendation.
10. 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.

11. The State or the Contractor shall not call members who served on the DRB for this contract as witnesses in arbitration proceedings which may arise from this contract, and all documents created by the DRB shall be inadmissible as evidence in subsequent arbitration proceedings, except the DRB's final written reports on each issue brought before it..
12. 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.
13. The DRB members shall have no claim against the State or the Contractor, or both, from any claimed harm arising out of the parties' evaluations of the DRB's report.

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

1. The Contractor shall identify clearly in all submissions pursuant to this section, that portion of the dispute that involves a subcontractor claim or claims.
2. The Contractor shall include, as part of its submission pursuant to Step 4 above, a certification (False Claims Act Certification) by the subcontractor's or supplier's officer, partner, or authorized representative with authority to bind the subcontractor and with direct knowledge of the facts underlying the subcontractor claim. The Contractor also shall submit a certification that the subcontractor claim is acknowledged and forwarded by the Contractor. The form for these certifications are available from the Engineer.
3. At any DRB meeting on a dispute that includes one or more subcontractor claims, the Contractor shall require that each subcontractor that is involved in the dispute have present an authorized representative with actual knowledge of the facts underlying the subcontractor claim to assist in presenting the subcontractor claim and to answer questions raised by the DRB members or the Department's representatives.
4. Failure by the Contractor to declare a subcontractor claim on behalf of its subcontractor (including lower tier subcontractors' and suppliers' pass through claims) at the time of submission of the Contractor's claims, as provided hereunder, shall constitute a release of the Department by the Contractor on account of such subcontractor claim.
5. The Contractor shall include in all subcontracts under this contract that subcontractors and suppliers of any tier (a) agree to submit subcontractor claims to the Contractor in a proper form and in sufficient time to allow processing by the Contractor in accordance with the Dispute Review Board resolution specifications; (b) agree to be bound by the terms of the Dispute Review Board provisions to the extent applicable to subcontractor claims; (c) agree that, to the extent a subcontractor claim is involved, completion of all steps required under these Dispute Review Board special provisions shall be a condition precedent to pursuit by the subcontractor of any other remedies permitted by law, including without limitation of a lawsuit against the Contractor; and (d) agree that the existence of a dispute resolution process for disputes involving subcontractor claims shall not be deemed to create any claim, right, or cause of action by any subcontractor or supplier against the Department.

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

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

DISPUTES REVIEW BOARD AGREEMENT

_____
(Contract Identification)

Contract No. _____

THIS DISPUTES 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 Disputes 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:

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.

II
SCOPE OF WORK

The scope of work of the DRB includes, but is not limited to, the following:

A. Objective

The principal objective of the DRB is to assist in the timely resolution of disputes between the parties arising from performance of this contract. It is not intended for either party to default on their normal responsibility to amicably and fairly settle their differences by indiscriminately assigning them to the DRB. It is intended that the mere existence of the DRB will encourage the parties to resolve disputes without resorting to this review procedure. But when a dispute which is serious enough to warrant the DRB's review does develop, the process for prompt and efficient action will be in place.

B. Procedures

The DRB shall render written reports on disputes between the parties arising from the construction contract. Prior to consideration of a dispute, the DRB shall establish rules and regulations that will govern the conduct of its business and reporting procedures in accordance 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 refrain from officially giving any 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 any other affiliates (subcontractors, suppliers, etc.) who have a beneficial interest in the contract.

During scheduled meetings of the DRB as well as during dispute hearings, DRB members shall refrain from expressing opinions on the merits of statements on matters under dispute or potential dispute. Opinions of DRB members expressed in private sessions shall be kept strictly confidential. Individual DRB members shall not meet with, or discuss contract issues with individual parties, except as directed by the DRB Chairperson. Any such discussions or meetings shall be disclosed to both parties. Any 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. All scheduled progress meetings shall be held at or near the job site. The DRB shall meet at least once at the start of the project, and at least once every six months thereafter. The frequency, exact time, and duration of additional site visits and progress meetings shall be as recommended by the DRB and approved by the parties consistent with the construction activities or matters under consideration and dispute. Each meeting shall consist of a round table discussion and a field inspection of the work being performed on the contract, if necessary. Each meeting shall be attended by representatives of both parties. The agenda shall generally be as follows:

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

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

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

D. DRB Consideration and Handling of Disputes

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

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

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

The DRB may request that written documentation and arguments from both parties be sent to each DRB member, through the DRB Chairperson, for review before the hearing begins. A party furnishing any written documentation to the DRB shall furnish copies of such information to the other party at the same time that such information is supplied to the DRB.

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

The third DRB member shall act as Chairperson for dispute hearings and all other DRB activities. The parties shall have a representative at all hearings. Failure to attend a duly noticed meeting by either of the parties shall be conclusively considered by the DRB as indication that the non-attending party considers any written submittals as their entire and complete argument. The claimant shall discuss the dispute, followed by the other party. Each party shall then be allowed one or more rebuttals until all aspects of the dispute are thoroughly covered. DRB members may ask questions, seek clarification, or request further data from either of the parties. The DRB may request from either party documents or information that would assist the DRB in making its findings and recommendations including, but not limited to, documents used by the CONTRACTOR in preparing the bid for the project. A refusal by a party to provide information requested by the DRB may be considered by the DRB as an indication that the requested material would tend to disprove that party's position. Claims shall not necessarily be computed by merely subtracting bid price from the total cost of the affected work. However, if any claims are based on the "total cost method", then, to be considered by the DRB, they shall be supported by evidence furnished by the CONTRACTOR that (1) the nature of the dispute(s) makes it impossible or impracticable to determine cost impacts with a reasonable degree of accuracy, (2) the CONTRACTOR's bid estimate was realistic, (3) the CONTRACTOR's actual costs were reasonable, and (4) the CONTRACTOR was not responsible for the added expenses. As to any claims based on the CONTRACTOR's field or home office accounting records, those claims shall be supported by an audit report of an independent Certified Public Accountant unless the contract includes special provisions that provide for an alternative method to calculate unabsorbed home office overhead. Any of those claims shall also be subject to audit by the DRB with the concurrence of the parties. In large or complex cases, additional hearings may be necessary in order to consider all the evidence presented by both parties. All involved parties shall maintain the confidentiality of all documents and information, as provided in this AGREEMENT.

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

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

The DRB's findings and recommendations, along with discussion of reasons therefor, shall then be submitted as a written report to both parties. Recommendations shall be based on the pertinent contract provisions, applicable laws and regulations, and facts and circumstances related to the dispute. The report shall be thorough in discussing the facts considered, the contract language, law or regulation viewed by the DRB as pertinent to the issues, and the DRB's interpretation and philosophy in arriving at its conclusions and recommendations. The DRB's report shall stand on its own, without attachments or appendices. The DRB chairman shall complete and furnish a summary report to the DRB Program Manager, Construction Program, M.S. 44, P.O. Box 942874, Sacramento, CA 94274.

With prior written approval of both parties, the DRB may obtain technical services necessary to adequately review the disputes presented; including audit, geotechnical, schedule analysis and other services. The parties' technical staff may supply those services as appropriate. The cost of any technical services, as agreed to by the parties, shall be borne equally by the two parties as specified in an approved contract change order. The CONTRACTOR 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 any individual DRB recommendation. The DRB shall hear appeals in accordance with the terms described in the Section entitled "Disputes Review Board" in the special provisions.

E. DRB Member Replacement

Should the need arise to appoint a replacement DRB member, the replacement DRB member shall be appointed in the same manner as the original DRB members were appointed. The selection of a replacement DRB member shall begin promptly upon notification of the necessity for a replacement and shall be completed within 14 days. This AGREEMENT will be amended to indicate change in DRB membership.

III
CONTRACTOR RESPONSIBILITIES

The CONTRACTOR shall furnish to each DRB member one copy of all pertinent documents which are or may become necessary for the DRB to perform their function. Pertinent documents are any 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 accordance with the terms outlined in the special provisions.

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.

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 any work under the terms of this AGREEMENT until authorized in writing by the STATE.

VI
PAYMENT

A. All Inclusive Rate Payment

The STATE and the CONTRACTOR shall bear the costs and expenses of the DRB equally. Each DRB board member shall be compensated at an agreed rate of $1,000.00 per day if time spent per meeting, including all on-site time plus one hour of travel time, is greater than four hours. Each DRB board member shall be compensated at an agreed rate of $600.00 per day if time spent per meeting, including all on-site time plus one hour of travel time, is less than or equal to four hours. The agreed rates shall be considered full compensation for on-site time, travel expenses, transportation, lodging, time for travel and incidentals for each day, or portion thereof, that the DRB member is at an authorized DRB meeting. No additional compensation will be made for time spent by DRB members in review and research activities outside the official DRB meetings unless that time has been specifically agreed to in advance by the STATE and CONTRACTOR. Time away from the project, that has been specifically agreed to in advance by the parties, will be compensated at an agreed rate of $100.00 per hour. The agreed amount of $100.00 per hour shall include all incidentals including any expenses for telephone, fax and computer services. Members serving on more than one DRB, regardless of the number of meetings per day, shall not be paid more than the all inclusive rate per day or rate per hour for an individual project. The STATE will provide, at no cost to the CONTRACTOR, administrative services such as conference facilities and secretarial services to the DRB.

B. Payments

All 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 any 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 three 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 three-year period, the cost records and accounts shall be retained until such litigation, claim, or audit involving the records is completed.

VII
ASSIGNMENT OF TASKS OF WORK

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

VIII
TERMINATION OF AGREEMENT, THE DRB, AND DRB MEMBERS

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

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.

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.

XI
DISPUTES

Any dispute 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.

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 any 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 accordance 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.

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 any private meetings or deliberations of the DRB.

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

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: _____

5-1.19 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.

5-1.20 AS-BUILT PLANS

The Contractor shall keep accurate as-built records on a set of project blueline prints of all additions and deletions to the work, and of all changes in location, elevation and character of work not otherwise shown or noted on contract documents. Prior to final acceptance of the work, the Contractor shall transmit this "As-Built" information to the Engineer for approval.

Reproducible "As-Built" construction plans shall be provided to the State within five (5) working days after completion of the project. Two copies shall be provided with changes shown in contrasting color to the original contract work. Details to be shown on the "As-Built" plans shall include, but not be limited to, location, type and installed depth or location of conduit runs, location of pull boxes, location and depth of underground utilities encountered during the course of the work and changes made to any facilities including the substitution of fiberglass conduit. "As-Built" plans shall be signed and date by the Contractor and by the Superintendent or Foreman of the crew that actually constructed the facility. In addition, employer or company names of the Contractor and/or Subcontractors shall be shown.

Full compensation for record keeping and for preparing "As-Built" plans shall be considered as included in the contract lump sum price paid for system testing and documentation and no additional compensation will be allowed therefor.

5-1.21 COMPENSATION ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS

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

ITEM CODE	ITEM
390152	ASPHALT CONCRETE

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

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

Total monthly adjustment = AQ

For an increase in paving asphalt price index exceeding 5 percent

A = 0.90 (Iu/Ib - 1.05) Ib

For a decrease in paving asphalt price index exceeding 5 percent

A = 0.90 (Iu/Ib - 0.95) Ib

Where A = Adjustment in dollars per ton of paving asphalt used to produce asphalt concrete rounded to the nearest $0.01.

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

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

Q = Quantity in tons of paving asphalt that was used in producing the quantity of asphalt concrete shown under "This Estimate" on the monthly estimate using the amount of asphalt determined by the Engineer.

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

1. 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.
2. Compensation adjustments made under this section will be taken into account in making adjustments under Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications.
3. The total price adjustment for price index increases of paving asphalt on this project shall not exceed $339,000.00.
4. 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 any of the companies discontinue posting their prices for any 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.

5-1.22 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.

5-1.23 PAYMENTS

Attention is directed to Section 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 said contract item of work which will be recognized for progress payment purposes.

Clearing and Grubbing	$ 333,333

After acceptance of the contract pursuant to 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:

Pavement reinforcing fabric
Piling
Prestressing steel in sealed containers
Prestressing ducts and anchorages
Precast concrete girders
Tieback anchors
Sound wall (masonry block)
Bar reinforcing steel
Joint seal, Type B
Joint seal assemblies
Sign structures
Culvert pipe
Underdrain pipe
Edge drain pipe
Rock slope protection fabric
Miscellaneous iron and steel
Miscellaneous metal
Bridge deck drainage system
Fence and gates
Railings
Crash cushions
Column casing
Pavement markers
Sign lighting fixtures
Luminaires
Signal and lighting standards
Fiber optic cables
Camera poles
Splice vaults

Data nodes
Video nodes
Twisted pair cables
Type III service equipment enclosures

5-1.24 SOUND CONTROL REQUIREMENTS

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

The noise level from the Contractor's operations, between the hours of 9:00 p.m. and 7:00 a.m., shall not exceed 86 dbA at a distance of 50 feet. This requirement shall not relieve the Contractor from responsibility for complying with local ordinances regulating noise level.

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

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

5-1.25 AERIALLY DEPOSITED LEAD, GENERAL

Aerially Deposited Lead is defined as lead deposited within the unpaved areas of the California Department of Transportation (CALTRANS) highway right of way primarily due to vehicle emissions. Aerially deposited lead has been discovered through testing within the project limits.

Portions of the Site Investigation Report are included in the "Material Information Handout." The complete report entitled "Lead Investigation on Route 10 between U.S. Route 57/210 Interchange to the Los Angeles/San Bernardino County Line," is available for inspection at the Department of Transportation, 120 South Spring Street, Office of Construction, Room 344, Los Angeles, California 90012, telephone (213) 897-0054. Materials with total levels of aerially deposited lead above the Total Threshold Limit Concentration (TTLC) of 1000 parts per million (ppm) or soluble levels of lead above the Solubility Threshold Limit Concentration (STLC) of 6.68×10^{-6} ounces/gallon (oz/gal) shall be considered hazardous pursuant to California Hazardous Waste Regulations, Title 22.

The California Department of Transportation (CALTRANS) has received from the California Department of Toxic Substances Control (DTSC) a variance regarding the use of these hazardous materials. This project is subject to the conditions of the variance and supplemental amendments. Under the variance any materials containing less than 0.0252 ounces/pound (oz/lb) total and less than 6.68×10^{-5} oz/gal soluble lead, using deionized water, and placed under a minimum one foot cover of non-hazardous material may be placed within the highway right of way. Materials containing between 0.0252 oz/lb and 0.0664 oz/lb total, and greater than 6.68×10^{-5} oz/gal, but not greater than 6.68×10^{-3} oz/gal soluble lead using deoinized water,, may be placed under pavement within the highway right of way. Cover materials pursuant to this provision are defined as soils with concentrations less than 500 ppm total and 6.68×10^{-4} oz/gal soluble lead using a citrate buffer. The materials containing aerially deposited lead are not regulated under the Federal Resource Conservation and Recovery Act (RCRA).

Provisions of this section shall be made a part of every subcontract executed pursuant to this contract. A copy of the DTSC/CALTRANS variance is included in the "Materials Handout Information." The Contractor shall comply with the conditions of the variance.

Once the Contractor has completed the placement of material containing aerially deposited lead in accordance with the requirements of the plans and specifications, the Contractor shall have no responsibility for such materials in place. CALTRANS shall not consider the Contractor a "generator" of such contaminated materials, and the Contractor shall not be obligated forfurther cleanup, removal or remedial actions for such materials if handled and disposed of in accordance with the project plans and the requirements of these specifications.

Attention is directed to "Material With Aerially Deposited Lead" under "Earthwork" of these special provisions regarding the handling of materials containing aerially deposited lead.

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

United States Department of Transportation (USDOT),
United States Environmental Protection Agency (USEPA),
California Department of Health Services,
California Environmental Protection Agency (CAL/EPA),
Department of Toxic Substances Control (DTSC), Region 3,
Integrated Waste Management Board,
Regional Water Quality Control Board (RWQCB), Region 4,

State Air Resources Control Board,
South Coast Air Quality Management District (SCAQMD), and
California Division of Occupational Safety and Health Administration (CALOSHA).

The Contractor shall , prepare a project specific Health and Safety Plan to prevent or minimize exposure to materials containing potentially hazardous levels of lead. The Contractor's attention is directed to Title 8, California Code of Regulations (CCR), Section 5192 (b)(4)(B) and the Occupational Safety and Health Guidance Manual published by the National Institute of Occupational Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA), and the United States Environmental Protection Agency (USEPA) for required elements of the Health and Safety Plan. The Health and Safety Plan shall contain as a minimum, but not limited to the following components: identification of key personnel for the project, job hazard analysis for work assignments, summary of risk assessment, air monitoring plan, personal protective equipment, work zones, on-site decontamination procedures, general safe work practices, security measures, emergency response plans, and worker training.

The Health and Safety Plan shall utilize monitoring and exposure standards based on Construction Standards Title 8, of the California Code of Regulations (CCR) Section 1532.1, and, as a minimum, shall contain a description of monitoring activities, specific means proposed to achieve compliance, a report of the technology considered, air monitoring plan,, a schedule for implementation of the Health and Safety Plan, a work practice program, administrative control schedule, description of arrangements for information transferbetween Contractors concerning potential exposure to lead and other relevant information. The Health and Safety Plan shall include an air monitoring plan that shall include, but not limited to, upwind and downwind perimeter monitoring, and a discussion of how the air monitoring will be conducted during the progression of roadway work in areas designated as containing material with aerially deposited lead. The air monitoring plan shall meet the requirements of the immediate area’s Air Quality Management District standards, if applicable. The Health and Safety Plan shall be approved by the Contractor's Certified Industrial Hygienist before submission to the Engineer. The Health and Safety Plan shall be submitted to the Engineer at least 15 days prior to beginning work in those areas containing material with aerially deposited lead.

The Contractor shall prepare a work plan for handling and stockpiling of materials containing hazardous levels of lead. The work plan shall include a plan for confirmatory sampling of any stockpile area after removal of the materials. The plan shall meet USEPA, SW 846, "Test Methods for Evaluating Solid Waste", Volume II: Field Manual Physical/Chemical, Chapter Nine, Section 9.1 requirements for the design and development of the sampling plan, statistical analysis and reporting of the test results and shall be submitted to the Engineer at least 15 days prior to beginning work in areas containing materials with aerially deposited lead

The Engineer will notify the Contractor of acceptance or rejection of any submitted or revised health and safety plan and work plan in not more than 10 days after submittal of the plan.

Prior to performing any work in areas containing material with 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 Construction Standard Title 8 of the California Code of Regulations (CCR), Section 1532.1.

Personal protective equipment, training and medical surveillance required by the Contractor’s Health and Safety Plan shall be supplied to State personnel by the Contractor. The number of State personnel will be 5.

The Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary and incidental to the due and lawful prosecution of the work, including registration for transporting vehicles carrying hazardous materials.

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.

5-1.26 DEFINITIONS AND TERMS

Delete section 1-1.18, "Engineer," of the Standard Specifications.

Engineer

The Chief Engineer, Department of Transportation, acting either directly or through properly authorized agents, the agents acting within scope of the particular duties delegated to them.

Delete Section 1-1.25, "Laboratory," of the Standard Specifications.

Laboratory

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

Office of Structure Design

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

5-1.27 PROPOSAL FORMS

The fourth paragraph of Section 2-1.05, "Proposal Forms," of the Standard Specifications is revised as follows:

All proposal forms other than for "District Opening" projects shall be obtained from the Department of Transportation, Plans and Bid Documents, Room 0200, Transportation Building, 1120 N Street, Sacramento, California 95814, or as otherwise designated in the "Notice to Contractor."

5-1.28 PROPOSAL REQUIREMENTS AND CONDITIONS

Delete Section 2-1.08, "Withdrawal of Proposals," of the Standard Specifications.

Withdrawal of Proposals

Any bid may be withdrawn at any time prior to the date and time fixed for the opening of bids only by written request for the withdrawal of the bid filed at the location at which the bid was received by the Department. The request shall be executed by the bidder or the bidder's duly authorized representative. The withdrawal of a bid does not prejudice the right of the bidder to file a new bid. Whether or not bids are opened exactly at the time fixed for opening bids, a bid will not be received after that time, nor may any bid be withdrawn after the time fixed for opening of bids.

5-1.29 AWARD OF CONTRACT

The second paragraph of Section 3-1.01, "Award of Contract," of the Standard Specifications is revised as follows:

The award of the contract, if it be awarded, will be to the lowest responsible bidder whose proposal complies with all the requirements prescribed. The award, if made, will be made within 30 days after the opening of the proposals. This period will be subject to extension for such further period as may be agreed upon in writing between the Department and the bidder concerned.

5-1.30 CONTRACT BONDS

The second paragraph of Section 3-1.02, "Contract Bonds," of the Standard Specifications is revised as follows:

Except as otherwise provided in Section 3248 of the Civil Code and Section 30154 of the Streets and Highways Code, the payment bond shall be in a sum equal to the contract price and the performance bond shall be in a sum equal to at least one-half the contract price.

5-1.31 CONTROL OF WORK

The first and second paragraphs of Section 5-1.04, "Coordination and Interpretation of Plans, Standard Specifications, and Special Provisions," of the Standard Specifications are revised as follows:

These Standard Specifications, project plans, special provisions, contract change orders and all supplementary documents are essential parts of the contract, and a requirement occurring in one is as binding as though occurring in all. They are intended to be complimentary, and to describe and provide for a complete work.

Project plans shall govern over the Standard Specifications; and these special provisions shall govern over both these Standard Specifications and the plans.

5-1.32 LEGAL RELATIONS AND RESPONSIBILITY

Section 7-1.01A(1), "Hours of Labor," of the Standard Specifications is revised as follows:

Section 7-1.01A(1) Hours of Labor

Eight hours labor constitutes a legal day's work. The Contractor or any subcontractor under the Contractor shall forfeit, as a penalty to the State of California, $25 for each worker employed in the execution of the contract by the respective Contractor or subcontractor for each calendar day during which that worker is required or permitted to work more than 8 hours in any one calendar day and 40 hours in any one calendar week in violation of the requirements of the

Labor Code, and in particular, Section 1810 to Section 1815, thereof, inclusive, except that work performed by employees of Contractors in excess of 8 hours per day, and 40 hours during any one week, shall be permitted upon compensation for all hours worked in excess of 8 hours per day at not less than one and one-half times the basic rate of pay, as provided in Section 1815 thereof.
Section 7-1.01A(2), "Prevailing Wage," of the Standard Specifications is revised as follows:

Section 7-1.01A(2) Prevailing Wage

The Contractor and any subcontractor under the Contractor shall comply with Labor Code Sections 1774 and 1775. Pursuant to Section 1775, the Contractor and any subcontractor under the Contractor shall forfeit to the State or political subdivision on whose behalf the contract is made or awarded a penalty of not more than fifty dollars ($50) for each calendar day, or portion thereof, for each worker paid less than the prevailing rates as determined by the Director of Industrial Relations for the work or craft in which the worker is employed for any public work done under the contract by the Contractor or by any subcontractor under the Contractor in violation of the requirements of the Labor Code and in particular, Labor Code Sections 1770 to 1780, inclusive. The amount of this forfeiture shall be determined by the Labor Commissioner and shall be based on consideration of the mistake, inadvertence, or neglect of the Contractor or subcontractor in failing to pay the correct rate of prevailing wages, or the previous record of the Contractor or subcontractor in meeting their respective prevailing wage obligations, or the willful failure by the Contractor or subcontractor to pay the correct rates of prevailing wages. A mistake, inadvertence, or neglect in failing to pay the correct rates of prevailing wages is not excusable if the Contractor or subcontractor had knowledge of the obligations under the Labor Code. In addition to the penalty and pursuant to Labor Code Section 1775, the difference between the prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing wage rate shall be paid to each worker by the Contractor or subcontractor. If a worker employed by a subcontractor on a public works project is not paid the general prevailing per diem wages by the subcontractor, the prime contractor of the project is not liable for the penalties described above unless the prime contractor had knowledge of that failure of the subcontractor to pay the specified prevailing rate of wages to those workers or unless the prime contractor fails to comply with all of the following requirements:

1. The contract executed between the contractor and the subcontractor for the performance of work on public works projects shall include a copy of the requirements in Sections 1771, 1775, 1776, 1777.5, 1813, and 1815 of the Labor Code.
2. The contractor shall monitor the payment of the specified general prevailing rate of per diem wages by the subcontractor to the employees, by periodic review of the certified payroll records of the subcontractor.
3. Upon becoming aware of the subcontractor's failure to pay the specified prevailing rate of wages to the subcontractor's workers, the contractor shall diligently take corrective action to halt or rectify the failure, including, but not limited to, retaining sufficient funds due the subcontractor for work performed on the public works project.
4. Prior to making final payment to the subcontractor for work performed on the public works project, the contractor shall obtain an affidavit signed under penalty of perjury from the subcontractor that the subcontractor had paid the specified general prevailing rate of per diem wages to the subcontractor's employees on the public works project and any amounts due pursuant to Section 1813 of the Labor Code.

Pursuant to Section 1775 of the Labor Code, the Division of Labor Standards Enforcement shall notify the Contractor on a public works project within 15 days of the receipt by the Division of Labor Standards Enforcement of a complaint of the failure of a subcontractor on that public works project to pay workers the general prevailing rate of per diem wages. If the Division of Labor Standards Enforcement determines that employees of a subcontractor were not paid the general prevailing rate of per diem wages and if the Department did not retain sufficient money under the contract to pay those employees the balance of wages owed under the general prevailing rate of per diem wages, the contractor shall withhold an amount of moneys due the subcontractor sufficient to pay those employees the general prevailing rate of per diem wages if requested by the Division of Labor Standards Enforcement. The Contractor shall pay any money retained from and owed to a subcontractor upon receipt of notification by the Division of Labor Standards Enforcement that the wage complaint has been resolved. If notice of the resolution of the wage complaint has not been received by the Contractor within 180 days of the filing of a valid notice of completion or acceptance of the public works project, whichever occurs later, the Contractor shall pay all moneys retained from the subcontractor to the Department. These moneys shall be retained by the Department pending the final decision of an enforcement action.

Pursuant to the requirements in Section 1773 of the Labor Code, the Department has obtained the general prevailing rate of wages (which rate includes employer payments for health and welfare, pension, vacation, travel time and subsistence pay as provided for in Section 1773.8 of the Labor Code, apprenticeship or other training programs authorized by Section 3093 of the Labor Code, and similar purposes) applicable to the work to be done, for straight time, overtime, Saturday, Sunday and holiday work. The holiday wage rate listed shall be applicable to all holidays recognized in the collective bargaining agreement of the particular craft, classification or type of workmen concerned.

The general prevailing wage rates and any applicable changes to these wage rates are available at the Labor Compliance Office at the offices of the District Director of Transportation for the district in which the work is situated. General prevailing wage rates are also available from the California Department of Industrial Relations' Internet Web Site at: http://www.dir.ca.gov.

The wage rates determined by the Director of Industrial Relations for the project refer to expiration dates. Prevailing wage determinations with a single asterisk after the expiration date are in effect on the date of advertisement for bids and are good for the life of the contract. Prevailing wage determinations with a double asterisks after the expiration date indicate that the wage rate to be paid for work performed after this date has been determined. If work is to extend past this date, the new rate shall be paid and incorporated in the contract. The Contractor shall contact the Department of Industrial Relations as indicated in the wage rate determinations to obtain predetermined wage changes.

Pursuant to Section 1773.2 of the Labor Code, general prevailing wage rates shall be posted by the Contractor at a prominent place at the site of the work.

Changes in general prevailing wage determinations which conform to Labor Code Section 1773.6 and Title 8 California Code of Regulations Section 16204 shall apply to the project when issued by the Director of Industrial Relations at least 10 days prior to the date of the Notice to Contractors for the project.

The State will not recognize any claim for additional compensation because of the payment by the Contractor of any wage rate in excess of the prevailing wage rate set forth in the contract. The possibility of wage increases is one of the elements to be considered by the Contractor in determining the bid, and will not under any circumstances be considered as the basis of a claim against the State on the contract.

Section 7-1.01A(2)(a), "Travel and Subsistence Payments

Attention is directed to the requirements in Section 1773.8 of the Labor Code. The Contractor shall make travel and subsistence payments to each workman, needed to execute the work, in conformance with the requirements in Labor Code Section 1773.8.

The first and second paragraphs of Section 7-1.01A(3), "Payroll Records," of the Standard Specifications are revised as follows:

Attention is directed to the requirements in Labor Code Section 1776, a portion of which is quoted below. Regulations implementing Labor Code Section 1776 are located in Sections 16016 through 16019 and Sections 16207.10 through 16207.18 of Title 8, California Code of Regulations.

"(a) Each contractor and subcontractor shall keep accurate payroll records, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work. Each payroll record shall contain or be verified by a written declaration that it is made under penalty of perjury, stating both of the following:

(1) The information contained in the payroll record is true and correct.
(2) The employer has complied with the requirements of Sections 1771, 1811, and 1815 for any work performed by his or her employees on the public works project.

"(b) The payroll records enumerated under subdivision (a) shall be certified and shall be available for inspection at all reasonable hours at the principal office of the contractor on the following basis:

(1) A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or his or her authorized representative upon request.
(2) A certified copy of all payroll records enumerated in subdivision (a) shall be made available for inspection or furnished upon request to a representative of the body awarding the contract, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations.
(3) A certified copy of all payroll records enumerated in subdivision (a) shall be made available upon request by the public for inspection or for copies thereof. However, a request by the public shall be made through either the body awarding the contract, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to paragraph (2), the requesting party shall, prior to being provided the records, reimburse the costs of preparation by the contractor, subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of the contractor.

"(c) The certified payroll records shall be on forms provided by the Division of Labor Standards Enforcement or shall contain the same information as the forms provided by the division.

"(d) A contractor or subcontractor shall file a certified copy of the records enumerated in subdivision (a) with the entity that requested the records within 10 days after receipt of a written request.

"(e) Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the awarding body, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement shall be marked or obliterated in a manner so as to prevent disclosure of an individual's name, address and social security number. The name and address of the contractor awarded the contract or the subcontractor performing the contract shall not be marked or obliterated.

"(f) The contractor shall inform the body awarding the contract of the location of the records enumerated under subdivision (a), including the street address, city and county, and shall, within five working days, provide a notice of a change of location and address.

"(g) The contractor or subcontractor shall have 10 days in which to comply subsequent to receipt of a written notice requesting the records enumerated in subdivision (a). In the event that the contractor or subcontractor fails to comply within the 10-day period, he or she shall, as a penalty to the state or political subdivision on whose behalf the contract is made or awarded, forfeit twenty-five dollars ($25) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due. A contractor is not subject to a penalty assessment pursuant to this section due to the failure of a subcontractor to comply with this section."

The penalties specified in subdivision (g) of Labor Code Section 1776 for noncompliance with the requirements in Section 1776 may be deducted from any moneys due or which may become due to the Contractor.

Section 7-1.01A(5), "Apprentices," of the Standard Specifications is revised as follows:

Attention is directed to Sections 1777.5, 1777.6, and 1777.7 of the California Labor Code and Title 8, California Code of Regulations Section 200 et seq. To ensure compliance and complete understanding of the law regarding apprentices, and specifically the required ratio thereunder, each contractor or subcontractor should, where some question exists, contact the Division of Apprenticeship Standards, 455 Golden Gate Avenue, San Francisco, CA 94102, or one of its branch offices prior to commencement of work on the public works contract. Responsibility for compliance with this section lies with the Contractor.

It is State policy to encourage the employment and training of apprentices on public works contracts as may be permitted under local apprenticeship standards.

The third paragraph of Section 7-1.01C, "Contractor's Licensing Laws," of the Standard Specifications is revised as follows:

Attention is also directed to the provisions of Public Contract Code Section 10164. In all projects where Federal funds are involved, the Contractor shall be properly licensed at the time the contract is awarded.

The title and the first paragraph of Section 7-1.02, "Weight Limitations," of the Standard Specifications are revised as follows:

7-1.02 LOAD LIMITATIONS

Unless expressly permitted in the special provisions, construction equipment or vehicles of any kind which, laden or unladen, exceed the maximum weight limitations set forth in Division 15 of the Vehicle Code, shall not be operated over completed or existing treated bases, surfacing, pavement or structures in any areas within the limits of the project, whether or not the area is subject to weight limitations under Section 7-1.01D, "Vehicle Code," except as hereinafter provided in this Section 7-1.02.

The second paragraph of Section 7-1.09, "Public Safety," of the Standard Specifications is deleted.
Attention is directed to "Indemnification and Insurance," of these special provisions.
The first paragraph of Section 7-1.11, "Preservation of Property of the Standard Specifications is revised as follows:

Attention is directed to Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications and "Indemnification and Insurance," of these special provisions. Due care shall be exercised to avoid injury to existing highway improvements or facilities, utility facilities, adjacent property, and roadside trees, shrubs, and other plants that are not to be removed.

Section 7-1.12, "Responsibility for Damage," of the Standard Specifications is deleted.

Attention is directed to "Indemnification and Insurance," of these special provisions.

The title of Section 7-1.165, is revised to "Damage by Storm, Flood, Tsunami, or Earthquake."

Any references to tidal wave or tidal waves in the Standard Specifications shall be understood to refer to tsunami or tsunamis, respectively.

5-1.33 INDEMNIFICATION AND INSURANCE

The Contractor's obligations regarding indemnification of the State of California and the requirements for insurance shall conform to this special provision.

Indemnification

With the exception that this section shall in no event be construed to require indemnification by the Contractor to a greater extent than permitted by law, the Contractor shall defend, indemnify and save harmless the State, including its officers, directors, agents (excluding agents who are design professionals), and employees, and each of them (Indemnitees), from any and all claims, demands, causes of action, damages, costs, expenses, actual attorneys' fees, losses or liabilities, in law or in equity, of every kind and nature whatsoever (Claims), arising out of or in connection with the Contractor's performance of this contract for:

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

Except as otherwise provided by law, the indemnification provisions above shall apply regardless of the existence or degree of fault of Indemnitees. The Contractor, however, shall not be obliged to indemnify Indemnitees for Claims arising from conduct delineated in Civil Code Section 2782. Further, the Contractor's indemnity obligation shall not extend to Claims to the extent they arise from any defective or substandard condition of the roadway which existed at or prior to the time the Contractor commenced work, unless this condition has been changed by the work or the scope of the work requires the Contractor to maintain existing Roadway facilities and the claim arises from the Contractor's failure to maintain. The Contractor's indemnity obligation shall extend to Claims arising after the work is completed and accepted only if these Claims are directly related to alleged acts or omissions of the Contractor which occurred during the course of the work. No inspection by the Department, its employees or agents shall be deemed a waiver by the Department of full compliance with the requirements of this section.

The Contractor's obligation to defend and indemnify shall not be excused because of the Contractor's inability to evaluate liability or because the Contractor evaluates liability and determines that the Contractor is not liable to the claimant. The Contractor will respond within 30 days to the tender of any claim for defense and indemnity by the State, unless this time has been extended by the State. If the Contractor fails to accept or reject a tender of defense and indemnity within 30 days, in addition to any other remedy authorized by law, so much of the money due the Contractor under and by virtue of the contract as shall reasonably be considered necessary by the Department, may be retained by the State until disposition has been made of the claim or suit for damages, or until the Contractor accepts or rejects the tender of defense, whichever occurs first.

With respect to third party claims against the Contractor, the Contractor waives any and all rights of any type to express or implied indemnity against the State, its directors, officers, employees, or agents (excluding agents who are design professionals).

Insurance

Insurance shall conform to the following requirements:

Casualty Insurance

The Contractor shall, at the Contractor's expense, procure and maintain insurance on all of its operations with companies acceptable to the Department as follows. All insurance shall be kept in full force and effect from the beginning of the work through final acceptance by the State. In addition, the Contractor shall maintain completed operations coverage with a carrier acceptable to the Department through the expiration of the patent deficiency in construction statute of repose set forth in Section 337.1 of the Code of Civil Procedure.

Workers' Compensation and Employer's Liability Insurance

Workers' Compensation insurance shall be provided as specified in Section 7-1.01A(6), "Workers' Compensation," of the Standard Specifications. Employer's Liability Insurance shall be provided in amounts not less than:

(a) $1,000,000 for each accident for bodily injury by accident.
(b) $1,000,000 policy limit for bodily injury by disease.
(c) $1,000,000 for each employee for bodily injury by disease.

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

Liability Insurance

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

(a) premises, operations and mobile equipment.
(b) products and completed operations.
(c) broad form property damage (including completed operations).
(d) explosion, collapse and underground hazards.
(e) personal injury.
(f) contractual liability.

Liability Limits/Additional Insureds

The limits of liability shall be at least:

(a) $1,000,000 for each occurrence (combined single limit for bodily injury and property damage.
(b) $2,000,000 aggregate for products-completed operations.
(c) $2,000,000 general aggregate. This general aggregate limit shall apply separately to the Contractor's work under this Agreement.
(d) $15,000,000 umbrella or excess liability. Umbrella or excess policy shall include products liability completed operations coverage and may be subject to $5,000,000 or $15,000,000 aggregate limits. Further, the umbrella or excess policy shall contain a clause stating that it takes effect (drops down) in the event the primary limits are impaired or exhausted.

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

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

The policy shall stipulate that the insurance afforded the additional insureds shall apply as primary insurance. Any other insurance or self insurance maintained by the Department or State will be excess only and shall not be called upon to contribute with this insurance. Such additional insured coverage shall be provided by a policy provision or by an endorsement providing coverage at least as broad as Additional Insured (Form B) endorsement form CG 2010, as published by the Insurance Services Office (ISO).

Automobile Liability Insurance

The Contractor shall carry automobile liability insurance, including coverage for all owned, hired and non-owned automobiles. The primary limits of liability shall be not less than $1,000,000 combined single limit each accident for bodily injury and property damage. The umbrella or excess liability coverage required under "Liability Limits/Additional Insureds," of this special provision shall also apply to automobile liability.

Policy Forms, Endorsements and Certificates

The Contractor's General Liability Insurance shall be provided under Commercial General Liability policy form No. CG0001 as published by the Insurance Service Office (ISO) or under a policy form at least as broad as policy form No. CG0001.

Evidence of insurance in a form acceptable to the Department, including the required "additional insured" endorsements, shall be furnished by the Contractor to the Department at or prior to the pre-construction conference. The evidence of insurance shall provide that there will be no cancellation, lapse, or reduction of coverage without thirty (30) days' prior written notice to the Department. Certificates of Insurance, as evidence of required insurance, for the General Liability, Auto Liability and Umbrella-Excess Liability policies shall set forth deductible amounts applicable to each policy and all exclusions which are added by endorsement to each policy. The Department may expressly allow deductible clauses, which it does not consider excessive, overly broad, or harmful to the interests of the State. Standard ISO form No. CG 0001 or similar exclusions will be allowed provided they are not inconsistent with the requirements of this section

Enforcement

The Department may take any steps as necessary to assure Contractor's compliance with its obligations. Should any insurance policy lapse or be canceled during the contract period the Contractor shall, within thirty (30) days prior to the effective expiration or cancellation date, furnish the Department with evidence of renewal or replacement of the policy. Failure to continuously maintain insurance coverage as herein provided is a material breach of contract. In the event the Contractor fails to maintain any insurance coverage required, the Department may, but is not required to, maintain this coverage and charge the expense to the Contractor or terminate this Agreement. The required insurance shall be subject to the approval of the Department, but any acceptance of insurance certificates by the Department shall in no way limit or relieve the Contractor of the Contractor's duties and responsibilities under the Contract to indemnify, defend and hold harmless the State, its officers, agents, and employees. Insurance coverage in the minimum amounts set forth herein shall not be construed to relieve the Contractor for liability in excess of such coverage, nor shall it preclude the State from taking other actions as is available to it under any other provision of the contract or law. Failure of the Department to enforce in a timely manner any of the provisions of this section shall not act as a waiver to enforcement of any of these provisions at a later date.

Self-Insurance

Self-insurance programs and self-insured retentions in insurance policies are subject to separate annual review and approval by the State of evidence of the Contractor's financial capacity to respond. Additionally, self-insurance programs or retentions must provide the State with at least the same protection from liability and defense of suits as would be afforded by first-dollar insurance.

Miscellaneous

Nothing contained in the Contract is intended to make the public or any member thereof a third party beneficiary of the Insurance or Indemnity provisions of this special provision, nor is any term, condition or other provision of the Contract intended to establish a standard of care owed to the public or any mender thereof.

5-1.34 PROSECUTION AND PROGRESS

The third paragraph of Section 8-1.01, "Subcontracting," of the Standard Specifications is revised as follows:

> The Contractor shall perform, with the Contractor's own organization, contract work amounting to not less than 50 percent of the original total contract price, except that any designated "Specialty Items" may be performed by subcontract and the amount of any designated "Specialty Items" performed by subcontract may be deducted from the original total contract price before computing the amount of work required to be performed by the Contractor with the Contractor's own organization. When items of work in the Engineer's Estimate are preceded by the letters (S) or (S-F), those items are designated as "Specialty Items." Where an entire item is subcontracted, the value of work subcontracted will be based on the contract item bid price. When a portion of an item is subcontracted, the value of work subcontracted will be based on the estimated percentage of the contract item bid price, determined from information submitted by the Contractor, subject to approval by the Engineer.

The following paragraph is added after the fifth paragraph of Section 8-1.01, "Subcontracting," of the Standard Specifications.

Pursuant to the provisions of Section 6109 of the Public Contract Code, the Contractor shall not perform work on a public works project with a subcontractor who is ineligible to perform work on the public works project pursuant to Section 1777.1 or 1777.7 of the Labor Code.

The third paragraph of Section 8-1.07, "Liquidated Damages," of the Standard Specifications is revised as follows:

The Contractor will be granted an extension of time and will not be assessed with liquidated damages or the cost of engineering and inspection for any portion of the delay in completion of the work beyond the time named in the special provisions for the completion of the work caused by acts of God or of the public enemy, fire, floods, tsunamis, earthquakes, epidemics, quarantine restrictions, strikes, labor disputes, shortage of materials and freight embargoes, provided that the Contractor shall notify the Engineer in writing of the causes of delay within 15 days from the beginning of that delay. The Engineer shall ascertain the facts and the extent of the delay, and the Engineer's findings thereon shall be final and conclusive.

The first paragraph of Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications is revised as follows:

Attention is directed to Section 7-1.11, "Preservation of Property," of the Standard Specifications and "Indemnification and Insurance," of these special provisions. The Contractor shall protect from damage utility and other non-highway facilities that are to remain in place, be installed, relocated or otherwise rearranged.

5-1.35 MEASUREMENT AND PAYMENT

The following paragraph is added after the third paragraph of Section 9-1.01, "Measurement of Quantities," of the Standard Specifications.

Elements of the material plant controller which affect the accuracy or delivery of data shall be made available for the application of security seals. These devices will be inspected and adjusting elements sealed prior to the first production of materials for the contract. The security seals will be furnished by the Engineer. Material production shall cease when alteration, disconnection or otherwise manipulation of the security seals occur, and production shall not resume until the device is inspected and resealed by the Engineer.

Section 9-1.015, "Final Pay Quantities," of the Standard Specifications is revised as follows:

Section 9-1.015 Final Pay Items

When an item of work is designated as (F) or (S-F) in the Engineer's Estimate, the estimated quantity for that item of work shall be the final pay quantity, unless the dimensions of any portion of that item are revised by the Engineer, or the item or any portion of that item is eliminated. If the dimensions of any portion of the item are revised, and the revisions result in an increase or decrease in the estimated quantity of that item of work, the final pay quantity for the item will be revised in the amount represented by the changes in the dimensions, except as otherwise provided for minor structures in Section 51-1.22, "Measurement." If a final pay item is eliminated, the estimated quantity for the item will be eliminated. If a portion of a final pay item is eliminated, the final pay quantity will be revised in the amount represented by the eliminated portion of the item of work.

The estimated quantity for each item of work designated as (F) or (S-F) in the Engineer's Estimate shall be considered as approximate only, and no guarantee is made that the quantity which can be determined by computations, based on the details and dimensions shown on the plans, will equal the estimated quantity. No allowances will be made in the event that the quantity based on computations does not equal the estimated quantity.

In case of discrepancy between the quantity shown in the Engineer's Estimate for a final pay item and the quantity or summation of quantities for the same item shown on the plans, payment will be based on the quantity shown in the Engineer's Estimate.

The fourth provision of the first paragraph of Section 9-1.03A(3b), "Equipment not on the Work," of the Standard Specifications is deleted.

Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications is revised as follows:

9-1.04 Notice of Potential Claim

The Contractor shall not be entitled to the payment of any additional compensation for any act, or failure to act, by the Engineer, including failure or refusal to issue a change order, or for the happening of any event, thing, occurrence, or other cause, unless the Contractor shall have given the Engineer due written notice of potential claim as hereinafter specified. Compliance with this special provision shall not be a prerequisite as to matters within the scope of the protest provisions in Section 4-1.03, "Changes," or Section 8-1.06, "Time of Completion," or the notice provisions in Section 5-1.116, "Differing Site Conditions," or Section 8-1.97, "Liquidated Damages," or Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications, nor to any claim which is based on differences in measurements or errors of computation as to contract quantities.

The written notice of potential claim shall be submitted to the Engineer prior to the time that the Contractor performs the work giving rise to the potential claim for additional compensation, if based on an act or failure to act by the Engineer, or in all other cases within 15 days after the happening of the event, thing, occurrence, or other cause, giving rise to the potential claim.

The written notice of potential claim shall be submitted on Form CEM-6201 furnished by the Department and shall be certified with reference to the California False Claims Act, Government Code Sections 12650-12655. The notice shall set forth the reasons for which the Contractor believes additional compensation will or may be due and the nature of the costs involved. Unless the amount of the potential claim has been stated in the written notice, the Contractor shall, within 15 days of submitting the notice, furnish an estimate of the cost of the affected work and impacts, if any, on project completion. The estimate of costs may be changed or updated by the Contractor when conditions have changed. When the affected work is completed, the Contractor shall submit substantiation of the Contractor's actual costs. Failure to do so shall be sufficient cause for denial of any claim subsequently filed on the basis of the notice of potential claim.

It is the intention of this special provision that differences between the parties arising under and by virtue of the contract be brought to the attention of the Engineer at the earliest possible time in order that the matters may be settled, if possible, or other appropriate action promptly taken. The Contractor hereby agrees that the Contractor shall have no right to additional compensation for any claim that may be based on any act, failure to act, event, thing or occurrence for which no written notice of potential claim as herein required was filed.

Should the Contractor, in connection with or subsequent to the assertion of a potential claim, request inspection and copying of documents or records in the possession of the Department that pertain to the potential claim, the Contractor's records of the project, as deemed by the Department to be pertinent to the potential claim, shall be made available to the Department for inspection and copying.

The sixth paragraph of Section, 9-1.06, "Partial Payments," of the Standard Specifications is revised as follows:

Attention is directed to the prohibitions and penalties pertaining to unlicensed contractors as provided in Business and Professions Code Sections 7028.15(a) and 7031.

The following paragraph is added after the third paragraph in Section 9-1.065, "Payment of Withheld Funds," of the Standard Specifications.

Alternatively, and subject to the approval of the Department, the payment of retentions earned may be deposited directly with a person licensed under Division 6 (commencing with Section 17000) of the Financial Code as the escrow agent. Upon written request of an escrow agent that has not been approved by the Department under subdivision (c) of Section 10263 of the Public Contract Code, the Department will provide written notice to that escrow agent within 10 business days of receipt of the request indicating the reason or reasons for not approving that escrow agent. The payments will be deposited in a trust account with a Federally chartered bank or savings association within 24 hours of receipt by the escrow agent. The Contractor shall not place any retentions with the escrow agent in excess of the coverage provided to that escrow agent pursuant to subdivision (b) of Section 17314 of the Financial Code. In all respects not inconsistent with subdivision (c) of Section 10263 of the Public Contract Code, the remaining provisions of Section 10263 of the Public Contract Code shall apply to escrow agents acting pursuant to subdivision (c) of Section 10263 of the Public Contract Code.

Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications is revised as follows:

9-1.07B Final Payment and Claims

After acceptance by the Director, the Engineer will make a proposed final estimate in writing of the total amount payable to the Contractor, including therein an itemization of the total amount, segregated as to contract item quantities, extra work and any other basis of payment, and shall also show therein all deductions made or to be made for prior payments and amounts to be kept or retained under the provisions of the contract. All prior estimates and payments shall be subject to

correction in the proposed final estimate. The Contractor shall submit written approval of the proposed final estimate or a written statement of all claims arising under of by virtue of the contract so that the Engineer receives the written approval or statement of claims no later than close of business of the thirtieth day after receiving the proposed final estimate. If the thirtieth day falls on a Saturday, Sunday or legal holiday, then receipt of the written approval or statement of claims by the Engineer shall be no later than close of business of the next business day. No claim will be considered that was not included in the written statement of claims, nor will any claim be allowed as to which a notice or protest is required under the provisions in Sections 4-1.03, "Changes," 8-1.06, "Time of Completion," 8-1.07, "Liquidated Damages," 5-1.116, "Differing Site Conditions," and 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications and "Notice of Potential Claim," elsewhere in these special provisions unless the Contractor has complied with the notice or protest requirements in those sections.

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

If the Contractor within the specified period of 30 days files claims, the Engineer will issue a semifinal estimate in accordance with the proposed final estimate submitted to the Contractor and within 30 days thereafter the State will pay the sum so found to be due. The semifinal estimate and payment thereon shall be conclusive and binding against both parties to the contract on all questions relating to the amount of work done and the compensation payable therefor, except insofar as affected by the claims filed within the time and in the manner required hereunder and except as otherwise provided in Sections 9-1.03C, "Records," and 9-1.09, "Clerical Records."

Claims filed by the Contractor shall be in sufficient detail to enable the Engineer to ascertain the basis and amount of those claims. If additional information or details are required by the Engineer to determine the basis and amount of the claims, the Contractor shall furnish additional information or details so that the additional information or details are received by the Engineer no later than the fifteenth day after receipt of the written request from the Engineer. If the fifteenth day falls on a Saturday, Sunday or legal holiday, then receipt of the information or details by the Engineer shall not be later than close of business of the next business day. Failure to submit the information and details to the Engineer within the time specified will be sufficient cause for denying the claim.

The Contractor shall keep full and complete records of the costs and additional time incurred for any work for which a claim for additional compensation is made. The Engineer or any designated claim investigator or auditor shall have access to those records and any other records as may be required by the Engineer to determine the facts or contentions involved in the claims. Claims submitted by the Contractor shall be accompanied by a notarized certificate containing the following language:

Under the penalty of law for perjury or falsification and with specific reference to the California False Claims Act, Government Code Section 12650 et. seq., the undersigned,

_____
(name)

_____
(title)

_____
(company)

hereby certifies that the claim for the additional compensation and time, if any, made herein for the work on this contract is a true statement of the actual costs incurred and time sought, and is fully documented and supported under the contract between parties.

Dated _____

/s/ _____

Subscribed and sworn before me this _____ day

of _____

_____
(Notary Public)
My Commission Expires _____

Failure to submit the notarized certificate will be sufficient cause for denying the claim.

Any claim for overhead type expenses or costs, in addition to being certified as stated above, shall be supported by an audit report of an independent Certified Public Accountant. Any claim for overhead shall also be subject to audit by the State at its discretion.

Any costs or expenses incurred by the State in reviewing or auditing any claims that are not supported by the Contractor's cost accounting or other records shall be deemed to be damages incurred by the State within the meaning of the California False Claims Act.

The District Director will make the final determination of any claims which remain in dispute after completion of claim review by the Engineer. A board or person designated by the District Director will review those claims and make a written recommendation thereon to the District Director. The Contractor may meet with the review board or person to make a presentation in support of those claims.

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

The third paragraph of Section 9-1.10, "Arbitration," of the Standard Specifications is revised as follows:

Arbitration shall be initiated by a Complaint in Arbitration made in compliance with the requirements of those regulations. A Complaint in Arbitration by the Contractor shall be made not later than 90 days after the date of service in person or by mail on the Contractor of the final written decision by the Department on the claim.

5-1.36 RELATIONS WITH LOS ANGELES COUNTY FLOOD CONTROL DISTRICT (LACFCD)

A portion of this project is located within the jurisdiction of the Los Angeles County Flood Control District (LACFCD). A permit regarding a stream or lake has been entered into by the Department of Transportation and the LACFCD. The Contractor shall be fully inform himself of the requirements of this permit as well as all rules, regulations, and conditions that may govern the Contractor's operations in these areas and shall conduct the work accordingly.

Copies of the permit may be obtained at the Department of Transportation, Plans and Bid Documents Section (MS 26), 1120 N Street, Room 200, Sacramento, California 95814, Telephone No. (916) 654-4490, and are available for inspection at the office of the District Director of Transportation at 120 South Spring Street, Office of Construction, Room 244, Los Angeles, CA 90012, Telephone Number ((213) 897-0054.

It is unlawful for any person to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any stream, river, or lake without first notifying LACFCD.

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

Should the Contractor fail to conform to the regulations and requirements of the LACFCD, the State reserves the right to perform the work necessary for conformity and the cost of such work will be deducted from any money or monies due to the Contractor.

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

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

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

Modifications to any permit issued by LACFCD will be fully binding on the Contractor.The provisions of this section shall be made a part of every subcontract executed pursuant to this contract.

5-1.37 RELATIONS WITH CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

The location of the project is within an area controlled by the Regional Water Quality Control Board. Regional Water Quality Control Board Order No.00-018 has been issued covering work to be performed under this contract. The Contractor shall be fully informed of all rules, regulations and conditions that may govern the Contractor's operations in the areas and shall conduct the work accordingly.

Copies of the agreement may be obtained at the Department of Transportation, Plans and Bid Documents Section, MS 26, 1120 N Street,Room 200, Sacramento, California 95814, Telephone No. (916) 654-4490, and are available for inspection at the office of the District Director of Transportation at 120 South Spring Street, Office of Construction, Room 244, Los Angeles, CA 90012, Telephone Number ((213) 897-0054.

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

Changes in the above listed conditions proposed by the Contractor shall be submitted to the Engineer for transmittal to the Regional Water Quality Control Board for their approval. Changes shall not be implemented until approved in writing by the Regional Water Quality Control Board.

Attention is directed to Section 8-1.06, "Time of Completion," of the Standard Specifications. Days when the Contractor's operations are restricted by the requirements of this section, shall not be considered to be nonworking days whether or not the controlling operation is delayed.

5-1.38 RELATIONS WITH CALIFORNIA DEPARTMENT OF FISH AND GAME

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

Copies of the agreement may be obtained at the Department of Transportation, Plans and Bid Documents Section, MS 26, 1120 N Street, Sacramento, California 95814, Telephone No. (916)654-4490, and are available for inspection at the office of the District Director of Transportation at 120 South Spring Street, Office of Construction, Room 344, Los Angeles, California 90012, telephone (213) 897-0054.

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

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

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

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

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

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

SECTION 6. (BLANK)

SECTION 7. (BLANK)

SECTION 8. MATERIALS

SECTION 8-1. MISCELLANEOUS

8-1.01 APPROVED TRAFFIC PRODUCTS

The Department maintains the following list of Approved Traffic Products. The Engineer shall not be precluded from sampling and testing products on the List of Approved Traffic Products.

The manufacturer of products on the List of Approved Traffic Products 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.

Materials and products may be added to the list of Approved Traffic Products 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 be dependent upon compliance with the specifications and tests the Department may elect to perform.

PAVEMENT MARKERS, PERMANENT TYPE

RETROREFLECTIVE

Apex, Model 921 (4"x4")
Ray-O-Lite, Models SS (4"x4"), RS (4"x4") and AA (4"x4")
Stimsonite, Models 88 (4" x4"), 911 (4"x4"), 953 (2.75"x4.5")
3M Series 290 (3.5"x4")

RETROREFLECTIVE WITH ABRASION RESISTANT SURFACE (ARS)

Ray-O-Lite "AA" ARS (4"x4")
Stimsonite, Models 911 (4"x4"), 953 (2.75"x4.5")
3M Series 290 (3.5"x4")

RETROREFLECTIVE WITH ABRASION RESISTANT SURFACE (ARS)
(Used for recessed applications)

Stimsonite, Model 948 (2.3"x4.7")
Ray-O-Lite, Model 2002 (2.2"x4.7")
Stimsonite, Model 944SB (2"x4")*
Ray-O-Lite, Model 2004 ARS (2"x4")*

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

NON-REFLECTIVE FOR USE WITH EPOXY ADHESIVE, 4" Round

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

NON-REFLECTIVE FOR USE WITH BITUMEN ADHESIVE, 4" Round

Apex Universal (Ceramic)
Apex Universal, Model 929 (ABS)
Elgin Molded Plastics, "Empco-Lite" Model 900 (ABS)
Highway Ceramics, Inc. (Ceramic)
Hi-Way Safety, Inc., Models P20-2000W and 2001Y (ABS)
Interstate Sales, "Diamond Back" (ABS) and (Polypropylene)
Alpine Products, D-Dot (ABS)
Road Creations, Model RCB4NR (Acrylic)

PAVEMENT MARKERS, TEMPORARY TYPE

TEMPORARY MARKERS FOR LONG TERM DAY/NIGHT USE (6 months or less)

Apex Universal, Model 924 (4"x4")
Davidson Plastics, Model 3.0 (4"x4")
Elgin Molded Plastics, "Empco-Lite" Model 901 (4" x4")
Road Creations, Model R41C (4"x4")
Vega Molded Products "Temporary Road Marker" (3"x4")

TEMPORARY MARKERS FOR SHORT TERM DAY/NIGHT USE (14 days or less)
(For seal coat or chip seal applications, clear protective covers are required)

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

STRIPING AND PAVEMENT MARKING MATERIALS

PERMANENT TRAFFIC STRIPING AND PAVEMENT MARKING TAPE

Advanced Traffic Marking, Series 300 and 400
Brite-Line, Series 1000
Swarco Industries, "Director 35" (For transverse application only)
Swarco Industries, "Director 60"
3M, "Stamark" Series 380 and 5730
3M, "Stamark" Series A320 Bisymetric (For use on low-volume roadways only)
3M, "Stamark" Series A420, A440, N420 and N440 (For transverse application only)

TEMPORARY (REMOVABLE) STRIPING AND PAVEMENT MARKING TAPE
(6 months or less)

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

PREFORMED THERMOPLASTIC (Heated in place)

Flint Trading, "Premark" and "Premark 20/20 Flex"
Pavemark, "Hotape"

REMOVABLE TRAFFIC PAINT

Belpro, Series 250/252 and No. 93 Remover

CLASS 1 DELINEATORS

ONE PIECE DRIVABLE FLEXIBLE TYPE, 66"

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

SPECIAL USE FLEXIBLE TYPE, 66"

Carsonite, "Survivor" with 18" U-Channel anchor
FlexStake, Model 604
GreenLine Models HWD and CGD (with 18" U-Channel base)
Safe-Hit with 8" pavement anchor (SH248-GP1)
Safe-Hit with 15" soil anchor (SH248-GP2) and with 18" soil anchor (SH248-GP3)

SURFACE MOUNT FLEXIBLE TYPE, 48"

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

CHANNELIZERS

SURFACE MOUNT TYPE, 36"

Bent Manufacturing Co.,"Masterflex" Models MF-360-36(Round) and MF-180-36(Flat)
Carsonite, "Super Duck" (Flat SDF-436, Round SDR-336)
Carsonite, Super Duck II Model SDCF203601MB "The Channelizer"
Davidson Plastics, Flex-Guide Models FG300LD and FG300UR
FlexStake, Surface Mount, Models 703 and 753TM
GreenLine, Model SMD-36
The Line Connection,"Dura-Post" Model DP36-3 (Permanent)
The Line Connection,"Dura-Post" Model DP36-3C (Temporary)
Repo, Models 300 and 400
Safe-Hit, Guide Post, Model SH236SMA

OBJECT MARKERS

TYPE "K", 18"

Carsonite, Model SMD-615
FlexStake, Model 701KM
Repo, Models 300 and 400
Safe-Hit, Model SH718SMA
The Line Connection, Model DP21-4K

TYPE "K-4", 18"-24"
(Shown as "Q" in the Traffic Manual)

Carsonite, Super Duck II
FlexStake, Model 701KM
Repo, Models 300 and 400
Safe-Hit, Models SH8 24SMA_WA and SH 824GP3_WA
The Line Connection, Model "DP21-4Q"

TEMPORARY RAILING (TYPE K) REFLECTORS AND CONCRETE BARRIER MARKERS

IMPACTABLE TYPE

Astro Optics "FB"
Davidson Plastics, Model PCBM-12
Duraflex Corp., "Flexx 2020" and "Electriflexx"

NON-IMPACTABLE TYPE

ARTUK, JD Series
Stimsonite, Model 967 (with 3 1/4" Acrylic cube corner reflector)
Stimsonite, Model 967LS
Vega Molded Products, Models GBM and JD

THRIE BEAM BARRIER MARKERS (For use to the left of traffic)

Duraflex Corp., "Railrider"
Davidson Plastics, "Mini" (3"x10")

CONCRETE BARRIER DELINEATORS, 16"
(For use to the right of traffic. When mounted on top of barrier, places top of reflective element at 48")

Davidson Plastics, Model PCBM T-16
Safe-Hit, Model SH216RBM

CONCRETE BARRIER-MOUNTED MINI-DRUM (10"x14"x22")
(Applied to a vertical surface. Top of reflective element at 48")

Stinson Equipment Company "SaddleMarker"

SOUND WALL DELINEATOR
(Applied to a vertical surface. Top of reflective element at 48")

Davidson Plastics, PCBM S-36

GUARD RAILING DELINEATOR
(Top of reflective element at 48" above plane of roadway)

WOOD POST TYPE, 27"

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

STEEL POST TYPE

Carsonite, Model CFGR-327 with CFGRBK300 Mounting Bracket

RETROREFLECTIVE SHEETING

CHANNELIZERS, BARRIER MARKERS AND DELINEATORS

3M, High Intensity
Reflexite, PC-1000 Metalized Polycarbonate
Reflexite, AC-1000 Acrylic
Reflexite, AP-1000 Metalized Polyester
Reflexite, AR-1000 Abrasion Resistant Coating)
Stimsonite, Series 6200 (For rigid substrate devices only)

TRAFFIC CONES, 13" Sleeves

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

TRAFFIC CONES, 4" and 6" Sleeves

3M Series 3840
Reflexite Vinyl or "TR" (Semi-transparent) or "Conformalite"

BARRELS AND DRUMS

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

BARRICADES, Type I, Engineering Grade

American Decal, Adcolite
Avery Dennison, 1500 and 1600
3M, Scotchlite, Series CW

BARRICADES, Type II, Super Engineering Grade

Avery Dennison, "Fasign" 2500 Series
Kiwalite, Type II
Nikkalite 1800 Series

SIGNS, Type II, Super Engineering Grade

Avery Dennison, "Fasign" 2500 Series
Kiwalite, Type II
Nikkalite 1800 Series

SIGNS, Type III, High-Intensity Grade

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

SIGNS, Type IV, High-Intensity Prismatic Grade

Stimsonite Series 6200

SIGNS, Type VII, High-Intensity Prismatic Grade

3M Series 3900

SIGNS, Type VI Roll-Up Signs

Reflexite, Vinyl (Orange), Reflexite "SuperBright" (Fluorescent orange)
3M Series RS34 (Orange) and RS20 (Fluorescent orange)

SIGN SUBSTRATE FOR CONSTRUCTION AREA SIGNS

ALUMINUM

FIBERGLASS REINFORCED PLASTIC (FRP)

Sequentia, "Polyplate"
Fiber-Brite

8-1.02 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:

Sign panels for roadside signs, for mounting on the ramp metering system signal head backplates and overhead sign structures.

Sign overlay panels for roadside signs and overhead sign structures.

Mast arm sign hanger assemblies

Laminated wood box posts with metal caps for roadside signs.

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.

Marker panels, including reflectors, for Type N, Type P and Type R object markers.

Target plates for median mileage panels.

Lamps for vehicular traffic signal units and Type A pedestrian signal units.

Loop detector sensor units.

Model 170 controller assemblies, including controller unit, completely wired controller cabinet, and inductive loop detector sensor units, for traffic monitoring stations system.

Individual or axle type scales for materials hauling equipment on bridges.

Completely wired controller cabinets for traffic monitoring stations sytem, with auxiliary equipment but without controller unit, will be furnished to the Contractor at the Department of Transportation, district Maintenance Yard, 7310 East Bandini boulevard, Commerce, California 90040.

The Contractor shall notify the Engineer and Traffic Design Branch, telephone (213) 897-0261, at least 15 working days prior to picking up the Model 332 and 334 controller cabinets.Changeable message sign communication cables, 6P18 and 12P18 will be furnished to the Contractor for pick-up at a site, within 5 miles of the project location, as directed by the Engineer.

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

The Contractor shall notify the Engineer at least 10 working days prior to installation of the Piezo-electric axle sensor units.

8-1.03 SLAG AGGREGATE

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

8-1.04 ENGINEERING FABRICS

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

The fourth paragraph of Section 88-1.04, "Rock Slope Protection Fabric," of the Standard Specifications is revised as follows:

Woven filament type rock slope protection fabric shall be Type A or Type B as specified in these special provisions. The woven filament fabric shall be manufactured from individually extruded and quenched filaments, not from larger previously quenched fibers or films, and shall conform to the following:

Specification	Requirement	
	Type A	Type B
Weight, ounces per square yard, min. ASTM Designation: D 3776	4.0	6.0
Grab tensile strength (1-inch grip), pounds, min. in each direction ASTM Designation: D 4632	100	200
Elongation at break, percent max. ASTM Designation: D 4632	35	35
Toughness, pounds, min. (Percent elongation x grab tensile strength)	3,500	7,000
Permittivity, 1/sec., min. ASTM Designation: D 4491	0.5	0.5

The sixth paragraph of Section 88-1.04, "Rock Slope Protection Fabric," of the Standard Specifications is revised as follows:

Nonwoven type rock slope protection fabric shall be Type A or Type B as specified in these special provisions and shall conform to the following:

Specification	Requirement	
	Type A	Type B
Weight, ounces per square yard, min. ASTM Designation: D 3776	4.0	6.0
Grab tensile strength (1-inch grip), pounds, min. in each direction ASTM Designation: D 4632	90	200
Elongation at break, percent max. ASTM Designation: D 4632	50	50
Toughness, pounds, min. (Percent elongation x grab tensile strength)	6,000	12,000
Permittivity, 1/sec., min. ASTM Designation: D 4491	0.5	0.5

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

8-1.05 PAINT

The last sentence of the second paragraph of Section, 91-1.01, "Description," of the Standard Specifications is revised as follows:

The paint shall possess satisfactory properties, in all respects which affect its application, adhesion and curing and shall be formulated to retain these properties for a minimum of one year.

The following paragraph is added after the third paragraph of Section 91-1.01, "Description," of the Standard Specifications:

The Engineer may require additional testing of any paint that has not been used within one year of manufacture.

The third and fourth paragraphs of Section 91-1.03, "Manufacturing and Packaging," of the Standard Specifications are revised as follows:

No paint shall be used until approved by the Engineer.

All containers of paint shall be labeled showing the exact title of the paint specification, State specification number, manufacturer's product number, manufacturer's name, date of manufacture, State lot number and manufacturer's batch number.

The second paragraph of Section 91-1.04, "Materials," of the Standard Specifications is revised as follows:

For paints designated by State Specification number, copies of the State Specifications may be obtained from the Transportation Laboratory.

Section 91-2, "Paints for Metal," of the Standard Specifications is revised as follows:

91-2 PAINTS FOR METAL

91-2.01 Description

Paints for metal shall be as specified in the special provisions.

91-2.02 through 91 -2.07 (Blank)

8-1.06 LIQUID ASPHALTS

Liquid Asphalts shall conform to the provisions in Section 93, "Liquid Asphalts," of the Standard Specifications and these special provisions.

The first paragraph of Section 93-1.03, "Mixing and Applying," of the Standard Specifications is revised as follows:

Attention is directed to Section 7-1.11, "Preservation of Property," of the Standard Specifications and "Indemnification and Insurance," of these special provisions. Liquid asphalt shall be prevented from spraying upon adjacent pavements, that

portion of the traveled way being used by traffic, structures, railings and barriers, markers, trees and shrubbery that are not to be removed, adjacent property and improvements, and other highway improvements or facilities not mentioned herein.

8-1.07 EPOXY

Epoxy shall confirm to the provisions in Section 95, "Epoxy," of the Standard Specifications and these special provisions.

The following paragraph is added after the second paragraph of Section 95-1.02, "Sampling and Testing," of the Standard Specifications:

> Epoxy components shall be formulated to maintain the specified properties for a minimum of one year. The Engineer may require additional testing of any epoxy component that has not been used within one year of manufacture.

The title of Section 95-2.01, "Binder (Adhesive), Epoxy Resin Base (State Specification 8040-01F-03)", of the Standard Specifications is revised as follows:

95-2.01 BINDER (ADHESIVE), EPOXY RESIN BASE (STATE SPECIFICATION 8040-03)

The title of Section 95-2.04, "Rapid Set Epoxy Adhesive for Pavement Markers (State Specification 8040-51B-07)," of the Standard Specifications is revised as follows:

95-2.04 RAPID SET EPOXY ADHESIVE FOR PAVEMENT MARKERS (STATE SPECIFICATION 8040-07)

The Title of Section 95-2.05, "Standard Set Epoxy Adhesive for Pavement Markers (State Specification 8040-51B-09)," of the Standard Specifications is revised as follows:

95-2.05 STANDARD SET EPOXY ADHESIVE FOR PAVEMENT MARKERS (STATE SPECIFICATION 8040-09)

The Title of Section 95-2.09, "Epoxy Sealant for Inductive Loops (State Specification 8040-31D-06)," of the Standard Specifications is revised as follows:

95-2.09 EPOXY SEALANT FOR INDUCTIVE LOOPS (STATE SPECIFICATION 8040-06)

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.

Unless the use of mineral admixture is prohibited, whenever the word "cement" is used in the Standard Specifications or the special provisions, it shall be understood to mean "cementitious material" when both of the following conditions are met:

A. The cement content of portland cement concrete is specified, andB. Section 90, "Portland Cement Concrete," of the Standard Specifications is referenced.

Portland cement concrete that is produced using equipment where the cement and mineral admixture are proportioned in the same weigh hopper shall be sampled and tested by the Contractor, in the presence of the Engineer, for mix uniformity in conformance with the requirements in ASTM Designation: C 94 Section 11, "Mixing and Delivery," and "Annex A1." The testing shall be performed on concrete produced using an approved project mix design and may be done at the project concrete placement site.

The batch plant producing the portland cement concrete for the project shall have met the requirements in California Test 109 within one year prior to producing concrete for the project.Sampling for mix uniformity tests shall be performed the first time portland cement concrete, of sufficient volume to perform these tests, is placed on the project. Test results shall be presented to the Engineer no later than 10 days after completion of sampling.

Test results from mixer uniformity testing will not be used for contract compliance, acceptance or payment.

Prior to placing concrete on the project, the Contractor shall supply a list of portland cement concrete mixers to be used. When truck mixers are to be used, the list shall contain the truck identification number, mixer brand, mixer age and mixer condition.

When truck mixers are used, the mix uniformity testing shall be performed on 5 truck mixers for each project. The truck mixers selected for testing shall be representative of the different mixer brands, ages, and conditions of the mixers on the list and approved by the Engineer. Mixer selection shall be completed before mix uniformity testing is started. Sampling for the mix uniformity tests from each of the 5 mixers shall be completed within the same work shift, unless otherwise approved in writing by the Engineer. The Contractor shall notify the Engineer, in writing, a minimum of 24 hours prior to performing the sampling for these tests. The letter of notification shall include the truck mixer information and a copy of the current American Concrete Institute (ACI) "Concrete Field Testing Technician, Grade 1" certification for each tester who will perform testing for the Contractor. The Contractor shall provide an adequate number of testers to successfully perform the testing with a minimum amount of impact to the Contractor's operations.When concrete is completely mixed in stationary mixers, each mixer used for the project shall be tested one time.

Full compensation for the testing of mix uniformity as specified herein shall be considered as included in the contract price paid for the concrete work involved and no additional compensation will be allowed therefor.

Section 90-1.01, "Description," of the Standard Specifications is amended to read:

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.

Unless otherwise specified, cementitious material to be used in portland cement concrete shall conform to the requirements for cement and mineral admixtures in Section 90-2, "Materials" and shall be either: 1) "Type IP (MS) Modified" cement; or 2) a combination of "Type II Modified" portland cement and mineral admixture.

Concrete for each portion of the work shall comply with the provisions for the Class, cementitious material content in pounds per cubic yard, 28-day compressive strength, minor concrete, or commercial quality concrete, as shown on the plans or specified in these specifications or the special provisions.

Class A concrete shall contain not less than 564 pounds of cementitious material per cubic yard.

Class B concrete shall contain not less than 470 pounds of cementitious material per cubic yard.

Class C concrete shall contain not less than 376 pounds of cementitious material per cubic yard.

Class D concrete shall contain not less than 658 pounds of cementitious material per cubic yard.

Minor concrete shall contain not less than 564 pounds of cementitious material per cubic yard unless otherwise specified in these specifications or the special provisions.

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

Use	Cementitious Material Content in pounds
Concrete which is designated by compressive strength:	
Deck slabs and slab spans of bridges	658 min., 800 max.
Roof sections of exposed top box culverts	658 min., 800 max.
Other portions of structures	564 min., 800 max.
Concrete not designated by compressive strength:	
Deck slabs and slab spans of bridges	658 min.
Roof sections of exposed top box culverts	658 min.
Prestressed members	658 min.
Seal courses	658 min.
Other portions of structures	564 min.
Concrete for precast members	564 min., 940 max.

Whenever the 28-day compressive strength shown on the plans is greater than 3,500 pounds per square inch, the concrete shall be considered to be designated by compressive strength. If the plans show a 28-day compressive strength which is 4,500 pounds per square inch or greater, an additional 7 days will be allowed to obtain the specified strength. The 28-day compressive strengths shown on the plans which are 3,500 pounds per square inch or less, are shown for design information only and are not to be considered a requirement for acceptance of the concrete.

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

The Contractor shall determine the mix proportions for all concrete except pavement concrete. The Engineer will determine the mix proportions for pavement concrete.

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 used in the work has a cementitious material content, consisting of cement, mineral admixture, or cement plus mineral admixture, which is less than the minimum required for the work, the concrete shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place and the Contractor shall pay to the State $0.25 for each pound of cement, mineral admixture, or cement plus mineral admixture which is less than the minimum required for the work. The Department may deduct the amount from 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 for cementitious material content will be made based on the results of California Test 518.

The requirements of the preceding paragraph shall not apply to minor concrete nor commercial quality 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.

The first paragraph in Section 90-2.01, "Portland Cement," of the Standard Specifications is amended to read:

90-2.01 Portland Cement.—Unless otherwise specified, portland cement shall be either "Type IP (MS) Modified" cement or "Type II Modified" portland cement.

"Type IP (MS) Modified" cement shall conform to the specifications for Type IP (MS) cement in ASTM Designation: C 595, and shall be comprised of an intimate mixture of Type II cement and not more than 25 percent of a 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 weight 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.
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.

The second paragraph in Section 90-2.01, "Portland Cement," of the Standard Specifications is amended to read:

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.

The third paragraph in Section 90-2.01, "Portland Cement," of the Standard Specifications is deleted.
The twelfth paragraph in Section 90-2.02, "Aggregates," of the Standard Specifications is deleted.
The first paragraph in Section 90-2.03, "Water," of the Standard Specifications is amended to read:

90-2.03 Water.—In conventionally reinforced concrete work, the water for curing, for washing aggregates, and for mixing shall be free from oil and shall not contain more than 1,000 parts per million of chlorides as Cl, nor more than 1,300 parts per million of sulfates as SO_4. 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, nor more than 1,300 parts per million of sulfates as SO_4. 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, tested in conformance with the requirements in ASTM Designation: C 109.

The following section is added to Section 90-2, "Materials," of the Standard Specifications:

90-2.04 Admixture Materials.—Admixture materials shall conform to the requirements in the following ASTM Designations:

Chemical Admixtures—ASTM Designation: C 494.
Air-entraining Admixtures—ASTM Designation: C 260.
Calcium Chloride—ASTM Designation: D 98.
Mineral Admixtures—Coal fly ash, raw or calcined natural pozzolan as specified in ASTM Designation: C 618. Silica fume conforming to the requirements in ASTM Designation C1240, with reduction of mortar expansion of 80 percent, minimum, using the cement from the proposed mix design.

Mineral admixtures shall be used in conformance with the provisions in Section 90-4.08, "Required Use of Mineral Admixtures."

Section 90-4.02, "Materials," of the Standard Specifications is amended to read:

90-4.02 Materials.—Admixture materials shall conform to the provisions in Section 90-2.04, "Admixture Materials."

Section 90-4.05, "Optional Use of Chemical Admixtures," of the Standard Specifications is amended to read:

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 concrete construction application subject to the following conditions:

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 weight except that the resultant cementitious material content shall be not less than 470 pounds per cubic yard.

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.

Section 90-4.07, "Optional Use of Air-entraining Admixtures," of the Standard Specifications is amended to read:

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."

Section 90-4.08, "Required Use of Mineral Admixtures," of the Standard Specifications is amended to read:

90-4.08 Required Use of Mineral Admixtures.—Unless otherwise specified, mineral admixture shall be combined with cement to make cementitious material for use in portland cement concrete.

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 of ASTM Designation: C 618.

The amounts of cement and mineral admixture used in cementitious material for portland cement concrete 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:

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

The minimum amount of mineral admixture to be combined with cement shall be determined using one of the following criteria:

A. When the calcium oxide content of a mineral admixture, as determined in conformance with the requirements in ASTM Designation: C 618 and the provisions in Section 90-2.04, "Admixture Materials," is equal to or less than 2 percent by weight, the amount of mineral admixture shall not be less than 15 percent by weight of the total amount of cementitious material to be used in the mix.
B. When the calcium oxide content of a mineral admixture, as determined in conformance with the requirements in ASTM Designation: C 618 and the provisions in Section 90-2.04, "Admixture Materials," is greater than 2 percent, the amount of mineral admixture shall not be less than 25 percent by weight of the total amount of cementitious material to be used in the mix.
C. When a mineral admixture is used, which 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 weight of the total amount of cementitious material to be used in the mix.

If more than the required amount of cementitious material is used, the balance of the additional cementitious material in the mix may be either cement, a mineral admixture conforming to the provisions in Section 90-2.04, "Admixture Materials," or a combination of both; however, the maximum total amount of mineral admixture shall not exceed 35 percent by weight 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 pounds per cubic yard, the total weight of cement and mineral admixture per cubic yard shall not exceed the specified maximum cementitious material content.

Section 90-4.09, "Optional Use of Mineral Admixtures," of the Standard Specifications is deleted.

Section 90-4.11, "Storage, Proportioning, and Dispensing of Mineral Admixtures," of the Standard Specifications is amended to read:

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 interlocks are required for cement and mineral admixture charging mechanisms by Section 90-5.03A, "Proportioning for Pavement," and cement and mineral admixtures are weighed cumulatively, their charging mechanisms shall be interlocked to prevent the introduction of mineral admixture until the weight of cement in the cement weigh hopper is within the tolerances specified in Section 90-5.02, "Proportioning Devices."

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.

Section 90-5.02, "Proportioning Devices," of the Standard Specifications is amended to read:

90-5.02 Proportioning Devices.—Weighing, measuring or metering devices used for proportioning materials shall conform to the provisions in Section 9-1.01, "Measurement of Quantities," and this Section 90-5.02. In addition, automatic weighing systems used shall comply with the provisions for automatic proportioning devices in Section 90-5.03A, "Proportioning for Pavement." These 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 insure their accuracy.

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

Equipment for cumulative weighing of aggregate shall have a zero tolerance of ±0.5 percent of the designated total batch weight of the aggregate. For systems with individual weigh hoppers for the various sizes of aggregate, the zero tolerance shall be ±0.5 percent of the individual batch weight 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 weight 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 weights. Equipment for measuring water shall have a zero tolerance of ±0.5 percent of its designated weight or volume.

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

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

Each scale graduation shall be approximately 0.001 of the total capacity of the scale. The capacity of scales for weighing cement, mineral admixture, or cement plus mineral admixture and aggregates shall not exceed that of commercially available scales having single graduations indicating a weight not exceeding the maximum permissible weight variation above, except that no scale shall be required having a capacity of less than 1,000 pounds, with one-pound graduations.

Section 90-5.03, "Proportioning," excluding Section 90-5.03A, "Proportioning for Pavement," of the Standard Specifications is amended to read:

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 weight.

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

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

Bulk "Type IP (MS) Modified" cement that conforms to the provisions in Section 90-2.01, "Portland 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 to be blended with mineral admixture for use in portland cement concrete for pavement and structures may be weighed in separate, individual weigh-hoppers or may be weighed in the same weigh hopper with mineral admixture 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 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 scale and weigh hopper for bulk weighing cement, mineral admixture, and cement plus mineral admixture shall be separate and distinct from the aggregate weighing equipment.

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

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

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

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

Section 90-5.03A, "Proportioning for Pavement," of the Standard Specifications is amended to read:

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 weight by means of automatic proportioning devices of approved type conforming to the provisions in this Section 90-5.03A.

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

The batching of cement, 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 weights which are 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 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 weight 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.

The third paragraph in Section 90-6.01, "General," of the Standard Specifications is amended to read:

Concrete shall be homogeneous and thoroughly mixed. There shall be no lumps or evidence of undispersed cement, mineral admixture, or cement plus mineral admixture.

The third and fourth paragraphs in Section 90-6.02, "Machine Mixing," of the Standard Specifications are amended to read:

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, or in accumulation of cementitious materials on surfaces of conveyors or hoppers, or in other conditions which reduce or vary the required quantity of cementitious material in the concrete mixture.

The sixth paragraph in Section 90-6.02, "Machine Mixing," of the Standard Specifications is amended to read:

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 seventh through tenth paragraphs in Section 90-6.03, "Transporting Mixed Concrete," of the Standard Specifications are amended to read:

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 comes 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 85° F., or above, a time less than 1.5 hours may be required.

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 85° F., or above, the time between the introduction of cement to the aggregates and discharge shall not exceed 45 minutes.

Each load of concrete delivered at the jobsite shall be accompanied by a weight certificate showing the mix identification number, non-repeating load number, date and time at which the materials were batched, the total amount of water (gallons) 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 weight certificate shall also show the actual scale weights (pounds) for the ingredients batched. Theoretical or target batch weights shall not be used as a substitute for actual scale weights.

Weight certificates shall be provided in printed form, or if approved by the Engineer, the data may be submitted in electronic media. Electronic media shall be presented in a tab-delimited format on a 3.5-inch diskette with a capacity of at least 1.4 megabytes. Captured data, for the ingredients represented by each batch shall be LFCR (one line, separate record) with allowances for sufficient fields to satisfy the amount of data required by these specifications.

The Contractor may furnish a weight certificate that is accompanied by a separate certificate which lists the actual batch weights or measurements for a load of concrete provided that both certificates are 1) imprinted with the same non-repeating load number that is unique to the contract and 2) delivered to the jobsite with the load.

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

Section 90-6.05, "Hand-Mixing," of the Standard Specifications is amended to read:

90-6.05 Hand-Mixing.—Hand-mixed concrete shall be made in batches not more than one-third cubic yard and shall be mixed on a watertight, level platform. The proper amount of coarse aggregate shall be measured in measuring boxes and spread on the platform and the fine aggregate shall be spread on this layer, the 2 layers being not more than one foot in total depth. On this mixture shall be spread the dry 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.

The table in the first paragraph in Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications is replaced with the following table:

Type of Work	Nominal Penetration (inches)	Maximum Penetration (inches)
Concrete pavement	0 - 1	1 1/2
Non-reinforced concrete facilities	0 - 1 1/2	2
Reinforced concrete structures: Sections over 12 inches thick Sections 12 inches thick or less	 0 - 1 1/2 0 - 2	 2 1/2 3
Concrete placed under water	3 - 4	4 1/2
Cast-in-place concrete piles	2 1/2 - 3 1/2	4

The second paragraph in Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications is amended to read:

The amount of free water used in concrete shall not exceed 312 pounds per cubic yard, plus 20 pounds for each required 100 pounds of cementitious material in excess of 564 pounds per cubic yard.

The fourth paragraph in Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications is amended to read:

Where there are adverse or difficult conditions which affect the placing of concrete, the above specified penetration and free water content limitations may be exceeded providing the Contractor is granted permission by the Engineer in writing to increase the cementitious material content per cubic yard of concrete. The increase in water and cementitious material shall be at a ratio not to exceed 30 pounds of water per added 100 pounds of cementitious material per cubic yard. 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.

Section 90-9.01, "General," of the Standard Specifications is amended to read:

90-9.01 General.—Concrete compressive strength requirements consist of a minimum strength which must 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 are shown on the plans.

The compressive strength of concrete will be determined from test cylinders which have been fabricated from concrete sampled in conformance with California Test 539. Test cylinders will be molded and initial field cured in conformance with California Test 540. Test cylinders will be cured and tested after receipt at the testing laboratory in conformance with 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 by the Engineer, in the mix proportions or in the concrete fabrication procedures, before placing additional concrete, and shall pay to the State $10.00 for each in-place cubic yard of concrete represented by the deficient test. If the result of a single compressive strength test at the maximum age specified or allowed is below 95 percent of the specified strength, but is 85 percent or more of the specified strength, the Contractor shall make the corrective changes specified above, and shall pay to the State $15.00 for each in place cubic yard of concrete represented by the deficient test. In addition, such corrective changes shall be made when the compressive strength of concrete tested at 7 days indicates, in the judgment of the Engineer, that the concrete will not attain the required compressive strength at the maximum age specified or allowed. Concrete represented by a single test which 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 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 300 cubic yards.

When a precast concrete member is steam cured, the compressive strength of the concrete will be determined from test cylinders which 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.

If concrete is specified by compressive strength, then materials, mix proportions, mixing equipment, and procedures proposed for use shall be prequalified 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, must 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, must 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 600 pounds per square inch greater than the specified 28-day compressive strength, and no individual cylinder shall have a strength less than the specified strength at the maximum age specified or allowed. Data contained in the report shall be from trial batches which were produced within one year of the proposed use of specified strength concrete in the project. Whenever air-entrainment is required, the air content of trial batches shall be equal to or greater than the air content specified for the concrete without reduction due to tolerances.

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

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

A. Date of mixing.
B. Mixing equipment and procedures used.
C. The size of batch in cubic yards and the weight, type and source of 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 concrete cylinders tested.

Certified test data and trial batch test reports shall be signed by an official of the firm which 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 which, in the judgment of the Engineer, could result in a lowering of the strength of the concrete below that specified.

The Contractor's attention is directed to the time required to test trial batches. 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.

Section 90-10.02A, "Portland Cement," of the Standard Specifications is renamed "Cementitious Material" and is amended to read:

90-10.02A Cementitious Material.—Cementitious material shall conform to the provisions in Section 90-1.01, "Description." Compressive strength requirements consist of a minimum strength which must 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 are shown on the plans.

The fifth paragraph in Section 90-10.02B, "Aggregate," of the Standard Specifications is deleted.
Section 90-10.03, "Production," of the Standard Specifications is amended to read:

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, which will result in concrete that is thoroughly and uniformly mixed, which is suitable for the use intended, and which conforms to provisions specified herein. Recognized standards of good practice are outlined in various industry publications such as are issued by American Concrete Institute, AASHTO, or California Department of Transportation.

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 any 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 90° F. will be considered as 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 nor 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 weight certificate, which shall be delivered to the Engineer at the discharge location of the concrete, unless otherwise directed by the Engineer. The ticket 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.

The third and fourth paragraphs in Section 90-11.02, "Payment," of the Standard Specifications are amended to read:

Should the Engineer order the Contractor to incorporate admixtures into 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.

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 in the concrete at the Contractor's expense and no additional compensation will be allowed therefor.

8-2.02 CEMENT AND WATER CONTENT

The amount of free water used in concrete for deck slabs of bridges and structure approach slabs shall not exceed 325 pounds per cubic yard, plus 20 pounds for each required 100 pounds of cementitious material in excess of 658 pounds per cubic yard.

8-2.03 RAPID SETTING CONCRETE MATERIAL

The rapid setting concrete material shall be a high-strength material consisting of either a magnesium phosphate concrete or a modified high alumina concrete. The magnesium phosphate concrete shall conform to the requirements in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions. The modified high alumina concrete shall be water activated and shall conform to the requirements for water activated magnesium phosphate concrete in Section 83-2.02D(1).

A clean uniform rounded aggregate filler may be used to extend the concrete. The moisture content of the aggregate shall not exceed 0.5 percent. Grading of the aggregate shall conform to the following:

Sieve Sizes	Percentage Passing
1/2"	100
No. 16	0-5

The amount of aggregate filler shall conform to the manufacturer's recommendation, but shall not exceed 100 percent extension of the high alumina concrete (dry material) or 60 percent extension of the magnesium phosphate concrete (dry material).

Mixing of components of dual component (with a prepackaged liquid activator) magnesium phosphate shall be by complete units, supplied by the manufacturer. Portions of units shall not be used. Water shall not be added to dual component magnesium phosphate.

Magnesium phosphate concrete shall not be mixed in containers or worked with tools containing zinc, cadmium, aluminum or copper. Modified high alumina concrete shall not be mixed in containers or worked with tools containing aluminum.

Retempering of concrete will not be permitted. Finishing tools that are cleaned with water shall be thoroughly dried before working the concrete.

When placing concrete on slopes exceeding 5 percent, the Engineer may require the Contractor to provide a flow controlled modified material.

The modified high alumina concrete shall be cured conforming to the provisions in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications. Magnesium phosphate concrete shall not be cured.

Unless otherwise permitted in writing by the Engineer, traffic shall not be permitted on the new concrete until at least one hour after final set.

SECTION 8-3. WELDING

8-3.01 WELDING ELECTRODES

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

8-3.02 WELDING QUALITY CONTROL

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

Welding quality control shall apply when any work is welded in conformance with the provisions in Section 49, ", " 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.

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	1998
D1.4	1992
D1.5	1995

All 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.

The welding of all 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 all 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 nondestructive testing (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:

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

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

Prior to submitting the Welding Quality Control Plan (WQCP) required herein, a pre-welding meeting between the Engineer, Contractor and any welding subcontractors or entities hired by these subcontractors to be used in the work, shall be held to discuss the requirements for the WQCP.

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

1. The name of the welding firm and the NDT firm to be used;
2. A manual prepared by the NDT firm that shall include equipment, testing procedures, code of safe practices, the Written Practice of the NDT firm, and the names, qualifications and documentation of certifications for all personnel to be used;
3. The name of the QCM and the names, qualifications and documentation of certifications for all Quality Control (QC) Inspectors and Assistant Quality Control Inspectors to be used;
4. An organizational chart showing all QC personnel and their assigned QC responsibilities;
5. The methods and frequencies for performing all required quality control procedures, including QC inspection forms to be used, as required by the specifications including:

   (a) all visual inspections;
   (b) all NDT including radiographic geometry, penetrameter and shim selection, film quality, film processing, radiograph identification and marking system, and film interpretation and reports; and
   (c) calibration procedures and calibration frequency for all NDT equipment;

6. A system for the identification and tracking of all welds, NDT and any required repairs, and a procedure for the reinspection of any 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 and 3) a method of reporting nonconforming welds to the Engineer;
7. 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;
8. The welding procedure specification (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;

9. 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; and
10. One copy each of all AWS welding codes and the FCP which are applicable to the welding to be performed. These codes and the FCP shall become the permanent property of the Department.
11. Example forms to be used for Certificates of Compliance, daily production logs, and daily reports.

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

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

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

It is expressly understood that the Engineer's approval of the Contractor's WQCP shall not relieve the Contractor of any responsibility under the contract for the successful completion of the work in conformity with the requirements of the plans and specifications. The Engineer's approval shall not constitute a waiver of any of the requirements 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, and 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 Quality Control 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:

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

All 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.

All 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. Except for steel piling, the Engineer shall be allowed 7 days to review the report and respond in writing after a complete Welding Report has been received. The review time for steel piling shall be as specified in "Piling" of these special provisions. Prior to receiving notification from the Engineer of the Contractor's conformance with the WQCP, the Contractor may encase in concrete or cover any 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. Any material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase or cover any welds pending notification by the Engineer, and should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling

operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

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

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

The Quality Control (QC) Inspector shall be the duly designated person who performs inspection, testing, and quality 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.

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

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

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

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

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

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

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

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

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

The Engineer shall have the authority to verify the qualifications or certifications of any welder, Quality Control 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 all shifts when any welding is being performed, or (2) having a QC Inspector within such close proximity of all welding operations that inspections by the QC Inspector of each operation, at each welding location, shall not lapse for a period exceeding 30 minutes.

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

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

When joint details that are not prequalified by the applicable AWS codes are proposed for use in the work, all 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.

All qualification tests for welders, welding operators, and WPSs used in welding operations will be witnessed by the Engineer.

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

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

All 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.

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

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 the following structures:

WHITE AVENUE UNDERCROSSING (WIDEN)
Bridge No. 53-853

A simple span cast-in-place (left superstructure lowered) prestressed concrete box girder bridge widening approximately 109 feet in length. The substructure consists of reinforced concrete abutments, founded on spread footings.

Install two 4" communications conduits with two 1 1/4" innerducts in the left side of bridge and one 4" fiberglass reinforced epoxy conduit in the right side of bridge encased in concrete.

PARK AVENUE UNDERCROSSING (WIDEN)
Bridge No. 53-854

A simple span cast-in-place (superstructure lowered) prestressed concrete box girder bridge widening approximately 95 feet (left) and 91 feet (right) in length. The substructure consists of reinforced concrete abutments, found on spread and pile footings.

Install lighting conduit and Type 9A pull boxes in the concrete barrier.

GAREY AVENUE UNDERCROSSING (WIDEN)
Bridge No. 53-855

A 10-span (left) and 9-span (right) multi-frame bridge widening composed of precast concrete I-girder spans and cast-in-place prestressed concrete box girder spans, approximately 875 feet (left) and 774 feet (right) in length. The substructure consists of reinforced concrete abutments and columns, founded on piles.

Install lighting conduit and Type 9A pull boxes in the concrete barrier.

TOWNE AVENUE UNDERCROSSING (WIDEN)
Bridge No. 53-858

A 2-span precast concrete I-girder bridge widening approximately 157 feet in length. The substructure consists of reinforced concrete abutments and columns, founded on piles.

Install lighting conduit and Type 9A pull boxes in the concrete barrier. Install one 4" fiberglass reinforced epoxy conduit in the right side of bridge encased in concrete.

SAN ANTONIO AVENUE UNDERCROSSING (WIDEN)
Bridge No. 53-859

A simple span cast-in-place (superstructure lowered) prestressed concrete box girder bridge widening approximately 86 feet in length. The substructure consists of reinforced concrete abutments, founded on piles.

Install lighting conduit and Type 9A pull boxes in the concrete barrier. Install two 4" communications conduits with two 1 1/4" innerducts in the right side of bridge and one 4" fiberglass reinforced epoxy conduit in the left side of bridge encased in concrete.

INDIAN HILL BOULEVARD UNDERCROSSING (WIDEN)
Bridge No. 53-860

A simple span cast-in-place (superstructure lowered) prestressed concrete box girder bridge widening approximately 88 feet (left) and 87 feet (right) in length. The substructure consists of reinforced concrete abutments, founded on spread footings.

Install one 4" fiberglass reinforced epoxy conduit in the left side of bridge encased in concrete.

FAIRPLEX DRIVE OVERCROSSING
Bridge No. 53-874

Construct tie-back walls and retaining walls in front of the existing bridge abutments.

Install lighting conduit and Type 9A pull boxes in the concrete barrier.

SAN JOSE WASH BOX CULVERT (EXTENSION)
Bridge No. 53-1825

Remove portions of an existing concrete lined channel and construct extensions to reinforced concrete box culverts. Construct new channel walls, retaining walls and approach slabs.

Install lighting conduit and Type 9A pull boxes in the concrete barrier.

CLEVELAND AVENUE PEDESTRIAN UNDERCROSSING (ABANDON)
Bridge No. 53-852

Remove existing wing walls and entrance ramps and fill existing reinforced concrete box culvert with slurry concrete.

Attach lighting conduit and lighting fixture to the wall of pedestrian undercrossing.

MOUNTAIN AVENUE PEDESTRIAN UNDERCROSSING (ABANDON)
Bridge No. 55-1018

Remove existing wing walls and entrance ramps and fill existing reinforced concrete box culvert with slurry concrete.

Install two 4" communications conduits with two 1 1/4" innerducts in the right side of bridge and one 4" fiberglass reinforced epoxy conduit in the left side of bridge encased in concrete.

COLLEGE AVENUE PEDESTRIAN UNDERCROSSING (EXTENSION)
Bridge No. 53-1019

Remove portion of existing reinforced concrete box culvert, extend reinforced concrete box culvert and add ramps with walls and drainage.

Attach lighting conduit and lighting fixture to the wall of pedestrian undercrossing. Install one 4" fiberglass reinforced epoxy conduit in the left side of bridge encased in concrete.

EAST CONNECTOR OVERCROSSING (FOOTING MODIFICATION)
Bridge No. 53-1987F

This structure is a 4-span cast-in-place concrete box girder. The exterior spans are conventionally reinforced concrete, while the interior spans are prestressed concrete connected to the exterior spans with hinges. The spans are 135', 184', 184' and 135'. The bridge is 34 feet wide. The superstructure is supported on round reinforced concrete columns founded on pile caps and spread footings.

DUDLEY STREET UNDERCROSSING
Bridge No. 53-852

Install lighting conduit and Type 9A pull boxes in the concrete barrier.

MILLS AVENUE UNDERCROSSING
Bridge No. 54-0453

Install two 4" communications conduits in the right side of bridge encased in concrete.

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 the 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
LOS ANGELES COUNTY TRANSPORTATION FUNDS

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

HIGHWAY CONSTRUCTION

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

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

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

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

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

10-1.01 ORDER OF WORK

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

The first order of work shall be to procure piling, furnish pre-construction shotcrete and architectural texture-formed relief texture test panels, submit working drawings for wall earthwork, and submit working drawings for tie-back anchors.

Attention is directed to "Slope Paving" of these special provisions regarding constructing a 4 foot by 6 foot test panel prior to placing the permanent slope paving.

Attention is directed to "Miscellaneous Concrete Construction" of these special provisions regarding constructing a 24-inch by 24-inch test panel prior to constructing curb ramps with detectable warning surfaces.

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.

Approach slab replacement and polyester concrete overlay shall be completed prior to restriping freeway lanes.

The first order of work shall be to place the order for the traffic signal, electrical and CCTV communication systems equipment and the fiber optic cables. The Contractor shall furnish the Engineer with a statement from the vendor that the order for the traffic signals, electrical and CCTV communication systems equipment and the fiber optic cables has been received and accepted by said vendor.

Attention is directed to the provisions in "Locate Existing Irrigation Facilities," elsewhere in these special provisions concerning locating and marking existing irrigation facilities prior to clearing and grubbing, excavating, grading and trenching operations.

The second order of work shall locate all edge drains where communications conduit will have to be routed as shown on the plans. In order to minimize the number of conduit bends the Contractor must locate edge drains that are in the path of communication conduit routing and transition the conduit to a constant minimum depth. The Contractor shall relocate existing conduits, pull boxes and irrigation lines before proceeding the trenching operations. Attention is directed to "Existing Highway Facilities" and "Earthwork" elsewhere in these special provisions regarding checking and locating existing irrigation crossovers, pipes supply lines, conductors and other facilities prior to excavating, grading and trenching operations. Existing pull boxes that fall within the areas where the trenching operations are to be performed, shall be removed and replaced with a pull box of the same size and designation outside of maintenance turnout areas.

Remove and replace existing irrigation lines, conduits, conductors and pull boxes that fall within the areas where the trenching operations are to be performed will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

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

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

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

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

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

Before obliterating any pavement delineation that is to be replaced on the same alignment and location, as determined by the Engineer, the pavement delineation shall be referenced by the Contractor, with a sufficient number of control points to reestablish the alignment and location of the new pavement delineation. The references shall include the limits or changes in striping pattern, including one- and two-way barrier lines, limit lines, crosswalks and other pavement markings. Full

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

Temporary construction easement for the construction of Retaining Wall No. 575 (northerly side of Route 10, Sta 582+73 to Sta 585+00) shall be disturbed only as necessary for retaining wall constuction and landscaping shall be restored to its original condition.

At those locations exposed to public traffic where guard railings or barriers are to be constructed, or removed and replaced, the Contractor shall schedule operations so that at the end of each working day there shall be no post holes open nor shall there be any railing or barrier posts installed without the blocks and rail elements assembled and mounted thereon.

Not less than 60 days prior to planting the plants, the Contractor shall furnish the Engineer a statement from the vendor that the order for the plants required for this contract, including inspection plants, has been received and accepted by the vendor. The statement from the vendor shall also include the names, sizes, and quantities of plants ordered and the anticipated date of delivery.

The Contractor shall place orders for replacement plants with the vendor at the appropriate time so that the roots of the replacement plants are not in a root-bound condition.

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 also include the names and quantity of seed ordered and the anticipated date of delivery.

Attention is directed to "Maintain Existing Plants" of these special provisions regarding checking for deficiencies of existing plants that are to remain in place, prior to the start of irrigation work.

Attention is directed to "Irrigation Systems Functional Test" of these special provisions, regarding restrictions for planting operations.

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

Attention is directed to "Existing Highway Irrigation Facilities" of these special provisions regarding the checking of existing irrigation facilities that are to remain in place, prior to the start of any irrigation work.

Clearing, grubbing, and earthwork operations shall not be performed in areas where existing irrigation facilities are to remain in place until existing irrigation facilities have been checked for proper operation in conformance with the provisions in "Highway Planting and Irrigation Systems" of these special provisions.

Attention is directed to Section 20-5.027B, "Wiring Plans and Diagrams," of the Standard Specifications regarding submittal of working drawings.

Temporary railings on bridges shall be placed prior to removal of existing barriers and overhangs. Concrete barriers at locations of lowered superstructures shall be placed after lowering has been completed.

Work at Garey Avenue Bent 8R shall not begin until December 1, 2001 unless approved by the Engineer. The relocation of the GTE fiberoptic lines that are in conflict with Bent 8R of Garey Avenue UC is to be done by others.

The Contractor’s attention is directed to the potential conflict between the Fairplex Drive Overcrossing tie-back retaining walls 486 and 487 and the 42-inch MWD Water Line. The first order of work shall be to locate the 42-inch MWD Water Line.

10-1.02 WATER POLLUTION CONTROL

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

This project shall conform to the requirements of Local Permit No.CA8000279 issued by the Santa Ana Regional Water Quality Control Board. This Local Permit, hereafter referred to as the "Permit," regulates storm water discharges associated with construction activities.

Water pollution control work shall conform to the requirements in the Construction Contractor's Guide and Specifications of the Caltrans Storm Water Quality Handbooks, dated April 1997, and addenda thereto issued up to and including the date of advertisement of the project, hereafter referred to as the "Handbook". Copies of the Handbook 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 Handbook and the Permit are also available for review at the Department of Transportation, 120 South Spring Street, Division of Construction, Room 244, Los Angeles, California 90012, Telephone Number (213) 897-0054..

The Contractor shall know and fully comply with the applicable provisions of the Handbook, Permit 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 a copy of the Permit at the project site and shall make the Permit available during construction.

Unless arrangements for disturbance 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 whatsoever to the Contractor or property owner with respect to any arrangements made between the Contractor and property owner to allow disturbance of areas outside the project limits.

The Contractor shall be responsible for the costs and for liabilities imposed by law as a result of the Contractor's failure to comply with the provisions set forth in this section "Water Pollution Control", including but not limited to, compliance with the applicable provisions of the Handbook, Permit and Federal, State and local regulations. For the purposes of this paragraph, 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 tothe remedies authorized by law, some of the money due the Contractor under the contract, as determined by the Department, may be retained by the State of California until disposition has been made of the costs and liabilities.

The retention of money due the Contractor shall be subject to the following:

1. The Department will give the Contractor 30 days notice ofthe 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.
2. 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.
3. 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 at the legal rate of interest for the period of the retention.

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

At reasonable times and upon presentation of credentials and other documents as may be required by law, the Contractor shall allow authorized agents of the California Regional Water Quality Control Board, State Water Resources Control Board, U. S. Environmental Protection Agency and local storm water management agency:

1. Enter upon the construction site and the Contractor's facilities pertinent to the work;
2. Have access to and copy records that must be kept as specified in the Permit;
3. Inspect the construction site and related soil stabilization practices and sediment control measures; and
4. Sample or monitor for the purpose of ensuring compliance with the Permit.

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

STORM WATER POLLUTION PREVENTION PLAN PREPARATION, APPROVAL AND UPDATES.—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 Handbook, the requirements of the Permit, and these special provisions. Upon the Engineer's approval of the SWPPP, the SWPPP shall be deemed to fulfill the provisions in Section 7-1.01G 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.

Within 30 days after the approval of the contract, the Contractor shall submit 3 copies of the SWPPP to the Engineer. The Engineer will have 15 days to review the SWPPP. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the SWPPP within 15 days of receipt of the Engineer's comments. The Engineer will have 15 days to review the revisions. Upon the Engineer's approval of the SWPPP, 3 additional copies of the SWPPP, incorporating the required changes, shall be submitted to the Engineer. In order to allow construction activities to proceed, the Engineer may conditionally approve the SWPPP while minor revisions are being completed.

The SWPPP shall identify pollution sources that may adversely affect the quality of storm water discharges associated with the project and shall identify water pollution control measures,hereafter referred to as control measures, to be constructed, implemented, and maintained in order to reduce to the extent feasible pollutants in storm water discharges from the construction site both during and after construction is completed under this contract.

The SWPPP shall incorporate control measures in the following categories:

1. Soil stabilization practices;
2. Sediment control practices;

3. Sediment tracking control practices;
4. Wind erosion control practices; and
5. Non-storm water management and waste management and disposal control practices.

Specific objectives and minimum requirements for each category of control measures are contained in the Handbook.

The Contractor shall consider the objectives and minimum requirements presented in the Handbook for each of the above categories. When minimum requirements are listed for any category, the Contractor shall incorporate into the SWPPP and implement on the project, one or more of the listed minimum controls required in order to meet the pollution control objectives for the category. In addition, the Contractor shall consider other control measures presented in the Handbook and shall incorporate into the SWPPP and implement on the project the control measures necessary to meet the objectives of the SWPPP. The Contractor shall document the selection process in conformance with the procedure specified in the Handbook.

The SWPPP shall include, but not limited to, the following items as described in the Handbook and Permit:

1. Source Identification;
2. Erosion and Sediment Controls;
3. Non-Storm Water Management;
4. Waste Management and Disposal;
5. Maintenance, Inspection and Repair;
6. Training;
7. List of Contractors and Subcontractors;
8. Post-Construction Storm Water Management;
9. Preparer;
10. A copy of the Notice of Intent (NOI) submitted by the Department for this project;
11. Copy of the Local Permit;
12. BMP Consideration Checklist;
13. SWPPP Checklist;
14. Schedule of Values; and
15. Water Pollution Control Drawings.

The Contractor shall amend the SWPPP, graphically and in narrative form, whenever there is a change in construction activities or operations which may affect the discharge of significant quantities of pollutants to surface waters, ground waters, municipal storm drain systems or when deemed necessary by the Engineer. The SWPPP shall also be amended if the SWPPP is in violation of any condition of the Permit, or has not effectively achieved the objective of reducing pollutants in storm water discharges. Amendments shall show additional control measures or revised operations, including those in areas not shown in the initially approved SWPPP, which are required on the project to control water pollution effectively. Amendments to the SWPPP shall be submitted for review and approval by the Engineer in the same manner specified for the initially approved SWPPP. Approved amendments shall be dated and logged in the SWPPP. Upon approval of the amendment, the Contractor shall implement the additional control measures or revised operations.

The Contractor shall keep a copy of the 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, U.S. Environmental Protection Agency or local storm water management agency. Requests by the public shall be directed to the Engineer.

By June 15 of each year, the Contractor shall submit an annual certification to the Engineer stating conformance with the requirements governing the Permit. If the project is in non-compliance at any time, the Contractor shall make a written report to the Engineer within 15 days of identification of non-compliance.

SCHEDULE OF VALUES.—The Contractor shall submit with the SWPPP, for approval by the Engineer, a schedule of values detailing the cost breakdown of the contract lump sum item for water pollution control. The schedule of values shall reflect the items of work, quantities, and costs for the control measures shown in the SWPPP, except for critical temporary controls and permanent control measures which are shown on the project plans and for which there is a contract item of work. Adjustments in the items of work and quantities listed in the schedule of values shall be made when required to address approved amendments to the SWPPP.

The sum of the amounts for the units of work listed in the schedule of values shall be equal to the contract lump sum price for water pollution control.

If approved in writing by the Engineer, the schedule of values will be used to determine progress payments for water pollution control during the progress of the work. The schedule of values will be used as the basis for calculating any adjustment in compensation for the contract item for water pollution control due to changes in the work ordered by the Engineer.

SWPPP IMPLEMENTATION.—Upon approval of the SWPPP, the Contractor shall be responsible throughout the duration of the project for installing, constructing, inspecting, and maintaining the control measures included in the SWPPP and any amendments thereto and for removing and disposing of temporary control measures. Unless otherwise directed by the Engineer or specified in these special provisions, 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 control measures are specified in the Handbook and these special provisions.

Soil stabilization practices and sediment control measures, including minimum requirements, shall be provided throughout the winter season, defined as between November 1 and March 15.

Implementation of soil stabilization practices and sediment control measures for soil-disturbed areas of the project site shall be completed, except as provided for below, not later than 20 days prior to the beginning of the winter season or upon start of applicable construction activities for projects which begin either during or within 20 days of the winter season.

Throughout the winter season, the active, soil-disturbed area of the project site shall be less than 5 acres. The Engineer may approve, on a case-by-case basis, expansions of the active, soil-disturbed area limit. The Contractor shall demonstrate the ability and preparedness to fully deploy soil stabilization practices and sediment control measures to protect soil-disturbed areas of the project site before the onset of precipitation. A quantity of soil stabilization and sediment control materials shall be maintained on site equal to 100 percent of that sufficient to protect unprotected, soil-disturbed areas on the project site. A detailed plan for the mobilization of sufficient labor and equipment shall be maintained to fully deploy control measures required to protect unprotected, soil-disturbed areas on the project site prior to the onset of precipitation. A current inventory of control measure materials and the detailed mobilization plan shall be included as part of the SWPPP.

Throughout the winter season, soil-disturbed areas of the project site shall be considered to be nonactive whenever soil disturbing activities are expected to be discontinued for a period of 20 or more days and the areas are fully protected. Areas that will become nonactive either during the winter season or within 20 days thereof shall be fully protected with soil stabilization practices and sediment control measures within 10 days of the discontinuance of soil disturbing activities or prior to the onset of precipitation, whichever is first to occur.

Throughout the winter season, active soil-disturbed areas of the project site shall be fully protected at the end of each day with soil stabilization practices and sediment control measures unless fair weather is predicted through the following work day. The weather forecast shall be monitored by the Contractor on a daily basis. The National Weather Service forecast shall be usedAn alternative weather forecast proposed by the Contractor may be used if approved by the Engineer. If precipitation is predicted prior to the end of the following work day, construction scheduling shall be modified, as required, and functioning control measures shall be deployed prior to the onset of the precipitation.

The Contractor shall implement, year-round and throughout the duration of the project, control measures included in the SWPPP for sediment tracking, wind erosion, non-storm water management and waste management and disposal.

The Engineer may order the suspension of construction operations which create water pollution if the Contractor fails to conform to the provisions of this section "Water Pollution Control" as determined by the Engineer.

MAINTENANCE.—To ensure the proper implementation and functioning of control measures, the Contractor shall regularly inspect and maintain the construction site for the control measures identified in the SWPPP. The Contractor shall identify corrective actions and time needed to address any deficient measures or reinitiate any measures that have been discontinued.

The construction site inspection checklist provided in the Handbook shall be used to ensure that the necessary measures are being properly implemented, and to ensure that the control measures are functioning adequately. One copy of each site inspection record shall be submitted to the Engineer.

During the winter season, inspections of the construction site shall be conducted by the Contractor to identify deficient measures, as follows:

1. Prior to a forecast storm;
2. After any precipitation which causes runoff capable of carrying sediment from the construction site;
3. At 24 hour intervals during extended precipitation events; and
4. Routinely, at a minimum of once every 2 weeks.

If the Contractor or the Engineer identifies a deficiency in the deployment or functioning of an identified control measure, 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 subsequent precipitation. The correction of deficiencies shall be at no additional cost to the State.

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

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

1. 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
2. After acceptance of the contract pursuant to Section 7-1.17, "Acceptance of Contract," 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, maintaining, removing and disposing of control measures, 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.

Changes in control measures required by an approved amendment to the SWPPP, except changes to those control measures shown on the project plans and for which there is a contract item of work, will be considered extra work as provided in Section 4-1.03D of the Standard Specifications and the following:

If the control measure is listed in the approved SWPPP schedule of values, an adjustment in compensation for the contract item for water pollution control will be made by applying the increase or decrease in quantities to the approved schedule of values. No adjustment of compensation will be made to the unit price listed for items in the schedule of values due to any increase or decrease in the quantities, 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 items listed in the schedule of values.

If the control measure is not listed in the approved SWPPP schedule of values, payment will be made by force account.

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

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

Retentions for failure to conform to the provisions of this section "Water Pollution Control" shall be in addition to the other retentions 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 FENCES

Temporary fences 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 fences shall conform to the plan details and the specifications for permanent fences of similar character as provided in Section 80, "Fences," of the Standard Specifications.

Used materials may be installed providing the used materials are good, sound, and are suitable for the purpose intended, as determined by the Engineer.

Materials may be commercial quality providing the dimensions and sizes of the materials are equal to, or greater than, the dimensions and sizes shown on the plans or specifiedherein.

Posts shall be either metal or wood at the Contractor's option.

Galvanizing and painting of steel items will not be required.

Treating wood with a wood preservative will not be required.

Concrete footings for metal posts will not be required.

Temporary fence that is damaged during the progress of the work shall be repaired or replaced by the Contractor at the Contractor's expense.

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

Removed temporary fence materials that are not damaged may be constructed in the permanent work provided the materials conform to the requirements specified for the permanent work and such materials are new when used for the temporary fences.

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

The type and kind of temporary fence will be measured and paid for in the same manner specified for permanent fence of similar character as provided in Section 80, "Fences," of the Standard Specifications.

Full compensation for maintaining, removing, and disposing of temporary fence shall be considered as included in the contract price paid per linear foot for temporary fence (Type CL-6) and no additional compensation will be allowed therefor.

10-1.04 PRESERVATION OF PROPERTY

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

Existing trees, shrubs and other plants, that are not to be removed as shown on the plans or specified in these special provisions, and are injured or damaged by reason of the Contractor's operations, shall be replaced by the Contractor. The minimum size of tree replacement shall be 24 inch box and the minimum size of shrub replacement shall be 15-gallon. Replacement ground cover plants shall be from flats and shall be planted 12 inches on center. Replacement of Carpobrotus ground cover plants shall be from cuttings and shall be planted 12 inches 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 prior to the start of the plant establishment period. and shall conform to the provisions in Section 20-4.05, "Planting," of the Standard Specifications.

10-1.05 RELIEF FROM MAINTENANCE AND RESPONSIBILITY

The Contractor may be relieved of the duty of maintenance and protection for those items not directly connected with plant establishment work, except highway planting and irrigation systems in conformance with the provisions in Section 7-1.15, "Relief From Maintenance and Responsibility," of the Standard Specifications.

10-1.06 COOPERATION

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

10-1.07 PROGRESS SCHEDULE (CRITICAL PATH)

Progress schedules will be required for this contract and shall conform to the requirements of these special provisions. Progress schedules shall utilize the Critical Path Method (CPM). Attention is directed to "Cooperation" and "Obstructions" of these special provisions. Nothing in these special provisions shall be construed as relieving the Contractor from the responsibilities specified in Section 7, "Legal Relations and Responsibility," of the Standard Specifications.

DEFINITIONS

The following definitions shall apply to these special provisions:

A. Activity.—A task or item of work that shall be performed in order to complete a project.
B. Baseline Schedule.—The initial CPM progress schedule as accepted by the Engineer representing the Contractor's original work plan.
C. Concurrent Delay.—Two or more delays on the critical path that occur at the same time.
D. Contract Completion Date.—The date the Contractor is contractually obligated to complete the project, including any authorized adjustments, as specified in Section 8-1.06, "Time of Completion," of the Standard Specifications.
E. Contractor Delay.—A delay that extends the time required to complete a controlling operation caused by and within the control of the Contractor, subcontractors at any tier or suppliers.

F. Controlling Operation.—A feature of work or activity on the critical path.
G. Critical Path.—In a project network, the sequence of activities yielding the longest path in a CPM analysis necessary to complete the project.
H. Critical Path Method (CPM).—A mathematical calculation using the sequence of activities and their interrelationships, interdependencies, resources, and durations to determine the critical path that shows the expected time to complete a project.
I. Data Date.—The day after the date through which progress updates have been calculated; everything occurring earlier than the data date is "As-Built"; and everything on or after the data date is "Planned."
J. Early Completion Time.—The difference in time between the contract completion date and the current State-accepted scheduled completion date.
K. Float.—The amount of time between the early start date and the late start date or the early finish date and the late finish date of any activity or group of activities in the network.
L. Free Float.—The amount of time an activity can be delayed before delaying a subsequent activity.
M. Fragnet.—A section or fragment of the network diagram comprised of a group of activities.
N. Milestone.—A marker in a network which is typically used to mark a point in time or denote the beginning or end of a sequence of activities. A milestone has zero duration and zero resources, but will otherwise function in the network as if the milestone were an activity.
O. Narrative Report.—A report that identifies potential problem areas, current and anticipated delaying factors and their impact, actions taken or proposed, proposed changes in schedule logic, extension or contraction of activities, proposed addition or deletion of activities, explanation for changes in the critical path, explanation for changes in scheduled completion date, out of sequence work, and other topics related to job progress or scheduling.
P. Near Critical Path.—A path having 10 working days or less of total float.
Q. Punch List.—A list of details needing attention to complete task or work for both contract item and extra work.
R. Schedule Revision.—A change in the future portion of the schedule that modifies logic; alters construction sequences such as performing sequential activities concurrently or concurrent activities sequentially; adds or deletes activities or significantly alters activity durations, as determined or accepted by the Engineer.
S. Scheduled Completion Date.—The Contractor's scheduled completion date as shown on the accepted baseline schedule as modified by subsequent accepted schedule updates and revisions.
T. Time Impact Analysis.—An analysis demonstrating the estimated time impact of a contract change order, delay or other event on the scheduled completion date.
U. Total Float.—The amount of time that an activity may be delayed without delaying the scheduled completion date.
V. Update.—The routine modification of the CPM progress schedule through a regular monthly review to incorporate actual past progress to date by activity, projected completion dates and approved time adjustments.

MATERIALS (COMPUTER SYSTEM)

The Contractor shall provide a computer system for the State's exclusive possession and use for CPM progress schedules. The minimum computer system to be furnished shall be complete with keyboard, mouse, monitor, printer and plotter. The system shall conform to the following requirements:

A. Latest industry-available Intel Pentium processor, Motorola RISC processor or equivalent.
B. Latest computer operating system software compatible with the selected processor, either Windows or MACINTOSH.
C. Minimum of 64 megabytes of random access memory (RAM).
D. Internal drives, including: one 4-gigabyte minimum hard disk drive, one 1.44-megabyte 90 mm (3.5-inch) floppy disk drive and one 32x speed CD-ROM drive.
E. Internal fax/modem, latest speed and software version of U.S. Robotics, 3COM or equivalent.
F. A 430 mm (17-inch) minimum, color monitor capable of at least 1,024 x 768 pixels.
G. A color-ink-jet-type, B-size plotter compatible with the selected system capable of printing fully legible, time-scaled charts, network diagrams and reports.
H. A manual parallel cable switching device, with connecting cables, allowing the user to alternate printing between the plotters.
I. CPM software shall be compatible with the hardware provided, shall be the latest version of Primavera Project Planner for Windows, SureTrak for Windows, or equal, and shall be able to create files that can easily be imported into the latest version of Primavera.
J. General software shall be the latest version of McAfee VirusScan virus protection or equal and shall be compatible with the hardware provided.
K. Upgrades to the CPM and general software shall be provided, as the upgrades become available.

The computer hardware and software furnished by the Contractor shall be compatible with that used for the production of the CPM progress schedule required by these special provisions, including original instruction manuals and other documentation normally provided with the CPM and general software. Before delivery and setup of the computer system, the Contractor shall submit, for approval of the Engineer, a detailed list of the computer hardware and software the Contractor proposes to furnish, including an itemized schedule of costs for the system.

The Contractor shall furnish, install, set up, maintain, and repair the computer system ready-for-use, and provide plotter supplies as necessary during the course of the project at a location determined by the Engineer. The first submittal of the baseline schedule will not be considered complete until the hardware and software are installed and ready for use with the submitted baseline schedule. The Contractor shall instruct and assist the Engineer in the use of the hardware and software. When requested by the Engineer, the Contractor shall provide one 8-hour session of outside commercial training in the use of the CPM software for a maximum of 2 project staff at a location acceptable to the Engineer. Hardware repairs shall be made within 48 hours of notification by the Engineer, or replacement equipment shall be furnished and installed by the Contractor until repairs have been completed.

Computer hardware and software furnished shall remain the property of the Contractor and shall be removed by the Contractor upon acceptance of the contract if no claims involving contract progress are pending. If contract claims involving contract progress are pending, computer hardware or software shall not be removed until the final estimate has been submitted to the Contractor.

GENERAL

Early completion time shall be considered a resource for the exclusive use of the Contractor. The Contractor may increase early completion time by increasing production or reallocating resources to be more efficient, or by proposing, and the State accepting, contract change orders that are the result of significant Contractor development and investment or from an appropriate share of an accepted cost reduction proposal in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications.

The State may reduce contract working days if the action is the result of a contract change order other than those that result from significant Contractor development and investment. The Contractor shall conduct a time impact analysis to determine the effect of the change in the same manner described in "Schedule Time Adjustment" specified herein, and shall include the impacts acceptable to the Engineer in the next update or revision.

The Contractor shall be responsible for assuring that the work sequences are logical and the network shows a coordinated plan for complete performance of the work. Failure of the Contractor to include in the schedule any element of work required for the performance of the contract shall not relieve the Contractor from completing the work within the time limit specified in the contract. If the Contractor or the Engineer discovers an undefined element of work, activity or logic, it shall be corrected by the Contractor in a schedule revision, as specified in these special provisions. If a planned activity requires greater-than-normal daily resources to accomplish, schedule revision submittals shall include a narrative describing the activity, and the amount and use of the extraordinary resources.

The Baseline Schedule or Schedule Update submitted for acceptance shall not show variances from the requirements of these special provisions unless approved by the Engineer. The Contractor shall make specific mention of the variations in the letter of transmittal and shall make the associated adjustments to the project schedule. The Contractor will not be relieved of the responsibility for executing the work in strict conformance with the provisions in the requirements of these special provisions. In the event of a conflict between the requirements of these special provisions and the information provided or shown on an accepted schedule, the requirements of these special provisions shall take precedence.

Each schedule submitted to the Engineer shall comply with the limits imposed by these special provisions, with the specified intermediate milestones and completion dates, and with the constraints, restraints or sequences included in these special provisions, except that after the Engineer accepts the baseline schedule, the Contractor may show a late scheduled completion date on subsequent updates or revisions. The degree of detail shall include factors to the satisfaction of the Engineer, including, but not limited to:

A. Physical breakdown of the project;
B. Contract milestones and completion dates, substantial completion dates, constraints, restraints, sequences of work shown in these special provisions, the planned substantial completion date, and the final completion date;
C. Type of work to be performed, the sequences and the activities to be performed by subcontractors;
D. Procurement, submittal, submittal review, manufacture, test, delivery, and installation of major materials and equipment that require approval;
E. Preparation, submittal and approval of shop or working drawings and material samples showing time, as specified in these special provisions for the Engineer's review;
F. Identification of interfaces and dependencies with preceding, concurrent and follow-on contractors, railroads, and utilities as indicated in these special provisions;

G. Identification of each utility relocation or interface as a separate activity;
H. Batch plant erection and plant certification;
I. Erection and removal of falsework or shoring;
J. Submission and approval of reports or results for major tests, such as that for pile loading or traffic controllers;
K. Indicate long-term ramp and connector closing and opening events, traffic switches, and opening and closing of pavements to traffic as separate one day activities;
L. Punch-list and final clean-up;
M. State-owned float as the last activity in the schedule, at the end of which is the Scheduled Completion Date;
N. Activity coding conventions shall include the following:

	Code	Value	Description
(1) Responsibility	RESP	CT	Caltrans
		UTIL	Utility Company
		RAIL	Railroad
		xxxx	Contractor
		xxxx	Subcontractor
		xxxx	others, as needed
(2) Stage	STGE	1	Stage 1
		2	Stage 2
		other designations	other descriptions, as needed
(3) Phase	PHAS	1	Phase 1
		2	Phase 2
		other phases	other phases, as needed
(4) Utilities	UTIL	PGE	Pacific Gas & Electric
		BELL	Pacific Bell
		GTE	GTE
		SCE	Southern California Edison
		other utilities	other utilities, as needed

The Contractor may include additional coding conventions, such as Ramps (RAMP), Facilities (FAC), and Events (EVNT).

The work shall be executed in the sequence indicated in the accepted baseline schedule and subsequent accepted updates and revisions. Once the Engineer accepts a CPM schedule, the Contractor shall neither artificially improve the progress nor artificially change the quantity of float in any part of the schedule by artificially adding or deleting activities, revising schedule logic restraints, or changing planned activity durations. Schedule changes of planned work shall be documented in a properly submitted revision. The Contractor may improve the progress by performing sequential activities concurrently or by performing activities more quickly than planned. In the case of multiple critical paths, float generated by early completion of one or a sequence of activities will be considered in determining if that sequence of activities remains on the critical path.

The schedule shall be modified to reflect actual events and conditions, including non-work days, as these events and conditions occur for historical purposes and for use in time impact analysis. Submittals and Engineer review time shall be shown in the progress schedule, including CPM schedule updates and revisions. The duration of the Engineer review activity shall be 15 days unless specified otherwise in these special provisions.

The Contractor shall be allowed to show an early or late scheduled completion date on schedule updates and revisions. The Engineer will use the most current, accepted schedule update and revision, and Contractor-provided cause, time-impact and schedule-delay analysis that is acceptable to the Engineer to determine apparent impacts.

The Engineer shall have 20 days to review and accept or reject the baseline schedule. The Engineer shall have 15 days to review and accept or reject any updated or revised schedule. Rejected schedules shall be resubmitted to the Engineer within 5 days, at which time a new review period of 5 days will begin. After the baseline schedule is accepted, schedules that are not accepted or rejected within the required review period will be deemed to have been accepted by the Engineer. Acceptance of a schedule does not relieve the Contractor of the responsibility of submitting complete and accurate information.

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 days after 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 complies with the requirements of these special provisions. If the Contractor proposes deviations to the construction staging of the project, the Contractor shall submit a general time-scaled logic diagram displaying the deviations and resulting time impacts and shall be prepared to discuss the proposal. At this meeting, the Contractor shall additionally submit the alpha-numeric 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 and comment on the logic diagram, the coding structure and activity identification system within 15 days after submission by the Contractor. The Contractor shall make modifications to the time-scaled logic diagram, the coding structure, and activity identification system that the Engineer requests and shall employ that coding structure and identification system. The Contractor shall include the Engineer-requested modifications in the baseline schedule.

NETWORK DIAGRAM AND PROJECT SCHEDULE REPORTS

Schedules submitted to the Engineer, including the baseline schedule, shall include originally-plotted time-scaled network diagram(s). Network diagrams shall be based on early start and early finish dates of activities shown. The network diagrams submitted to the Engineer shall also be accompanied by the CPM software-generated tabular reports for each activity included in the project schedule. Three different report sorts shall be provided: Early Start, Total Float, and Activity Number which shall show the predecessors and successors for each activity. Tabular reports, 215 mm x 280 mm size (8 1/2" x 11"), shall be submitted to the Engineer and shall include at a minimum, the following:

A. Data date;
B. Predecessor and successor activity numbers and descriptions;
C. Activity number and description;
D. Activity code(s);
E. Scheduled, or actual and remaining durations for each activity;
F. Earliest start date (by calendar date);
G. Earliest finish date (by calendar date);
H. Actual start date (by calendar date);
I. Actual finish date (by calendar date);
J. Latest start date (by calendar date);
K. Latest finish date (by calendar date);
L. Free Float, in work days;
M. Total Float, in work days;
N. Percentage of activity complete and remaining duration for incomplete activities;
O. Lag(s); and
P. Imposed constraints.

The networks shall be drafted time-scaled to show a continuous flow of information from left to right. The primary path(s) of criticality shall be clearly and graphically identified on the network(s). The network diagram shall be prepared on E-size sheets, 860 mm x 1120 mm (34" x 44"), and shall have a title block in the lower right-hand corner and a timeline on each page. Exceptions to the size of the network sheets and the use of computer graphics to generate the networks shall be subject to the Engineer's approval.

The narrative report shall be organized as follows:

A. Contractor's Transmittal Letter;
B. Work completed during the period;
C. Identification of unusual resources: manpower, material, or equipment restrictions or use, 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 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. Contract completion date(s) status:

1. Ahead of schedule and number of days,
2. Behind schedule and number of days,
3. If date changes, explain the cause;

J. Attached Updated Network Diagram and Reports.

Schedule network diagrams, tabular reports and narrative reports shall be submitted to the Engineer for acceptance in the following quantities:

A. Two sets of originally-plotted, time-scaled network diagram(s);
B. Two copies of each of the three sorts of the CPM software-generated tabular reports 215 mm x 280 mm size (8 1/2" x 11");
C. One 1.44-megabyte 89 mm (3.5 inch) floppy diskette containing the schedule data;
D. Two copies of the narrative report.

BASELINE SCHEDULE REQUIREMENTS

Within 30 days after approval of the contract, the Contractor shall submit a baseline schedule to the Engineer. The baseline project schedule shall have a data date of the first working day of the contract and shall not include any completed work to-date. The baseline schedule shall be practicable; include the entire scope of work; meet interim target dates, milestones, stage construction requirements, and internal time constraints; show logical sequence of activities; and shall not extend beyond the number of working days originally provided in these special provisions. An early completion schedule will be acceptable provided that the schedule meets the requirements of these special provisions and the Standard Specifications.

The baseline CPM progress schedule submitted by the Contractor shall have a sufficient number of activities to assure adequate planning of the project, to permit monitoring and evaluation of progress, and the analysis of time impacts. The baseline schedule shall depict how the Contractor plans to complete the whole work involved, and shall show the activities that define the critical path. Multiple critical paths and near-critical paths shall be kept to a minimum, as determined by the Engineer. A total of not more than 50 percent of the baseline schedule activities shall be critical or near-critical, unless otherwise approved by the Engineer.

Activities shall have a duration of not less than one working day nor more than 20 working days, unless otherwise approved by the Engineer. The activities in the baseline schedule, with the exception of the first and last activities, shall have a minimum of one predecessor and a minimum of one successor. The baseline schedule shall not attribute negative float or negative lag to an activity.

MONTHLY SCHEDULE UPDATES

On or before the first calendar day of each month, the Contractor shall meet with the Engineer to review contract progress. At the monthly progress meeting the Contractor shall submit to the Engineer an update of the network diagram and project schedule reports as defined above. Update schedules shall have a data date of the twenty-first calendar day of the month, or other date as established by the Engineer, and shall include the information available up to that date. Durations for work that has been completed will be shown on the schedule as the work actually occurred, including Engineer submittal review and Contractor resubmittal times.

SCHEDULE REVISIONS

When the Contractor proposes a revision to an accepted schedule, the Contractor shall state in writing the reasons for the change, as well as the specifics, such as, but not limited to, revisions to activities, logic, durations, and other matters pertinent to the proposed revisions. If the Engineer considers a schedule revision to be of a major nature, the Engineer may require the Contractor to revise and submit for acceptance the affected portion(s) of the project schedule and an analysis to show the effect on the entire project. In addition to the revision submittal, the Contractor shall submit a schedule update with the same

data date as the revision which is to reflect the project condition just prior to implementing the revision. The Contractor shall discuss contemplated revisions with the Engineer prior to the submittal.

Within 15 days, the Contractor shall submit a revised CPM network for approval when requested by the Engineer, or when any of the following occurs:

A. There is a significant change in the Contractor's operations that affects the critical or near critical path(s).
B. The scheduled completion date of the current submitted updated CPM schedule indicates that the contract progress is 20 days or more behind the current accepted schedule or revision.
C. The Contractor or the Engineer considers that an approved or anticipated change will impact the critical or near critical path or contract progress.

SCHEDULE TIME ADJUSTMENT

When the Contractor requests a time adjustment due to contract change orders or delays, or if the Contractor or the Engineer considers that an approved or anticipated change will impact the critical path or contract progress, the Contractor shall submit a written time impact analysis to the Engineer illustrating the impacts of each change or delay on the current scheduled completion date or milestone completion date. The analysis shall use the currently accepted schedule that has a data date closest to and prior to the event. If the Engineer determines that the currently accepted schedule does not appropriately represent the conditions prior to the event, the schedule shall be updated to the day before the event being analyzed. An additional analysis shall be performed after the completion of the event. If the event is on the critical path at the time of its completion, then the difference between the scheduled completion dates of these 2 analyses shall be equal to the adjustment in time. The time impact analysis shall include one or more fragnet(s) demonstrating how the Contractor proposes to incorporate the event(s) into the schedule, including logic and duration of the proposed activities. Until such time that the Contractor provides the analysis, the Engineer may, at his option, construct and utilize the project as-built schedule or other recognized method to determine adjustments in contract time.

Time impact analyses shall be submitted in duplicate within 15 days of a delay and shall be used in determining contract change order days. Approval or rejection of each time impact analysis by the Engineer will be made within 15 days after receipt of the time impact analysis. In the event the Contractor does not agree with the decision of the Engineer regarding the impact of a change or delay, notice shall be given in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications. The third paragraph of Section 4-1.03A of the Standard Specifications shall not apply.

FINAL SCHEDULE UPDATE

Within 30 days after acceptance of the contract by the Director, the Contractor shall submit a final update of the schedule (as-built schedule) with actual start and actual finish dates for the activities. The Contractor shall submit a written certificate with this submittal signed by the Contractor's Project Manager and an officer of the company stating "To the best of my knowledge, the enclosed final update of the project schedule reflects the actual start and completion 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. Submittal of the final schedule update and the certification shall be a condition precedent to the release of any retained funds under the contract.

PAYMENT

Progress schedule (critical path) will be paid for at a lump sum price. The contract lump sum price paid for progress schedule (critical path) shall include full compensation for furnishing all labor, material (including computer hardware and software), tools, equipment, and incidentals; and for doing all the work involved in preparing, furnishing, updating, and revising progress schedules; maintaining and repairing the computer hardware; and instructing and assisting the Engineer in the use of the computer hardware and software, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer. Payments for the progress schedule (critical path) contract item will be made as follows:

A. A total of 50 percent of the progress schedule (critical path) contract item amount will be made upon achieving all of the following: 5 percent of all work completed, accepted baseline, all accepted required schedule updates and revisions, and required CPM training.
B. A total of 60 percent of the progress schedule (critical path) contract item amount will be made upon achieving all of the following: 25 percent of all work completed, accepted baseline, and all accepted required schedule updates and revisions.
C. A total of 75 percent of the progress schedule (critical path) contract item amount will be made when 50 percent of all work completed, accepted baseline, and all accepted required schedule updates and revisions.

D. A total of 100 percent of the progress schedule (critical path) contract item amount will be made when 100 percent of all work completed, accepted baseline, all accepted required schedule updates and revisions, and a completed and certified Final Schedule Update.

The adjustment provisions in Section 4-1.03, "Changes," of the Standard Specifications shall not apply to the item of progress schedule (critical path). Adjustments in compensation for progress schedule (critical path) will not be made for any increased or decreased work ordered by the Engineer in furnishing progress schedules.

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 pre-construction scheduling documents, an acceptable baseline, acceptable updated schedule, or acceptable revised progress schedule (critical path) conforming to the requirements of these special provisions as determined by the Engineer. Retentions for failure to submit acceptable CPM progress schedules shall be in addition to other retentions provided for in the contract. Retentions for failure to submit progress schedules (critical path) will be released for payment on the next monthly estimate for partial payment following the date that pre-construction scheduling documents and acceptable progress schedules (critical path) are submitted to the Engineer, and no interest will be due the Contractor.

10-1.08 OVERHEAD

Overhead shall conform to the provisions of this section, "Overhead," of these special provisions. The Contractor will be compensated for time-related overhead in accordance with these special provisions.

Attention is directed to "Force Account Payment" and "Progress Schedule (Critical Path)" 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. Such 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)" 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:

1. suspensions of work ordered in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications, except:

    a. suspensions ordered due to weather conditions being unfavorable for the suitable prosecution of the controlling operation or operations; or
    b. 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
    c. any other suspensions mutually agreed upon between the Engineer and the Contractor.

2. 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
3. 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 calendar 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:

1. are allowable in conformance with the requirements of the Federal Acquisition Regulations, 48 CFR, Chapter 1, Part 31;
2. are adequately supported by reliable documentation; and
3. related solely to the project under examination.

Upon the Engineer's written request, the Contractor shall make its financial records available for audit by the State for the purpose of verifying the actual rate of time-related overhead specified in the audit submitted by the Contractor. The actual rate of time-related overhead specified in the audit, submitted by the Contractor, will be subject to approval by the Engineer.

If the Engineer elects, or if requested in writing by the Contractor, contract item payments for time-related overhead, in excess of 149 percent of the number of working days designated in the Engineer's Estimate, will be adjusted to reflect the actual rate.

The cost of performing an audit examination and submitting the report, requested by the Engineer, will be borne equally by the State and the Contractor. The division of the cost will be made by determining the cost of providing an audit examination in conformance with the provisions of Section 9-1.03B, "Work performed by Special Forces or Other Special Services" of the Standard Specifications, and paying to the Contractor one-half of that cost.

The contract price paid per working day for time-related overhead shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in time-related overhead, complete in place, including all field and home office overhead costs incurred by the Contractor and by any joint venture partner, subcontractor, supplier or other party associated with the Contractor, and the Contractor's share of costs of audits of overhead costs requested by the Engineer, as specified in these special provisions, and as directed by the Engineer. The provisions in Sections 4-1.03B, "Increased or Decreased Quantities," 4-1.03C, "Changes in Character of the Work," of the Standard Specifications shall not apply to time-related overhead.

Full compensation for additional overhead costs involved in the performance of extra work at force account shall be considered as included in the markups specified in "Force Account Payment," of these special provisions.

Full compensation for additional overhead cost involved in performing additional contract item work that is not a controlling operation and for all overhead, other than the time-related overhead measured and paid for as specified in this section "Overhead", shall be considered as included in the various items of work involved, and no additional compensation will be allowed therefor.

For the purpose of making partial payments pursuant to the provisions in Section 9-1.06, "Partial Payments," of the Standard Specifications, the number of working days to be paid for time-related overhead in each monthly partial payment will be the number of working days, specified above to be measured for payment, that occurred during that monthly estimate period. The amount earned per working day for time-related overhead shall be either the contract item price, or 20 percent of the original total contract amount divided by the number of working days specified in "Beginning of Work, Time of Completion and Liquidated Damages," of these special provisions, whichever is the lesser.

After all work has been completed, except plant establishment work, as provided in Section 20-4.08, "Plant Establishment Work," of the Standard Specifications, the amount, if any, of the total contract item price for time-related overhead not yet paid will be included for payment in the first estimate made after completion of all roadway construction work, in conformance with the provisions in Section 9-1.06, "Partial Payments," of the Standard Specifications.

10-1.09 OBSTRUCTIONS

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

Attention is directed to the existence of certain underground facilities that may require special precautions be taken by the Contractor to protect the health, safety and welfare of workers and of the public. Facilities requiring special precautions include, but are not limited to: conductors of petroleum products, oxygen, chlorine, and toxic or flammable gases; natural gas in pipelines greater than 6 inches (150-mm) in diameter or pipelines operating at pressures greater than 60 psi (415 kPa) gage; underground electric supply system conductors or cables, with potential to ground of more than 300 volts, either directly buried or in a duct or conduit which do not have concentric grounded or other effectively grounded metal shields or sheaths.

If these facilities are not located on the plans in both alignment and elevation, no work shall be performed in the vicinity of the facilities, except as provided herein for conduit to be placed under pavement, until the owner, or the owner's representative, has located the facility by potholing, probing or other means that will locate and identify the facility. Conduit to be installed under pavement in the vicinity of these facilities shall be placed by the trenching method in conformance with the provisions in "Conduit" of these special provisions. If, in the opinion of the Engineer, the Contractor's operations are delayed or interfered with by reason of the utility facilities not being located by the owner or the owner's representative, the State will compensate the Contractor for the delays to the extent provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications, and not otherwise, except as provided in Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications.

All excavation required to install electrical conduits and pull boxes within 4 feet in the areas with high risks utilities shall be performed by hand excavation without the use of power equipment except that power equipment may be used to cut and remove asphalt or Portland cement pavement.

The Contractor shall notify the Engineer and the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to performing any excavation or other work close to any underground pipeline, conduit, duct, wire or other structure. Regional notification centers include, but are not limited to, the following:

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

All excavation required to install electrical conduits and pull boxes within 4 feet in the areas with high risks utilities shall be performed by hand excavation without the use of power equipment except that power equipment may be used to cut and remove asphalt or Portland cement concrete pavement.

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

Utility	Location	Date
12" water line	Garey/Mckinley Avenues	12/1/00
24" water line	Mckinley Avenue	12/1/00
2" gas line	Garey Avenue	12/1/00

The following utility facilities will be relocated during the progress of the contract. The Contractor shall notify the Engineer, in writing, prior to doing work in the vicinity of the facility. The utility facility will be relocated within the listed working days, as defined in Section 8-1.06, "Time of Completion," of the Standard Specifications, after the notification is received by the Engineer.

Utility	Location	Working Days
GTE UG	Cleveland Ave PUC	unknown
Cable TV	Several locations	30
GTE UG	White Avenue UC	30

Installation of the following utility facilities will require coordination with the Contractor's operations. The Contractor shall make the necessary arrangements with the utility company, through the Engineer, and shall submit a schedule of work, verified by a representative of the utility company, to the Engineer. The schedule of work shall provide not less than the following number of working days, as defined in Section 8-1.06, "Time of Completion," of the Standard Specifications for the utility company to complete their work.

Utility (Address)	Location	Working Days
GTE UG	McKinley & Orange Grove	250

The utility facilities listed in the following table will be arranged as shown on the plans during construction operations to permit the pile driving or drilling operations and the substructure construction. It is anticipated that no other utility facilities will be rearranged or temporarily deactivated in advance of or during construction operations to permit pile driving or drilling operations or substructure construction, unless the Contractor makes the necessary arrangements as provided in said Section 8-1.10 of the Standard Specifications.

Utility Facility	**Approximate Location**
UNG TEL (GTE)	466+10
4" WL (CITY OF POMONA)	542+30LT
UNG & OHV TEL (GTE)	560+40LT – 560+60RT
UNG ELEC (SCE)	571+50LT – 572+30LT
UNG TEL (GTE)	571+50LT – 572+30LT
SPRINKLER SYS (CITY OF POMONA)	572+30
3" WL (CITY OF POMONA)	571+90RT – 573+00RT
UNG CABLE TV (CONTINENTAL)	586+00RT – 587+00LT
6" WL (CITY OF POMONA)	595+20RT – 596+40LT
Swr (CITY OF POMONA)	597+00LT – 601+30RT
ELECTROLIER, TRAFFIC SIGNAL	597+20LT
4-1/2" & 16" WL (CITY OF POMONA)	597+10LT – 601+50RT
SERVICE POLE	598+40RT
2" GAS (SCG)	600+00RT – 601+20RT
SERVICE POLE	601+20LT
FIBER OPTIC, MH (GTE)	601+80RT
SERVICE POLE	603+00LT
2" GAS (SCG)	701+90LT – 702+00RT

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 or drilling operations or substructure construction, will not be rearranged in advance of or during construction operations. Should the Contractor desire to have any of theutility facilities rearranged or temporarily deactivated for his convenience, the Contractor shall make the necessary arrangements as provided in said Section 8-1.10 of the Standard Specifications.

Utility Facility	Approximate Location
OVH ELEC (SCE)	439+00 LT– 444+00RT
42" WL (CITY OF POMONA)	481+50 RT– 489+00LT
42" WL (MWD)	483+50RT – 489+00LT
24" WL (CITY OF POMONA)	488+20LT – 488+70RT
8-5/8" GAS (SCE)	497+00LT – 497+70RT
10" Swr (CITY OF POMONA)	497+00LT – 497+70RT
8" Swr (CITY OF POMONA)	516+00RT – 516+10LT
OVH ELEC (SCE)	516+10LT – 523+00LT
OVE & UNG TEL (GTE)	516+10LT – 523+00LT
8" Swr (CITY OF POMONA)	535+80LT – 537+00LT
4" WL (CITY OF POMONA)	542+10RT
12KV OVH ELEC (SCE)	548+40RT – 548+50LT
Swr (CITY OF POMONA)	548+20LT – 551+70LT
OVH ELEC (SCE)	548+20LT – 551+70LT
OVE & UNG TEL (GTE)	548+20LT – 551+70LT
6" WL (CITY OF POMONA)	565+10LT – 565+20RT
Swr (CITY OF POMONA)	567+50RT – 572+60LT
14" TRANSITE (LAC Sanitation District)	572+00RT – 572+50LT
SPRINKLER SYS (CITY OF POMONA)	572+30LT
121-1/" WL (MWD)	572+20RT – 573+00LT
8" Swr (CITY OF POMONA)	572+20RT
12" Swr (LAC Sanitation District)	572+30RT – 573+20LT
27" Swr (LAC Sanitation District)	572+40RT – 573+30LT
16" WL (CITY OF POMONA)	572+50RT – 573+40LT
12KV OVH ELEC (SCE)	586+00RT – 587+00LT
2" GAS (SCE)	586+10RT – 587+10LT
8" Swr (CITY OF POMONA)	586+40RT – 587+50LT
24" WL (CITY OF POMONA)	586+40RT – 587+60LT
Swr (CITY OF POMONA)	590+30RT – 591+50LT
6" WL (CITY OF POMONA)	590+40RT – 592+10LT
OVH TEL (GTE)	590+50RT – 592+40LT
OVH ELEC (SCE)	590+50RT – 592+40LT
8" Swr (CITY OF POMONA)	595+50RT – 597+00LT
16" WL (CITY OF POMONA)	596+00RT – 597+20LT
UNG TEL (GTE)	596+80LT – 601+00RT
10" IRRIG (POTLACH CORP)	598+00LT
UNG ELEC (SCE)	601+20RT – 603+80LT
4"/6" GAS (SCE)	601+30RT – 605+00LT
UNG ELEC (SCE)	601+90RT – 604+00LT
FIBER OPTIC (GTE)	602+10RT – 604+50LT
18" WL (CITY OF POMONA)	601+70RT – 604+10LT
16" WL (CITY OF POMONA)	601+80RT – 604+30LT
24" WL (CITY OF POMONA)	602+10RT – 605+00LT
UNG TEL (GTE)	602+20RT – 604+90LT
10" WLs (CITY OF POMONA)	623+50RT – 623+70LT
8" Swr (CITY OF POMONA)	629+00RT – 629+10LT
2" GAS (SCE)	630+70RT – 633+60LT
16" WL (CITY OF POMONA)	631+30RT – 634+40LT
8" WL (CITY OF POMONA)	631+70RT – 634+70LT
12KV OVH ELEC (SCE)	647+70RT – 648+80LT
2" GAS (SCE)	647+90RT – 648+80LT
8" Swr (CITY OF POMONA)	648+00RT – 649+10LT
12" WL (CITY OF POMONA)	648+30RT – 649+50LT
120V OVH ELEC (SCE)	647+70RT – 648+40RT
OVH ELEC (SCE)	657+90RT – 662+30RT
OVE & UNG TEL (GTE)	657+90RT – 662+30RT
8" WL (SO CAL WATER CO)	675+90RT – 675+90LT

2" GAS (SCE)	675+90RT – 675+90LT
10" WL (CITY OF POMONA)	675+95RT – 675+95LT
12" Swr (LAC Sanitation District)	676+00RT – 676+00LT
8-5/8” MP GAS (SCE)	676+05LT – 676+05RT
12KV OVH ELEC (SCE)	676+10LT – 676+10RT
Swr (LAC Sanitation District)	682+30LT – 682+70LT
Swr (LAC Sanitation District)	684+50LT – 688+70LT
OVH & UNG TEL (GTE)	694+80LT - 701+00LT
UNG TEL (GTE)	702+30LT – 702+30RT
8" WL (SO CAL WATER CO)	702+60LT – 702+60RT
Swr (LAC Sanitation District)	702+00LT – 702+90LT
6" WL (SO CAL WATER CO)	715+40RT – 715+50LT

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.

10-1.10 DUST CONTROL

Dust control shall conform to the provisions in Section 10, "Dust Control," of the Standard Specifications.

10-1.11 MOBILIZATION

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

10-1.12 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 "Approved Traffic Products" 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

The second paragraph in Section 12-2.02, "Flagging Costs," of the Standard Specifications is revised as follows:

> The provisions in this Section 12-2.02 shall in nowise relieve the Contractor from the responsibility of providing for the safety of the public as provided in Section 7-1.09 nor relieve the Contractor from the responsibility for damage as provided in Section 7, "Legal Relations and Responsibility."

The following paragraph is added after the fourth paragraph of Section 12-3.01, "General," of the Standard Specifications:

> Retroreflective sheeting shall conform to the requirements in ASTM Designation: D 4956-95 and to the special provisions.

The table in Section 12-3.03, "Flashing Arrow Signs," of the Standard Specifications is amended to read:

Type	Min. Size	Min. Number of Panel Lights	Min. Legibility Distance
I	47 1/4” x 94 1/2”	15	1 mile
II	35 1/2” x 71”	13	3/4-mile

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 "Approved Traffic Products" of these special provisions.

In Section 12-3.06A, "Stationary Mounted Signs", Item 2 of the first paragraph is revised as follows:

2. The height to the bottom of stationary mounted sign panels above the edge of traveled way shall be at least 7 feet.

The third, fourth, fifth and sixth paragraphs of Section 12-3.06A, "Stationary Mounted Signs," of the Standard Specifications are revised as follows:

Sign panels for stationary mounted signs shall consist of Type II, Type III, or Type IV retroreflective sheeting applied to an aluminum substrate conforming to the requirements in the Department's "Specifications for Reflective Sheeting Aluminum Signs." The type of retroreflective sheeting, Type II, Type III, or Type IV, shall be at the Contractor's option and sign substrates fabricated from materials other than aluminum may be used as specified in these special provisions.

Legend and border may be applied by a screening process or by use of pressure sensitive cut-out sheeting. Size and spacing of letters and symbols shall be as depicted on the sign specification sheets published by the Department.

Rectangular signs over 55 inches measured along the horizontal axis, and diamond-shaped signs 60 inches and larger shall be framed unless otherwise specified. Frames shall be constructed in conformance with the requirements in the Department's "Framing Details for Sheet Aluminum Signs," Sheets 1 through 4 and Table 1 on Sheet 5.

Copies of the Department's "Specifications for Reflective Sheeting Aluminum Signs," "Framing Details for Sheet Aluminum Signs," and sign specification sheets may be obtained from the Department's Office of Business Management, Materiel Operations Branch, 1900 Royal Oaks Drive, Sacramento, CA 95815.

The second paragraph of Section 12-3.06B, "Portable Signs," of the Standard Specifications is revised as follows:

Sign panels for portable signs shall conform to the provisions for sign panels for stationary mounted signs in Section 12-3.06A, "Stationary Mounted Signs," or shall be Type VI retroreflective sheeting, or shall be cotton drill fabric, flexible industrial nylon fabric or other approved fabric. Fabric signs shall not be used during the hours of darkness. Size, color and legend requirements for portable signs shall be described for stationary mounted sign panels in Section 12-3.06A. The height to the bottom of the sign panel above the edge of traveled way shall be at least one foot.

Delete the third, and fourth paragraphs of Section 12-3.06B, "Portable Signs," of the Standard Specifications.

Delete the second and third paragraph of Section 12-3.10, "Traffic Cones," of the Standard Specifications.

The following is added after the first paragraph of Section 12-3.10, "Traffic Cones," of the Standard Specifications:

During the hours of darkness, traffic cones shall be affixed with retroreflective cone sleeves. The retroreflective sheeting of sleeves on the traffic cones shall be visible at 1,000 feet at night under illumination of legal high beam headlights, by persons with vision of or corrected to 20/20.

Retroreflective cone sleeves shall conform to one of the following:

Removable flexible retroreflective cone sleeves shall be fabricated from the retroreflective sheeting specified in the special provisions, have a minimum height of 12 3/4 inches and shall be placed a maximum of 3 inches from the top of the cone. The sleeves shall not be in place during daylight hours;

Permanently affixed semitransparent retroreflective cone sleeves shall be fabricated from the semitransparent retroreflective sheeting specified in the special provisions, have a minimum height of 12 3/4 inches, and shall be placed a maximum of 3 inches from the top of the cone. Traffic cones with semitransparent retroreflective cone sleeves may be used during daylight hours; or

Permanently affixed double band retroreflective cone sleeves shall have 2 white retroreflective bands. The top band shall be 6 inches in height, placed a maximum of 4 inches from the top of the cone. The lower band shall be 4 inches in height, placed 2 inches below the bottom of the top band. Traffic cones with double band retroreflective cone sleeves may be used during daylight hours.

The type of retroreflective cone sleeve used shall be at the option of the Contractor. Only one type of retroreflective cone sleeve shall be used on the project.

10-1.13 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 "Portable Changeable Message Signs," "Public Safety," "Temporary Traffic Screen," "Structure Approach Slabs (Type R)," and "Polyester Concrete Overlay," 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.

The minimum size specified for Type II flashing arrow signs in the table following the second paragraph of Section 12-3.03, "Flashing Arrow Signs," of the Standard Specifications is amended to read "36 inches by 72 inches".

The second and third paragraphs of Section 12-3.10, "Traffic Cones," of the Standard Specifications are amended to read:

During the hours of darkness traffic cones shall be affixed with reflective cone sleeves. The reflective sheeting of sleeves on the traffic cones shall be visible at 1,000 feet at night under illumination of legal high beam headlights, by persons with vision of or corrected to 20/20.

Reflective cone sleeves shall conform to the following:

1. Removable flexible reflective cone sleeves shall be fabricated from the reflective sheeting specified in the special provisions, have a minimum height of 13 inches and shall be placed a maximum of 3 inches from the top of the cone. The sleeves shall not be in place during daylight hours.
2. Permanently affixed semitransparent reflective cone sleeves shall be fabricated from the semitransparent reflective sheeting specified in the special provisions, have a minimum height of 13 inches, and shall be placed a maximum of 3 inches from the top of the cone. Traffic cones with semitransparent reflective cone sleeves may be used during daylight hours.
3. Permanently affixed double band reflective cone sleeves shall have 2 white reflective bands. The top band shall be 6 inches in height, placed a maximum of 4 inches from the top of the cone. The lower band shall be 4 inches in height, placed 2 inches below the bottom of the top band. Traffic cones with double band reflective cone sleeves may be used during daylight hours.

The type of reflective cone sleeve used shall be at the option of the Contractor. Only one type of reflective cone sleeve shall be used on the project.

Lane closures shall conform to the provisions in the section of these special provisions entitled "Traffic Control System for Lane Closure."

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 for grinding, and except the work of installing, maintaining, and removing traffic control devices) is within 6 feet 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 feet between fixtures.

White Avenue Undercrossing
(Bridge No. 53-853)

	Number	Width	Height
Vehicle Openings	1	60'-0"	15'-0"
Pedestrian Openings	2	6'-0"	10'-0"

Location and Spacing of
Falsework Pavement Lighting

R, L & C 30'-0"

Park Avenue Undercrossing
(Bridge No. 53-854)

	Number	Width	Height
Vehicle Openings	1	44-0"	15'-0"
Pedestrian Openings	2	6'-0"	10'-0"

Location and Spacing of
Falsework Pavement Lighting

R, L & C 30'-0"

San Antonio Avenue Undercrossing
(Bridge No. 53-859)

	Number	Width	Height
Vehicle Openings	1	40-0"	15'-0"
Pedestrian Openings	2	6'-0"	10'-0"

Location and Spacing of
Falsework Pavement Lighting

R, L & C 30'-0"

Indian Hill Boulevard Undercrossing
(Bridge No. 53-860)

	Number	Width	Height
Vehicle Openings	1	60-0"	15'-0"
Pedestrian Openings	2	4'-0"	10'-0"

Location and Spacing of
Falsework Pavement Lighting

R, L & C	30'-0"

(Width and Height in feet.)
(R=right side of traffic. L=left side of traffic)
(C=Centered overhead.)

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

Personal vehicles of the Contractor's employees shall not be parked within the freeway right of way.

The Contractor shall notify local authorities of the Contractor's intent to begin work at least 5 days before work is begun. The Contractor shall cooperate with local authorities relative to handling traffic through the area and shall make arrangements relative to keeping the working area clear of parked vehicles.

Whenever vehicles or equipment are parked on the freeway shoulder within 6 feet of a traffic lane, the shoulder area shall be closed as shown on the plans.

Except as otherwise provided in these special provisions, freeway lanes and connectors shall be closed only during the hours shown on Charts 1, 2, and 12 through 16 included in this section "Maintaining Traffic." Except work required under said 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.

The Contractor may be allowed to work during the hours designated as "No freeway lane closure permitted; no work permitted ... " shown on Charts 1 and 2 provided temporary traffic screens are installed on top of temporary railings (Type K), as shown on the plans. Temporary traffic screens shall be furnished, installed, maintained, and removed at the Contractor's expense.

Traffic lanes, which are outside of through traffic lanes, as described in the Charts 1 and 2 may be closed anytime the adjacent connector or ramp, is permitted to be closed in accordance with Charts 12 through 38.

When removing and replacing concrete approach slabs and polyester concrete overlay, the Contractor shall schedule his operations in conformance with the hours and requirements shown on Tables A and B in place of Charts 1 and 2.

When a designated legal holiday falls between and including Thursday and the following Tuesday, no work will be permitted during the intervening weekend for concrete pavement reconstruction.

Except as otherwise provided in these special provisions, Route 10 freeway may be closed to public traffic at one location in one direction at a time for the purpose of removing and installing sign structures and loop detector installation in conformance with the hours and requirements shown on Charts 3 through 12.

When work requires a connector to be closed within the limits of a freeway lane closure, all work on the connector shall be completed first. Work on portions of the freeway mainline necessary to insure a safe passageway for public traffic between the connector and the open lanes of the freeway mainline shall also be completed. The connector shall then be opened to public traffic before commencing work on the remaining portions of the freeway mainline, unless otherwise permitted by the Engineer.

On those days when a special event is scheduled at the Fairplex and California Speedway, no work that encroaches onto the traveled ways shall be allowed from 3 hours before to 2 hours following the events, unless otherwise permitted by the Engineer.

Except as otherwise shown on the Stage Construction Plans, ramps may be closed only during the hours shown on Charts 17 through 38 .

At the option of the Contractor, eastbound and westbound off-ramps to Fairplex Drive may be closed for an extended period of time for construction of exit ramp termini. Such extended periods shall begin at 8:00 p.m. Friday and end at 5:00 a.m. the following Monday. Only one off-ramp in either direction shall be closed during the extended closure. The Contractor shall submit a written request for the Engineer's approval a minimum of 20 working days prior to the actual closure. When an off-ramp to Fairplex Drive is closed, the Contractor shall place a portable changeable message sign at the appropriate location on eastbound Route 10 by Call Box No. 412 and on westbound Route 10 by White Avenue on-ramp with the following message:

FAIRPLEX DRIVE EXIT	CLOSED AHEAD

The Contractor shall notify Metropolitan Transportation Authority at Telephone 626) 279-9716 and Foothill Transit at Telephone (213) 922-4634 a minimum of 10 working days before off-ramp actual approved closures.

No two consecutive on-ramps or consecutive off-ramps in the same direction of travel shall be closed at the same time unless otherwise permitted by the Engineer.

If two or more consecutive on-ramps are permitted to be closed, the Contractor, at his expense, shall furnish and install special signs for entrance ramp closures (sign SP-4) as directed by the Engineer.

When an off-ramp is closed, the Contractor shall furnish and erect, as directed by the Engineer, a special sign for exit ramp closures (sign SP-3 or SP-5) as shown on the plans.

Special advance notice publicity signs (sign SP-1), as shown on the plans shall be posted as directed by the Engineer, a minimum of 7 days prior to the actual ramp or connector closure. When ramp is closed, public traffic shall be detoured as directed by the Engineer.

Furnishing, erecting, maintaining, and removing special portable freeway detour signs (sign SP-2) along the detour routes as directed by the Engineer shall be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

Full compensation for furnishing, erecting, maintaining, and removing special signs for exit ramp closures (SP-3 or SP-5), special advance notice publicity signs (SP-1), and special "WET CONCRETE" signs as shown on the plans or in these special provisions shall be considered as included in the contract lump sum price paid for traffic control system and no additional payment will be made therefor.

All aforementioned special signs shall become the property of the Contractor at the conclusion of this project and shall be removed from the worksite.

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
Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway - Rte 57/71/210 IC to San Bernardino County line

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

Legend:

1	Provide at least one through freeway lane open in direction of travel
2	Provide at least two through freeway lanes open in direction of travel
3	Provide at least three through freeway lanes open in direction of travel
	No lane closure permitted; work permitted anywhere that does not require freeway lane closure
X	No lane closure permitted; no work permitted on east roadway

REMARKS: Number of Through Traffic Lanes - 4 and varies*

Legend* - Traffic lanes which are outside of the through traffic lanes and are delineated with a double line of pavement markers as shown on “Pavement Markers and Traffic Lines Detail 37 series,” shall not be closed at same time as through traffic lanes, except as otherwise provided in this section.

Chart No. 2
Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway - San Bernardino County line to Rte 57/71/210 IC

	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		X	X	X	X	X	X	X	X	X	X	X	X	X	X		3	3	2	2	
Fridays	1	1	1	1		X	X	X	X	X	X	X	X	X	X	X	X	X	X		3	3	3	2	
Saturdays	1	1	1	1	1	2	2	3		X	X	X	X	X	X	X	X	X	X			3	3	2	
Sundays	1	1	1	1	1	2	2	2	3		X	X	X	X	X	X	X	X	X				3	2	
Working day before designated legal holiday	1	1	1	1		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Designated legal holidays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Legend:

1	Provide at least one through freeway lane open in direction of travel
2	Provide at least two through freeway lanes open in direction of travel
3	Provide at least three through freeway lanes open in direction of travel
	No lane closure permitted; work permitted anywhere that does not require freeway lane closure
X	No lane closure permitted; no work permitted on west roadway

REMARKS: Number of Through Traffic Lanes - 4 and varies*

Legend* - Traffic lanes which are outside of the through traffic lanes and are delineated with a double line of pavement markers as shown on “Pavement Markers and Traffic Lines Detail 37 series,” shall not be closed at same time as through traffic lanes, except as otherwise provided in this section.

Chart No. 3
Complete Freeway Closure Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway - Rte. 71 to Fairplex Drive

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

Legend:

X Freeway may be closed completely

No complete freeway closure is allowed

REMARKS:
Detour traffic to southbound Rte 71 Fwy and exit at Valley Blvd / Holt Ave.; east to Fairplex Dr.; north to the on-ramp to E/B Rte 10 Fwy.
Place a portable changeable message sign on the right shoulder of eastbound Route 10 freeway by call box No. 412 with the message: "FREEWAY / CLOSED / AHEAD - USE S 71 / TO / HOLT AVE".
Close N/B 57 to E/B 10 and E/B 210 to E/B 10 connectors. The Contractor shall conform to the hours, detour and other requirements per Chart 13 and 14.
Close Campus Drive on-ramp into N/B 57 to E/B 10 connector.

Chart No. 4
Complete Freeway Closure Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway - Fairplex Drive to Garey Avenue

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

Legend:

X Freeway may be closed completely

No complete freeway closure is allowed

REMARKS:
Detour traffic to exit at Fairplex Dr. off-ramp; south to Holt Ave.; east to Garey Ave.; north to the on-ramp to E/B Rte 10 Fwy.
Place a portable changeable message sign on the right shoulder of E/B Rte 10 Fwy 1500 feet upstream of the E/B 10 to S/B 71 connector with the message: “FREEWAY / CLOSED / AHEAD - FAIRPLEX / TO / GAREY”.
Place a second portable changeable message sign on the right shoulder of N/B Rte 57 Fwy by Diamond Bar Blvd. on-ramp gore with the message: “EAST 10 / FREEWAY / CLOSED - FAIRPLEX / TO / GAREY”.
Close E/B 210 to E/B 10 connector. The Contractor shall conform to the hours , detour and other requirements per Chart 14.
Close the on-ramp at Fairplex Dr. and Dudley St.

Chart No. 5
Complete Freeway Closure Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway - Garey Avenue to Towne Avenue

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

Legend:

X Freeway may be closed completely

No complete freeway closure is allowed

REMARKS:
Detour traffic to exit at Garey Ave. off-ramp; south to Holt Ave.; east to Towne Ave.; north to the on-ramp to E/B Rte 10 Fwy.
Place a portable changeable message sign on the right shoulder of E/B Rte 10 Fwy 1500 feet in advance of Fairplex Drive off-ramp with the message: “FREEWAY / CLOSED / AHEAD - GAREY / TO / TOWNE”.

Chart No. 6
Complete Freeway Closure Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway - Towne Avenue to Indian Hill Blvd.

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

Legend:

X Freeway may be closed completely

No complete freeway closure is allowed

REMARKS:
Detour traffic to exit at Towne Ave. off-ramp; south to Holt Ave.; east to Indian Hill Ave.; north to the on-ramp to E/B Rte 10 Fwy.
Place a portable changeable message sign on the right shoulder of E/B Rte 10 Fwy 1500 feet in advance of Garey Ave. off-ramp with the message: “FREEWAY / CLOSED / AHEAD - TOWNE TO / INDIAN / HILL BL”
Close Orange Grove Ave. on-ramp.

Chart No. 7
Complete Freeway Closure Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway - Indian Hill Blvd to Central Avenue

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

Legend:

X Freeway may be closed completely

No complete freeway closure is allowed

REMARKS:
Detour traffic to exit at Indian Hill Blvd. off-ramp; south to Holt Ave.; east to Central Ave.; north to the on-ramp to E/B Rte 10 Fwy.
Place a portable changeable message sign on the right shoulder of E/B Rte 10 Fwy 1500 in advance of Towne Ave. off-ramp with the message: “FREEWAY / CLOSED / AHEAD - INDIAN / HILL TO / CENTRAL”

Chart No. 8
Complete Freeway Closure Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway - Central Avenue to Indian Hill Blvd.

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

Legend:

X Freeway may be closed completely

No complete freeway closure is allowed

REMARKS:
Detour traffic to exit at Central Ave. off-ramp; south to Holt Ave.; west to Indian Hill Blvd.; north to the on-ramp to W/B Rte 10 Fwy.
Place a portable changeable message sign on the right shoulder of W/B Rte 10 Fwy 1500 feet in advance of the Mountain Ave. off-ramp with the message: “FREEWAY / CLOSED / AHEAD - CENTRAL / TO INDIAN / HILL BL”

Chart No. 9
Complete Freeway Closure Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway - Indian Hill Blvd. to Towne Avenue

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

Legend:

X Freeway may be closed completely

No complete freeway closure is allowed

REMARKS:
Detour traffic to exit at Indian Hill Blvd. off-ramp; south to Holt Ave.; west to Towne Ave.; north to the on-ramp to W/B Rte 10 Fwy.
Place a portable changeable message sign on the right shoulder of W/B Rte 10 Fwy 1500 feet in advance of the Monte Vista Ave. off-ramp with the message: “FREEWAY / CLOSED / AHEAD - INDIAN / HILL TO / TOWNE”
Close Indian Hill Blvd. on-ramp.

Chart No. 10
Complete Freeway Closure Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway - Towne Avenue to Fairplex Drive

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

Legend:

X Freeway may be closed completely

No complete freeway closure is allowed

REMARKS:
Detour traffic to exit at Towne Ave. off-ramp; south to Holt Ave.; west to Fairplex Dr.; north to the on-ramp to W/B Rte 10 Fwy.
Place a portable changeable message sign on the right shoulder of W/B Rte 10 Fwy 1500 feet in advance of Towne Ave. with the message: “FREEWAY / CLOSED / AHEAD - GARVEY / TO / FAIRPLEX”
Close on-ramp at Towne Av., Garey Ave., White Ave., and Dudley St.

Chart No. 11
Complete Freeway Closure Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway - Fairplex Drive to Route 71

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

Legend:

X Freeway may be closed completely

No complete freeway closure is allowed

REMARKS:
Detour traffic to exit at Fairplex Dr. off-ramp; south to Holt Ave.; west to the Rte. 71 Fwy.
Place a portable changeable message sign on the right shoulder of W/B Rte 10 Fwy 1500 feet in advance of the Towne Ave. off-ramp with the message: “FREEWAY / CLOSED / AHEAD - FAIRPLEX / TO / RTE 57”
Close on-ramp at Dudley St. and Fairplex Dr.

Chart No. 12
Connector Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway to Southbound Route 71 Freeway

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

Legend:

X Connector may be closed

Work permitted that does not require connector lane closure

REMARKS:
Detour traffic to continue on the Rte 10 Fwy; exit at the Fairplex Dr. off-ramp; south to Holt Ave.; west to the on-ramp to S/B 71 Fwy.
Place a portable changeable message sign on the right shoulder of the E/B 10 Fwy by Call Box 412 with the message: "SOUTH 71 / EXIT / CLOSED - DETOUR / USE / FAIRPLEX".

Chart No. 13
Connector Lane Requirements and Hours of Work

Location: Northbound Route 57 Freeway to Eastbound Route 10 Freeway

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

Legend:

X Connector may be closed

Work permitted that does not require connector lane closure

REMARKS:
Detour traffic to exit at the Temple Ave. off-ramp; east to Mission Blvd.; east to Garey Ave.; north to Orange Grove Ave.; east to the on-ramp to eastbound Route 10 Fwy.
Place a portable changeable message sign on the right shoulder of the N/B 57 Fwy by the Diamond Bar Blvd. on-ramp gore with the message: "EAST 10 / EXIT / CLOSED - DETOUR / USE / TEMPLE".
Close the Campus Dr. on-ramp.

Chart No. 14
Connector Lane Requirements and Hours of Work

Location: Eastbound Route 210 Freeway to Eastbound Route 10 Freeway

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

Legend:

X Connector may be closed

Work permitted that does not require connector lane closure

REMARKS:
The Contractor shall perform this closure by closing the No. 4 lane starting upstream of the Via Verde off-ramp. The Contractor shall provide a slip exit ramp to W/B 10 connector.
Detour traffic south on Rte 71 Fwy to exit at the Vallery Blvd./Holt Ave. off-ramp; east to Garey Ave.; north to Orange Grove Ave.; east to the on-ramp to eastbound Route 10 Fwy.
Place a portable changeable message sign on the right shoulder of the E/B 210 Fwy between Call Box #466 and 468 with the message: "EAST 10 / EXIT / CLOSED - USE / South 71 TO / HOLT AVE".
Place a second portable changeable message sign on the #4 lane by Via Verde on-ramp with the message: "EAST 10 / EXIT / CLOSED - USE / South 71 TO / HOLT AVE".

Chart No. 15
Connector Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway to Southbound Route 57 and Westbound Route 210 Freeway

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

Legend:

X Connector may be closed

Work permitted that does not require connector lane closure

REMARKS:
Detour traffic to exit at Fairplex Dr. off-ramp; south to the on-ramp to northbound Route 57 Fwy.
Detour southbound Route 57 traffic west on Valley Blvd. to Mission; west to Temple Ave.; north to the on-ramp to Southbound Route 57.
Place a special sign "A" at the intersection of Fairplex Dr. and Holt Ave./Valley Blvd.
Place a portable changeable message sign on the right shoulder of the W/B 10 Fwy 1500 feet upstream of the Dudley Street off-ramp with the message: "South 57 West 210 / EXITS / CLOSED - DETOUR / USE / FAIRPLEX".
Close the Fairplex Dr. on-ramp to W/B Rte 10 Fwy.

Chart No. 16
Connector Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway to Westbound Route 210 Freeway

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

Legend:

X Connector may be closed

Work permitted that does not require connector lane closure

REMARKS:
Detour traffic to exit at Fairplex Dr. off-ramp; south to the on-ramp to northbound Route 57 Fwy.
Place a portable changeable message sign on the right shoulder of the W/B 10 Fwy 1500 feet in advance of the Dudley Street off-ramp with the message: "WEST 210 / EXIT / CLOSED - DETOUR / USE / FAIRPLEX".
Close the Fairplex Dr. on-ramp to W/B Rte 10 Fwy.

Chart No. 17
Ramp Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway off-ramp to Fairplex Drive

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 18
Ramp Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway on-ramp from Fairplex Drive

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 19
Ramp Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway off-ramp to Fairplex Drive

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 20
Ramp Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway on-ramp from Fairplex Drive

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 21
Ramp Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway off-ramp to Dudley Street

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 22
Ramp Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway on-ramp from Dudley Street

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 23
Ramp Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway off-ramp to Dudley Street

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 24
Ramp Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway on-ramp from Dudley Street

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 25
Ramp Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway off-ramp to White Avenue

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 26
Ramp Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway on-ramp from White Avenue

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 27
Ramp Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway off-ramp from Garey Avenue

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 28
Ramp Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway on-ramp from Orange Grove Blvd.

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 29
Ramp Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway off-ramp to Garey Avenue

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 30
Ramp Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway on-ramp from Garey Avenue

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 31
Ramp Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway off-ramp to Towne Avenue

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 32
Ramp Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway on-ramp from Towne Avenue

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 33
Ramp Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway off-ramp to Towne Avenue

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 34
Ramp Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway on-ramp from Towne Avenue

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 35
Ramp Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway off-ramp to Indian Hill Blvd.

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 36
Ramp Lane Requirements and Hours of Work

Location: Eastbound Route 10 Freeway on-ramp from Indian Hill Blvd.

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 37
Ramp Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway off-ramp to Indian Hill Blvd.

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

Chart No. 38
Ramp Lane Requirements and Hours of Work

Location: Westbound Route 10 Freeway on-ramp from Indian Hill Blvd.

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

Legend:

X Ramp may be closed

Work permitted anywhere that does not require ramp lane closure

REMARKS:

TABLE A

PERMISSIBLE HOURS OF LANE CLOSURES FOR
APPROACH SLAB REPLACEMENT AND POLYESTER CONCRETE OVERLAY

Lane No. Being Replaced / Overlay	Remove, Replace, and Cure Slabs; Polyester Concrete Overlay	
	Lane No. Closed	Closure Hours
DIRECTION: EASTBOUND ROUTE 10 FREEWAY - WHITE AVENUE TO PARK AVENUE		
#1	#1 & 2	11:00 pm Friday ------ 9:00 am Saturday 11:00 pm Saturday ------ 9:00 am Sunday
#2 or #1 & 2	#1, 2 & 3	12:01 am Sunday ------ 9:00 am Sunday
#3or #3 & 4	#2, 3 & 4	12:01 am Sunday ------ 9:00 am Sunday
#4	#3 & 4	11:00 pm Friday ------ 9:00 am Saturday 11:00 pm Saturday ------ 9:00 am Sunday
Lane No. Being Replaced / Overlay	Other Closure Requirements	
#1	Open lane # 2 during curing period.	
#2 or #1& 2	Open lane # 3 during curing period. Place a portable changeable message sign on the right shoulder of E/B 10; 1500 feet in advance of the Fairplex off-ramp with the message: "SINGLE / LANE / AHEAD - AT / WHITE / AVE". Change message to " 2 LEFT / LANES / CLOSED - AT / WHITE / AVE" when lane # 3 is open to traffic.	
#3 or #3& 4	Open lane # 2 during curing period. Close White Ave and Garey Ave. off-ramps. Place a portable changeable message sign on the right shoulder of E/B 10; 1500 feet in advance of the Fairplex off-ramp with the message: "SINGLE / LANE / AHEAD - AT / WHITE / AVE". Change message to " 2 RIGHT / LANES / CLOSED - AT / WHITE / AVE" when lane # 2 is open to traffic.	
#4	Open lane # 3 during curing period. Close White Ave and Garey Ave. off-ramps.	

TABLE B

PERMISSIBLE HOURS OF LANE CLOSURES FOR
APPROACH SLAB REPLACEMENT AND POLYESTER CONCRETE OVERLAY

Lane No. Being Replaced / Overlay	Remove, Replace, and Cure Slabs; Polyester Concrete Overlay	
	Lane No. Closed	Closure Hours
DIRECTION: WESTBOUND ROUTE 10 FREEWAY - PARK AVENUE TO WHITE AVENUE		
#1	#1 & 2	10:00 pm Friday ------ 8:00 am Saturday 11:00 pm Saturday ------ 9:00 am Sunday
#2 or #1 & 2	#1, 2 & 3	12:01 am Sunday ------ 9:00 am Sunday
#3or #3 & 4	#2, 3 & 4	12:01 am Sunday ------ 9:00 am Sunday
#4	#3 & 4	10:00 pm Friday ------ 8:00 am Saturday 11:00 pm Saturday ------ 9:00 am Sunday
Lane No. Being Replaced / Overlay	Other Closure Requirements	
#1	Open lane # 2 during curing period.	
#1 or #1& 2	Open lane # 3 during curing period. Place a portable changeable message sign on the right shoulder of W/B 10; 1500 feet in advance of the Indian Hill off-ramp with the message: "SINGLE / LANE / ONLY - AT / WHITE / AVE". Change message to " 2 LEFT / LANES / CLOSED - AT / WHITE / AVE" when lane # 3 is open to traffic.	
#3 or #3& 4	Open lane # 2 during curing period. Close Garey Ave. on- and off-ramp. Place a portable changeable message sign on the right shoulder of W/B 10; 1500 feet in advance of the Indian Hill off-ramp with the message: "SINGLE / LANE / ONLY - AT / WHITE / AVE". Change message to " 2 RIGHT / LANES / CLOSED - AT / WHITE / AVE" when lane # 2 is open to traffic.	
#4	Open lane # 3 during curing period. Close Garey Ave. on- and off-ramp.	

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 provided with surfacing of asphalt concrete, portland cement concrete or timber. 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, the Contractor shall provide pedestrian facilities 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 by the Contractor. Walkways shall be kept clear of obstructions.

Full compensation for providing said 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 of girders over Garey Avenue, McKinley Street, Orange Grove Avenue and Town Avenueshall be undertaken on one location at a time. During girder erection, public traffic in the lanes over which girders are being placed shall be routed around the work area on adjacent streets by means of a local detour.

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 by means of a local detour. 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 of traffic during erection of girders and erection/removal of falsework shall be undertaken only between the hours of 11:00 p.m. and 4:00 a.m., Monday through Thursday, except designated legal holidays and days preceding designated legal holidays, for the period necessary for erecting or removing the girders and falsework.

Regardless of the construction procedure, methods and equipment selected, the Contractor shall have necessary materials and equipment on the site to erect and remove the girders and falsework in any one span prior to detouring public traffic, and shall erect and remove the girders and falsework in an expeditious manner in order that inconvenience to public traffic will be at a minimum.

10-1.14 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 $6500 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.

10-1.15 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE

A traffic control system shall consist of closing traffic lanes and ramps in conformance with the details shown on the plans, the provisions of 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 from the responsibility to provide such additional devices or take such measures as may be necessary to comply with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications.

When performing traffic control where the median is less than 10 feet, the Contractor shall conform to the requirements under the moving lane closures for truck-mounted attenuators (TMA).

During traffic stripe operations and pavement marker placement operations using bituminous adhesive, traffic shall be controlled, at the option of the Contractor, with either stationary or moving type 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 any 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 component to the original location.

STATIONARY LANE CLOSURE.--When lane and ramp closures are made for work periods only, at the end of each work period, components of the traffic control system, except portable delineators placed along open trenches or excavation adjacent to the traveled way, shall be removed from the traveled way and shoulder. If the Contractor so elects, the components may be stored at selected central locations, designated by the Engineer within the limits of the highway right of way.

The 500-foot section of lane closure, shown along lane lines between the 1,000-foot lane closure tapers on the plans entitled "Traffic Control System for Lane Closures on Freeways and Expressways" and "Traffic Control System for Lane and Complete Closures on Freeways and Expressways" shall not be used.

The traffic cones shown to be placed transversely across closed traffic lanes and shoulders on the plans entitled "Traffic Control System for Lane Closures on Freeways and Expressways" and "Traffic Control System for Lane and Complete Closures on Freeways and Expressways" shall not be placed.

MOVING LANE CLOSURE.--Flashing arrow signs used in moving lane closures shall be truck-mounted. Changeable message signs used in moving lane closure operations shall conform to the provisions in Section 12-3.12, "Portable Changeable Message Signs," of the Standard Specifications, except the signs shall be truck-mounted and the full operation height of the bottom of the sign may be less than 7 feet 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:

(1)

Hexfoam TMA Series 3000,
Alpha 1000 TMA Series 1000 and
Alpha 2001 TMA Series 2001

Manufacturer:	Distributor(Northern):
Energy Absorption Systems, Inc. One East Wacker Drive Chicago, IL 60601-2076 Telephone (312) 467-6750	Traffic Control Service, Inc. 8585 Thys Court Sacramento, CA 95828 Telephone 1-(800) 884-8274 FAX (916) 387-9734
	Distributor(Southern): Traffic Control Service, Inc. 1881 Betmor Lane Anaheim, CA 92805 Telephone 1-(800) 222-8274

(2)

Cal T-001 Model 2 or Model 3

Manufacturer:	Distributor:
Hexcel Corporation 11711 Dublin Blvd. P.O. Box 2312 Dublin, CA 94568 Telephone (510) 828-4200	Hexcel Corporation 11711 Dublin Blvd. P.O. Box 2312 Dublin, CA 94568 Telephone (510) 828-4200

(3)

Renco Rengard Model Nos.
CAM 8-815 and RAM 8-815

Manufacturer:	Distributor:
Renco Inc. 1582 Pflugerville Loop Road P.O. Box 730 Pflugerville, TX 78660-0730 Telephone 1-(800) 654-8182	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 1/2 inch 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 1/2 inch high letters which states, "The bottom of this TMA shall be _____ inches ±_____ inches 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 accordance 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, CA 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 as 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. Such 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.

10-1.16 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 24 feet. The temporary pavement markers shall be the same color

as the laneline or centerline the pavement markers replace. Temporary pavement markers shall be, at the option of the Contractor, one of the temporary pavement markers listed for short term day/night use (14 days or less) or long term day/night use (6 months or less) in "Approved Traffic Products" 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 24 feet 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 4-inch 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 100 feet.
B. Temporary pavement delineation for left edgelines shall, at the option of the Contractor, consist of either solid 4-inch 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 100 feet or temporary pavement markers placed at longitudinal intervals of not more than 6 feet. 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 "Approved Traffic Products" of these special provisions.

Traffic stripe (4-inch 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 4-inch wide traffic stripe will not be required, painted traffic stripe conforming to the provisions of "Temporary Traffic Stripe (Paint)" of these special provisions may be used. The 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 (36") listed in "Approved Traffic Products" 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 (TAPE)

Temporary traffic stripe consisting of removable traffic stripe tape shall be applied at the locations shown on the plans. The temporary traffic stripe tape shall be complete in place at the location shown prior to opening the traveled way to public traffic.

Removable traffic stripe tape shall be the temporary removable traffic stripe tape listed in "Approved Traffic Products" of these special provisions.

Removable traffic stripe tape shall be applied in conformance with the manufacturer's installation instructions and shall be rolled slowly with a rubber tired vehicle or roller to ensure complete contact with the pavement surface. Traffic stripe tape shall be applied straight on tangent alignment and on a true arc on curved alignment. Traffic stripe tape shall not be applied when the air or pavement temperature is less than 50° F, unless the installation procedures to be used are approved by the Engineer, prior to beginning installation of the tape.

When removable traffic stripe tape is specified for temporary left edgeline delineation, temporary pavement markers placed at longitudinal intervals of not more than 6 feet may be used in place of the temporary traffic stripe tape. 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 "Approved Traffic Products" of these special provisions. When temporary pavement markers are used in place of tape, payment for those temporary pavement markers will be made on the basis of the theoretical length of the temporary traffic stripe (tape) required for the left edgeline which the temporary pavement markers replace.

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 Stripe and Pavement Marking" 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 "Approved Traffic Products" 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 6 feet 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 "Approved Traffic Products" 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 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 "Approved Traffic Products" 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 (tape) will be measured and paid for by the meter, measured along the line of the stripe, with deductions for gaps in broken traffic stripes. Double and 8-inch temporary traffic stripes, shown on the plans as tape, will be measured as 2 temporary traffic stripes (tape).

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.

The contract price paid per meter for temporary traffic stripe (tape) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying, maintaining and removing temporary traffic stripe tape, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.17 FLASHING ARROW SIGNS

Flashing arrow signs conforming to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications shall be furnished, placed and maintained at the locations shown on the plans or as directed by the Engineer.

If flashing arrow signs are displaced or are not in an upright position, from any cause, during the progress of the work, the Contractor shall immediately repair and repaint or replace the flashing arrow signs in their original locations.

After initial placement, if flashing arrow signs are moved from location to location, as ordered by the Engineer, the cost of such moves will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

The quantity of flashing arrow signs to be paid for will be measured as units determined from actual count in place at the locations shown on the plans or at other locations as determined by the Engineer. Each flashing arrow sign will be counted once at each location shown on the plans, or at other locations as determined by the Engineer, repaired or replacement flashing arrow signs placed at such locations will not be considered as additional units for payment purposes. Flashing arrow signs shown on the plans as part of a traffic control system shall be considered as part of that traffic control system and will be paid for as specified under "Traffic Control System for Lane Closures," elsewhere in these special provisions.

The contract unit price paid for flashing arrow sign shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in furnishing, placing, operating, maintaining, repairing, replacing and removing flashing arrow signs, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.18 BARRICADE

Barricades shall be furnished, placed and maintained at the locations shown on the plans, specified in the Standard Specifications or in these special provisions orwhere designated by the Engineer. Barricades shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Delete the third paragraph of Section 12-3.02, "Barricades," of the Standard Specifications.

Markings for barricade rails shall be alternate orange and white stripes. The entire area of orange and white stripes shall be Type-I, engineering grade, or Type-II, super engineering grade, retroreflective sheeting. The color of the orange retroreflective sheeting shall conform to PR No. 6, Highway Orange, of the Federal Highway Administration's Color Tolerance Chart. Retroreflective sheeting shall be placed on rail surfaces in such a manner that no air bubbles or voids are present between the rail surface and retroreflective sheeting. The predominate color for barricade components other than rails shall be white, except that unpainted galvanized metal or aluminum may be used.

Attention is directed to "Approved Traffic Products" of these special provisions regarding retroreflective sheeting for barricades.

Construction area sign and marker panels conforming to the provisions in Section 12-3.06, "Construction Area Signs," of the Standard Specifications shall be installed on barricades in a manner determined by the Engineer at the locations shown on the plans.

Sign panels for construction area signs and marker panels installed on barricades shall conform to the provisions in Section 12-3.06A, "Stationary Mounted Signs," of the Standard Specifications and these special provisions.

Full compensation for furnishing, installing, maintaining, and removing construction area signs and markers on barricades shall be considered as included in the contract unit price paid for the type of barricade involved and no separate payment will be made therefor.

Barricades shown on the plans as part of a traffic control system will be paid for as provided in "Traffic Control System for Lane Closure," of these special provisions, and will not be included in counts for payment for barricades.

10-1.19 PORTABLE CHANGEABLE MESSAGE SIGN

Portable changeable message signs shall be furnished, placed, operated, and maintained at those locations shown on the plans and shall conform to the provisions of Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to Charts 3 through 16 and Tables A and B of the "Maintaining Traffic" of these special provisions and as shown on the Stage Construction Plans concerning the use of the portable changeable message signs.

Full compensation for furnishing all labor, materials, tools equipment and incidentals, and for doing all the work involved in furnishing, placing, operating maintaining, repairing, replacing, transporting for location, and removing the portable changeable message signs as specified in these special provisions shall be considered as included in the contract lump sum price paid for traffic control system and no additional payment will be made therefor.

10-1.20 TEMPORARY RAILING

Temporary railing (Type K) shall be placed as shown on the plans, 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.

Delete the fourth paragraph of Section 12-4.01, "Measurement and Payment," of the Standard Specifications.

When the Engineer’s Estimate includes a contract item for temporary railing (Type K), the temporary railing (Type K) will be measured by the linear foot along the top of the railing, at each location shown on the plans, specified, or ordered by the Engineer. If the Engineer orders a lateral move of the temporary railing (Type K), and the repositioning is not shown on the plans, moving the temporary railing will be paid for as extra work as provided in Section 4-1.03D and the temporary railing will not be measured in the new position. Temporary railing (Type K) placed in excess of the length shown, specified, or ordered will not be paid for. The contract price paid per linear foot for temporary railing (Type K) shall include full compensation for furnishing all labor, materials (including reinforcement, Type P marker panels and reflectors), tools, equipment and incidentals, and for doing all the work involved in furnishing, placing, maintaining, repairing, replacing, and removing the temporary railing, including excavation and backfill, drilling holes and bonding threaded rods or dowels when required, removing threaded rods or dowels and filling the drilled holes with mortar and moving and replacing removable panels as required, complete in place, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

Delete the fourteenth paragraph of Section 12-3.08, "Temporary Railing (Type K)," of the Standard Specifications.

Each rail unit placed within 10 feet of a traffic lane shall have a reflector installed on top of the rail. Reflectors shall be as specified in these special provisions, and adhesive shall conform to the reflector manufacturer's recommendations. A Type P marker panel shall also be installed at each end of railing installed adjacent to a two-lane, two-way highway and at the end facing traffic of railing installed adjacent to a one-way roadbed. If the railing is placed on a skew, the marker shall be installed at the end of the skew nearest the traveled way. Type P marker panels shall conform to the provisions in Section 82, "Markers and Delineators," except that the Contractor shall furnish the marker panels.

Reflectors on temporary railing (Type K) shall conform to the provisions in "Approved Traffic Products," of these special provisions.

Temporary railing (Type K), conforming to the details shown on 1995 Standard Plan T3 or 1997 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 railing (Type K), conforming to the details shown on 1995 Standard Plan T3 or 1997 Standard Plan T3, may be used. Temporary railing (Type K) fabricated prior to January 1, 1993, and conforming to 1988 Standard Plan B11-30 may be used, provided the fabrication date is printed on the required Certificate of Compliance and vertical holes are not drilled in the top of the temporary railing to secure temporary traffic screen to the temporary railing.

Attention is directed to "Public Safety" and "Order of Work" of these special provisions.

Temporary railing (Type K) placed in conformance with the provisions in "Public Safety" of these special provisions will be neither measured nor paid for.

10-1.21 CHANNELIZER

Channelizers shall conform to the provisions in Sections 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Channelizers shall conform to the provisions in "Approved Traffic Products," 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.

10-1.22 TEMPORARY TRAFFIC SCREEN

Temporary traffic screen shall be furnished, installed, and maintained on top of temporary railing (Type K) at the locations designated on the plans, specified in the special provisions or directed by the Engineer, and shall conform to the requirements specified for traffic handling equipment and devices in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to "Maintaining Traffic" of these special provisions regarding temporary traffic screen provided at the Contractor's option.

Temporary traffic screen panels shall be new or used CDX Grade, or better, plywood or weather resistant strandboard mounted and anchored on temporary railing (Type K). Wale boards shall be new or used Douglas fir, rough sawn, Construction Grade, or better. Pipe screen supports shall be new or used galvanized steel pipe, Schedule 40. Nuts, bolts and washers shall be cadmium plated. Screws shall be black or cadmium plated flat head, cross slotted screws with full thread length.

When no longer required, as determined by the Engineer, temporary traffic screen shall be removed from the site of the work and shall become the property of the Contractor.

10-1.23 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," and "Order of Work", of these special provisions.

GENERAL.--Whenever the work or the Contractor's operations establishes a fixed obstacle, the exposed fixed obstacle shall be protected with a sand filled temporary crash cushion. The sand filled temporary crash cushion shall be in place prior to opening the lanes adjacent to the fixed obstacle to public traffic.

Sand filled temporary crash cushions shall be maintained in place at each location, including times when work is not actively in progress. Sand filled temporary crash cushions may be removed during a work period for access to the work provided that the exposed fixed obstacle is 15 feet or more from a lane carrying public traffic and the temporary crash cushion is reset to protect the obstacle prior to the end of the work period in which the fixed obstacle was exposed. When no longer required, as determined by the Engineer, sand filled temporary crash cushions shall be removed from the site of the work.

MATERIALS.--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:

1. Energite III Inertial Modules, manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601-2076, Telephone 1-312-467-6750, FAX 1-800-770-6755.

   A. Distributor (Northern): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, Telephone 1-800-884-8274, FAX 1-916-387-9734
   B. Distributor (Southern): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805, Telephone 1-800-222-8274, FAX 1-714-937-1070.

2. Fitch Inertial Modules, manufactured by Roadway Safety Service, Inc., 1050 North Rand Road, Wauconda, IL 60084, Telephone 1-800-426-0839, FAX 1-847-487-9820.

   A.. Distributor (Northern): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, Telephone 1-800-884-8274, FAX 1-916-387-9734

B. Distributor (Southern): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805, Telephone 1-800-222-8274, FAX 1-714-937-1070.

3. 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.

A. Russ Enterprises, Inc., 1533 Berger Drive, San Jose, CA 95112, Telephone 1-408-287-4303, FAX 1-408-287-1929.
B. Statewide Safety, 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 pounds for each module as 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.

INSTALLATION.--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 crash cushion array is within 12 feet of the traveled way. The marker panel, when required, shall be firmly fastened to the crash cushion with commercial quality hardware or by other methods determined by the Engineer.

At the completion of the project, temporary crash cushion modules, sand filling, pallets or frames, and marker panels shall become the property of the Contractor and shall be removed from the site of the work. Temporary crash cushion modules shall not be installed in the permanent work.

MEASUREMENT AND PAYMENT.--Temporary crash cushion modules will be measured by the unit 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 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.

10-1.24 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.

Delete the first paragraph of Section 15-1.02, "Preservation of Property," of the Standard Specifications.

Existing facilities which are to remain in place shall be protected in conformance with the provisions in Sections 7-1.11, "Preservation of Property," and 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications and "Indemnification and Insurance," elsewhere in these special provisions.

Plans of the existing bridges may be requested by fax from the Division of Structure Maintenance and Investigations, 1801 30th Street, Sacramento, California, Fax (916) 227-8357, and are available at the Office of Structure Maintenance and Investigations, Los Angeles, California, Telephone (213) 897-6156.

Plans of the existing bridges available to the Contractor are reproductions of the original contract plans with significant changes noted and working drawings and do not necessarily show normal construction tolerances and variances. Where dimensions of new construction required by this contract are dependent on the dimensions of the existing bridges, the Contractor shall verify the controlling field dimensions and shall be responsible for adjusting dimensions of the work to fit existing conditions.

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 Division of Occupational Safety and Health Construction Safety Orders Title 8, of the California Code of Regulations including Section 5158, "Other Confined Space Operations."

10-1.24A ABANDON MANHOLE

Existing manholes, where shown on the plans to be abandoned, shall be abandoned.

Frames and covers shall be removed and reused in the work as shown on the plans.

Full compensation for removing and reusing frames and covers shall be considered as included in the contract price paid for the item of work requiring reuse of the frame and cover.

10-1.24B REMOVE MANHOLE

Existing manholes, where shown on the plans to be removed, shall be removed.

10-1.24C ABANDON CULVERT

Existing culverts, where shown on the plans to be abandoned, shall be abandoned in place or, at the option of the Contractor, the culverts shall be removed and disposed of. Resulting openings into existing structures that are to remain in place shall be plugged with commercial quality concrete containing not less than 660 pounds of cement per cubic yard.

Abandoning culverts in place shall conform to the following:

Culverts that intersect the side slopes shall be removed to a depth of not less than 3 feet measured normal to the plane of the finished side slope, before being abandoned.

Culverts12 inches 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 Engineerthat completely fills the pipe. Sand backfill material shall be clean, free draining, and free from roots and other deleterious substances.

The ends of culverts shall be securely closed by a 0.5-foot thick tight fitting plug or wall of commercial quality concrete.

Culverts shall not be abandoned until their use is no longer required. The Contractor shall notify the Engineer in advance of any intended culvert abandonment.

Full compensation for concrete plugs, pipe removal, structure excavation, and backfill (including sand, controlled low strength backfill material or slurry cement backfill), shall be considered as included in the contract unit price paid for abandon culvert and no additional compensation will be allowed therefor.

10-1.24D ABANDON UNDERDRAIN

Existing underdrains, where shown on the plans to be abandoned, shall be abandoned in place or at the option of the Contractor, the underdrains shall be removed and disposed of. All resulting openings into existing structures, that are to remain in place, shall be plugged with commercial quality concrete containing not less than 470 pounds of cement per cubic yard.

Abandoning underdrains in place shall conform to the following:

Underdrains, that intersect the side slopes, shall be removed to a depth of not less than 3 feet, measured normal to the plane of the finished side slope, before being abandoned.

The ends of underdrains shall be securely closed by a 0.5-foot thick tight fitting plug or wall of commercial quality concrete.

Underdrains shall not be abandoned until their use is no longer required. The Contractor shall notify the Engineer in advance of any intended underdrains abandonment.

Full compensation for plugs, pipe removal, structure excavation, and backfill, shall be considered as included in the contract unit price paid for abandon underdrain, and no additional compensation will be allowed therefor.

10-1.24E REMOVE YELLOW PAINTED TRAFFIC STRIPES

Yellow painted traffic stripes to be removedshall be removed at locations shown on the plans and at the locations designated by the Engineer in conformance with these special provisions.

Yellow painted traffic stripes may contain lead and chromium. Residue produced when yellow paint is removed may contain heavy metals in concentrations that exceed hazardous waste thresholds established by the California Code of Regulations and may produce toxic fumes when heated.

The removed yellow paint material shall be disposed of at a Class 1 disposal facility in conformance with the requirements of the disposal facility operator within 90 days after accumulating 100 kg of residue and dust. The Contractor shall make all arrangements with the operator of the disposal facility and perform all testing of the yellow paint residue required by the operator. The Contractor shall submit the name and location of the facility along with testing requirements to the Engineer not less than 21 days prior to removal of the yellow painted traffic stripes.

The Contractor removing the yellow paint shall submit the written compliance programs required in Subsection (e)(2), "Compliance Program," of Section 1532.1, "Lead," of the Construction Safety Orders to the Engineer not less than 21 days prior to the start of the removal operations. The compliance programs shall be prepared by an industrial hygienist certified by the American Board of Industrial Hygiene and shall cover all Contractor employees removing or handling yellow paint residue. Inspection reports shall be made in conformance with Section 1532.1, "Lead," and shall be submitted to the Engineer

Prior to performing any removal, personnel who have no prior lead training, including State personnel, shall complete a safety training class provided by the Contractor. The training shall meet the requirements of Title 8, Section 1532.1. The number of State personnel to be trained shall be 2.

Where grinding or other methods approved by the Engineer are used to remove yellow painted traffic stripes, the residue, including dust, shall be contained and collected immediately. Sweeping shall not be performed. Collection shall be by a HEPA vacuum attachment operated concurrently, or other equally effective method, with the removal operations. The Contractor shall submit a removal, storage, and disposal workplan, in writing, to the Engineer for approval not less than 21 days prior to the start of the removal operations.

The collected residue shall be stored in labeled and covered containers. The containers shall be approved by the United States Department of Transportation for transportation and temporary storage. The containers shall be handled in such a manner that no spillage will occur. The containers shall be stored in a secured enclosure at a location within the project limits approved by the Engineer while awaiting test results required by the operators of the disposal facility.

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

Removed yellow paint material shall remain the property of the State.

The removed material shall be transported to the Class 1 disposal facility by a transporter currently registered with the California Department of Toxic Substance Control using current manifesting procedures. The Engineer will obtain the United States Environmental Protection Agency Identification Number and sign all manifests as the generator.

The Contractor shall assume that the yellow paint residue is not regulated under the Federal Resource Conservation and Recovery Act (RCRA). Additional disposal costs for residue regulated under RCRA, as determined by the test results, will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

Except as otherwise provided above for possible additional costs to be paid for as extra work, full compensation for submitting the required compliance programs, making arrangements with the Class 1 disposal facility operator, providing for the temporary storage of the residue within a secured area, testing the residue as required by the disposal facility operator, transportation of the residue to the Class 1 disposal facility, and disposal of the residue, all as specified herein, shall be considered as included in the contract price paid per linear foot for remove yellow painted traffic stripe and no additional compensation will be allowed therefor.

Nothing in these special provisions shall relieve the Contractor from his responsibilities as provided in Section 7-1.09, "Public Safety," of the Standard Specifications.

10-1.24F REMOVE CRASH CUSHION

Crash cushions, designated on the plans to be removed, shall become the property of the Contractor and shall be removed.

Remove crash cushion shall be measured by the unit and consist of removing a grouping of modules, regardless of the number of modules grouped at each location.

10-1.24G REMOVE METAL BEAM GUARD RAILING

Existing metal beam guard railing, where shown on the plans to be removed, shall be removed and disposed of.

Existing concrete anchors or steel foundation tubes shall be completely removed and disposed of. Full compensation for removing concrete anchors shall be considered as included in the contract price paid per linear foot for remove metal beam guard railing and no separate payment will be made therefor.

Full compensation for removing cable anchor assemblies, terminal anchor assemblies or steel foundation tubes shall be considered as included in the contract price paid per linear foot for remove metal beam guard railing and no separate payment will be made therefor.

10-1.24H REMOVE DOUBLE METAL BEAM BARRIER

Existing double metal beam barrier, where shown on the plans to be removed, shall be removed and disposed of.

Existing concrete anchors shall be completely removed and disposed of. Full compensation for removing concrete anchors shall be considered as included in the contract price paid per linear foot for remove double metal beam barrier and no separate payment will be made therefor.

Full compensation for removing cable anchor assemblies, terminal anchor assemblies or steel foundation tubes shall be considered as included in the contract price paid per linear foot for remove double metal beam barrier and no separate payment will be made therefor.

Existing headlight glare screen located on double metal beam barrier shall be removed and disposed of. Full compensation for removing and disposing of headlight glare screen shall be considered as included in the contract price paid per linear foot for remove double metal beam barrier and no separate payment will be made therefor.

10-1.24I REMOVE SIGN STRUCTURE

Existing sign structures, where shown on the plans to be removed, shall be removed and disposed of.

Overhead sign structure removal shall consist of removing posts, frames, portions of foundations, sign panels, walkways with safety railings, and sign lighting electrical equipment.

A sign structure shall not be removed until the structure is no longer required for the direction of public traffic.

Concrete foundations may be abandoned in place, except that the top portion, including anchor bolts, reinforcing steel, and conduits shall be removed to a depth of not less than 3 feet below the adjacent finished grade. The resulting holes shall be backfilled and compacted with material equivalent to the surrounding material.

Electrical wiring shall be removed to the nearest pull box. Fuses within spliced connections in the pull box shall be removed and disposed of.

Electrical equipment, where shown on the plans, shall be salvaged.

10-1.24J REMOVE FENCE

Existing fence, including post footings and anchor blocks, where shown on the plans, shall be removed and disposed of.

Full compensation for backfilling and compacting post holes shall be considered as included in the contract price paid per linear foot for remove fence and no additional compensation will be allowed therefor.

10-1.24K 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.

Delete the first paragraph of Section 15-2.02C, "Pavement Markers," of the Standard Specifications.

Pavement markers, including underlying adhesive, shall be removed by such methods that will cause the least possible damage to the pavement or surfacing. Damage to the pavement or surfacing caused by pavement marker removal shall be repaired by the Contractor at the Contractor's expense by methods acceptable to the Engineer.

10-1.24L REMOVE TRAFFIC STRIPE AND PAVEMENT MARKING

Traffic stripes and pavement markings to be removed shall be removed at the locations shown on the plans and at the locations designated by the Engineer.

Nothing in these special provisions shall relieve the Contractor from the Contractor's responsibilities as provided in Section 7-1.09, "Public Safety," of the Standard Specifications.

Delete the first paragraph of Section 15-2.02B, "Traffic Stripes and Pavement Markings," of the Standard Specifications.

Traffic stripes and pavement markings shall be removed by any method that does not materially damage the existing pavement. Pavement marking images shall be removed in such a manner that the old message cannot be identified. Where grinding is used, the pavement marking image shall be removed by grinding a rectangular area. The minimum dimensions of the rectangle shall be the height and width of the pavement marking. Residue resulting from removal operations shall be removed from pavement surfaces by sweeping or vacuuming before the residue is blown by the action of traffic or wind, migrates across lanes or shoulders, or enters into drainage facilities.

Full compensation for additional grinding outside the limits of the existing pavement marking image to obtain a rectangular area shall be considered as included in the contract price paid per square foot for remove pavement marking and no additional compensation will be allowed therefor.

10-1.24M REMOVE DRAINAGE FACILITIES

Existing flared end sections, pipes, inlets, parkway drains and manholes, where any portion of these structures is within 3 feet of the grading plane in excavation areas, or within one foot of original ground in embankment areas or where shown on the plans to be removed, shall be completely removed and disposed of.

10-1.24N 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.

10-1.24O REMOVE RETAINING WALL

Existing retaining walls, at those locations shown on the plans to be removed, shall be removed and disposed of.

Removing retaining wall will be measured and paid for by the linear foot, measured along the face of the retaining wall before removal operations.

Concrete removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

10-1.24P REMOVE BLOCK WALL

Existing block walls, at those locations shown on the plans to be removed, shall be removed and disposed of.

Removing block wall will be measured and paid for by the linear foot, measured along the face of the block wall before removal operations.

Concrete removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

10-1.24Q REMOVE GRAVITY WALL

Existing gravity walls, at those locations shown on the plans to be removed, shall be removed and disposed of.

Removing gravity wall will be measured and paid for by the linear foot, measured along the face of the gravity wall before removal operations.

Concrete removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

10-1.24R REMOVE SOUND WALL

Existing sound walls, at those locations shown on the plans to be removed, shall be removed and disposed of.

Removing sound wall will be measured and paid for by the linear foot, measured along the face of the sound wall before removal operations.

Concrete removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

10-1.24S RECONSTRUCT SIGN STRUCTURE

Reconstructing sign structures shall consist of removing and reconstructing existing sign structures at the new locations shown on the plans.

Sign panels will be furnished by the State as provided under "Materials" of these special provisions.

Each existing concrete foundation including anchor bolts, reinforcing steel, and conduit shall be removed to a depth of not less than 3 feet below the adjacent finished grade. Electrical wiring, if any, shall be removed to the nearest pull box. Removed portions of concrete foundations shall be disposed of.

Sign lighting electrical work is provided for in Section 10-3, "Signals, Lighting And Electrical Systems," of these special provisions.

New foundation work for reconstructed sign structures shall conform to the provisions in Section 56-1, "Overhead Sign Structures," of the Standard Specifications.

New metal components required to reconstruct sign structures shall conform to the requirements for new sign structures in Section 56-1, "Overhead Sign Structures," of the Standard Specifications and will be measured and paid for by the pound as furnish sign structure (truss).

Full compensation for installing new metal components shall be considered as included in the contract unit price paid for reconstruct sign structure and no separate payment will be made therefor.

10-1.24T RELOCATE SIGN STRUCTURE

Relocating sign structures shall consist of removing and relocating existing sign structures as shown on the plans.

Each existing concrete foundation, including anchor bolts, reinforcing steel, and conduit shall be removed to a depth of not less than 3 feet below the adjacent finished grade. Electrical wiring, if any, shall be removed to the nearest pull box. Removed portions of concrete foundations 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.

New foundation work for relocated sign structures shall conform to the provisions in Section 56-1, "Overhead Sign Structures," of the Standard Specifications, except that full compensation for furnishing and installing a new anchor bolt assembly on each new foundation shall be considered as included in the contract price paid per linear foot for the size of cast-in-drilled-hole concrete pile (sign foundation) involved and no separate payment will be made therefor.

Sign lighting electrical work is provided for in Section 10-3, "Signals, Lighting And Electrical Systems," of these special provisions.

10-1.24U ADJUST INLET

Existing pipe inlets and 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 770 pounds of cement per cubic yard.

Where inlets are located in areas to be paved or surfaced, no individual structure shall be constructed to final grade until the paving or surfacing has been completed immediately adjacent to the structure.

10-1.24V ADJUST FRAME AND GRATE TO GRADE

Frames and grates of existing drainage inlets or other facilities shall be adjusted to grade in conformance with the provisions in Section 15-2.05, "Reconstruction," of the Standard Specifications.

10-1.24W REMODEL INLET

Existing inlets, where shown on the plans to be remodeled, shall be remodeled.

Removed portions of inlets 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.

Full compensation for removing and reusing frames and grates shall be considered as included in the contract unit price paid for remodel inlet and no separate payment will be made therefor.

10-1.24X ADJUST MANHOLE TO GRADE

Existing manholes to be adjusted, 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 770 pounds of cement per cubic yard.

Where manholes are located in areas to be paved or surfaced, no individual structure shall be constructed to final grade until the paving or surfacing has been completed immediately adjacent to the structure.

10-1.24Y 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 30 inches 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 0.15-foot 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 30:1 (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 50 feet of the planer, unless otherwise directed by the Engineer.

Cold plane asphalt concrete pavement will be measured by the square yard for the depth (maximum) designated in the Engineer's Estimate. The quantity to be paid for will be the actual area of surface cold planed for the depth (maximum) designated in the Engineer's Estimate, irrespective of the number of passes required to obtain the depth shown on the plans.

The contract price paid per square yard for cold plane asphalt concrete pavement for the depth (maximum) designated in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in cold planing asphalt concrete surfacing and disposing of planed material, including furnishing the asphalt concrete for and constructing, maintaining, removing, and disposing of temporary asphalt concrete tapers, as specified in the Standard Specifications and these special provisions and as directed by the Engineer.

10-1.24Z CAP INLET

Existing pipe inlets and concrete drainage inlets, where shown on the plans to be capped, shall be capped and the bottoms of the inlets shall be rounded with portland cement concrete as shown on the plans.

Portland cement concrete shall be minor concrete or may be produced from commercial quality aggregates and cement containing not less than 564 pounds of cement per cubic yard.

Inlets shall be removed to a depth of at least one foot below the grading plane.

Concrete removal shall be performed without damage to portions of the inlet that are to remain in place. Damage to existing concrete, which is to remain in place, shall be repaired by the Contractor to a condition equal to that existing prior to the beginning of removal operations. The repair of existing concrete damaged by the Contractor's operations shall be at the Contractor's expense.

Existing reinforcement that is to be incorporated in the new work shall be protected from damage and shall be thoroughly cleaned of adhering material before being embedded in the new concrete.

The quantity of capping inlets will be determined as units from actual count.

The contract unit price paid for cap inlet shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in capping inlets, including removing portions of inlets, rounding bottoms of inlets, bar reinforcing steel, and structure excavation and structure backfill, as shown on the plans, as specified in the Standard Specifications and these special provisions and as directed by the Engineer.

10-1.24AA CAP REINFORCED CONCRETE BOX OPENING

Existingreinforced concrete box openings, where shown on the plans to be capped, shall be capped as shown on the plans.

Portland cement concrete shall be minor concrete or may be produced from commercial quality aggregates and cement containing not less than 770 pounds of cement per cubic yard.

Concrete removal shall be performed without damage to portions of the reinforced concrete box that are to remain in place. Damage to existing concrete, which is to remain in place, shall be repaired by the Contractor to a condition equal to that existing prior to the beginning of removal operations. The repair of existing concrete damaged by the Contractor's operations shall be at the Contractor's expense.

Existing reinforcement that is to be incorporated in the new work shall be protected from damage and shall be thoroughly cleaned of adhering material before being embedded in the new concrete.

The quantity of capping reinforced concrete box openings will be determined as units from actual count.

The contract unit price paid for cap reinforced concrete box openings shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in capping reinforced concrete box openings, including removing portions of reinforced concrete boxes, bar reinforcing steel, and structure excavation and structure backfill, as shown on the plans, as specified in the Standard Specifications and these special provisions and as directed by the Engineer.

10-1.24BB MAINTAIN EXISTING TRAFFIC SURVEILLANCE STATIONS

Attention is directed to Section 7-1.11 "Preservation of Property," of the Standard Specifications. A Traffic Surveillance Station consists of detectors, the Model 170 Controller assembly, the telecommunication demarcation point, and all associated conduit and conductors necessary to interconnect these components and to provide reporting via the existing communication system to the Traffic Operations Center.

In areas where trenching operations are to be performed, the Contractor shall determine the exact location of the existing detectors, including the portion leading to the adjacent pull box, prior to beginning the trenching operations. If any part of the detector, including the portion leading to the adjacent pull box is damaged by the Contractor's operations the entire detector shall be replaced. The Engineer shall be notified immediately when damage occurs. Detectors damaged by the Contractor's operations shall be replaced within five calendar days of damage. Replacement detectors shall conform to the requirements specified under Section 86-5.01 "Vehicle Detectors" of the Standard Specifications.

Attention is directed to Sections 71.08, "Public Convenience," 7-1.09 "Public Safety," and 12, "Construction Area Traffic Control Devices" of the Standard Specifications and to the sections entitled "Public Safety" and "Maintaining Traffic" elsewhere in these special provisions.

Replacement of any vehicle detector damaged by the Contractor's operations, including necessary traffic control systems, shall be performed by the Contractor at no expense to the State, as directed by the Engineer.

Full compensation for maintain existing traffic surveillance stations 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.

10-1.24CC ABANDON PEDESTRIAN UNDERCROSSING

Existing pedestrian undercrossings, where shown on the plans to be abandoned, shall be abandoned at the following locations:

Location 1
Cleveland Avenue Pedestrian Undercrossing
Bridge No. 53-852

Location 2
Mountain Avenue Pedestrian Undercrossing
Bridge No. 55-1018

The invert slab shall be broken, the interior shall be completely filled and the ends shall be sealed according to the details shown on the plans and the requirements in these special provisions.

All utilities connected to the pedestrian undercrossing shall be disconnected at the service point, unless otherwise shown on the plans, and abandoned. Disconnecting and abandoning utilities shall conform with the codes and regulations of the serving utilities.

Except as otherwise specified, fill shall consist of pneumatically placed fine aggregate with water added at the nozzle.

Where removal of concrete is shown on the plans, the concrete may be disposed of within the pedestrian undercrossing or stairwells at a depth of not less than 3 feet below finished grade. Voids and interstices in the concrete fill material shall be completely filled with aggregate.

Aggregate and water shall conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications. Fine aggregate shall not contain more than 6 percent moisture by weight.

A maximum of 30 percent pea gravel may be substituted for fine aggregate in the fill. The size of pea gravel shall be such that 100 percent passes the 3/8 inch screen and not more than 5 percent passes the No. 30 screen.

The velocity of the aggregate and amount of water added at the nozzle that result in the maximum density of the aggregate in place shall be determined by the Contractor and approved by the Engineer. The approved aggregate velocity and amount of water shall be maintained during filling operations.

A constant pressure of not less than 45 pounds per square inch shall be maintained in the placing machine where the hose length is 100 feet or less and the minimum pressure shall be increased at least 5 pounds per square inch for each additional 50 feet of hose length or fraction thereof.

Water used at the nozzle shall be maintained at a uniform pressure, which shall be at least 15 pounds per square inch more than the air pressure at the machine.

The Contractor may propose alternative methods for placing the fill. Alternative methods shall be approved by the Engineer before use. Approval of alternative methods will be determined in conformance with the provisions for approval of alternative equipment in Section 5-1.11, "Alternative Equipment," of the Standard Specifications.

Abandon pedestrian undercrossing will be paid for at a contract lump sum price.

The contract lump sum prices paid for abandon pedestrian undercrossing location 1 and location 2 shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, for disconnecting utility services, for constructing concrete for furnishing and placing fill, for removing portions of existing structures as shown on the plans, and for doing all the work involved in abandoning the pedestrian undercrossing, as shown on the plans, as specified in the Standard Specifications and these special provisions and as directed by the Engineer.

10-1.24DD BRIDGE REMOVAL

Removing portions of bridges shall conform to the provisions in Section 15-4, "Bridge Removal," of the Standard Specifications and these special provisions.

Portions of bridges including barriers, railings, AC overlay, overhangs, portions of abutments, channel lining, retaining walls and wingwalls and other portions as shown on the plans shall be removed from bridges at the following locations:

Location A
White Avenue Undercrossing
Bridge No. 53-853

Location B
Park Avenue Undercrossing
Bridge No. 53-854

Location C
Garey Avenue Undercrossing
Bridge No. 53-855

Location D
Towne Avenue Undercrossing
Bridge No. 53-858

Location E
San Antonio Avenue Undercrossing
Bridge No. 53-859

Location F
Indian Hill Boulevard Undercrossing
Bridge No. 53-860

Location G
San Jose Wash
Bridge No. 53-1825

Location H
College Avenue Pedestrian Undercrossing
Bridge No. 53-1019

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 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 following additional requirements apply to the removal of portions of bridges whenever the removal work is to be performed over public traffic:

A protective cover supported by falsework or members of the existing structure shall be constructed before beginning bridge removal work.

The construction and removal of the protective cover and the installation and removal of temporary railings shall conform to the requirements under "Order of Work" "Maintaining Traffic" and "Temporary Railings" of these special provisions.

The protective cover shall prevent any materials, equipment, or debris from falling onto the public traffic. The protective cover shall have a minimum strength equivalent to that provided by good, sound Douglas fir planking having a nominal thickness of 2 inches. Additional layers of material shall be furnished as necessary to prevent fine materials or debris from sifting down upon the traveled way and shoulders.

The protective cover shall conform to the provisions for falsework in Section 51-1.06, "Falsework," of the Standard Specifications.

The Contractor shall be responsible for designing and constructing a safe and adequate protective cover, and shoring and falsework needed to support the protective cover, all with sufficient strength and rigidity to support the entire load to be imposed.

Bridge removal methods shall be described in the working drawings and calculations in sufficient detail to substantiate live loads used in the protective cover design. Dead and live load values assumed for designing the protective cover shall be shown on the working drawings.

The protective cover shall provide a minimum vertical clearance of 15'-0" over traffic.

The construction of the protective cover as specified herein shall not relieve the Contractor of responsibilities specified in Section 7-1.12, "Responsibility for Damage" of the Standard Specifications and "Indemnification and Insurance" of these special provisions.

10-1.24EE ACCESS OPENING, SOFFIT

Access opening in bridge soffits shall consist of removing portions of existing box girder bridge soffits at the locations and to the dimensions shown on the plans.

A 3/4 inch deep saw cut shall be made around the perimeter of the soffit areas to be removed.

Bar reinforcing steel shall be removed as shown on the plans. The ends of the remaining bars shall be coated with 2 applications of a zinc-rich primer in the same manner specified for exposed ends of prestressing steel in Section 50-1.05, "Prestressing Steel," of the Standard Specifications.

Within a cell where work is to be performed, existing formwork and miscellaneous concrete that will interfere with the work shall be removed.

All material removed shall become the property of the Contractor and shall be disposed of outside the highway right of way as provided in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

When no longer required, soffit access openings shall be closed as shown on the plans. All materials, including galvanized sheet metal covers, steel hardware, hinges, and corrosion resistant concrete expansion anchorage devices, shall be commercial quality.

An approved thread locking system, consisting of a cleaner, primer and anaerobic adhesive, shall be applied where shown on the plans. Lubricants and foreign materials shall be removed from the threaded areas of both parts using the cleaner and small wire brush. The primer shall be applied to cover the threaded areas of both parts. The anaerobic adhesive shall be applied to fill the male threads in the area of the final position of the nut. The nut shall be installed at the location or to the torque shown on the plans, and an additional fillet of anaerobic adhesive shall be applied completely around the exposed junctions of the nut and male part.

Unless specified as an option, using deck access openings in lieu of soffit access openings will not be allowed.

Access openings through soffits will be measured and paid for by the unit as access opening, soffit. Openings to be paid for will be determined from actual count of the completed units in place.

The contract unit price paid for access opening, soffit shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the soffit access opening, complete in place, including closing the soffit access opening and removing forms and miscellaneous concrete, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.24FF JACKING SUPERSTRUCTURE

Jacking superstructure shall consist of lowering the superstructures as shown on the plans and in accordance with the requirements in these special provisions at the following locations:

Location A
White Avenue Undercrossing (Left side only)
Bridge No. 53-853

Location B
Park Avenue Undercrossing
Bridge No. 53-854

Location E
San Antonio Avenue Undercrossing
Bridge No. 53-859

Location F
Indian Hill Boulevard Undercrossing
Bridge No. 53-860

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GENERAL.--Attention is directed to "Order of Work" and "Maintaining Traffic," elsewhere in these special provisions.

The Contractor shall design the temporary supports for the superstructure and determine the methods and equipment for lowering the superstructure.

At least 5 weeks before starting the work the Contractor shall submit to the Engineer complete calculations, details and working drawings of the temporary supports, methods and equipment he proposes to use in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. Working drawings and calculations shall be signed by an engineer who is registered as a Civil Engineer in the State of California.

LOWERING OPERATIONS.- -The supports and jacking equipment shall accommodate the structure dead load shown on the plans and any additional loads due to the Contractor's operations. The lowering system shall provide total stability of the structure throughout the lowering operations.

Systems involving modifications to the bridge that impair the structural integrity, intended serviceability or design capacity of the bridge shall not be used.

A redundant system of supports for back-up should the primary lowering system fail shall be provided. Such redundant system shall include stacks of steel plates that will be removed one by one as the superstructure is lowered. Steel plates shall be maintained to within 3/4 inch of the superstructure soffit during the entire lowering process.

Monitoring and control devices to assure proper load distribution and lowering shall be provided. The superstructure shall be lowered uniformly without distortion that would cause damage to the structure.

The superstructure shall be lowered to the position shown on the plans so that the load is distributed uniformly across each abutment. Galvanized shims shall be placed, as approved by the Engineer, when they are required to provide uniform loading at bearing pads.

Damage to the structure as a result of the Contractor's operations shall be repaired or replaced by the Contractor at his expense in accordance with the requirements for new work of similar character.

After lowering the superstructure, all members installed on the bridge for jacking the superstructure shall be removed and the bridge surfaces shall be finished.

PAYMENT.--Lowering the superstructure will be paid for on the basis of a lump sum price. The contract lump sum price paid for lowering superstructure shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in lowering the superstructure (including shimming at bearing pads), complete in place as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.24GG 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 yard, measured before and during removal operations except as otherwise provided in this special provision.

Removing concrete curb, concrete curb and gutter and concrete sidewalk will be paid for as remove concrete.

Removing concrete barrier will be measured and paid by the linear foot, measured along the barrier before removal operations as remove concrete barrier.

Removing portions of existing concrete channel sections will be paid for on the basis of a lump sum price as concrete channel removal.

Removing concrete retaining wall will be paid for on the basis of a lump sum price as concrete retaining wall removal.

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.

10-1.24HH REMOVE PORTLAND CEMENT CONCRETE PAVEMENT

Removing portland cement concrete pavement shall conform to the provisions in Section 15-3, "Removing Concrete," of the Standard Specifications.

Where no joint exists in the pavement on the line at which concrete is to be removed, a straight, neat cut with a power driven saw shall be made along the line to a minimum depth of 0.17-footbefore removing the concrete.

The quantities of portland cement concrete pavement removed will be measured and paid for by the square yard.

No deduction will be made from any excavation quantities for the quantity of portland cement concrete pavement removed.

Full compensation for removing bituminous or other overlying material and sawing joints at removal lines, as required, shall be considered as included in the contract price paid per square yard for remove concrete pavement and no additional compensation will be allowed therefor.

Where no joint exists between concrete to be removed and concrete to remain in place, the concrete shall be cut in a neat line to a minimum depth of 0.17-foot with a power driven saw before concrete is removed.

Where concrete has been removed outside the roadway prism, the backfilled areas shall be graded to drain and blend in with the surrounding terrain.

Concrete to be removed which has portions of the same structure both above and below ground will be considered as concrete above ground for compensation.

10-1.24II REMOVE UNSOUND CONCRETE

This work shall consist of the removal and disposal of unsound portland cement concrete, unsound epoxy concrete patches and all asphalt concrete patches, from the decks, curbs and railings of bridges. Unsound concrete shall be removed as shown on the plans and to the limits designated by the Engineer.

Unsound concrete is generally that concrete which emits a relatively dead or hollow sound when a chain is dragged over its surface or its surface is tapped with a metal tool. Concrete encasing corroded reinforcing steel beyond the limits identified by the sound may be considered as unsound concrete. The Engineer will determine the soundness of all concrete.

Equipment and tools shall not be used to remove unsound concrete which, in the opinion of the Engineer, cause the removal of excess quantities of sound concrete along with the unsound concrete. Equipment used shall be fitted with suitable traps, filters, drip pans or other devices to prevent oil or other deleterious matter from being deposited on the deck.

After the removal of unsound concrete has been completed, any existing reinforcing steel which has been exposed shall be restored to position and blocked and tied in conformance with the provisions in Section 52, "Reinforcement," of the Standard Specifications.

Reinforcing steel that has been damaged to the extent that the steel’s usefulness is destroyed as a result of the Contractor's operations, shall be repaired or replaced by the Contractor at the Contractor’s expense.

Removing unsound concrete will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

10-1.24JJ PREPARE CONCRETE BRIDGE DECK SURFACE

This work shall consist of cleaning the portland cement concrete deck surface by using steel shot-blasting and blowing clean the deck surface, as shown on the plans and as described in these special provisions.

All laitance and surface contaminants including, but not limited to rust, oil, paint, joint material, and other foreign material shall be cleaned from the surface of the existing concrete deck.

If the surface becomes contaminated at any time prior to placing the primer for the overlay, the surface shall be cleaned by abrasive blasting.

Where abrasive blasting is being performed within 10 feet of a lane occupied by public traffic, the residue including dust shall be removed immediately after contact between the abrasive and the surface being treated. Such removal shall be by a vacuum attachment operating concurrently with the abrasive blasting operation.

Nothing in these special provisions shall relieve the Contractor from his responsibilities in conformance with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications.

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.

Equipment or procedures that leave fractured aggregate or otherwise damage the concrete surface which is to remain shall not be used.

All removed materials shall become the property of the Contractor and shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Preparing concrete bridge deck surface will be measured by the square foot of surface which is prepared to receive the overlay, based on dimensions shown on the plans.

The contract price paid per square foot for prepare concrete bridge deck surface shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in preparing the concrete bridge deck surface complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.24KK REMOVE ASPHALT CONCRETE SURFACING

The existing asphalt concrete surfacing, membrane seal and reinforced concrete expansion dams shall be removed to the top of existing portland cement concrete slab at bridge decks and bridge approaches as shown on the plans and as described in these special provisions.

The method of removal shall be selected by the Contractor. Equipment or procedures that damage the remaining concrete surface, as determined by the Engineer, shall not be used.

The outline of the asphalt concrete to be removed shall be cut with a power-driven saw to a depth of not less than 0.15-foot before removing the surfacing. Surfacing shall be removed without damage to surfacing that is to remain in place. Damage to pavement which is to remain in place shall be repaired to a condition satisfactory to the Engineer, or the damaged pavement shall be removed and replaced with new asphalt concrete when ordered by the Engineer. Repairing or removing and replacing pavement damaged outside the limits of surfacing to be removed shall be at the Contractor's expense and will not be measured or paid for.

All removed materials shall become the property of the Contractor and shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Remove asphalt concrete surfacing will be measured by the square yard.

The contract price paid per square yard for remove asphalt concrete surfacing shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in removing asphalt concrete surfacing, membrane seal, and reinforced concrete expansion dams, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.25 CLEARING AND GRUBBING

Clearing and grubbing shall conform to the provisions in Section 16, "Clearing and Grubbing," of the Standard Specifications and these special provisions.

Attention is directed to "Indemnification and Insurance" and "Aerially Deposited Lead, General" of these special provisions.

Delete Section 16-1.02, "Preservation of Property," of the Standard Specifications.

Attention is directed to Sections 7-1.11, "Preservation of Property" and 8-1.10, "Utility and Non-Highway Facilities" of the Standard Specifications. Existing highway improvements and facilities, adjacent property, utility and non-highway facilities, existing highway underdrain, and trees and plants that are not to be removed, shall be protected from injury or damage resulting from the Contractor's operations. Only trees and plants that are designated or marked for removal by the Engineer shall be removed.

Delete the last paragraph of Section 16-1.03, "Construction," of the Standard Specifications.

Tree branches extending over the roadway and which hang within 20 feet of finished grade shall be cut off close to the trunks in accordance with recognized standards of good arboricultural practices. In connection with removal of tree branches that extend over the new or widened roadway, the Contractor shall remove other tree branches under the direction of the Engineer, in such a manner that the tree will present a balanced appearance.

10-1.26 EARTHWORK

Earthwork shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

Attention is directed to "Indemnification and Insurance," elsewhere in these special provisions.

Delete the first paragraph of Section 19-1.02, "Preservation of Property," of the Standard Specifications.

Attention is directed to Sections 7-1.11, "Preservation of Property," 7-1.16, "Contractor's Responsibility for the Work and Materials," and 8-1.10, "Utility and Non-Highway Facilities" of the Standard Specifications..

Delete the fourth paragraph of Section 19-1.02, "Preservation of Property," of the Standard Specifications.

In addition to the requirements in Sections 5-1.02, "Plans and Working Drawings," and 5-1.02A, "Trench Excavation Safety Plans," plans of the shoring details for excavations on or affecting railroad property will be reviewed for adequacy of protection provided for railroad facilities, property, and traffic. Those plans shall be submitted at least 12 weeks before the Contractor intends to begin excavation requiring the shoring. Approval by the Engineer of the plans for the shoring details will be contingent upon the plans being satisfactory to the railroad company involved.

Delete the seventh paragraph of Section 19-3.03, "Cofferdams," of the Standard Specifications.

In accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," the Contractor shall submit to the Engineer, for approval, drawings showing the Contractor's proposed method of cofferdam construction and other details left open to the Contractor's choice or not fully shown on the plans. Except for drawings of cofferdams on or affecting railroad property, the drawings shall be submitted at least 3 weeks in advance of the time the Contractor begins construction of the cofferdams. Drawings of cofferdams on or affecting railroad property shall be submitted at least 12 weeks in advance of the time the Contractor begins construction of cofferdams. Approval by the Engineer of the drawings for the cofferdams will be contingent upon the plans being satisfactory to the railroad company involved.

Delete the twelfth paragraph of Section 19-3.06, "Structure Backfill," of the Standard Specifications.

Structure backfill placed at bridge supports in waterways and water channels, and not beneath any embankment, pavement or slope protection, need not be compacted, shall consist of soil which is free of organic matter, trash or other unsatisfactory material, and shall be placed to the level of the original ground or finished grade.

Where a portion of existing surfacing is to be removed, the outline of the area to be removed shall be cut on a neat line with a power-driven saw to a minimum depth of 0.17-foot before removing the surfacing. Full compensation for cutting existing surfacing shall be considered as included in the contract price paid per cubic yard for roadway excavation and no additional compensation will be allowed therefor.

At the locations and to the limits shown on the plans, material below the bottom of bridge footings shall be removed and replaced with material in conformance with the placing and compacting requirements for structure backfill. The relative compaction shall be not less than 95 percent. Removal of the material will be measured and paid for by the cubic yard as structure excavation (bridge) and furnishing, placing, and compacting the replacement material will be measured and paid for by the cubic yard as structure backfill (bridge).

At the locations and to the limits shown on the plans, material below the bottom of retaining wall footings shall be removed and replaced with material in conformance with the placing and compacting requirements for structure backfill. The relative compaction shall be not less than 95 percent. Removal of the material will be measured and paid for by the cubic yard as structure excavation (retaining wall) and furnishing, placing, and compacting the replacement material will be measured and paid for by the cubic yard as structure backfill (retaining wall).

10-1.27 MATERIAL WITH AERIALLY DEPOSITED LEAD

Attention is directed to "Aerially Deposited Lead, General" of these special provisions.

Existing materials to be excavated from a depth of 0-feet to 3-feet below existing grade and contain less than 6.75×10^{-5} ounces per gallon soluble lead using deionized water, and are designated as Type Y materials and shall be placed in embankments and covered with a minimum of one foot of cover material as shown on the plans.

Existing materials to be excavated shown on the plans as Type Y materials contain less than 0.0252 ounces per pound total lead concentration or less than 6.75×10^{-5} soluble lead using deionized water, and shall be placed in embankments beneath one foot of cover material as shown on the plans.

Excavation, transportation, placement and handling of materials containing aerially deposited lead shall result in no visible dust. The Contractor shall have a water truck available at all times while performing earthwork, excavation or clearing and grubbingactivities in work areas containing aerially deposited lead.

The Contractor shall monitor the air quality during excavation operations in accordance with the requirements of the Health and Safety Plan. Results of the air quality tests shall be made available to the Engineer upon request.

Full compensation for conforming to the requirements of this section involving materials containing lead, except as otherwise specifically provided in these special provisions, shall be considered as included in the contract prices paidper cubic yard for roadway excavation and no additional compensation will be allowed therefor.

10-1.28 CONTROLLED LOW STRENGTH MATERIAL

Controlled low strength material shall consist of a workable mixture of aggregate, cementitious materials and water, and shall conform to the provisions for slurry cement backfill in Section 19-3.062, "Slurry Cement Backfill," of the Standard Specifications and these special provisions.

At the option of the Contractor, controlled low strength material may be used as structure backfill for pipe culverts, except that controlled low strength material shall not be used as structure backfill foraluminum and aluminum-coated culverts nor for culverts having a diameter or span greater than 20 feet.

When controlled low strength material is used for structure backfill, the width of the excavation shown on the plans may be reduced so that the clear distance between the outside of the pipe and the side of the excavation, on each side of the pipe, is a minimum of 12 inches. This minimum may be reduced to 6 inches when, either the height of cover is less than or equal to 20 feet or the pipe diameter or span is less than 42 inches.

Controlled low strength material in new construction shall not be permanently placed higher than the basement soil. For trenches in existing pavements, permanent placement shall be no higher than the bottom of the existing pavement permeable drainage layer. If a drainage layer does not exist, permanent placement in existing pavements shall be no higher than one inch below the bottom of the existing asphalt concrete surfacing or no higher than the top of base below the existing Portland cement concrete pavement. The minimum height that controlled low strength material shall be placed, relative to the culvert invert, is 0.5D (D=Diameter) or 0.5 height for rigid culverts and 0.7D or 0.7 height for flexible culverts.

When controlled low strength material is proposed for use, the Contractor shall submit a mix design and test data to the Engineer for approval prior to excavating the trench for which controlled low strength material is proposed for use. The test data shall demonstrate that the mix design provides:

a) A 28-day compressive strength between 50 and 100 psi for pipe culverts having a height of cover of 20 feet or less and a minimum 28-day compressive strength of 100 psifor pipe culverts having a height of cover greater than 20 feet. Compressive strength shall be determined in conformance with the requirements in ASTM Designation: D 4832.
b) When controlled low strength material is used as structure backfill for pipe culverts, the sections of pipe culvert in contact with the controlled low strength material shall conform to the requirements of Chapter 850 of the Highway Design Manual using the minimum resistivity, pH, chloride content, and sulfate content of the hardened controlled low strength material. Minimum resistivity and pH shall be determinedin conformance with the requirements of California Test 643. The chloride content shall be determined in conformance with the requirements of California Test 422 and the sulfate content shall be determined in conformance with the requirements of California Test 417.
c) Cement shall be any type of portland cement conforming to the requirements in ASTM Designation: C 150; or any type of blended hydraulic cement conforming to the requirements in ASTM Designation: C 595M or the physical requirements in ASTM Designation: C 1157M. Testing of cement will not be required.
d) Admixtures may be used in conformance with the provisions in Section 90-4, "Admixtures," of the Standard Specifications. Chemical admixtures containing chlorides as Cl in excess of one percent by weight of admixture, as determined in conformance with the requirements of California Test 415, shall not be used. If an air-entraining admixture is used, the maximum air content shall be limited to 20 percent. Mineral admixtures shall be used at the Contractor's option.

Materials for controlled low strength material shall be thoroughly machine-mixed in a pugmill, rotary drum or other approved mixer. Mixing shall continue until the cementitious material and water are thoroughly dispersed throughout the material. Controlled low strength material shall be placed in the work within 3 hours after introduction of the cement to the aggregates.

When controlled low strength material is to be placed within the traveled way or otherwise to be covered by paving or embankment materials, the material shall achieve a maximum indentation diameter of 3 inches prior to covering and opening to traffic. Penetration resistance shall be measured in conformance with the requirements in ASTM Designation: C 6024.

Controlled low strength material used as structure backfill for pipe culverts will be considered structure backfill for compensation purposes.

Full compensation for controlled low strength material used as backfill material for abandon culvert will be considered as included in the contract unit price paid for abandon culvert and no additional compensation will be allowed therefor.

10-1.29 TIEBACK WALL EARTHWORK

Cross sections of the site in the vicinity of the tieback wall are included in the "Information Handout" available to the Contractor in conformance with the provisions in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

The Contractor shall submit to the Engineer working drawings and a construction sequence for the proposed method of tieback wall construction for the site. The drawings shall conform to the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The drawings shall be signed by an engineer who is registered as a Civil Engineer in the State of California. One set of the drawings and construction sequence, and one copy of the design calculations, shall be furnished to the Engineer. The working drawings and construction sequence shall include, but not be limited to, defining order of work, traffic control, method of installation of tiebacks, method of placing shotcrete, limits of structure excavation lifts, and type of drilling and excavation equipment to be used. The Contractor shall allow one week after complete drawings and all support data are submitted for the review and approval of the proposed method of tieback wall construction.

Should the Engineer fail to complete the review and approval 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 working drawings and construction sequence plan review and approval for the tieback wall, 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.

Structure Excavation (Tieback Wall)--Excavation and construction of the tieback wall shall proceed from the top down in lifts.

Care shall be taken in performing structure excavation (tieback wall) for placement of shotcrete such that a minimal void behind the shotcrete is required to be backfilled.

Excavation in front of the wall shall not extend more than 3 feet below the level of the tiebacks prior to completion of the tieback assemblies.

The Engineer will determine whether boulders or portions of boulders that interfere with the placement of the shotcreteshall be removed. The additional earthwork involved in removing boulders or portions of boulders shall be performed by the Contractor as directed by the Engineer, and such additional work will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

At the end of the work shift, shotcrete or temporary shoringshall be in place the full height of the exposed excavation face.

Structure Backfill (Tieback Wall)--Material for structure backfill behind shotcreteshall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications. Structure backfill behind shotcreteshall be compacted by hand tamping, mechanical compaction or other means approved by the Engineer.

Structure backfill in fill areas behind the shotcreteshall be keyed into the existing or excavated back slope.

Backfill behind the shotcreteshall be in place and compacted to at least 3 feet above the level of the tiebacks prior to drilling for the tiebacks. The remainder of the backfill behind the shotcreteshall be placed and compacted after tiebacks are drilled, stressed and grouted.

Measurement and Payment--Excavation for tieback wall construction will be measured and paid for as structure excavation (retaining wall).

Full compensation for working drawings and supplements, and shoring, if required, for tieback wall construction shall be considered as included in the contract price paid per cubic yard for structure excavation (retaining wall) and no additional compensation will be allowed therefor.

Full compensation for geocomposite drains, and plastic pipes, shall be considered as included in the contract price paid per cubic yard for shotcrete and no additional compensation will be allowed therefor.

MEASUREMENT AND PAYMENT (EARTHWORK)

Measurement and payment for earthwork shall conform to all provisions for "Measurement" and "Payment" in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

Pervious backfill material in connection with the bridge work will be measured and paid for by the cubic yard as structure backfill (bridge).

Pervious backfill material within the limits of payment for retaining walls will be measured and paid for by the cubic yard as structure backfill (retaining wall).

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 yard for structure excavation (bridge) or structure backfill (bridge).

10-1.30 IRRIGATION CROSSOVERS

Irrigation crossovers shall conform to the provisions in Section 20-5, "Irrigation Systems," of the Standard Specifications and these special provisions.

Materials shall be commercial quality unless otherwise specified. Materials containing asbestos fibers shall not be used. Materials shall conform to the provisions in Section 20-2, "Materials," of the Standard Specifications and these special provisions.

Irrigation crossovers shall include conduits, water line crossovers, sprinkler control crossovers and appurtenances. Sizes of the conduits, water line crossovers and sprinkler control crossovers shall be as shown on the plans or as specified in these special provisions.

The title of Section 20-5.03B, "Conduit for Water Line Crossovers and Sprinkler Control Crossovers," of the Standard Specifications is changed to, "Conduit for Irrigation Crossovers."

Conduits shall be jacked or drilled in conformance with the provisions in Section 20-5.03B, "Conduit for Irrigation Crossovers," of the Standard Specifications.

Conduit for irrigation crossovers shall conform to the provisions in Section 20-2.16, "Conduit," of the Standard Specifications.

Conduits shall be welded steel pipe.

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.

10-1.31 FINISHING ROADWAY

Finishing roadway shall conform to the provisions in Section 22, "Finishing Roadway," of the Standard Specifications.

10-1.32 AGGREGATE SUBBASE

Aggregate subbase shall be Classes 2 and 4 and shall conform to the provisions in Section 25, "Aggregate Subbases," of the Standard Specifications and these special provisions.

Delete the first paragraph of Section 25-1.02A, "Class 1, Class 2, and Class 3 Aggregate Subbases," of the Standard Specifications.

Aggregate for Class 1, Class 2 and Class 3 aggregate subbase shall be clean and free from organic matter and other deleterious substances, and shall be of such a nature that it can be copacted readily under watering and rolling to form a firm, stable base. Aggregate may include material processed from reclaimed asphalt concrete, portland cement concrete, lean concrete base, cement treated base or a combination of any of these materials. The amount of reclaimed material shall not excedd 50 percent of the total of the voulme of the aggregate used.

Delete the first paragraph of Section 25-1.02B, "Class 4 Aggregate Subbase," of the Standard Specifications.

Aggregate for Class 4 aggregate subbase shall be clean and free from organic matter and other deleterious substances, and shall conform to the grading and quality requirements set forth in these special provisions. Aggregate may include material processed from reclaimed asphalt concrete, portland cement concrete, lean concrete base, cement treated base or a combination of any of these materials. The amount of reclaimed material shall not excedd 50 percent of the total of the voulme of the aggregate used.

Aggregate for Class 4 aggregate subbase may include reclaimed glass. Aggregate subbase incorporating reclaimed glass shall not be placed at locations where surfacing will not be placed over the aggregate subbase.

The percentage composition by weight of Class 4 aggregate subbase shall conform to the following grading requirements:

	Percentage Passing	
Sieve Sizes	Operating Range	Contract Compliance
3"	100	100
2 $^1/_2$"	90-100	87-100
No. 4	35-100	30-100
No. 200	0-20	0-23

Class 4 aggregate subbase shall also conform to the quality requirements:

	Requirements	
	Operating Range	Contract Compliance
Sand Equivalent	21 Min.	18 Min.
Resistance (R-value)	- - - - - - -	50 Min.

The provisions of the last four 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 said Section 25-1.02A, may be used in place of Class 4 aggregate subbase. The restrictionthat the amount of reclaimed material included in Class 2 aggregate subbase not exceed 50 percent of tht total volume of the aggregate used shall not apply. Aggregate for Class 2 aggregate subbase may include reclaimed glass. Aggregate 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

10-1.33 AGGREGATE BASES

Aggregate bases shall be Class 2 and Class 3 and shall conform to the provisions in Section 26, "Aggregate Bases," of the Standard Specifications and these special provisions.

Delete the first paragraph of Section 26-1.02A, "Class 2 Aggregate Bases," of the Standard Specifications.

Aggregate for Class 2 aggregate base shall be clean and free from organic matter and other deleterious substances, and shall be of such nature that it can be compacted readily under watering and rolling to form a firm, stable base. Aggregate may include material processed from reclaimed asphalt concrete, portland cement concrete, lean concrete base, cement treated base or a combination of any of these materials.

Delete the third paragraph of Section 26-1.02A, "Class 2 Aggregate Bases," of the Standard Specifications.

The aggregate for Class 2 and Class 3 aggregate bases 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.

Delete Section 26-1.02B, "Class 3 Aggregate Base," of the Standard Specifications.

Aggregate for Class 3 aggregate base shall and shall conform to the grading and quality requirements set forth in these special provisions. Aggregate may include material processed from reclaimed asphalt concrete, portland cement concrete, lean concrete base, cement treated base or a combination of any of these materials.

The grading of aggregate for Class 3 aggregate base shall, at the option of the Contractor, conform either to the grading specified in the special provisions or to either the 1 1/2-inch maximum or the 3/4 inch maximum grading for Class 2 aggregate base as provided in Section 26-1.02 A, "Class 2 Aggregate Base." Once a grading is selected, said grading shall not be changed without written approval of the Engineer.

Aggregate for Class 2 and Class 3 aggregate base may include reclaimed glass. Aggregate base incorporating reclaimed glass shall not be placed at locations where surfacing will not be placed over the aggregate base.

At the option of the Contractor, the aggregate for Class 3 aggregate base shall conform to either the 1 1/2-inch maximum or the 3/4 inch maximum grading.

Once a grading is selected, the grading shall not be changed without written approval by the Engineer.

Aggregate for Class 3 aggregate base shall be clean and free from organic matter and other deleterious substances and shall conform to the following requirements:

Grading Requirements
(Percentage Passing)
1 1/2" Maximum

Sieve Sizes	Operating Range	Contract Compliance
2"	100	100
1 1/2"	90 - 100	87 - 100
1"	-------	-------
3/4"	50 - 90	45 - 95
No. 4	25 - 60	20 - 65
No. 30	10 - 35	6 - 39
No. 200	3 - 15	0 - 19

Grading Requirements
(Percentage Passing)
3/4" Maximum

Sieve Sizes	Operating Range	Contract Compliance
2"	-------	-------
1 1/2"	-------	-------
1"	100	100
3/4"	90 - 100	87 - 100
No. 4	40 - 70	35 - 75
No. 30	12 - 40	7 - 45
No. 200	3 - 15	0 - 19

Quality Requirements

Tests	Operating Range	Contract Compliance
Sand Equivalent	21 Min.	18 Min.
Resistance (R-value)	---------	50 Min.

The requirements of the last 4 paragraphs in Section 26-1.02A, "Class 2 Aggregate Base," of the Standard Specifications shall apply to Class 3 aggregate base.

10-1.34 LEAN CONCRETE BASE

Lean concrete base shall conform to the provisions in Section 28, "Lean Concrete Base," of the Standard Specifications and these special provisions.

Delete the second paragraph of Section 28-1.10, "Payment," of the Standard Specifications.

If the Engineer orders an increase in the specified portland cement content as provided in Section 28-1.01, "Description," of the Standard Specifications, the compensation payable to the Contractor for lean concrete base will be increased on the basis of the cost of cement per ton, f.o.b. the cement mill (including sales tax) plus the freight cost per ton for delivery of the cement to the project from the mill. In determining the cost of the cement, any cash or trade discount offered or available will be credited to the State notwithstanding the fact that the discount may not have been taken by the purchaser.

10-1.35 ASPHALT CONCRETE

Asphalt concrete shall be Types A and B 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.

The aggregate for Types A and B asphalt concrete shall conform to the open graded asphalt concrete percentage passing 1/2" maximum grading specified in Section 39-2.03, "Aggregate," of the Standard Specifications and in Section 11-1, "Quality Control / Quality Assurance," of these special provisions.

The asphalt concrete mixture, composed of the proposed aggregate blend and the proposed asphalt binder content as determined by California Test 367, shall have a minimum tensile strength ratio (TSR) of 70 percent as determined by AASHTO Designation: T283.

If the Contractor selects the batch mixing method, asphalt concrete shall be produced by the automatic batch mixing method as provided in Section 39-5.03B, "Automatic Proportioning," of the Standard Specifications and in Section 11-1, "Quality Control / Quality Assurance," of these special provisions.

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 requirements in the first paragraph and the last 4 paragraphs in Section 42-2.02, "Construction," of the Standard Specifications.

In addition to the aggregate requirements listed in Section 11-1, "Asphalt Concrete," elsewhere in these special provisions, the combined aggregates shall conform to the following quality requirement when mixed with paving asphalt Grade AR-4000 in the amount of asphalt determined to be optimum by California Test 367:

Test	California Test	Requirement
Surface Abrasion	360, Method A	Loss not to exceed 15 grams

In addition to the requirements in Section 39-7.01, "Spreading Equipment," of the Standard Specifications and 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 30 feet. The ski device shall be a rigid one piece unit and the entire length shall be utilized in activating the sensor.

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 0.01-foot 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.

Should 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 39-8.04, "Compacting," of the Standard Specifications and 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.

Should 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.

In addition to the straightedge requirements in Section 39-8.04, "Compacting," of the Standard Specifications and in Section 11-1, "Quality Control / Quality Assurance," of these special provisions, asphalt concrete pavement shall conform to the surface tolerances specified herein.

The top surface of the uppermost layer of asphalt concrete surfacing shall be profiled, in the presence of the Engineer, using a California Profilograph or equivalent in conformance with California Test 526 and as specified in these special provisions. Prior to beginning profiles, the profilograph shall be calibrated in the presence of the Engineer. Profiles shall be made on the traveled way 3 feet from and parallel to each edge of traveled way and at the approximate location of the planned lane lines.

Pavement so profiled shall conform to the following Profile Index requirements:

1. Pavement on tangent alignment and pavement on horizontal curves having a centerline radius curve of 2,000 feet or more shall have a Profile Index of 5 inches per mile or less for each 0.1-mile section profiled.
2. Pavement on horizontal curves having a centerline radius curve of 1,000 feet or more but less than 2,000 feet including the pavement within the superelevation transition of such curves, and pavement thicker than 0.20-foot total thickness placed on existing surfacing, shall have a Profile Index of 10 inches per mile or less for each 0.1-mile section profiled.

3. Pavement shall not have individual deviations in excess of 0.3-inch, as determined by California Test 526. The location of the profiles for determining deviations shall be designated by the Engineer.

Checking the following areas of pavement surface with the California Profilograph or equivalent will not be required:

1. Pavement on horizontal curves having a centerline radius curve of less than 1,000 feet and pavement within the superelevation transition of such curves.
2. Pavement with a total thickness of 0.20-foot or less, or pavement with extensive grade correction which does not receive advance leveling operations as specified in Section 39-8.03, "Spreading," of the Standard Specifications and in Section 11-1, "Quality Control / Quality Assurance," these special provisions, or where the edge of asphalt concrete conforms to curbs or gutters with a Profile Index greater than 5 inches per mile.
3. Pavement for ramps and connectors with steep grades and high rates of superelevation and short sections of city or county streets and roads.
4. Pavement within 50 feet of a transverse joint that separates the pavement from an existing pavement not constructed under the contract.
5. Shoulders and miscellaneous areas.

The Contractor shall schedule paving operations such that final rolling of asphalt concrete pavement is completed and initial runs of the profilograph are completed prior to opening new pavement to public traffic. Scheduling of these operations shallconform to the provisions for lane closures in "Maintaining Traffic" of these special provisions. In the event that initial profiles are not made prior to opening the pavement to public traffic, the initial profilograph runs shall be made the next day that traffic control is permitted for the area to be profiled.

The top surface of the uppermost layer of asphalt concrete surfacing that does not meet specified surface tolerances shall be brought within tolerance by abrasive grinding. Areas which have been subject to abrasive grinding shall receive a fog seal coat. Deviations in excess of 0.3-inch which cannot be brought into specified surface tolerances by abrasive grinding shall be corrected by either (1) removal and replacement or (2) placing an overlay of asphalt concrete. The corrective method for each area shall be selected by the Contractor and shall be as approved by the Engineer prior to beginning the corrective work. Replacement or overlay pavement not meeting specified tolerances shall be corrected by the methods specified above. Corrective work shall be at the Contractor's expense except that flagging costs will be paid for in conformance with the provisions in Section 12-2, "Flagging," of the Standard Specifications.

After abrasive grinding has been completed to reduce individual deviations in excess of 0.3-inch, additional grinding or corrections to the surface as specified above shall be performed as necessary to reduce the Profile Index of the pavement to the specified Profile Index value required for the area. The Contractor shall run profilograms of areas that havebeen subject to abrasive grinding or corrective work until the final profilograms indicate the Profile Index of the area is within the specified tolerance.

When abrasive grinding is used to bring the top surface of the uppermost layer of asphalt concrete surfacing within specified surface tolerances, additional abrasive grinding shall be performed as necessary to extend the area ground in each lateral direction so that the lateral limits of grinding are at a constant offset from, and parallel to the nearest lane line or pavement edge, and in each longitudinal direction so that the grinding begins and ends at lines normal to the pavement centerline, within any ground area. Ground areas shall be neat rectangular areas of uniform surface appearance.

Abrasive grinding shall conform to the provisions in the first paragraph and the last 4 paragraphs in Section 42-2.02, "Construction," of the Standard Specifications, except that the grinding residue shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The original of final profilograms that indicate the pavement surface is within the Profile Index specified shall become the property of the State and shall be delivered to the Engineer prior to acceptance of the contract.

Full compensation for performing all profile checks for Profile Index and furnishing final profilograms to the Engineer, for performing corrective work to the pavement surface including abrasive grinding, removing and replacing asphalt concrete or placing asphalt concrete overlay to bring the surface within the tolerance specified shall be considered as included in the contract price paid per ton for asphalt concrete and no separate payment will be made therefor.

The area to which paint binder has been applied shall be closed to public traffic. Care shall be taken to avoid tracking binder material onto existing pavement surfaces beyond the limits of construction.

A drop-off of more than 0.15-foot will not be allowed at any time between adjacent lanes open to public traffic.

Shoulders or median borders adjacent to a lane being paved shall be surfaced prior to opening the lane to traffic.

The aggregate from each separate bin used for asphalt concrete, Types A and B, except for the bin containing the fine material, shall have a Cleanness Value of 57, minimum, as determined by California Test 227, modified as follows:

Tests will be performed on the material retained on the No. 8 sieve from each bin and will not be a combined or averaged result.

Each test specimen will be prepared by hand shaking for 30 seconds, a single loading of the entire sample on a 12-inch diameter, No. 4 sieve, nested on top of a 12-inch diameter, No. 8 sieve.

Where a coarse aggregate bin contains material which will pass the maximum size specified and be retained on a 3/8 inch sieve, the test specimen weight and volume of wash water specified for 1" x No. 4 aggregate size will be used.

Samples will be obtained from the weigh box area during or immediately after discharge from each bin of the batching plant or immediately prior to mixing with asphalt in the case of continuous mixers.

The Cleanness Value of the test sample from each of the bins will be separately computed and reported.

At drier-drum and continuous plants with cold feed control, Cleanness Value test samples will be obtained from the discharge of each coarse aggregate storage. An aggregate sampling device shall be provided which will provide a 50-pound sample of each coarse aggregate.

10-1.36 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 accordance with the requirements for asphalt concrete placed on the traveled way in Section 11-1, "Quality Control / Quality Assurance," of these special provisions.

Aggregate for asphalt concrete dikes shall conform to the 3/8 inch maximum grading as specified in Section 39-2.02, "Aggregate," of the Standard Specifications.

The miscellaneous areas to be paid for at the contract price per square yard 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 ton for asphalt concrete specified in Section 11-1, "Quality Control / Quality Assurance," of these special provisions. Section 39-10.02, "Statistical Evaluation and Determination of Pay Factor," in Section 11-1, "Quality Control / Quality Assurance," elsewhere in 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 as specified in Section 39-8.02, "Payment," of the Standard Specifications.

10-1.37 CONCRETE PAVEMENT

Portland cement concrete pavement shall conform to the provisions in Section 40, "Portland Cement Concrete Pavement," of the Standard Specifications and these special provisions.

Delete the second paragraph of Section 40-1.015, "Cement Content," of the Standard Specifications.

After testing samples of the Contractor's proposed aggregate supply, the Engineer may order an increase or decrease in the cement content. If an increase or decrease in the specified quantity of portland cement is ordered by the Engineer, the compensation payable to the Contractor for portland cement concrete pavement will be increased or decreased on the basis the cost of cement per ton, f.o.b. the cement mill (including sales tax) plus the freight cost per ton, for delivery of the cement to the project from the mill. In determining the cost of the cement, any cash or trade discount offered or available will be credited to the State notwithstanding the fact that the discount may not have been taken by the purchaser.

The concrete for pavement shall contain a minimum of 517 pounds per cubic yard of portland cement.

An air-entraining admixture conforming to the requirements in Section 90-4, "Admixtures," of the Standard Specifications shall be added to the concrete at the rate required to result in an air content of 6 (±1 1/2) percent in the freshly mixed concrete.

Transverse weakened plane joints across portland cement concrete shoulders shall be continuous with such joints across the traveled way. Longitudinal joints shall be constructed between portland cement concrete shoulders and adjacent traffic lanes and tie bars shall be installed at such joints as provided herein.

Tie bars shall be installed at longitudinal joints between portland cement concrete shoulders and adjacent traffic lanes and at transverse contact joints, as shown on the plans. Tie bars shall be deformed reinforcing steel bars conforming to the requirements in ASTM Designation: A 615/A 615M, Grade 300 or 400, ASTM Designation: A 616/A 616M, Grade 350 or 400 or ASTM Designation: A 706/A 706M. Tie bars shall be epoxy-coatedin conformance with the provisions in "Reinforcement," of these special provisions.

The joint detail shown on the plans for transverse and longitudinal joints, including the foam backer rod and silicone joint sealant shown on the plans, shall not apply.

Full compensation for furnishing and placing tie bar (epoxy coated) in portland cement concrete pavement shall be considered as included in the contract price paid per cubic yard for concrete pavement and no separate payment will be made therefor.

10-1.38 CONCRETE PAVEMENT (FAST SETTING HYDRULIC CEMENT CONCRETE)

Portland cement concrete pavement at exit ramp termini and other ramp locations shall be constructed as shown on the plans and as provided in "Replace Concrete Pavement (Fast-Setting Hydraulic Cement Concrete)," of these special provisions, except removing existing pavement shall not apply.

10-1.39 REPLACE CONCRETE PAVEMENT

Replace concrete pavement shall consist of removing existing portland cement concrete pavement and replacing the removed pavement with new portland cement concrete pavement as shown on the plans and in conformance with these special provisions.

GENERAL.--The exact limits of concrete pavement removal and replacement will be determined by the Engineer.

The outlines of excavations in the shoulder pavement, except where a joint exists, shall be cut on a neat line to a minimum depth of 0.25-foot with a power-driven concrete saw or wheel-type rock cutting excavator before material is removed. Excavations shall be permanently or temporarily backfilled to conform to the grade of the adjacent pavement prior to opening the replacement pavement to public traffic. Surplus excavated material may be used as temporary backfill material.

The outline of concrete to be removed shall be sawed full depth with a power-driven saw except where the concrete is adjacent to an asphalt concrete shoulder.

REMOVING EXISTING PAVEMENT.--Regardless of the type of equipment used to remove concrete within the sawed outline, the surface of the concrete to be removed shall not be impacted within 1.5 feet of the pavement to remain in place. Pavement removal shall be performed without damage to pavement that is to remain in place. Damage to pavement that is to remain in place shall be repaired to a condition satisfactory to the Engineer, or the damaged pavement shall be removed and replaced with new concrete pavement if ordered by the Engineer. Repairing or removing and replacing damaged pavement outside the limits of concrete pavement replacement shall be at the Contractor's expense and will not be measured nor paid for.

Removed materials shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The material remaining in place, after removing pavement and base to the required depth, shall be graded to a uniform plane, watered, and compacted. The finished surface of the remaining material shall not extend above the grade established by the Engineer.

Areas of the base material which are low as a result of over excavation shall be filled, at the Contractor's expense, with pavement concrete at the time and in the same operation that the replacement concrete is placed.

PORTLAND CEMENT CONCRETE REPLACEMENT PAVEMENT.--Portland cement concrete replacement pavement shall conform to the provisions for concrete pavement in Section 40, "Portland Cement Concrete Pavement," of the Standard Specifications and these special provisions.

The provisions in Section 40-1.015, "Cement Content," of the Standard Specifications shall not apply.

The concrete for replacement pavement shall contain not less than 658 pounds of portland cement per cubic yard. Portland cement shall be Type II Modified, Type II Prestress or Type III. Type II Modified and Type III cement shall conform to the provisions in Section 90-2.01, "Portland Cement," of the Standard Specifications. Type II Prestress cement shall conform to the provisions for 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.

Calcium chloride conforming to the provisions in Section 90-4, "Admixtures," of the Standard Specifications shall be added to the concrete mix at a rate not to exceed 2 percent of the dry weight of the cement. The exact rate will be determined by the Engineer.

Chemical admixtures and mineral admixtures shall not be used to replace portland cement.

Prior to placing concrete, a 1/4 inch thick commercial quality polyethylene flexible foam expansion joint filler shall be placed across the original transverse joint faces and extend the full depth of the excavation with the top of the joint filler flush with the top of pavement. The joint filler shall be secured to the face of the existing pavement joint face by a method that will hold the joint filler in place during placement of concrete.

The penetration of concrete mixes for slab replacement shall conform to the provisions in Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications, except that the nominal penetration shall not exceed 1 1/2 inches and the maximum penetration shall not exceed 2 1/2 inches.

Concrete shall not be placed when the atmospheric temperature is 40° F. or lower. Concrete shall not be placed when the atmospheric temperature is between 40° F. and 50° F. unless a written outline of proposed methods for protecting the concrete from rapid cooling has been submitted by the Contractor and approved by the Engineer. Concrete placed when the atmospheric temperature is between 40° F. and 60° F. shall contain Type II Prestress or Type III portland cement. Concrete

placed when the atmospheric temperature is 60° F. or higher shall contain Type II Modified, Type II Prestress or Type III portland cement.

Concrete shall be spread, compacted, and shaped using stationary side forms in conformance with the provisions in Sections 40-1.07, "Spreading, Compacting and Shaping," and 40-1.07A, "Stationary Side Form Construction," of the Standard Specifications, except as follows:

The third paragraph in Section 40-1.07 shall not apply.

Wood side forms not less than 2-inch nominal thickness may be used. Wood side forms shall conform to the provisions in Section 51-1.05, "Forms," of the Standard Specifications.

The concrete may be spread, shaped, and compacted in conformance with the provisions in the last paragraph in Section 40-1.07A.

The elevation of the completed pavement surface shall be such that water will not pond on either side of the longitudinal contact joint with the existing parallel concrete pavement.

The new pavement surface at the longitudinal contact joint with the existing parallel concrete pavement shall conform as closely as possible to the elevation of the existing concrete pavement. A difference in elevation between the new pavement and the existing pavement shall be eliminated by finishing the new pavement within one foot of the existing pavement by hand methods, adding or removing concrete as necessary.

The joint detail shown on the plans for transverse and longitudinal joints, including the foam backer rod and silicone joint sealant and the longitudinal joint tie bar detail shown on the plans, shall not apply.

Transverse weakened plane joints shall be constructed to match the spacing and skew of existing transverse weakened plane joints in the adjacent concrete pavement. If transverse weakened plane joints are to be sawed, the exact time of sawing shall be the Contractor's responsibility, but in any event, the joints shall be sawed prior to opening the pavement to traffic.

The provisions in Section 40-1.08B(3), "Repair of Spalls, Ravelling and Tearing," of the Standard Specifications shall not apply.

Tests to determine the coefficient of friction of the final textured surface will be made only if the Engineer determines by visual inspection that the final texturing may not have produced a surface having the specified coefficient of friction. Tests to determine the coefficient of friction will be made after the pavement is opened to public traffic, but not later than 5 days after concrete placement. Grooving of pavement areas having a coefficient of friction of less than 0.30, as determined by such tests, shall be performed prior to the installation of the required edge drains adjacent to the areas to be grooved.

Transverse and longitudinal straightedge requirements shall not apply to the pavement surface within one foot of longitudinal contact joints with existing concrete pavement. Longitudinal straightedge requirements shall apply at transverse contact joints with existing concrete pavement and when the straightedge is placed with the midpoint coincident with such joints.

The surface of the concrete pavement will not be profiled and the Profile Index requirements shall not apply.

Concrete replacement pavement shall be cured using curing compound. The curing compound shall be curing compound (1) as specified in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications. The curing compound shall be applied at the nominal rate of one gallon per 150 square feet. The minimum curing period as specified in this section "Replace Concrete Pavement" shall be considered as starting when the curing compound has been applied to the entire slab or slabs of pavement being replaced. Fogging of the pavement surface with water after the curing compound has been applied will not be required. Damage to the curing compound after the pavement is opened to public traffic shall not be repaired. If the film of curing compound be damaged from any cause before the pavement is opened to public traffic, the damaged portion shall be repaired immediately with additional compound, at the Contractor's expense.

TEMPORARY ROADWAY STRUCTURAL SECTION.--A sufficient standby quantity, as determined by the Engineer, of asphalt concrete and aggregate base shall be provided at the project site for construction of a temporary roadway structural section where existing pavement is being replaced. The temporary structural section shall be maintained and later removed as a first order of work when the Contractor is able to construct and cure the new concrete pavement replacement within the prescribed time limit. The temporary structural section shall consist of 0.3-foot thick asphalt concrete over aggregate base.

The aggregate base for the temporary structural section shall be produced from commercial quality aggregates consisting of broken stone, crushed gravel or natural rough-surfaced gravel, and sand or any combination thereof. The grading of the aggregate base shall conform to the 3/4 inch maximum grading specified in Section 26-1.02A, "Class 2 Aggregate Base," of the Standard Specifications.

The asphalt concrete for the temporary structural section shall be produced from commercial quality aggregates and asphalt binder. The grading of the aggregate shall conform to the 3/4 inch maximum medium grading in Section 39-2.02, "Aggregate," of the Standard Specifications and the asphalt binder shall conform to the provisions of liquid asphalt SC-800 in Section 93, "Liquid Asphalts," of the Standard Specifications. The amount of asphalt binder to be mixed with the aggregate shall be approximately 0.3-percent less than the optimum bitumen content as determined by California Test 367.

Aggregate base and asphalt concrete for the temporary structural section shall be spread and compacted by methods that will produce a well-compacted, uniform base, free from pockets of coarse or fine material and a surfacing of uniform smoothness, texture, and density. The aggregate base may be spread and compacted in one layer and the asphalt concrete may be spread and compacted in one layer. The finished surface of the asphalt concrete shall not vary more than 0.05-foot from the lower edge of a straightedge, 12-foot ± 0.20-foot long, placed parallel with the centerline and shall match the elevation of the existing concrete pavement along the joint between the existing pavement and temporary surfacing.

The material from the removed temporary structural section 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 except that removed aggregate base may be stockpiled at the project site and reused for construction of another temporary structural section. When no longer required, standby material or stockpiled material for construction of temporary structural sections shall be removed and disposed of outside the right of way in conformance with Section 7-1.13.

MEASUREMENT AND PAYMENT.--Replace concrete pavement will be measured and paid for in the same manner specified for concrete pavement in Sections 40-1.13, "Measurement," 40-1.14, "Payment," of the Standard Specifications, except that the provisions in Section 40-1.135, "Pavement Thickness," of the Standard Specifications shall not apply.

Full compensation for removing and disposing of existing concrete pavement; furnishing and disposing of standby materials for construction of a temporary structural section; and constructing, maintaining, removing and disposing of temporary structural sections shall be considered as included in the contract price paid per cubic yard for replace concrete pavement and no separate payment will be made therefor.

10-1.40 REPLACE CONCRETE PAVEMENT (FAST-SETTING HYDRAULIC CEMENT CONCRETE)

Replace concrete pavement (fast-setting hydraulic cement concrete) shall consist of removing existing portland cement concrete pavement and replacing the removed pavement with new fast-setting hydraulic cement concrete pavement as shown on the plans and in conformance with these special provisions.

GENERAL.--The exact limits of concrete pavement removal and replacement will be determined by the Engineer.

Existing concrete pavement removed during a work period shall be replaced, in that same work period, with fast-setting hydraulic cement concrete pavement which shall be cured for at least 4 hours and meets the minimum strength requirements of "Evaluation and Acceptance," in this section prior to the time the lane is to be opened to public traffic as designated in "Maintaining Traffic" of these special provisions. In the event the existing pavementis removed and the Contractor is unable, as determined by the Engineer, to construct fast-setting hydraulic concrete pavement by the time the replacement pavement is to be opened to traffic, the excavation shall be filled and compacted with a temporary roadway structural section conforming to the provisions in "Temporary Roadway," of these special provisions.

REMOVING EXISTING PAVEMENT.--Removing existing concrete pavement shall conform to the provisions in Section 15-3, "Removing Concrete," of the Standard Specifications and these special provisions. Concrete pavement shall be removed by a non-impact method. Each pavement panel shall be removed in one or more pieces without disturbance or damage to the underlying cement treated base.

The outline of concrete to be removed, including concrete pavement adjacent to an asphalt concrete shoulder, shall be sawed to full depth with a power-driven saw.

Pavement removal shall be performed without damage to pavement that is to remain in place. Pavement which is to remain in place and has been damaged by the Contractor's activities shall be repaired to a condition approved by the Engineer, or the damaged pavement shall be removed and replaced with concrete conforming to the provisions in "Replacement Pavement—Fast-Setting Hydraulic Cement Concrete Pavement (FSHCC)" of these special provisions.

After removal of the existing concrete pavement, the surface of the undisturbed or undamaged cement treated base shall be cleaned by hand method. Existing cement treated base which, in the opinion of the Engineer, is not in a condition suitable to serve as a base for the replacement pavement shall be removed and replaced to the same thickness with new base material. Removal and replacement of unsuitable cement treated base material will be paid for as extra work as specified in Section 4-1.03D of the Standard Specifications.

Damage to the underlying cement treated base which has been caused by the Contractor shall be repaired to a condition approved by the Engineer or shall be removed and replaced with new base material if ordered by the Engineer. Repairs or removal and replacement of damaged cement treated base shall be at the Contractor’s expense.

New base material shall be replacement pavement and shall conform to "Replacement Pavement—Fast-Setting Hydraulic Cement Concrete Pavement (FSHCC)" of these special provisions. Prior to placement of the replacement pavement, new base material shall be covered with an approved bond breaking material as specified in "Bond Breaker," of these special provisions.

Material remaining in place, after removing pavement, shall be graded to a uniform plane, watered, and compacted. The finished surface of the remaining material shall not extend above the grade established by the Engineer.

Areas of the base material which are low as a result of over excavation shall be filled, at the Contractor's expense, with pavement concrete at the time and in the same operation that the replacement concrete is placed.

The Contractor shall remove no more existing pavement than can be backfilled with new base and replacement pavement or temporary roadway by the time the replacement pavement is to be opened to traffic. The amount of existing pavement that will be permitted to be removed ahead of the replacement operation will depend on the placement process used and the type of temporary roadway chosen by the Contractor and shall be approved by the Engineer prior to beginning construction.

Repairing or removing and replacing damaged existing pavement and damaged cement treated base outside the limits of concrete pavement replacement shall be at the Contractor's expense and will not be measured nor paid for.

Removed materials shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13, "Disposal of Materials Outside the Highway Right of Way," of the Standard Specifications.

REPLACEMENT PAVEMENT—FAST-SETTING HYDRAULIC CEMENT CONCRETE PAVEMENT.--Existing concrete pavement which has been removed shall be replaced by fast-setting hydraulic cement concrete pavement (FSHCC). Fast-setting hydraulic cement concrete pavement shall conform to the provisions in Section 40, "Portland Concrete Pavement," of the Standard Specifications and these special provisions.

The combined aggregate grading used in concrete for replacement pavement shall be either the 1 1/2-inch maximum or the 1-inch maximum grading.

The cement for fast-setting hydraulic cement concrete pavement shall be a hydraulic cement as defined in ASTM Designation: C 219 and shall conform to the following requirements:

Property	Test Method	Requirement
Contraction in Air	California Test 527 w/C Ratio = 0.39±0.010	0.053% (max)
Mortar Expansion in Water	ASTM: C1038	0.04% (max)
Soluble Chloride	California Test 422	0.05% (max)
Soluble Sulfates	California Test 417	0.30% (max)
Thermal Stability	ASTM: C109	90% (min)*
Compressive Strength @ 3 hours	ASTM: C109	2000 psi
Compressive Strength @ 3 days	ASTM: C109	4000 psi

Comparison of compressive strength cubes cured 7 days in water at 73°F followed by 7 days in water at 194°F to that of cubes cured 14 days in water at 73°F.

The provisions in Section 90-1.01, "Description," and of the Standard Specifications shall not apply to fast-setting hydraulic cement concrete pavement except as follows:

The mix proportions for fast-setting hydraulic cement concrete pavement shall be as recommended by the manufacturer of the hydraulic cement.

The provisions in Section 90-2.01, "Portland Cement," and of the Standard Specifications shall not apply except as follows:

Hydraulic cement shall be protected from exposure to moisture until used. Adequate facilities shall be provided to assure that hydraulic cement meeting the requirements of these special provisions will be kept separate from other cement in order to prevent any but the specified hydraulic cement from entering the work. Safe and suitable facilities for sampling hydraulic cement shall be provided at the weigh hopper, or in the feed line immediately in advance of the hopper.

Hydraulic cement furnished without a Certificate of Compliance shall not be used in the work.

A Type C accelerating chemical admixture approved by the Engineer and conforming to the requirements in Section 90-4, "Admixtures," of the Standard Specifications may be used. The Type C accelerating chemical admixture, if used, shall be included in all the testing for the requirements listed in the table above. In addition to the accelerating chemical admixtures listed on the Department’s current list of approved brands of admixtures, citric acid or borax may be used. All chemical admixtures shall be blended into fast-setting hydraulic cement concrete in liquid form.

At least 10 days prior to use, the Contractor shall submit in writing to the Engineer a proposed mix design that shall include the proposed aggregate gradings, the mix proportions of hydraulic cement and aggregate, the type and amount of chemical admixture, the maximum time allowed between batching and placing roadway pavement, the range of temperature over which this mix design is effective (50° F maximum) and any special conditions (including water temperature) or instructions. The Contractor may submit more than one mix design to include the temperature range that is anticipated during placement of roadway pavement. In addition, the Contractor shall furnish samples of the hydraulic cement, aggregates and chemical admixture proposed for use in fast-setting hydraulic cement concrete pavement in the quantity ordered by the Engineer. The Contractor shall develop and furnish both flexural strength and compressive strength gain curves for each proposed mix design for fast-setting hydraulic cement concrete pavement measured at intervals of 3 hours, 4 hours, 8 hours, 24 hours, 7 days and 28 days. Strength gain curves may be developed from laboratory prepared samples. Fast-setting hydraulic cement concrete may be laboratory prepared and shall include all admixtures. Ten days in advance of revising the mix proportions for the fast-setting hydraulic cement concrete to be used in the work, the Contractor shall submit in writing to the Engineer a copy of the proposed mix design. Before using fast-setting hydraulic cement concrete, the mix designs shall be approved by the Engineer.

Fast-setting hydraulic cement concrete pavement shall develop a flexural strength (modulus of rupture) of not less than 410 psi not more than 4 hours after completion of final finishing and also shall develop a flexural strength (modulus of rupture) of not less than 610 psi 28 days after completion. The modulus of rupture shall be considered to be the average of the test results of 3 beam specimens determined by California Test 523 or AASHTO T97.

The penetration requirement in Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications shall not apply.

The provisions in Section 40-1.015, "Cement Content," of the Standard Specifications shall not apply to fast-setting hydraulic cement concrete.

BOND BREAKER.--A bond breaker shall be placed between the replacement pavement and existing cement treated base, as shown on the plans.

The bond breaker shall be either waterproof paper intended for use in curing portland cement concrete, plastic film or sheeting not less than 6 mils in thickness, paving asphalt or other material approved by the Engineer which will not react adversely with the chemical constituents of the concrete or bond with the concrete. Waterproof paper and plastic film or sheeting, if used, shall be placed in a wrinkle-free manner and adjacent sheets shall be overlapped a minimum of 6 inches.

If paving asphalt is to be used as a bond breaker, no water shall be added before application to the surface of the new base. The application rate of paving asphalt shall be applied in one application at a rate of from 0.02-gallon per square yard to 0.1-gallon per square yard of surface covered.

MEASUREMENT OF QUANTITIES

All weighing, measuring and metering devices used to measure the quantity of material used in the work shall be in conformance with the requirements of Section 9, "Measurement and Payment," of the Standard Specifications with the following exception:

The weighing, measuring and metering devices shall have been tested and approved in accordance with California Test 109 within 30 days of the production of fast-setting hydraulic cement concrete pavement.

SPREADING, COMPACTING AND SHAPING

Fast-setting hydraulic cement concrete pavement shall not be placed when the atmospheric temperature during spreading, placement and curing is expected to be outside the temperature ranges covered by the Contractor’s proposed mix design.

Stationary side form construction shall conform to the requirements of Section 40-1.07A, "Stationary Side Form Construction," of the Standard Specifications, with the following exception:

Wood side forms not less than 1-1/2 inches thick may be used. Wood side forms shall conform to the provisions in Section 51-1.05, "Forms," of the Standard Specifications.

Tests to determine the coefficient of friction of the final textured surface will be made only if the Engineer determines by visual inspection that the final texturing may not have produced a surface having the specified coefficient of friction. Any test to determine the coefficient of friction will be made after the pavement is opened to public traffic, but not later than 5 days after replacement pavement has been placed. Grooving of pavement areas having a coefficient of friction of less than 0.30, as determined by the test, shall be performed prior to the installation of any required edge drains adjacent to the areas to be grooved.

Transverse and longitudinal straightedge requirements shall not apply to the replacement pavement surface within one foot of longitudinal contact joints with existing concrete pavement. Longitudinal straightedge requirements shall apply at transverse contact joints with existing concrete pavement and when the straightedge is placed with the midpoint coincident with the joints.

The replacement pavement surface at the longitudinal contact joint with the existing parallel concrete pavement shall conform as closely as possible to the elevation of the existing concrete pavement. Any difference in elevation between the replacement pavement and the existing pavement shall be eliminated by finishing the fast-setting hydraulic cement concrete pavement within one foot of the existing concrete pavement by hand methods, adding and removing replacement pavement concrete as necessary.

Fast-setting hydraulic cement concrete pavement shall be cured for at least 4 hours following completion of final finishing and before opening the lane to traffic.

The Contractor shall be allowed to move the safety barrier transfer/transport machine and construction equipment on replacement pavement 3 hours following completion of final finish when the modulus of rupture has reached 305 psi or higher.

JOINTS

Joints shall conform to the provisions in Section 40-1.08, "Joints," of the Standard Specifications and these special provisions.

Prior to placing concrete, a 1/4-inch thick commercial quality polyethylene flexible foam expansion joint filler shall be placed across the original transverse joint faces and extend the full depth of the excavation with the top of the joint filler flush with the top of pavement. The joint filler shall be secured to the face of the existing pavement joint face by any method that will hold the joint filler in place during placement of the replacement pavement.

Transverse weakened plane joints shall be constructed to match the spacing of the existing transverse weakened plane joints in the adjacent concrete pavement.

Sawing of weakened plane joints shall be completed within 2 hours of completion of final finishing. The minimum depth of the saw cut of the weakened plane joint shall be 1 3/4 inches.

CURING METHOD

The method of cure for replacement pavement shall be as recommended by the manufacturer of the hydraulic cement and as approved by the Engineer.

TEMPORARY ROADWAY.--In the event the existing pavement is removed and the Contractor is unable, as determined by the Engineer, to construct fast-setting hydraulic cement concrete pavement by the time the replacement pavement is opened to traffic, the excavation shall be filled and compacted with a temporary roadway structural section. The temporary structural section shall be removed and replaced by replacement pavement at the Contractor's expense at a time agreed to by the Engineer.

The materials and methods for construction of the temporary roadway shall be chosed by the Contractor and submitted for the Engineer's approval in the Quality Control Plan.

Temporary roadway shall be constructed when:

1. Replacement pavement which fails to meet the requirement of a modulus of rupture of greater than 350 psi at the time that the lane is opened to traffic or a 7-day modulus of rupture of greater than 610 psi.
2. The Contractor shall provide at the job site, a sufficient standby quantity of materials for temporary roadway conforming to the following:

   a. A 3 1/2-inch layer of Type A, 3/4-inch maximum, medium asphalt concrete over 4 1/2-5 1/2 inches of aggregate base. Asphalt concrete shall conform to the provisions of Section 39, “Asphalt Concrete,” of the Standard Specifications, or

   b. Not less than 6 inches of portland cement concrete over 2 1/8-3 1/8 inches of aggregate base. Portland cement concrete shall conform to the provisions of Section 40, "Portland Cement Concrete Pavement," of the Standard Specifications. The provisions of Section 40-1.015, "Cement Content," of the Standard Specifications shall not apply. The concrete for temporary roadway pavement shall contain not less than 880 pounds of portland cement per cubic yard.

   Calcium Chloride conforming to the requirements of Section 90-4, "Admixtures," of the Standard Specifications shall be added to the concrete mix at a rate not to exceed 8 percent of the dry weight of the cement. The exact rate will be determined by the Engineer. Chemical admixtures and mineral admixtures shall not be used to replace portland cement.

The temporary roadway shall be maintained and later removed as a first order of work when the Contractor is able to construct and cure the fast-setting concrete pavement within the required time and strength requirements of these special provisions. The schedule for the removal and replacement of temporary roadway shall be approved by the Engineer.

The aggregate base for the temporary structural section shall be produced from commercial quality aggregate consisting of broken stone, crushed gravel or natural rough-surfaced gravel and sand, or any combination thereof. The grading of the aggregate base shall conform to the 3/4-inch maximum grading specified in Section 26-1.02A, "Class 2 Aggregate Base," of the Standard Specifications.

CONTRACTOR PROCESS CONTROL

GENERAL

The Contractor shall establish, provide and maintain a quality control system, which will provide assurance to the Engineer that all materials and completed construction conform to the contract requirements specified herein. The Contractor shall also be responsible for the quality of all component materials contained within replacement pavement, complete in place, including those procured from subcontractors or vendors.

At least 14 days prior to the placement of the trial slab, the Contractor shall submit to the Engineer for approval a complete and written Quality Control Plan which shall be used to ensure the quality of the product and the work. At the request of the Engineer or Contractor, the Contractor and the Quality Control Managers shall meet with the Engineer to discuss the Quality Control Plan.

If in the judgment of the Engineer the Contractor has not implemented or is not complying with the approved Quality Control Plan, production and placement shall be suspended. Production and placement shall resume with the Engineer's approval.

QUALITY CONTROL PLAN

The Contractor shall provide a Quality Control Plan that describes the procedures which the Contractor will use to control the production process, to determine when changes to the production process are needed, and the procedures proposed to be used to implement the required changes for replacement pavement. The Quality Control Plan shall also include an outline for the placement and testing of the trial slab.

Replacement pavement production and placement shall not begin until the Quality Control Plan has been approved by the Engineer. Approval of the Quality Control Plan will be based on the inclusion of all required information. Approval of the Quality Control Plan does not imply any warranty by the Engineer that adherence to the plan will result in production of replacement pavement that complies with these specifications. It shall remain the responsibility of the Contractor to demonstrate such compliance.

The Quality Control Plan shall include the names and qualifications of at least 2 Quality Control Managers. The Quality Control Managers shall be responsible for the administration of the Quality Control Plan. The Quality Control Managers shall have a current ACI certification for inspection and testing of concrete. All sampling, inspection and test reports shall be reviewed and signed by the Quality Control Manager responsible for the production period involved prior to submittal to the Engineer. At least one of the Quality Control Managers shall be present for all stages of design, trial slab construction, during production and construction of replacement pavement and for all meetings between the Contractor and Engineer relating to production, placement or testing of replacement pavement. The Quality Control Manager can not be a member of the production or paving crew, an inspector or tester on this project during production and placement of replacement pavement. The Quality Control Manager can have no other duties during the production and placement.

The Quality Control Plan shall include an outline of the production, transportation and placement of the replacement pavement. The Quality Control Plan shall include a contingency plan for correcting situations when there is a problem in production, transportation or placement. The Contractor shall have the equipment and personnel present to meet the requirements of the contingency plan. The Quality Control Plan shall contain provisions for determining when placement of replacement pavement will be suspended and temporary roadway will be substituted.

The Quality Control Plan shall include an outline of the sampling, testing and quality control personnel to be used during and after construction of the replacement pavement. At the time of submission of the Quality Control Plan, quality control samplers and testers must be California IAST certified for the samples and tests for which they will be responsible.

Before production and placement begins, the Contractor, Quality Control Managers, and Engineer shall have a meeting with all production, transportation, placement, inspection, sampling and testing personnel to familiarize them with the requirements of this project; the production, transportation and placement processes for replacement pavement; the contingency plan; and the sampling and testing requirements. The Contractor will provide the facility for this meeting. Attendance at this meeting is mandatory for at least the project manager, the quality control managers, the production plant manager, the plant inspector, all truckers, the paving superintendent, the paving foreman, the paving machine operator and all inspectors, samplers and testers. All meeting attendees will sign in at the meeting. Production and placement shall not begin nor proceed unless those key personnel have attended the mandatory meeting.

QUALITY CONTROL INSPECTION, SAMPLING AND TESTING

The Contractor shall perform quality control inspection, sampling and testing to ensure that replacement pavement production and placement conforms to the requirements specified herein.

The Contractor, shall provide the required sampling, testing and inspection during all phases of the replacement pavement production and placement. The Contractor shall provide notice so that the Engineer will witness all sampling and testing. The Engineer shall be given unrestricted access to the Contractor's quality control inspectors, samplers, testers and laboratories. During the production and placement period, the Contractor shall provide results of all testing to the Engineer within 15 minutes of completion of testing. The Contractor shall record all inspection, sampling and testing on forms approved by the Engineer. The Contractor shall provide written results of all inspection and testing to the Engineer within 48 hours of completion of each shift of paving and within 24 hours for all 7-day strength tests.

The Contractor shall provide a testing laboratory with adequate equipment and personnel for the performance of the quality control tests. This laboratory shall be located at a location approved by the Engineer and such that the prompt testing requirements can be met. All sampling and testing equipment shall be maintained in proper working condition. All sampling shall be performed to the standards of California Test 125. The Quality Control Plan shall include a list of the equipment to be used, the method of testing flexural strength, the names and certifications of the sampling and testing personnel and the location of the laboratory and testing equipment during and after the paving operation.

Testing laboratories and equipment and sampling and testing personnel shall conform to the requirements of the Department's Quality Assurance Program.

TRIAL SLAB AND PROCESS CONTROL TESTING

Prior to construction of replacement pavement, the Contractor shall construct one or more trial slabs under conditions similar to those which will exist during pavement replacement to demonstrate that mixing, transporting, placing, finishing, curing and sawing techniques and that the personnel and equipment to be used will produce replacement pavement conforming to these special provisions. During production and placement, the Contractor shall conform to the requirements of these special provisions and to the procedure outlined in the Quality Control Plan to ensure that mixing, transporting, placing, finishing, curing and sawing techniques and that the personnel and equipment to be used will produce replacement pavement conforming to these special provisions.

Trial Slab-The Contractor shall construct a trial slab to demonstrate that the fast-setting hydraulic cement concrete pavement will reach the required strengths within the required time periods. The trial slab shall be constructed using the approved mix design, admixtures and conditions for batching. During construction of the trial slab, the Contractor shall demonstrate placement at the minimum and maximum time allowance for batching to placement. The Contractor shall not proceed to placing replacement pavement within the roadway until a trial slab has been constructed that meets the requirements of these special provisions.

The trial slab of replacement pavement shall have dimensions of not less than 10 feet by 20 feet and shall be 9 inches in thickness. The trial slab shall not be placed on the roadway or within the project limits. The trial slab shall be placed in a location agreed to by the Engineer.

During trial slab construction, the Contractor shall sample the aggregates for grading, cleanness value, and sand equivalent. The Contractor will split these samples with the Engineer. Both sets of test results of these samples shall conform to the provisions in Section 90-2.02, "Aggregates," of the Standard Specifications. If the test results do not conform to the requirements, the trial slab will be rejected.

During trial slab construction, beams shall be fabricated within 20 minutes of delivery of concrete. Beams shall be used to determine the 4-hour and 28-day modulus of rupture. Beams fabricated for the 4-hour test shall be cured under the same conditions as the actual trial slab. Beams fabricated for the 28-day test shall be cured in accordance with California Test 523 or AASHTO T97 and as modified per the Engineer. Testing will be performed by the Contractor and witnessed by the Engineer. At the Engineer’s request, the Contractor shall produce samples for the Engineer to test. Beams fabricated from the trial slab shall meet the strength and time requirements for 3-hour, 4-hour and 28-day flexural strength of fast-setting concrete pavement as specified in these special provisions. The strengths determined from these beams shall be the basis for determining whether fast-setting concrete pavement production and placement may proceed. Beams failing the 4-hour or 28-day modulus of rupture requirements shall be cause for the Engineer to reject the trial slab and require construction of a new trial slab.

During trial slab construction, cylinders will be fabricated and tested in accordance with California Tests 539 and 540 at intervals of 3 hours, 4 hours and 28 days. At the Engineer's request, the Contractor shall produce samples for the Engineer to test. Results from the compressive strength gained by these samples shall be developed into compressive strength-gain curves which will be used during production and placement at the roadway to aid in determining whether production and placement should proceed.

The Contractor will outline the location and time; procedure for production, placement and finishing of the fast-setting hydraulic cement concrete pavement; sampling, sample curing and sample transportation; testing and reporting of test results for the trial slab in the Quality Control Plan.

PROCESS CONTROL AND QUALITY CONTROL TESTING

The Contractor shall provide continuous process control and quality control sampling and testing throughout production and placement of replacement pavement.

During production of fast-setting hydraulic cement concrete for use on the roadway, the Contractor shall sample aggregates at least once in every 650 cubic yards of replacement pavement produced but not less than one sample per placement shift. The aggregate will be tested for grading, cleanness, and sand equivalent.

During placement of replacement pavement, the Contractor shall fabricate and test flexural strength beams and compressive strength cylinders in the first 33 cubic yards, in the final truckload and at least once in every 130 cubic yards (or part thereof) in between.

During placement of replacement pavement on the roadway, the Contractor shall sample and test yield, penetration, air content and unit weight at least once in every 650 cubic yards of replacement pavement produced but not less than 2 samples per day.

At the Engineer's request, the Contractor shall provide split samples and fabricate beams. Cost of sampling, fabricating and transporting extra samples shall be paid as extra work as specified in Section 4-1.03D, "Extra Work," of the Standard Specifications. When, in the opinion of the Engineer, the replacement pavement fails to conform to the mix design requirements or the requirements of these special provisions the Contractor shall provide sample fabrication and testing at the direction of the Engineer. If the material fails to meet requirements of these special provisions, the cost of sampling and testing shall be at the Contractor’s expense. If the material meets the requirements of these special provisions, the cost of sampling and testing shall be paid as extra work as specified in Section 4-1.03D of the Standard Specifications.

Beams and cylinders shall be used to determine 3-hour, 4-hour and 28-day strengths. Beams fabricated for the 3-hour and 4-hour tests shall be cured for at least 2-hours and 3-hours respectively under the same conditions as the pavement before transporting, stripping molds and for testing. Beams fabricated for the 28-day test shall be cured in accordance with California Test 523 or AASHTO T97 and as modified per the Engineer. Modulus of rupture shall be the basis for determining whether replacement pavement production and placement may proceed and will be used for accepting or rejecting the replacement pavement. Compressive strength shall be used as the "referee" in disputes.

EVALUATION AND ACCEPTANCE

All replacement pavement produced and placed during construction of the roadway will be evaluated and accepted or rejected as follows:

1. Replacement pavement which has a modulus of rupture of 410 psi or greater at 4 hours and before the lane is opened to traffic and a 28-day modulus of rupture of 610 psi or greater shall be accepted and shall be paid at the contract price paid per cubic yard of replace concrete pavement.
2. Replacement pavement which has a modulus of rupture of 410 psi or greater at4 hours and before the lane is opened to traffic and a 28-day modulus of rupture of 550 psi and 610 psi or greater shall be accepted and shall be paid at 95 percent of the contract price paid per cubic yard of replace concrete pavement.
3. Replacement pavement which has a modulus of rupture greater than 350 psi. and less than 410 psi before the lane is opened to traffic or a 28-day modulus of rupture of less than 550 psi shall be accepted and shall be paid at 90 percent of the contract bid price.
4. Replacement pavement which has a modulus of rupture of less than 350 psi before the lane is opened to traffic shall be rejected.
5. Additional tests shall be taken as necessary by the Contractor to determine pavement modulus of rupture prior to opening to traffic.

Rejected replacement pavement shall be removed and replaced at the Contractor's expense.

At the Engineer's direction, the Contractor shall suspend producing and placing fast-setting concrete pavement if it is determined that further production, placement or attempts at placement will interfere with the time the lane is to be opened to public traffic as designated in "Maintaining Traffic," of these special provisions.

If more than one sample of replacement pavement fails to meet the 4-hour modulus of rupture of 410 psi in succession, or has a 4-hour modulus of rupture less than 350 psi for any one sample, placement of replacement pavement shall be suspended. Areas from which existing pavement has been removed will be backfilled with temporary roadway materials and all work on the roadway will cease. Before work may begin on the roadway again, the Contractor shall construct a trial slab to demonstrate that the problem has been solved. Work on the roadway shall not begin until the Engineer has approved the changes.

The Contractor shall remove and replace all temporary roadway with replacement pavement, at the Contractor's expense, at a future time agreed to by the Engineer.

Materials resulting from the construction of the trial slab, test specimens, and all rejected replacement pavement shall become property of the Contractor and shall be removed and disposed outside the highway right of way as provided in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

MEASUREMENT AND PAYMENT.--Replace concrete pavement (fast-setting hydraulic cement concrete) will be measured and paid for in the same manner specified for concrete pavement in Sections 40-1.13, "Measurement," and 40-1.14, "Payment," of the Standard Specifications, except that the provisions in Section 40-1.135, "Pavement Thickness," of the Standard Specifications shall not apply.

10-1.41 GRIND CONCRETE PAVEMENT

Grinding existing portland cement concrete pavement and new concrete pavement as shown on the plans shall conform to the provisions in Section 42-2, "Grinding," of the Standard Specifications and these special provisions.

Grinding shall be performed at the locations shown on the plans.

Concrete pavement shall be ground to a maximum depth of 1/4-inch and shall be ground after retrofit dowels are installed..

Residue from grinding portland cement concrete pavement shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13, "Disposal of Material Outside of the Highway Right of Way," of the Standard Specifications.

There is no "'Materials Information" listing locations where grinding residue may be disposed of for this contract.

Residue from grinding portland cement concrete pavement shall be disposed of at a site chosen by the Contractor, provided the Contractor has obtained approval from the California Regional Water Quality Control Board having jurisdiction over any required site. The Contractor shall deliver to the Engineer a copy of the approval or approvals not less than 5 working days prior to disposing any residue at the disposal site.

The Contractor shall provide to the Engineer a landfill receipt and weight ticket to verify that the material has been disposed of in a manner consistent with this section of these special provisions.

The drying or storing of wet residue within the project limits or elsewhere within the State right of way will not be permitted. The wet residue shall be transported to a suitable intermediate location obtained by the Contractor to dry the material. This off-site drying location shall be approved by the California Regional Water Quality Control Board. The Contractor shall deliver to the Engineer a copy of the approval or approvals from the California Regional Water Quality Board not less than 5 working days prior to beginning any portland cement concrete grinding. Dried residue material shall be disposed at a disposal site qualified to receive it.

The Contractor shall make all necessary arrangements for the disposal of the residue from the grinding of portland cement concrete pavement, including but not limited to the drying of the material, agreements with property ownersand obtaining necessary permits, licenses and environmental clearances. Before performing the grinding of portland cement concrete pavement, the Contractor shall furnish to the Engineer satisfactory evidence that the Contractor has made all arrangements required above.

Full compensation for conforming to the requirements of this section shall be considered as include in the contract price paid per square yard for grind concrete pavement and no separate payment will be made therefor.

Grind concrete pavement will be measured and paid for by the square yard in the same manner specified for grind existing concrete pavement in Section 42-2.05, "Payment," of the Standard Specificatiions.

10-1.42 PILING

Piling shall conform to the provisions in Section 49, "Piling," of the Standard Specifications, and these special provisions.

Foundation recommendations are included in the "Information Handout" available to the Contractor as provided for in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

Attention is directed to "Welding Quality Control" of these special provisions.

Attention is directed to "Public Safety" of these special provisions. Before performing pile handling or pile installation operations at a location that is closer than the length of the pile being handled or installed to the edge of areas open to public traffic or public use, 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, a detailed plan describing the measures that will be employed to provide for the safety of traffic and the public.

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

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

At the Contractor's option, the Contractor may conduct additional foundation investigation, including installing and axial load testing additional non-production indicator piling. The Engineer shall approve locations of additional foundation testing. The Contractor shall notify the Engineer at least 5 working days prior to beginning additional foundation investigation.

Additional foundation investigation shall be completed prior to requesting revised specified pile tip elevations or modification to the installation methods specified herein. Revisions to specified tip elevations and modifications to the specified installation methods will be subject to the provisions of Section 5-1.14, "Cost Reduction Incentive."

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

The pile structural capacity design is based on the nominal strength as defined in Caltrans Bridge Design Specifications (Article 8.1.3) or the nominal resistance as defined in the LRFD Bridge Design Specifications (Article 1.3.2.1). The nominal resistance of the pile, as shown on the plans, is the design capacity required to resist the factored axial load demands.

Indicator compression pile load testing shall conform to the requirements of ASTM Designation: D 1143. The acceptance criteria for compression pile load testing shall be as follows:

The pile shall sustain the first compression test load applied which is equal to the nominal compression resistance, as shown on the plans, with no more than 0.5-inch total vertical movement at the top of the pile measured relative to the top of the pile prior to the start of compression load testing.

Indicator tension pile load testing shall conform to the requirements of ASTM Designation: D 3689. The loading apparatus described as "Load Applied to Pile by Hydraulic Jack(s) Acting at One End of Test Beam(s) Anchored to the Pile" shall not be used. The acceptance criteria for tension pile load testing shall be as follows:

The pile shall sustain the first tension test load applied which is equal to the nominal tension resistance, as shown on the plans, with no more than 0.5-inch total vertical movement at the top of the pile measured relative to the top of the pile prior to the start of tension load testing.

Indicator piling shall be removed in conformance with the requirements in Section 15-4.02, "Removal Methods," and the remaining holes shall be backfilled with earth or other suitable material approved by the Engineer.

Section 49-1.04, "Test Piles," of the Standard Specifications is amended to read:

49-1.04 Load Test Piles.—When load test piles and anchor piles are shown on the plans or specified for a structure, the loading tests using those piles shall be completed before the remaining piles for that structure or specified control location are drilled, cast, cut to length, or driven.

Load test piles shall be installed with the same type of equipment that is to be used for installation of foundation piles.

Load test piles which are shown on the plans or specified in the special provisions shall conform to the requirements for piling as specified in these specifications and, unless otherwise shown, shall be so located that they may be cut off and become a part of the completed structure.

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

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

High strength threaded steel rods shall conform to the provisions for bars in Section 50-1.05, "Prestressing Steel," except Type II bars shall be used.

High strength steel plates shall conform to the requirements in ASTM Designation: A 709, Grade 50.

Anchor nuts shall conform to the provisions in the second paragraph in Section 50-1.06, "Anchorages and Distribution."

The Contractor, at the Contractor's expense, may use additional cement or Type III cement in the concrete for the load test and anchor piles.

Testing of load test piles shown on the plans and specified in the special provisions will be performed by the Engineer without cost to the Contractor. The loading tests will be made when the concrete in the load test and anchor piles has developed a compressive strength of at least 2,000 pounds per square inch. The Engineer will require not more than 5 working days to perform each load test.

Should the Engineer fail to complete the load tests within the time specified in the special provisions and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in load testing of piles, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays."

The Contractor shall furnish labor, materials, tools, equipment, and incidentals as required to assist the Engineer in the installation, operation and removal of State-furnished steel load test beams, State-furnished jacks, bearing plates, drills, and other test equipment. This work will be paid for as extra work as provided in Section 4-1.03D.

The first and second paragraphs in Section 49-1.05, "Driving Equipment," of the Standard Specifications are amended to read:

49-1.05 Driving Equipment.—Driven piles shall be installed with impact hammers that are approved in writing by the Engineer. Impact hammers shall be steam, hydraulic, air, or diesel hammers. Impact hammers shall develop sufficient energy to drive the piles at a penetration rate of not less than 1/8 inch per blow at the specified bearing value.

Vibratory hammers shall not be used for installation of piles, unless otherwise shown on the plans or specified in the special provisions.

Hammers with an external combustion engine that are not single action, shall have a transducer that records ram velocity.

Double acting diesel hammers with internal combustion engines shall have a transducer that records bounce chamber pressure.

For hammers with no visual way of observing the ram stroke, a printed readout showing hammer energy during driving operation shall be provided to the Engineer by the Contractor.

The fifth paragraph in Section 49-1.05, "Driving Equipment," of the Standard Specifications is deleted.

Difficult pile installation is anticipated due to the presence of very dense silty sand, silty gravel, silt with gravel, poor to well graded sand, occasional cobbles, low overhead clearance, underground utilities, overhead utilities, and traffic control. Driving shoes shall be used if necessary to obtain the specified tip elevation shown in the plans.

The first sentence of the first paragraph in Section 49-1.08, "Bearing Value and Penetration," of the Standard Specifications is amended to read:

49-1.08 Bearing Value and Penetration.—Except for piles to be load tested, driven piles shall be driven to a bearing value of not less than the design loading shown on the plans unless otherwise specified in the special provisions or permitted in writing by the Engineer.

The third through seventh paragraphs in Section 49-1.08, "Bearing Value and Penetration," of the Standard Specifications are amended to read:

The bearing values for driven piles shall be determined from the following formula in which "P" is the design loading shown on the plans in pounds, "E" is the manufacturer's rating for foot-pounds of energy developed by the hammer, and "s" is the penetration per blow in inches, averaged over the last few blows.

P =

The penetration per blow "s" shall be measured only when there is no appreciable rebound of the hammer and only when the last blow is struck on a sound pile head or driving block. The penetration per blow "s" may be measured either during initial driving or during redriving following a set period as determined by the Engineer.

Section 49-1.10, "Load Testing," of the Standard Specifications is deleted.
The third paragraph in Section 49-2.03, "Requirements," of the Standard Specifications is amended to read:

Untreated and treated timber piles shall be of Douglas fir or Southern Pine timber and shall be clean peeled.

The third paragraph in Section 49-4.04, "Steel Shells," of the Standard Specifications is amended to read:

Steel shells shall conform to the provisions for steel pipe piles specified in Section 49-5, "Steel Piles."

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

49-5.01 Description.—Steel piles shall include structural shape piles and pipe piles. Structural shape steel piles shall be of the rolled section shown on the plans or of the section specified in the special provisions and shall be structural steel conforming to the specifications of ASTM Designation: A 36/A 36M, or at the option of the Contractor, structural steel conforming to the specifications of ASTM Designation: A 572/A 572M.

Steel piles shall not be joined by welded lap splicing.

The manufacturer or fabricator of steel piling shall furnish a Certificate of Compliance stating that the piling being supplied conforms to these specifications and to the special provisions. The Certificate of Compliance shall include test reports for tensile, chemical, and any specified nondestructive tests. Samples for testing shall be taken from the base metal, steel, coil or from the manufactured or fabricated piling.

Section 49-5.02, "Splicing," of the Standard Specifications is amended to read:

49-5.02 Splicing.—Steel pile splices shall conform to the requirements of AWS D 1.1 and the special provisions. Structural shape steel piling splices shall be complete joint penetration groove welds.

Note 3 on Standard Plan B2-5 is deleted.

Driving System Submittal

Prior to installing driven piling, the Contractor shall provide a driving system submittal, including driveability analysis, in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. A submittal shall be made for each control location shown below. All proposed driving systems (i.e., each hammer that may be brought onto the site) shall be included in the submittal.

Bridge Number	Control Location
Garey Avenue UC 53-855	Bents 2L-10L & 2R-9R
Towne Avenue UC 53-858	Bents 2L & 2R

The driving system submittal shall contain an analysis showing that the proposed driving systems will install piling to the specified tip elevation and specified bearing. Driving systems shall generate sufficient energy to drive the piles with stresses not more than 95 percent of the specified yield strength of the steel pile or unfilled steel shell. Submittals shall include the following:

1. Complete description of soil parameters used, including soil quake and damping coefficients, skin friction distribution, ratio of shaft resistance to nominal compression resistance, any assumptions made regarding the formation of soil plugs, and any assumptions made regarding drilling through the center of open ended steel shells.
2. List of all hammer operation parameters assumed in the analysis, including fuel settings, stroke limitations, and hammer efficiency.
3. Driveability studies that are based on a wave equation analysis using a computer program that has been approved by the Engineer. Driveability studies shall model the Contractor's proposed driving systems, including the hammers, capblocks, and pile cushions, as well as determine driving resistance and pile stresses for assumed site conditions. Separate analyses shall be completed at elevations above the specified tip elevations where difficult driving is anticipated. Studies shall include plots for a range of pile compression capacities above and below the nominal compression resistance shown on the plans. Plots shall include the following:

a. Pile compressive stress versus blows per foot.
b. Pile tensile stress versus blows per foot.
c. Nominal compression resistance versus blows per foot.

4. Copies of all test results from any previous pile load tests, dynamic monitoring, and all driving records used in the analyses.
5. Completed "Pile and Driving Data Form," which is shown in these special provisions.

The driving system submittal shall be stamped and signed by an engineer who is registered as a Civil Engineer in the State of California. The Contractor shall allow the Engineer 15 working days to review a driving system submittal after a complete set has been received, as determined by the Engineer, and prior to installing piling. Should the Engineer fail to complete his 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 the driving system submittal review, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.07, "Liquidated Damages" in the Standard Specifications.

The Contractor shall use the driving system and installation methods described in the approved driving system submittal for a given control location. Any change in hammers from those submitted and approved by the Engineer shall also meet the requirements for driving system submittals. Revised and new driving system submittals shall be approved by the Engineer prior to using corresponding driving systems on production piling. The Contractor shall allow the Engineer 15 working days to review each revised and each new driving system submittal after a complete set has been received, as determined by the Engineer.

Approval of pile driving equipment shall not relieve the Contractor of his responsibility to drive piling free of damage to the specified penetration.

Full compensation for driving system submittals shall be considered as included in the contract unit price paid for drive pile and no additional compensation will be allowed therefor.

Jetting And Drilling

Section 49-1.05, "Driving Equipment," of the Standard Specifications shall not be used for driven type piles.

Pileswhich are designated on the plans to be predrilled due to close proximity to an obstruction shall be driven in drilled oversized holes in conformance with the provisions for predrilling holes through embankments in Section 49-1.06, "Predrilled Holes," and Section 49-6.02, "Payment," of the Standard Specifications. These locations and corresponding bottom of hole elevations are listed in the following table.

Bridge Name or Number	Abutment Number	Bent Number	Elevation Bottom of Hole
Park Avenue Undercrossing	2L		902
San Jose Wash			Channel Invert

Full compensation for predrilling, CMP sleeves, filling the space around piles driven in predrilled holes and through sleeves with sand, grout, or pea gravel, and disposing of material resulting from drilling shall be considered as included in the contract unit price paid for drive pile, and no additional compensation will be allowed therefor.

CAST-IN-PLACE CONCRETE PILING

Cast-in-drilled-hole concrete piling shall conform to the provisions in Section 49-4, "Cast-In-Place-Concrete Piling," of the Standard Specifications and these special provisions.

Materials

Concrete filling for cast-in-place concrete piles is designated by compressive strength and shall have a minimum 28-day compressive strength of 3250 pounds per square inch. The combined aggregate grading for the concrete shall be the 1" maximum grading.

Cast-in-drilled-hole concrete piles 2 feet in diameter or larger may be constructed by excavation and depositing concrete under slurry.

Concrete deposited under slurry shall have a nominal penetration equal to or greater than 3 1/2 inches. Concrete shall be proportioned to prevent excessive bleed water and segregation.

Concrete deposited under slurry shall contain not less than 658 pounds of cement per cubic yard.

For cast-in-drilled-hole concrete piling, the following gradation is added to the table in the third paragraph in Section 90-3.01, "General," of the Standard Specifications:

Primary Aggregate Nominal Size	Sieve Sizes	Limits of Proposed Gradation
1/2" x No. 4	3/8"	40 - 78
3/8" x No. 8	3/8"	50 - 85

At the Contractor's option, the Contractor may use either the 1/2" maximum combined aggregate grading or the 3/8" maximum combined aggregate grading. For cast-in-drilled-hole concrete piling, the following table is added to the first paragraph in Section 90-3.02, "Coarse Aggregate Grading," of the Standard Specifications:

Percentage Passing Primary Aggregate Nominal Size				
	1/2"x No. 4		3/8" x No. 8	
Sieve Sizes	Operating Range	Contract Compli-ance	Operating Range	Contract Compli-ance
_"	100	100		
_"	82 - 100	80 - 100	100	
3/8"	X ± 15	X ± 22	X ± 15	X ± 20
No. 4	0 - 15	0 - 18	0 - 25	0 - 28
No. 8	0 - 6	0 - 7	0 - 6	0 - 7

For cast-in-drilled-hole concrete piling, the following grading limits of combined aggregates for the 1/2" x No. 4 primary aggregate nominal size or for the 3/8" x No 8 primary aggregate nominal are added to the table in Section 90-3.04, "Combined Aggregate Gradings," of the Standard Specifications:

Grading Limits of Combined Aggregate		
	Percentage Passing	
Sieve Sizes	1/2" Maximum	3/8" Maximum
3/4-inch	100	100
1/2-inch	90 - 100	100
3/8-inch	55 - 86	50 - 100
No. 4	45 - 63	45 - 63
No. 8	35 - 49	35 - 49
No. 16	25 - 37	25 - 37
No. 30	15 - 25	15 - 25
No. 50	5 - 15	5 - 15
No. 100	1 - 8	1 - 8
No. 200	0 - 4	0 - 4

Portions of cast-in-drilled-hole concrete piles shown on the plans to be formed shall be formed and finished in conformance with the provisions for concrete structures in Section 51, "Concrete Structures," of the Standard Specifications.

The fourth paragraph in Section 49-4.01, "Description," of the Standard Specifications is amended to read:

> Cast-in-place concrete piles shall be constructed so that the excavation methods and the concrete placement procedures shall provide for placing the concrete against undisturbed material in a dry or dewatered hole.

The concrete filling for cast-in-place concrete piles shall be dense and homogeneous. The methods used to place the concrete shall prevent segregation. Concrete placed in steel shells, dry drilled holes or dewaterred drilled holes shall not be permitted to fall from a height greater than 8 feet without the use of adjustable length pipes or tubes unless the flow of concrete is directed into the center of the hole using a hopper and not allowed to strike the reinforcement, reinforcement bracing and other objects in the hole.

Concrete filling for cast-in-place concrete piles shall be vibrated in the upper 15 feet of the pile.

Section 51-1.10, "Concrete Deposited Under Water," shall not apply to cast-in-drilled-hole piling.

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

Except for cast-in-place piling for soundwalls and retaining walls, when cast-in-place concrete piling is less than 24 inches in diameter, the Contractor may propose to increase the diameter and revise the pile tip elevation. The Contractor may propose to increase the diameter of cast-in-place piling for soundwalls and retaining walls, but the pile tip elevations shall not be revised. No additional compensation for delays will be allowed for the Contractor's use of increased diameter cast-in-place concrete piling.

The second through seventh paragraphs of Section 49-4.03, "Drilled Holes," of the Standard Specifications are amended to read:

The axis of the hole shall not deviate from plumb more than 1 1/2 inches per 10 feet of length.

Care shall be taken during excavation to prevent disturbing the foundation material surrounding the pile. Equipment or methods used for excavating holes shall not cause quick soil conditions or cause scouring or caving of the hole. After excavation is begun, the pile shall be constructed in a continuous and expeditious manner in order to prevent deterioration of the surrounding foundation material from air slaking or from the presence of water. Deteriorated foundation material, including material that has softened, swollen or degraded, shall be removed from the sides and the bottom of the hole and shall be disposed of. The bottom of the drilled hole shall be cleaned just before placing reinforcement or concrete to remove any loose sand, gravel, dirt, and drill cuttings.

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 or drill cuttings settle out of slurry, as determined by the Engineer, the reinforcement shall be removed and the bottom of the drilled hole cleaned.

Water that has infiltrated the hole shall be removed before placing concrete therein except when concrete is deposited under slurry. Fluvial or drainage water shall not be permitted to enter the hole.

Temporary steel casings shall be furnished and placed tight in the hole where shown on the plans and where necessary to control water or to prevent quick soil conditions or caving of the hole. Temporary casing shall be watertight and of sufficient strength to withstand the loads from installation, removal, lateral concrete pressures and earth pressures. The casing shall be non-corrugated and the surfaces shall be smooth, clean and free from hardened concrete. The casing shall be removed while the concrete is being placed. In a dewatered hole the concrete in the casing shall be maintained at a level at least 5 feet above the bottom of the casing or at a level above the bottom of the casing adequate to prevent displacement of the concrete by material from outside the casing, whichever is greater. Casing may be vibrated or hammered when required to assist in removal of the casing from the hole, to prevent lifting of the reinforcement, and to prevent concrete contamination. The withdrawal of casings shall not leave voids or cause contamination of the concrete with soil or other materials.

Portions of the holes may be enlarged, backfilled with slurry cement backfill, concrete, or other material, and redrilled to the specified diameter to control caving. Backfill material at enlarged piles shall be chemically compatible with concrete and steel, shall be drillable, and shall have the necessary strength required for the conditions.

Drill cuttings shall be disposed of in accordance with the provisions in Section 19-2.06, "Surplus Materials," of the Standard Specifications. Material resulting from placing concrete in piles, including slurry, shall be disposed of in accordance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," unless otherwise permitted in writing by the Engineer.

The second and third paragraphs of Section 49-4.05, "Inspection," of the Standard Specifications are amended to read:

Driven shells and dewatered drilled holes shall be clean and free of water before reinforcement and concrete are placed.

The Contractor shall have available at all times a suitable light for inspecting the entire length of the shells or dewatered holes before placing the reinforcement and concrete.

Construction

The Contractor shall submit a placing plan to the Engineer for approval prior to producing the test batch for cast-in-drilled-hole concrete piling and at least 10 working days prior to constructing piling. The plan shall include complete description, details, and supporting calculations as listed below:

A. Requirements for all cast-in-drilled-hole concrete piling:

1. Concrete mix design, certified test data, and trial batch reports.
2. Drilling methods and equipment.

3. Proposed method for casing installation and removal when necessary.
4. Plan view drawing of pile showing reinforcement and inspection pipes, if required.
5. Methods for placing, positioning, and supporting bar reinforcement.
6. Methods and equipment for accurately determining the depth of concrete and actual and theoretical volume placed, including effects on volume of concrete when any casings are withdrawn.

B. Additional requirements when concrete is placed under slurry:

1. Concrete batching, delivery, and placing systems including time schedules and capacities therefor. Time schedules shall include the time required for each concrete placing operation at each pile.
2. Concrete placing rate calculations. When requested by the Engineer, calculations shall be based on the initial pump pressures or static head on the concrete and losses throughout the placing system, including anticipated head of slurry and concrete to be displaced.
3. Suppliers test reports on the physical and chemical properties of the slurry and any proposed slurry chemical additives including Material Safety Data Sheet.
4. Slurry testing equipment and procedures.
5. Removal and disposal of excavation, slurry, and contaminated concrete, including methods and rates of removal.
6. Slurry agitating, recirculating, and cleaning methods and equipment.

In addition to compressive strength requirements, the consistency of the concrete to be deposited under slurry shall be verified before use by producing a batch to be tested. The test batch shall be produced and delivered to the project under conditions and in time periods similar to those expected during the placement of concrete in the piles. Concrete for the test batch shall be placed in an excavated hole or suitable container of adequate size to allow testing in conformance with California Test 533. Depositing of test batch concrete under slurry will not be required. The test batch shall demonstrate that the proposed concrete mix design achieves both the specified nominal penetration and a penetration of at least 2 inches after twice the time required for each concrete placing operation at each pile, as submitted in the placing plan, has elapsed. The time period shall begin at the start of placement. The concrete shall not be vibrated or agitated during the test period. Upon completion of testing, the concrete shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Concrete deposited under slurry shall not be vibrated until all temporary casing is removed and concrete contaminated with soil, slurry, or other materials is removed. Concrete deposited under slurry shall be vibrated in the upper 6 feet of the pile.

The concrete deposited under slurry shall be carefully placed in a compact, monolithic mass and by a method that will prevent washing of the concrete. Placing concrete shall be a continuous operation lasting not more than the time required for each concrete placing operation at each pile, as submitted in the placing plan, unless otherwise approved in writing by the Engineer. The concrete shall be placed with concrete pumps and delivery tube system of adequate number and size to complete the placing of concrete in the time specified. The delivery tube system shall consist of one of the following:

1. A tremie tube or tubes, each of which are at least 10-inches in diameter fed by one or more concrete pumps.
2. One or more concrete pump tubes, each fed by a single concrete pump.

The delivery tube system shall consist of watertight tubes with sufficient rigidity to keep the ends always in the mass of concrete placed. If only one delivery tube is utilized to place the concrete, the tube shall be placed near the center of the drilled hole. Multiple tubes shall be uniformly spaced in the hole. Internal bracing for the steel reinforcing cage shall accommodate the delivery tube system. Tremies shall not be used for piles without space for a 10-inch tube.

Spillage of concrete into the slurry during concrete placing operations shall not be allowed. Delivery tubes shall be capped with a water tight cap, or plugged above the slurry level with a good quality, tight fitting, moving plug that will expel the slurry from the tube as the tube is charged with concrete. The cap or plug shall be designed to be released as the tube is charged. The pump discharge or tremie tube shall extend to the bottom of the hole before charging the tube with concrete. After charging the delivery tube system with concrete, the flow of concrete through a tube shall be induced by slightly raising the discharge end. During concrete placement, the tip of the delivery tube shall be maintained to prevent reentry of the slurry into the tube. Until at least 10 feet of concrete has been placed, the tip of the delivery tube shall be within 6 inches of the bottom of the drilled hole, and then the embedment of the tip shall be maintained at least ten feet below the top surface of the concrete. Rapid raising or lowering of the delivery tube shall not be permitted. If the seal is lost or the delivery tube becomes plugged and must be removed, the tube shall be withdrawn, the tube cleaned, the tip of the tube capped to prevent entrance of the slurry, and the operation restarted by pushing the capped tube 10 feet into the concrete and then reinitiating the flow of concrete.

When slurry is used, the slurry level shall be maintained within 1 foot of the top of the drilled hole.

When slurry is used, a fully operational standby concrete pump, adequate to complete the work in the time specified, shall be provided at the site during concrete placement.

A log of the placing of the concrete in each drilled hole shall be maintained by the Contractor when concrete is deposited under slurry. The log shall show the pile location, tip elevation, dates of excavation and concrete placement, total quantity of concrete deposited, length and tip elevation of any casing, and details of any hole stabilization method and materials used. The log shall include an 8 1/2" x 11" sized graph of the concrete placed versus depth of hole filled. The graph shall be plotted continuously throughout placing of concrete. The depth of drilled hole filled shall be plotted vertically with the pile tip oriented at the bottom and the quantity of concrete shall be plotted horizontally. Readings shall be made at least at each 5 foot of pile depth, and the time of the reading shall be indicated. The graph shall be labeled with the pile location, tip elevation, cutoff elevation, and the dates of excavation and concrete placement. The log shall be delivered to the Engineer within one working day of completion of placing concrete in the pile.

After placing reinforcement and prior to placing concrete in the drilled hole, if drill cuttings settle out of slurry, the bottom of the drilled hole shall be cleaned. The Contractor shall verify that the bottom of the drilled hole is clean.

If temporary casing is used, concrete placed under slurry shall be maintained at a level at least 5 feet above the bottom of the casing. The withdrawal of casings shall not cause contamination of the concrete with slurry.

Material resulting from using slurry shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Where cast-in-drilled-hole concrete piling is constructed in slag aggregate embankments, the diameter of the piling shall be increased to provide at least 3 inches of concrete cover over the reinforcing steel. Increases in the diameter of piling solely for the purpose of providing additional concrete cover over the reinforcing steel will not be considered as qualifying for revisions in the specified tip elevation.

Any pile which has been increased in diameter as provided above will be paid for at the contract price per meter for the size of cast-in-drilled-hole concrete piling shown on the plans at that location.

Inspection Pipes for Acceptance Testing

Vertical inspection pipes shall be provided in all cast-in-drilled-hole concrete piles that are 24 inches in diameter or larger, except when the holes are dry or when the holes are dewatered without the use of temporary casing to control the groundwater.

Inspection pipes shall be Schedule 40 polyvinyl chloride pipe with a nominal inside diameter of 2 inches. Each inspection pipe shall be capped top and bottom and shall have watertight couplers to provide a clean, dry and unobstructed 2-inch diameter clear opening from 2 feet above the pile cutoff down to the bottom of the reinforcing cage.

If the Contractor drills the hole below the specified tip elevation, the reinforcement and the inspection pipes shall be extended to 3 inches clear of the bottom of the drilled hole.

Inspection pipes shall be placed around the pile, inside the outermost spiral or hoop reinforcement, and 3 inches clear of the vertical reinforcement, at a uniform spacing not exceeding 2 feet 9 inches measured along the circle passing through the centers of inspection pipes. A minimum of 2 inspection pipes per pile shall be used. When the vertical reinforcement is not bundled and each bar is not more than one inch in diameter, inspection pipes may be placed 2 inches clear of the vertical reinforcement. The inspection pipes shall be placed to provide the maximum diameter circle that passes through the centers of the inspection pipes while maintaining the clear spacing required herein. The pipes shall be installed in straight alignment, parallel to the main reinforcement, and securely fastened in place to prevent misalignment during installation of the reinforcement and placing of concrete in the hole.

The Contractor shall log the location of the inspection pipe couplers with respect to the plane of pile cut off, and these logs shall be delivered to the Engineer upon completion of the placement of concrete in the drilled hole.

After placing concrete and before requesting acceptance tests, each inspection pipe shall be tested by the Contractor in the presence of the Engineer by passing a 1.90 inch diameter rigid cylinder 2 feet long through the complete length of pipe. If the 1.90 inch diameter rigid cylinder fails to pass any of the inspection pipes, the Contractor shall attempt to pass a 1.25 inch diameter rigid cylinder 4 feet 8 inches long through the complete length of those pipes in the presence of the Engineer. If an inspection pipe fails to pass the 1.25 inch diameter cylinder, the Contractor shall immediately fill all inspection pipes in the pile with water.

The Contractor shall replace each inspection pipe that does not pass the 1.25 inch diameter cylinder with a 2-inch diameter hole cored through the concrete for the entire length of the pile. Cored holes shall be located as close as possible to the inspection pipes they are replacing, no more than 6 inches inside the reinforcement, and coring shall not damage the pile reinforcement. Cored holes shall be made with a double wall core barrel system utilizing a split tube type inner barrel. Coring with a solid type inner barrel will not be allowed. Coring methods and equipment shall provide intact cores for the entire length of the pile concrete. The coring operation shall be logged by an Engineering Geologist or Civil Engineer licensed in the State of California and experienced in core logging. Coring logs shall include complete descriptions of

inclusions and voids encountered during coring, and shall be delivered to the Engineer upon completion. Concrete cores shall be preserved, identified with the exact location the core was recovered from within the pile, and made available for inspection by the Engineer.

Acceptance tests of the concrete will be made by the Engineer, without cost to the Contractor. Acceptance tests will evaluate the homogeneity of the placed concrete. Tests will include gamma-gamma logging. Tests may also include crosshole sonic logging and other means of inspection selected by the Engineer. The Contractor shall not conduct operations within 25 feet of the gamma-gamma logging operations. The Contractor shall separate reinforcing steel as necessary to allow the Engineer access to the inspection pipes to perform gamma-gamma logging or other acceptance testing. After requesting acceptance tests and providing access to said piling, the Contractor shall allow 15 working days for the Engineer to conduct these tests if the 1.90 inch diameter cylinder passed all inspection pipes, and 20 working days if only the 1.25 inch diameter cylinder passed all inspection pipes. Should the Engineer fail to complete such tests within the time allowance, and if in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in inspection, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

All inspection pipes and cored holes in a pile shall be dewatered and filled with grout after notification by the Engineer that the pile is acceptable. Placement and removal of water in the inspection pipes shall be at the Contractors expense. Grout shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. The inspection pipes and holes shall be filled using grout tubes that extend to the bottom of the pipe or hole or into the grout already placed.

If acceptance testing performed by the Engineer determines that a pile does not meet the requirements of the specifications, then that pile will be rejected and all depositing of concrete under slurry or concrete placed using temporary casing for the purpose of controlling groundwater shall be suspended until written changes to the methods of pile construction are approved in writing by the Engineer.

The Contractor shall submit to the Engineer for approval a mitigation plan for repair, supplementation, or replacement for each rejected cast-in-drilled-hole concrete pile, and this plan shall conform to the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. Prior to submitting this mitigation plan, the Engineer will hold a repair feasibility meeting with the Contractor to discuss the feasibility of repairing rejected piling. The Engineer will consider the size of the defect, the location of the defect, and the design information and corrosion protection considerations for the pile. This information will be made available to the Contractor, if appropriate, for the development of the mitigation plan. If the Engineer determines that it is not feasible to repair the rejected pile, the Contractor shall not include repair as a means of mitigation and shall proceed with the submittal of a mitigation plan for replacement or supplementation of the rejected pile.

If the Engineer determines that a pile does not require mitigation due to structural, geotechnical, or corrosion concerns, the Contractor may elect to not repair anomalies found during acceptance testing of that pile. For the unrepaired pile, no payment will be made for the length of pile affected by the anomaly, as determined by the Engineer.

Pile mitigation plans shall include the following:

A. The designation and location of the pile addressed by the mitigation plan.
B. A review of the structural, geotechnical, and corrosion design requirements of the rejected pile.
C. A step by step description of the mitigation work to be performed, including drawings if necessary.
D. An assessment of how the proposed mitigation work will address the structural, geotechnical, and corrosion design requirements of the rejected pile.
E. Methods for preservation or restoration of existing earthen materials.
F. A list of affected facilities, if any, with methods and equipment for protection of these facilities during mitigation.
G. The State assigned contract number, bridge number, full name of the structure as shown on the contract plans, District-County-Route-Kilometer Post , and the Contractor's (and Subcontractor's if applicable) name on each sheet.
H. A list of materials, with quantity estimates, and personnel, with qualifications, to be used to perform the mitigation work.
I. The seal and signature of an engineer who is licensed as a Civil Engineer by the State of California.

For rejected piles to be repaired, the Contractor shall submit a pile mitigation plan that contains the following additional information:

A. An assessment of the nature and size of the anomalies in the rejected pile.
B. Provisions for access for additional pile testing if required by the Engineer.

For rejected piles to be replaced or supplemented, the Contractor shall submit a pile mitigation plan that contains the following additional information:

A. The proposed location and size of additional piling.

B. Structural details and calculations for any modification to the structure to accommodate the replacement or supplemental piling.

All provisions for cast-in-drilled-hole concrete piling shall apply to replacement piling.

The Contractor shall allow the Engineer 15 workingdays to review the mitigation plan after a complete submittal has been received.

Should the Engineer fail to review the complete pile mitigation submittal within the time specified, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the pile mitigation plan, an extension of time commensurate with the delay in completion of the work thus caused will be granted in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

When repairs are performed, the Contractor shall submit a mitigation report to the Engineer within 10 days of completion of the repair. This report shall state exactly what repair work was performed and quantify the success of the repairs relative to the submitted mitigation plan. The mitigation report shall be stamped and signed by an engineer that is licensed as a Civil Engineer by the State of California. The mitigation report shall show the State assigned contract number, bridge number, full name of the structure as shown on the contract plans, District-County-Route-Kilometer Post, and the Contractor (and Subcontractor if applicable) name on each sheet. The Engineer shall be the sole judge as to whether a mitigation proposal is acceptable, the mitigation efforts are successful, and to whether additional repairs, removal and replacement, or construction of a supplemental foundation is required.

SLURRY.--Slurry shall be commercial quality mineral or synthetic drilling slurry and shall conform the requirements of these special provisions

Water for slurry shall conform to the provisions in Section 90-2.03, "Water," of the Standard Specifications and these special provisions. Natural ground water in the drilled hole may be used for slurry when approved by the Engineer.

Slurry shall not weaken the bond between the concrete and both the reinforcement and the foundation material at the sides of the excavation.

The Contractor shall sample and test all slurry in the presence of the Engineer, unless otherwise directed. The date, time, names of the persons sampling and testing the slurry, and results of the tests shall be recorded and shall be approved by the Engineer before concrete is placed. A copy of slurry test results shall be delivered to the Engineer at the completion of each pile.

Mineral--Mineral slurry shall be mixed and thoroughly hydrated in slurry tanks, and slurry shall be sampled from the slurry tanks and tested before placement in the drilled hole.

Slurry shall be recirculated or continuously agitated in the drilled hole to maintain the specified properties.

Recirculation shall include removal of drill cuttings from the slurry before discharging the slurry back into the drilled hole. When recirculation is used, the slurry shall be sampled and tested at least every 2 hours after beginning its use until tests show that the samples taken from the slurry tank and from near the bottom of the hole have consistent specified properties. Subsequently, slurry shall be sampled at least twice per shift as long as the specified properties remain consistent.

Slurry that is not recirculated in the drilled hole shall be sampled and tested at least every two hours after beginning its use. The slurry shall be sampled midheight and near the bottom of the hole. Slurry shall be recirculated when tests show that the samples taken from midheight and near the bottom of the hole do not have consistent specified properties.

Slurry shall also be sampled and tested prior to final cleaning of the bottom of the hole and again just prior to placing concrete. Samples shall be taken from midheight and near the bottom of the hole. Cleaning of the bottom of the hole and placement of the concrete shall not start until tests show that the samples taken from midheight and near the bottom of the hole have consistent specified properties.

Mineral slurry shall be tested for conformance to the requirements shown in the following table:

MINERAL SLURRY		
PROPERTY	REQUIREMENT	TEST
Density (pcf) - before placement in the drilled hole - during drilling - prior to final cleaning - immediately prior to placing concrete	 64.3* to 69.1* 64.3* to 75.0*	 Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/quart) bentonite attapulgite	 28 to 50 28 to 40	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	8 to 10.5	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning - immediately prior to placing concrete	 less than or equal to 4.0	Sand API 13B-1 Section 5
*When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 2 pcf. Slurry temperature shall be at least 40 degrees Fahrenheit (4 degrees Celsius) when tested.		

Any caked slurry on the sides or bottom of hole shall be removed before placing reinforcement. If concrete is not placed immediately after placing reinforcement, the reinforcement shall be removed and cleaned of slurry, the sides of the drilled hole cleaned of caked slurry, and the reinforcement again placed in the hole for concrete placement.

Synthetic.--Synthetic slurries shall be used in conformance with the manufacturer's recommendations and these special provisions. The following synthetic slurries may be used:

PRODUCT	MANUFACTURER
SlurryPro CDP	KB Technologies Ltd. Suite 216 735 Broad Street Chattanooga, TN 37402 (800) 525-5237
Super Mud	PDS Company 8140 East Rosecrans Ave. Paramount, CA 90723 (310) 634-8180

Inclusion of a synthetic slurry on the above list may be obtained by meeting the Department's requirements for synthetic slurries. The requirements can be obtained from the Office of Structure Design, P.O. Box 942874, Sacramento, CA 94274-0001.

Synthetic slurries listed may not be appropriate for a given site.

Synthetic slurries shall not be used in holes drilled in primarily soft or very soft cohesive soils as determined by the Engineer.

A manufacturer's representative, as approved by the Engineer, shall provide technical assistance for the use of their product, shall be at the site prior to introduction of the synthetic slurry into a drilled hole, and shall remain at the site until released by the Engineer.

Synthetic slurries shall be sampled and tested at both mid-height and near the bottom of the drilled hole. Samples shall be taken and tested during drilling as necessary to verify the control of the properties of the slurry. Samples shall be taken and tested when drilling is complete, but prior to final cleaning of the bottom of the hole. When samples are in conformance with the requirements shown in the following tables for each slurry product, the bottom of the hole shall be cleaned and any loose or settled material removed. Samples shall be obtained and tested after final cleaning and just prior to placing concrete.

SlurryPro CDP synthetic slurries shall be tested for conformance to the requirements shown in the following table:

SLURRYPRO CDP KB Technologies Ltd.		
PROPERTY	REQUIREMENT	TEST
Density (pcf) - during drilling - prior to final cleaning - just prior to placing concrete	 less than or equal to 67.0* less than or equal to 64.0*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/quart) - during drilling -prior to final cleaning - just prior to placing concrete	 50 to 120 less than or equal to 70	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	6 to 11.5	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning - just prior to placing concrete	 less than or equal to 0.5	Sand API 13B-1 Section 5
*When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 2 pcf. Slurry temperature shall be at least 40 degrees Fahrenheit (4 degrees Celsius) when tested.		

Super Mud synthetic slurries shall be tested for conformance to the requirements shown in the following table:

SUPER MUD PDS Company		
PROPERTY	REQUIREMENT	TEST
Density (pcf) - prior to final cleaning - just prior to placing concrete	less than or equal to 64.0*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/quart) - during drilling - prior to final cleaning - just prior to placing concrete	32 to 60 less than or equal to 60	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	8 to 10.0	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning -just prior to placing concrete	less than or equal to 0.5	Sand API 13B-1 Section 5
*When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 2 pcf. Slurry temperature shall be at least 40 degrees Fahrenheit (4 degrees Celsius) when tested.		

Water.--At the option of the Contractor water may be used as slurry when casing is used for the entire length of the drilled hole.

Water slurry shall be tested for conformance to the requirements shown in the following table:

WATER SLURRY		
PROPERTY	REQUIREMENT	TEST
Density (pcf) - prior to final cleaning - just prior to placing concrete	63.5 *	Mud Weight (Density) API 13B-1 Section 1
Sand Content (percent) - prior to final cleaning -just prior to placing concrete	less than or equal to 0.5	Sand API 13B-1 Section 5
*When approved by the Engineer, salt water slurry may be used, and the allowable densities may be increased up to 2 pcf..		

MEASUREMENT AND PAYMENT

Measurement and payment for the various types and classes of piles shall conform to the provisions in Sections 49-6.01, "Measurement," and 49-6.02, "Payment," of the Standard Specifications and these special provisions.

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

If precast prestressed concrete piling or steel pipe piling is manufactured or fabricated more than 300 air miles from both Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. Whereas it is and will be impractical and extremely difficult to ascertain and determine the actual increase in such expenses, it is agreed that payment to the Contractor for furnishing piling of the types shown in the Engineer's Estimate will be reduced $5000 for each manufacture or fabrication site located more than 300 air line miles from both Sacramento and Los Angeles and an additional $3000 ($8000 total) for each manufacture or fabrication site located more than 3000 air line miles from both Sacramento and Los Angeles.

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

Load test piles and adjacent anchor piles that become a part of the completed structure, or are shown on the plans, or are specified, will be paid for at the contract prices for the type or class of piling shown in the Engineer's Estimate.

Full compensation for furnishing and placing additional testing reinforcement, 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 therefor.

No 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, or review of request by the Engineer.

Driven piling which is substituted, at the Contractor's option, for the piling shown on the plans, will be measured and paid for by the linear foot as furnish piling and by the unit as drive pile of the type or class shown in the Engineer's Estimate. Additional length needed to develop the required bearing shall be at the Contractor's expense. Full compensation for furnishing and placing the pile anchors, splicing piles, additional removal of materials inside cast-in-steel-shell piling, additional concrete inside cast-in-steel-shell piling, or other expenses resulting from said substitution shall be considered as included in the contract price paid per linear foot for furnish piling and the contract unit price paid for drive pile of the type or class shown in the Engineer's Estimate, and no additional compensation will be allowed therefor.

Full compensation for slurry, depositing concrete under slurry, test batches, inspection pipes, filling inspection holes and pipes with grout, drilling oversized cast-in-drilled-hole concrete piling, filling cave-ins and oversized piles with concrete, and redrilling through concrete shall be considered as included in the contract prices paid per linear foot for cast-in-drilled-hole concrete piling of the sizes listed in the Engineer's Estimate, and no additional compensation will be allowed therefor.

10-1.43 PRESTRESSING CONCRETE

Prestressing concrete shall conform to the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications and these special provisions.

The first paragraph in Section 50-1.02, "Drawings," of the Standard Specifications is amended to read:

The Contractor shall submit to the Division of Structure Design (DSD), Documents Unit, Mail Station 9, P.O. Box 942874, Sacramento, California 94274-0001 (1801 30th Street, Sacramento, CA 95816), telephone (916) 227-8252, for approval in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," working drawings of the prestressing system proposed for use. For initial review, 6 sets of the drawings shall be submitted for railroad bridges and 4 sets shall be submitted for other structures. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to DSD for final approval and for use during construction.

The sixth paragraph in Section 50-1.02, "Drawings," of the Standard Specifications is amended to read:

At the completion of each structure on the contract, one set of reduced prints on 20 pound (minimum) bond paper, 11 inches by 17 inches in size, of the corrected original tracings of all working drawings for each structure shall be furnished to the Engineer. Reduced prints of drawings which are common to more than one structure shall be submitted for each structure. An index prepared specifically for the drawings for each structure containing sheet numbers and titles shall be included on the first reduced print in the set for each structure. Reduced prints for each structure shall be arranged in the order of drawing numbers shown in the index.

The seventh paragraph in Section 50-1.02, "Drawings," of the Standard Specifications is amended to read:

The edge of the corrected original tracing image shall be clearly visible and visually parallel with the edges of the page. A clear, legible symbol shall be provided as near to the upper left side of each page as is feasible within the original print to show the amount of reduction and a horizontal and vertical scale shall be provided on each reduced print to facilitate enlargement to original scale.

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

Prestressing steel for post-tensioning which is installed in members prior to placing and curing of the concrete, shall be continuously protected against rust or other 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 in Section 50-1.05, "Prestressing Steel," of the Standard Specifications.

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

The maximum temporary tensile stress (jacking stress) in prestressing steel shall not exceed 75 percent of the specified minimum ultimate tensile strength of the prestressing steel. Pretensioned prestressing steel shall be anchored at stresses that will result in the ultimate retention of working forces at not less than those shown on the plans, but in no case shall the stress at anchorages after seating exceed 70 percent for normal relaxation strand, or 75 percent for low relaxation strand, of the specified minimum ultimate tensile strength of the prestressing steel.

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

Each jack used to stress tendons shall be equipped with either: (1) two pressure gages or (2) one pressure gage and a load cell, at the option of the Contractor. The jack body shall be permanently marked with the ram area. Each pressure gage shall be fully functional and have an accurately reading dial at least 6 inches in diameter. The jack and each gage shall be calibrated as a unit with the cylinder extension in the approximate position that it will be at final jacking force. The load cell, if used, shall be calibrated and shall be provided with an indicator which may be used to determine the prestressing force in the tendon. The range of the load cell shall be such that the lower 10 percent of the manufacturer's rated capacity will not be used in determining the jacking stress. The jacking equipment calibration procedure shall be as follows:

Each jack used to stress tendons, which are permanently anchored at 25 percent or more of the specified minimum ultimate tensile strength of the prestressing steel, shall be calibrated by the Transportation Laboratory within one year prior to use and after each repair, unless otherwise directed. The Contractor shall be responsible for:

1) scheduling of calibration of the jacking equipment with the Transportation Laboratory, telephone (916) 227-7251;

2) verifying that the jack and supporting systems are complete, with proper components, and are in good operating condition;

3) mechanically calibrating the gages with a dead weight tester or other approved means prior to calibration of the jacking equipment by the Transportation Laboratory,

4) providing sufficient labor, equipment, and material to install and support the jacking and calibration equipment and to remove the equipment after the calibration is complete, and;

5) plotting the calibration results.

Each jack used to stress tendons, which are permanently anchored at less than 25 percent of the specified minimum ultimate tensile strength of the prestressing steel, shall be calibrated by a private laboratory approved by the Transportation Laboratory within 6 months prior to use and after each repair, unless otherwise directed.

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

Full compensation for furnishing and placing additional concrete and deformed bar reinforcing steel required by the particular system used, ducts, anchoring devices, distribution plates or assemblies and incidental parts, for furnishing samples for testing, for calibration of jacking equipment done by a private laboratory, and for pressure grouting ducts shall be considered as included in the contract lump sum price paid for prestressing cast-in-place concrete or in the contract price for furnish precast members, and no additional compensation will be allowed therefor.

The contract item, "Prestressing," provides for the work involved in post tensioning the precast prestressed girder spans at Garey Avenue Undercrossing and Towne Avenue Undercrossing.

The contract lump sum price paid for Prestressing shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved in post tensioning the precast prestressed girder spans of Garey Avenue Undercrossing and Towne Avenue Undercrossing, 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 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:

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.

The concrete strength shall not be less than that shown on the plans.

Not less than 35 percent of the total prestressing force at any section shall be provided by full length draped tendons.

Anchorage blocks for partial length tendons shall be located so that they will not interfere with the placement of any utility facilities shown on the plans or of any future utilities to be placed through openings shown on the plans.

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.

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.

10-1.44 TIEBACK ANCHORS

Anchors at Fairplex Drive Overcrossing retaining walls 486 and 487, consisting of holes drilled in foundation material, grouted steel bars or strands, and anchorage assemblies, and testing of installed anchors, shall conform to the details shown on the plans, the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications and these special provisions.

Foundation recommendations are included in the "Information Handout" available to the Contractor in conformance with the provisions in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

During the drilling of the tieback holes, caving and sluffing of soils around the drilled holes are anticipated. Contractor shall install full-length casing. Casing shall be removed from the hole as concrete is placed therein. The bottom of the casing shall be maintained not more than 5 feet nor less than 1 foot below the top of the concrete during casing withdrawal and concrete placing operations. Separation of the concrete during withdrawal operations shall be avoided by hammering or otherwise vibrating the casing. The methods used to withdraw temporary casings shall preclude contamination of the concrete and commingling of the soil and concrete or of any ground water and concrete.

Difficult tieback installation is anticipated due to the presence of caving soils cobbles and boulders, low overhead clearance, underground utilities, the requirements of tieback embedment into rock, sound control, and traffic control.

The Contractor shall determine the bond length necessary to meet acceptance criteria specified herein.

The submittal of reduced prints of corrected original tracings will not be required for tieback anchor installations.

In fabricating, handling, shipping, and placing tieback anchors, adequate care shall be taken to avoid damage to the sheathing. All damage to the sheathing caused by handling and fabrication prior to tieback anchor installation shall be repaired or replaced as determined by the Engineer. Repair procedure for the sheathing shall be included in the working drawings.

The Contractor may submit, for approval by the Engineer, calculations and details for furnishing an alternative number of tiebacks that provides the same horizontal component and distribution of the design force as provided by the planned tiebacks. Alternative wall details shall be furnished, for approval by the Engineer, if the number of tiebacks is reduced. Alternative design calculations shall be prepared and sealed by an Engineer who is licensed as a Civil Engineer in the State of California.

Materials—Whenever "member" is referred to in Section 50, "Prestressing Concrete," of the Standard Specifications, it shall be considered to mean tieback anchor.

Structural steel for the tieback retaining wall shall conform to the provisions in Section 55, "Steel Structures," of the Standard Specifications and these special provisions. Structural steel shall consist of the steel tube and the bearing plate of the anchorage assembly and the anchorage enclosure. The anchorage assembly and the anchorage enclosure shall be galvanized as indicated on the plans.

The permanent bearing plate of the tieback anchor shall effectively distribute the design force (T), to the concrete, such that the concrete bearing stress does not exceed 1600 pounds per square inch and the bending stress does not exceed 0.55 f_y for steel nor 0.36 f_y for cast steel or cast iron.

Grout shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. Fine aggregate may be added to the grout mixture of portland cement and water used outside of the grouted sheathing in drilled holes which are 8 inches or greater in diameter, but only to the extent that the cement content of the grout is not less than 846 pounds per cubic yard of grout. Fine aggregate, if used, shall conform to the provisions in Section 90-2, "Materials," and Section 90-3, "Aggregate Gradings," of the Standard Specifications.

The plastic sheathing for tieback anchors shall conform to the following: polyvinyl chloride (PVC) sheathing, high density polyethylene (HDPE) sheathing, and polypropylene sheathing.

Corrugated plastic sheathing shall be PVC or HDPE. The width of corrugations, the distance between corrugations, and the height of corrugations of corrugated plastic sheathing shall be approximately the same.

PVC sheathing may be used for smooth sheathing for bar tendons and corrugated sheathing. PVC sheathing shall conform to ASTM Designation: D 1784, Class 13464-B. Corrugated PVC sheathing shall have a nominal wall thickness of 0.04 inches. HDPE sheathing may be used for smooth sheathing for bar tendons and corrugated sheathing. HDPE sheathing shall have a density between 58 pounds per cubic foot and 60 pounds per cubic foot as measured in conformance with ASTM Designation: D 792, A-2. Corrugated HDPE sheathing shall have a nominal wall thickness of 0.06-inches for sheathing with an outside diameter of 3 inches or greater, and a nominal thickness of 0.04-inches for sheathing with an outside diameter less than 3 inches, with a tolerance of minus 0.01-inches.

HDPE sheathing may be used for the smooth sheathing encapsulating individual strands of strand type tendons. Smooth HDPE sheathing for encapsulating strands shall have a minimum wall thickness of 0.04-inches. Polypropylene sheathing may be used for the smooth plastic sheathing encapsulating individual strands of strand type tendons. Polypropylene sheathing shall have a density between 56 pounds per cubic foot and 57 pounds per cubic foot. Smooth polypropylene sheathing shall have a minimum wall thickness of 0.04-inches.

The smooth sheathing for the unbonded length of the individual strands shall have sufficient strength to prevent damage during construction operations, shall be watertight, chemically stable without embrittlement or softening, and nonreactive with concrete, steel or corrosion inhibiting grease. Smooth plastic sheathing, including joints, shall be watertight.

The corrugated sheathing, including joints, shall have sufficient strength to prevent damage during construction operations, shall be grout-tight and watertight, chemically stable without embrittlement or softening, and nonreactive with concrete, steel or corrosion inhibiting grease.

The transition between the corrugated plastic sheathing and the anchorage assembly shall be an approved detail that allows stressing to the design force without evidence of distress in the corrugated plastic sheathing.

Additional requirements for tiebacks with strand type tendons are as follows:

The individual strands of a tendon, except for the bonded length, shall be fully coated with corrosion inhibiting grease and then encapsulated by a smooth HDPE or polypropylene sheath. The corrosion inhibiting grease shall fill all space between strand wires and shall encapsulate the strand giving an encasement diameter at least 0.005-inches greater than the diameter of the bare strand. The sheath shall be hot melt extruded onto the strand or shall be shop applied by an approved method that assures that all spaces between the sheath and the strand and between the strand wires are filled with corrosion inhibiting grease.

The corrosion inhibiting grease shall provide a continuous nonbrittle film of corrosion protection to the prestressing steel and lubrication between the strand and the sheathing, shall resist flow from the sheathing, shall be chemically stable and nonreactive with the prestressing steel, sheathing material and concrete, and shall be organic with appropriate polar, moisture displacing, and corrosion inhibiting additives.

The corrosion inhibiting grease shall have the physical properties listed in Table 3.2.1 of the Post Tensioning Manual, Fourth Edition, by the Post Tensioning Institute and as modified below. At least 40 days before use, a sample from the lot to be used and test results shall be provided for the corrosion inhibiting grease.

Test	Requirements	ASTM Designation:
Water Soluble Ions: Nitrates	10 ppm max	D 3867
Corrosion Test: 5% Salt Fog @ 100° F. 5 mils coating on 3" x 6" Q panel Type S, 1000 hrs min.	Grade 7 or better	B 117, D 610
Compatibility with sheathing: Hardness change & volume change of polymer after exposure to grease 40 days at 150° F.	15% max. 10% max.	D 4289, Except use D 792 for density

Construction.—Tieback anchors shall be installed in accordance with the manufacturer's recommendations. In case of a conflict between the manufacturer's recommendations and these special provisions, these special provisions shall prevail.

Water and grout from tieback anchor construction operations shall not be permitted to fall on public traffic, to flow across shoulders or lanes occupied by public traffic, or to flow into landscaping, gutters or other drainage facilities. Excessive amounts of water shall not be used in any of the drilling and the tieback anchor installation procedures.

Tieback anchor steel shall be protected prior to completion of all grouting against rust, corrosion and physical damage in conformance with the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications. In addition, there shall be no evidence of distress in the plastic sheathing or crushing of the cement grout within the pregrouted sheathing.

The tieback anchorage assembly shall be protected against rust, corrosion and physical damage, prior to completion of all grouting of enclosure or encasement in concrete.

The tieback anchor installation method selected by the Contractor shall be sufficient to achieve the loadings specified herein. Holes for tieback anchors shall be drilled in the foundation to a depth sufficient to provide the necessary bond length beyond the minimum unbonded length shown on the plans.

Tieback anchorage holes shall be drilled by either the rotary or rotary percussion drilling method.

The top level of tiebacks shall be installed in drilled holes advanced with drill casing. Drill casing shall be removed while filled with grout as the initial grout is being placed.

The diameter of the drilled hole shall be large enough to provide a minimum of 1-inch grout cover within the bonded length of the tendon. Centralizers shall be used within the bonded length of the tendon.

Pregrouting shall occur at least 48 hours before placing the tendon in the drilled hole.

Prior to installing each anchor assembly into the drilled hole, the anchor assembly shall be clean and free of oil, grease or other extraneous substances, and any damage to the sheathing shall be repaired or replaced.

Grout for all stages of tieback construction shall be injected at the low end of the void being filled and shall be expelled at the high end until there is no evidence of entrapped air, water or diluted grout. The grout shall be placed using grout tubes, unless another method is approved by the Engineer. The quantity of the grout and the grout pressures shall be recorded.

After placing initial grout, the anchor shall remain undisturbed until the grout has reached a strength sufficient to provide anchorage during testing operations.

Additional requirements for tiebacks with bar type tendons are as follows:

The bar tendons in the unbonded area shall be sheathed with smooth sheathing that extends into the steel tube of the permanent tieback anchorage assembly, as shown on the plans. For this portion of smooth sheathing there is no minimum wall thickness and the sheathing shall be either PVC or HDPE.

In addition, bar tendons shall be sheathed full-length with corrugated sheathing. The annular space between the bar and the corrugated sheathing shall be pregrouted prior to placing the tendons in the drilled hole. The bar shall be centered in the sheathing.

There shall be a seal between the smooth sheathing and the corrugated sheathing at the top and bottom of the length of smooth sheathing.

For bar tendons, the initial grout in the drilled hole may be placed before or after insertion of the bar tendon.

For drilled holes 6 inches in diameter or less, the initial grout outside of the corrugated sheathing shall extend to within 6 inches of the end of the steel tube of the anchorage assembly. Grout in the unbonded length shall not be placed under pressure. For drilled holes greater than 6 inches in diameter, the initial grout outside of the corrugated sheathing shall be within the limits of the bonded length. After placing the initial grout, the anchor shall remain undisturbed until the grout has reached a strength sufficient to provide anchorage during testing operations.

Additional requirements for tiebacks with strand type tendons are as follows:

The Contractor shall have the option of using Alternative A or Alternative B as shown on the plans for tieback tendons.

For Alternative A and Alternative B, strand tendons shall be sheathed with corrugated sheathing. The individual strands within the bonded length shall be separated by spaces so that the entire surface of each strand is bonded in the grout. The maximum spacing of strand spacers shall be 5 feet. The strand spacers shall be plastic and of a construction and strength that will provide support for the individual strands during construction operations.

For Alternative A, the bonded length of the tendon is sheathed with corrugated sheathing and pregrouted full length of the corrugated sheathing before placing the tendon in the hole. The corrugated sheathing shall lap the smooth sheathing on the strands 2 feet. For this alternative, the initial grout in the drilled hole may be placed before or after insertion of the strand tendon.

For Alternative B, the tendon is sheathed full length with corrugated sheathing and pregrouted a minimum length of 2 feet before placing the tendon in the hole. After placing the tendon into the drilled hole and before placing initial grout in the drilled hole, the grout shall be injected at the low end of the corrugated sheathing and the grout shall be expelled at the high end until there is no evidence of entrapped air, water or diluted grout.

For Alternative A and Alternative B, anchors in holes of 6 inches diameter and smaller shall be initially grouted to within 6 inches of the end of the steel tube. Grout in the unbonded length shall not be placed under pressure. After placing the initial grout, the anchor shall remain undisturbed until the grout has reached a strength sufficient to provide anchorage during testing operations.

For Alternative A and Alternative B, anchors in holes of greater than 6 inches diameter shall be initially grouted within the bond length. After placing the initial grout, the anchor shall remain undisturbed until the grout has reached a strength sufficient to provide anchorage during testing operations.

Testing.—All tiebacks shall be load tested by either a performance test or a proof test. Load testing shall be performed against a temporary waler which bears against existing soil Bearing pads shall be kept a minimum of 1 foot away from the edges of the drilled hole. Temporary walers shall remain the property of the Contractor. The magnitude of applied test loads shall be determined with a calibrated pressure gauge or a load cell. Movements of the end of the tieback, relative to an independent fixed reference point, shall be measured and recorded to the nearest 0.001-inches at each load increment during the load tests. The Contractor shall perform the measuring and recording and shall furnish the Engineer copies of the recorded movements.

A minimum of 3 tiebacks shall be performance tested for each tieback wall. The Engineer shall determine the location of the tiebacks to be performance tested.

The performance test or proof test shall be conducted by measuring the test load applied to the tieback and the tieback end movement during incremental loading and unloading of the anchor in accordance with the loading schedule. The test load shall be held constant for 10 minutes. During the test load hold, the movement of the end of the tendon shall be measured at 1, 2, 3, 4, 5, 6, and 10 minutes. If the total movement between one minute and 10 minutes exceeds 0.04-inches, the test load shall be held for an additional 50 minutes. Total movement shall be measured at 15, 20, 25, 30, 45, and 60 minutes. If the test load is held for 60 minutes, a creep curve showing the creep movement between one minute and 60 minutes shall be plotted as a function of the logarithm of time.

LOADING SCHEDULES		
PERFORMANCE TEST		PROOF TEST
	(CONT'D)	
AL	AL	AL
0.25T	0.25T	0.25T
AL	0.50T	0.50T
0.25T	0.75T	0.75T
0.50T	1.00T	1.00T
AL	1.25T	1.25T
0.25T	AL	1.50T (TEST LOAD)
0.50T	0.25T	AL
0.75T	0.50T	
AL	0.75T	
0.25T	1.00T	
0.50T	1.25T	
0.75T	1.50T (TEST LOAD)	
1.00T (CONT'D)	AL	
T = Design force for the anchor shown on the plans		
AL = Alignment load		

For performance and proof tests, each increment of load shall be applied in less than one minute and held for at least one minute but not more than 2 minutes or as specified above. The observation period for the load hold shall start when the pump begins to apply the last increment of load.

The jacking equipment, including the tendon movement measuring system, shall be stable during all phases of the tieback loading operations.

All tiebacks not performance tested shall be proof tested. If 1.5 times the design force cannot be obtained, the tieback shall be redesigned and replaced. Tieback anchors shall not be retested, unless the tieback bond length is post-grouted after the unacceptable test.

A performance tested tieback is acceptable if:

1. The measured elastic movement exceeds 0.80 of the theoretical elongation of the unbonded length plus the jacking length at the maximum test load; and

2. The creep movement between one and ten minutes is less than 0.04-inches.

A proof tested tieback is acceptable if:

1. The pattern of movements is similar to that of adjacent performance tested tiebacks; and

2. The creep movement between one and ten minutes is less than 0.04-inches.

Performance tested or proof tested tiebacks which fail to meet the acceptance criterion Number 2 will be acceptable if the maximum load is held for 60 minutes and the creep curve plotted from the movement data indicates a creep rate of less than 0.08-inches for the last log cycle of time.

Lock-off.—After successful testing of the tiebacks, the tiebacks shall be tensioned against the structure and locked off at a load equal to 1.00T. The lock-off force is the load on the jacks which is maintained while the anchor head or anchor nuts on the tieback are permanently set. Immediately after lock-off, a lift-off test shall be performed to demonstrate that the specified lock-off force was obtained. Adjustments in the shim thickness shall be made if required to maintain the specified lock-off force.

For strand tendons, the permanent wedges shall be fully set in the anchor head while the tendon is stressed to the test load of 1.50 T , and then locked off at the lock-off force by removal of the shims or other appropriate means.

Grouting to the level of secondary grouting to the dimensions shown on the plans shall be completed only after successful testing and lock-off has been completed. At least 24 hours after the secondary grout has set, the remaining void in the steel tube and bearing plate shall be filled with grout. Grout shall be injected at the low end and expelled at the high end until there is no evidence of entrapped air or water. A minimum grout head of 2 feet shall be maintained until the grout has set.

Measurement and Payment.—No payment will be made for tiebacks which do not pass the specified testing requirements.

Tieback anchors will be measured and paid for by the unit, and the number for payment will be determined by the requirements of the details shown on the plans. No change in the number of tieback anchors to be paid for will be made because of the use by the Contractor of an alternative number of tiebacks.

The contract unit price paid for tieback anchor shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the tieback anchors, including special measures taken to contain grout in the drilled hole, testing, and furnishing and installing anchorage assemblies, complete in place, including repair or replacement of sheathing as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for casing holes and removing casing shall be considered as included in the contract price paid per cubic yard for structure excavation (retaining wall) and no additional compensation will be allowed therefor.

10-1.45 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

Precast concrete catcher blocks shall be furnished and installed between the existing rocker bearings at abutment 2 of White Avenue Undercrossing and both abutments at Towne Avenue Undercrossing.

At Garey Avenue UC and Towne Avenue UC, the transverse shear keys at abutments and hinges that have expansion joint material along their side faces shall be constructed parallel to the longitudinal axis of the bridge to a tolerance of 1/16”.

Shotcrete shall not be used as an alternative construction method for reinforced concrete members unless otherwise specified.

Delete the tenth and sixteenth paragraphs of Section 51-1.05, "Forms," of the Standard Specifications.

Form panels for exposed surfaces shall be plywood conforming to or exceeding the requirements of U.S. Product Standard PS 1 for Exterior B-B (Concrete Form) Class I Plywood or any material which will produce a smooth uniform concrete surface substantially equal to that which would result from the use of that plywood. Only form panels in good condition free from defects, such as scars, dents or delaminations, shall be used for exposed surfaces.

All forms shall be removed except as provided herein. Soffit forms for deck slabs of cast-in-place box girders, forms for the interior voids of precast members, and the forms in hollow abutments or piers may remain in place when no permanent access is available into the cells or voids, or when the only utilities to be installed in completed cells or voids are to be inserted into casings which are placed prior to the completion of the cell or void. When permanent access is available into the cells or voids, or when utility facilities other than those in preplaced casings are to be installed in cells or voids, forms used to support the deck of cast-in-place box girders or to form the void of a precast member shall be removed, except that, when the dimensions of the structure or member permit, the forms may remain in place providing the following conditions are met:

1. Any portion of the forms which obstruct access openings or conflict with utility facilities are removed.
2. A longitudinal crawl space not less than 3'-0" high and 2'-0" wide is provided throughout the length of all such cells or voids.
3. The forming system employed leaves no sharp projections into the cells or voids.
4. All forms shall be removed between the hinge and 5'-0" past the access openings in cells of cast-in-place box girder bridges that have access openings near hinges.

Delete the sixth paragraph of Section 51-1.06A(1), "Design Loads," of the Standard Specifications.

The minimum horizontal load to be allowed for wind on all other types of falsework, including falsework supported on heavy-duty shoring or pipe column falsework, shall be the sum of the products of the wind impact area and applicable wind pressure value for each zone. The wind impact area is the gross projected area of the falsework and any unrestrained portion of the permanent structure, excluding the areas between falsework bents or towers where diagonal bracing is not used. Wind pressure values shall be determined from the following table:

Height Zone (Feet above ground)	Wind Pressure Value	
	For Members Over and Bents Adjacent to Traffic Openings	At Other Locations
0 to 30	2.0 Q psf	1.5 Q psf
30 to 50	2.5 Q psf	2.0 Q psf
50 to 100	3.0 Q psf	2.5 Q psf
Over 100	3.5 Q psf	3.0 Q psf

Delete Section 51-1.07, "Reinforcement," of the Standard Specifications.

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

Delete the second, third and fourth paragraphs of Section 51-1.06F, "Sealed Joints," of the Standard Specifications.

Type A and AL joint seals shall consist of a groove in the concrete which is filled with field mixed and placed polyurethane or silicone sealant.

Type B joint seals shall consist of a groove in the concrete which is filled with a preformed elastomeric joint seal.

Joint seal assemblies shall consist of metal or metal and elastomeric assemblies which are anchored or cast into a recess in the concrete over the joint.

The type of seal to be used for the Movement Rating (MR) shown on the plans shall be as follows:

Movement Rating	Seal Type
0.59-inch	Type A or Type B
1.18-inch	Type A (silicone only) or Type B
>1.18-inch and <1.97-inch	Type B
>1.97-inch	joint seal assembly

Delete the first, second and fifth paragraphs of Section 51-1.06F, "Sealed Joints," of the Standard Specifications.

The sealant shall consist of a 2 component polyurethane sealant, which will withstand up to ±25 percent movement, or a 2 component silicone sealant, which will withstand up to ±50 percent movement.

Polyurethane and silicone sealants shall be tested in conformance with the requirements in California Test 435. The sealants shall conform to State Specification 8030-61J-01 and the following requirements:

Specification	Requirement
Modulus at 150 percent elongation	5-75 psi
Width of sealant after 7 days extension and one hour recovery	21/32-inch, max.
Condition 24 hours after notching	Notched or loss of bond 1/4-inch, max.
Condition of water immersed specimen at 7 days	Notched or loss of bond 1/4-inch, max.
Condition of specimen when tested in conformance with the requirements in ASTM Designation: G 52 using FS 40 UV-B bulbs for a minimum of 25 cycles. The cycle shall be 4 hours UV exposure at 60°C and 4 hours condensate exposure at 40°C	No more than slight checking or cracking
Grease cone penetration	4.5-12.0 millimeters

State Specifications for polyurethane and silicone sealants may be obtained from the Transportation Laboratory.

Polyethylene foam or rod stock shall be commercial quality, with a continuous impervious, glazed surface, suitable for retaining the liquid sealant. Contaminated primer shall be removed and replaced.

A Certificate of Compliance, accompanied by a certified test report, shall be furnished for each batch of polyurethane and silicone sealant in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

Samples of the 2 components, not less than one quart each, from each batch of sealant shall be submitted to the Transportation Laboratory. In addition, samples of manufacturer required primers, not less than one quart each, shall be submitted. The samples shall be furnished for testing, with the Certificate of Compliance, 30 days in advance of proposed use.

Delete the second paragraph of Section 51-1.12F(3)(b), "Type B Seal," of the Standard Specifications.

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

The seal shall consist of a multi-channel nonporous, homogeneous material furnished in a finished extruded form.

The minimum depth of the seal, measured at the contact surface, shall be at least 95 percent of the minimum uncompressed width of the seal as designated by the manufacturer.

When tested in conformance with the requirements in California Test 673 for Type B seals, joint seals shall provide a Movement Rating (MR) of not less than that shown on the plans.

The top and bottom edges of the joint seal shall maintain continuous contact with the sides of the groove over the entire range of joint movement.

The seal shall be furnished full length for each joint with no more than one shop splice in any 59-foot length of seal.

One field splice per joint may be made at locations and by methods approved by the Engineer. The seals are to be manufactured full length for the intended joint, then cut at the approved splice section and rematched before splicing. The Contractor shall submit splicing details, prepared by the joint seal manufacturer, to the Engineer for approval prior to beginning splicing work.

The Contractor shall demonstrate the adequacy of the procedures to be used in the work before installing seals in the joints.

Shop splices and field splices shall have no visible offset of exterior surfaces, and shall show no evidence of bond failure.

At all open ends of the seal that would admit water or debris, each cell shall be filled to a depth of 3-inches with commercial quality open cell polyurethane foam, or closed by other means subject to approval by the Engineer.

Delete the second paragraph of Section 51-1.12H, "Elastomeric Bearing Pads," of the Standard Specifications.

Pads 1/2-inch or less in thickness shall conform to the provisions in Section 51-1.12H(1), "Plain and Fabric Reinforced Elastomeric Bearing Pads," of the Standard Specifications and these special provisions. At the Contractor's option, pads over 1/2-inch in thickness shall conform to the provisions in Section 51-1.12 H(2), "Steel Reinforced Elastomeric Bearings," of the Standard Specifications and these special provisions.

Delete the fifth, seventh, ninth and tenth paragraphs of Section 51-1.12H(1), "Plain and Fabric Reinforced Elastomeric Bearing Pads," of the Standard Specifications.

The peel strength test will be performed after immersing the sample in water for a minimum of 10 days. The bond between elastomer and fabric shall be such that when a sample is tested for separation, the bond shall have a minimum peel strength of 5250 N/m when tested in conformance with the requirements in California Test 663.

The sole polymer in the elastomeric compound shall be neoprene and shall be not less than 60 percent by volume of the total compound. The elastomer shall be Type CR, Grade 3, and shall have a shear modulus of 109 psi ± 11 psi, in conformance with the requirements in ASTM Designation: D 4014.

A fabric sample not less than 36-inches by 45-inches will be taken by the Engineer for testing from each new lot of fabric used in manufacturing bearing pads. A sample pad not less than 8-inches by 12-inches in size will be taken by the Engineer for testing from each lot of pads or batch of elastomer to be furnished, whichever results in the greater number of samples. The samples will be selected at random at the point of manufacture or, at the option of the contractor, at the jobsite. Samples taken at the jobsite shall consist of complete pads as detailed on the plans, and the Contractor shall furnish additional complete pads to replace those taken for testing. Pads shall be available for sampling at least 4 weeks in advance of intended use. All sample pads for testing shall be furnished by the Contractor at the Contractor's expense.

Specimens tested in conformance with the requirements in California Test 663 shall meet the requirements for the bond between elastomer and fabric reinforcement laminations.

Delete Section 51-1.12H(2), "Steel Reinforced Elastomeric Bearings," of the Standard Specifications.

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

The bearings shall consist of alternating steel laminates and internal elastomer laminates with top and bottom elastomer covers. Steel laminates shall nave a nominal thickness of 0.075-inch (14 gage). Internal elastomer laminates shall have a thickness of 1/2-inch, and the top and bottom elastomer covers shall each have a thickness of 1/4-inch. The combined thickness of internal elastomer laminates and top and bottom elastomer covers shall be equal to the bearing pad thickness shown on the plans. The total out to out thickness of a pad shall not be less than the thickness shown on the plans nor more than 1/4-inch greater than that thickness. The elastomer cover to the steel laminates at the sides of the bearing shall be 1/8-inch. If guide pins or other devices are used to control the side cover over the steel laminates, any exposed portions of the steel laminates shall be sealed by vulcanized patching. The length, width, or diameter of the bearings shall be as shown on the plans.

The total thickness of the bearings shall be equal to the thickness of elastomer laminates and covers plus the thickness of the steel laminates.

The shear modulus of the elastomer shall be 109 psi ± 11 psi. The elastomer shall be Type CR, Grade 3. The ozone test concentration (partial pressure) shall be 100 MPa, formerly referred to as 100 parts per hundred million.

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications, shall be furnished to the Engineer certifying that the bearings to be furnished conform to all of the above provisions. The Certificate of Compliance shall be supported by a certified copy of the results of tests performed by the manufacturer of the bearings. One sample bearing shall be furnished to the Engineer from each lot of bearings to be furnished for the contract. Samples shall be available at least 3 weeks in advance of intended use. The sample bearing shall be one of the following:

Bearing Pad Thickness as Shown on the Plans	Sample Bearing
≤ 2-inches	Smallest complete bearing shown on the plans
> 2-inches	*2 1/4-inches ± 1/8-inch thick sample not less than 8-inches X 12-inches in plan and cut by the manufacturer from the center of one of the thickest complete bearings

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

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

Delete the third paragraph of Section 51-1.15, "Drains in Walls," of the Standard Specifications.

In addition to the drain holes and weep holes specified in the second paragraph of Section 51-1.15, "Drains in Walls," of the Standard Specifications, holes approximately 3 inches in diameter for relief of hydrostatic pressure shall be provided at the bottom of walls, immediately above the footing, at approximately 15-foot centers.

Delete the second paragraph of Section 51-1.22, "Measurement," of the Standards Specifications.

The estimated quantity of concrete for minor structures designated as final pay in the Engineer's Estimate will not be revised as specified in Section 9-1.015, "Final Pay Items," of the Standard Specifications, when the constructed height ofthe minor structure, including revisions by the Engineer, is within 0.5-foot of the vertical dimension shown on the plans.

When a roughened concrete surface is shown on the plans, the existing concrete surface shall be roughened to a full amplitude of approximately 1/4-inch by abrasive blasting, water blasting or mechanical equipment.

Neoprene strip shall be furnished and installed at deck closure pours and abutment backwall joint protection 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.

All forms shall be removed between the hinge and 5 feet past the access openings in cells of cast-in-place box girder bridges that have access openings near hinges.

Materials for access opening covers in soffits of new cast-in-place concrete box girder bridges shall conform to the provisions for materials in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

Plastic pipe located at vertical drains used behind retaining walls and bridge abutments, including horizontal or sloping drains down slopes and across sidewalk areas shall be polyvinyl chloride (PVC) plastic pipe, Schedule 80, conforming to the provisions for pipe for edge drains and edge drain outlets in Section 68-3.02, "Materials," of the Standard Specifications. The vertical drain pipe shall be rigidly supported in place during backfilling operations.

FALSEWORK.--Falsework shall be designed and constructed in conformance with the requirements in Section 51-1.06, "Falsework," of the Standard Specifications and these special provisions.

In addition to the requirements in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications, the following requirements shall apply:

The time to be provided for the Engineer's review of the working drawings for specific structures, or portions thereof, shall be as follows:

Structure or Portion of Structure	Review Time - Weeks
White Avenue UC	4
Park Avenue UC	4
Garey Avenue UC	4
Towne Avenue UC	3
San Antonio Avenue UC	4
Indian Hill Boulevard UC	4

The first paragraph of Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications is 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 14 feet; where any individual falsework clear span length exceeds 16 feet; 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 when specified in "Railroad Relations and Insurance" of the special provisions.

The falsework drawings shall include details of the falsework removal operations showing the methods and sequences of removal and equipment to be used.

The seventeenth paragraph of Section 51-1.06A is amended to read:

Temporary bracing shall be provided, as necessary, to withstand all imposed loads during erection, construction and removal of any falsework. The falsework drawings shall show provisions for such temporary bracing or methods to be used to conform to this requirement during each phase of erection and removal. Wind loads shall be included in the design of such bracing or methods.

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

The minimum horizontal load to be allowed for wind on heavy-duty steel shoring or steel pipe column falsework having a vertical load carrying capacity exceeding 30 kips per leg or column shall be the sum of the products of the wind impact area, shape factor, and the applicable wind pressure value for each height zone. The wind impact area is the total projected area of all the elements in the tower face or falsework bent normal to the direction of the applied wind. The shape factor shall be taken as 2.2 for heavy-duty shoring and 1.0 for pipe column falsework. Wind pressure values shall be determined from the following table:

Height Zone (Feet above ground)	Wind Pressure Value	
	Shores or Columns Adjacent to Traffic	At Other Locations
0 to 30	20 psf	15 psf
30 to 50	25 psf	20 psf
50 to 100	30 psf	25 psf
Over 100	35 psf	30 psf

Delete the sixth paragraph of Section 51-1.06A(1), "Design Loads," of the Standard Specifications.

The minimum horizontal load to be allowed for wind on all other types of falsework, including falsework supported on heavy-duty shoring or pipe column falsework, shall be the sum of the products of the wind impact area and applicable wind pressure value for each zone. The wind impact area is the gross projected area of the falsework and any unrestrained portion of the permanent structure, excluding the areas between falsework bents or towers where diagonal bracing is not used. Wind pressure values shall be determined from the following table:

Height Zone (Feet above ground)	Wind Pressure Value	
	For Members Over and Bents Adjacent to Traffic Openings	At Other Locations
0 to 30	2.0 Q psf	1.5 Q psf
30 to 50	2.5 Q psf	2.0 Q psf
50 to 100	3.0 Q psf	2.5 Q psf
Over 100	3.5 Q psf	3.0 Q psf

The second entry under "Timber" in the second paragraph of Section 51-1.06A(2), "Design Stresses, Loadings, and Deflections," of the Standard Specifications is amended to read:

Compression parallel to the grain .... psi, but not to exceed 1,600 psi.

The last paragraph under "Timber" in the second paragraph of Section 51-1.06A(2), "Design Stresses, Loadings, and Deflections," of the Standard Specifications is amended to read:

Timber connections shall be designed in conformance with the procedures, stresses and loads permitted in the Falsework Manual as published by the Department of Transportation, Division of Structures, Office of Structure Construction.

The third paragraph of Section 51-1.06B “Falsework Construction” of the Standard Specifications is ammended to read:

When falsework is supported on piles, the piles shall be driven and the actual bearing value assessed in conformance with Section 49, “Piling,” as specified in these specifications.

For falsework piles with a calculated loading capacity greater than 100 tons, the contractor shall conduct dynamic monitoring of pile driving and conduct penetration and bearing analyses based on a wave equation analysis. Said analysis 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.

The first paragraph of Section 51-1.06C, "Removing Falsework," of the Standard Specifications is amended to read:

Falsework supporting any span of a simple span bridge shall not be released before 10 days after the last concrete, excluding concrete above the bridge deck, has been placed. Unless otherwise permitted by the Engineer, falsework supporting any span of a continuous or rigid frame bridge shall not be released before 10 days after the last concrete, excluding concrete above the bridge deck, has been placed in that span and in the adjacent portions of each adjoining span for a length equal to at least 1/2 the length of the span where falsework is to be released.

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

Unless otherwise specified, removing falsework supporting any span of structural members subject to bending, shall conform to the requirements for removing falsework supporting any span of a simple span bridge.

Temporary crash cushion modules, as shown on the plans and conforming to the provisions in "Temporary Crash Cushion Module," elsewhere in these special provisions, shall be installed at the approach end of temporary railings which are located less than 15 feet from the edge of a traffic lane. For two-way traffic openings, temporary crash cushion modules shall be installed at the departing end of temporary railings which are located less than 6 feet from edge of a traffic lane.

The installation of temporary crash cushion modules, if required, shall be complete before falsework erection is begun. Temporary crash cushion modules at falsework shall not be removed until such removal is approved by the Engineer.

Temporary crash cushion modules installed as specified above will be measured and paid for as provided in "Temporary Crash Cushion Module," of these special provisions except that when the Engineer's Estimate does not include a contract

item for temporary crash cushion modules, full compensation for furnishing, placing, maintaining, repairing, replacing and removing the temporary crash cushion modules at falsework locations as specified in these special provisions shall be considered as included in the contract prices paid for the various items of work requiring falsework and no separate payment will be made therefor.

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 Division 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 Division 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 11" x 17" or 22" x 34" in size and 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-Post Mile. 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 20 pound (minimum) bond paper (22" x 34" in size) of all CRIP plan sheets prepared by the Contractor for each CRIP shall be furnished to the Office of Structure Design, Documents Unit.

Each CRIP shall be submitted prior to completion of 25 percent of the contract working days and sufficiently in advance of the start of the work that is proposed to be revised by the CRIP to allow time for review by the Engineer and correction by the Contractor of the CRIP plans and calculations without delaying the work. The Contractor shall allow a minimum of 12 weeks for the review of a CRIP. In the event that several CRIPs are submitted simultaneously, or an additional CRIP is submitted for review before the review of a previously submitted CRIP has been completed, the Contractor shall designate the sequence in which the CRIPs are to be reviewed. In this event, the time to be provided for the review of any proposal in the sequence shall be not less than the review time specified herein for that proposal, plus 2 weeks for each CRIP of higher priority which is still under review.

Should the review not be complete by the date specified in the Contractor's CRIP, or such other date as the Engineer and Contractor may subsequently have agreed to in writing and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in review of CRIP plans and calculations, an extension of time commensurate with the delay in completion of the work thus caused will be granted as provided in Section 8-1.07, "Liquidated Damages," of the Standard Specifications except that the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications shall not apply.

Permits and approvals required of the State have been obtained for the structures shown on the plans. Proposals which result in a deviation in configuration may require new permits or approvals. The Contractor shall be responsible for obtaining the new permits and approvals before the Engineer will reach a decision on the proposal. Delays in obtaining permits and approvals will not be reason for granting an extension of contract time.

All proposed modifications shall be designed in conformance with the bridge design specifications and procedures currently employed by the Department. The proposal shall include all related, dependent or incidental changes to the structure and other work affected by the proposal. The proposal will be considered only when all aspects of the design changes are included for the entire structure. Changes, such as but not limited to, additional reinforcement and changes in location of reinforcement, necessary to implement the CRIP after approval by the Engineer, shall be made at the Contractor's expense.

Modifications may be proposed in (1) the thickness of girder stems and deck slabs, (2) the number of girders, (3) the deck overhang dimensions as specified herein, (4) the amount and location of reinforcing steel, (5) the amount and location of prestressing force in the superstructure, and (6) the number of hinges, except that the number of hinges shall not be increased. The strength of the concrete used may be increased but the strength employed for design or analysis shall not exceed 6,000 psi.

Modifications proposed to the minimum amount of prestressing force which must be provided by full length draped tendons are subject to the provisions in "Prestressing Concrete" of these special provisions.

No modifications will be permitted in (1) the foundation type, (2) the span lengths or (3) the exterior dimensions of columns or bridge superstructure, except that the overhang dimension from face of exterior girder to the outside edge of roadway deck may be uniformly increased or decreased by 25 percent on each side of the box girder section. Fixed connections at the tops and bottoms of columns shown on the plans shall not be eliminated.

The Contractor shall be responsible for determining construction camber and obtaining the final profile grade as shown on the plans.

The Contractor shall reimburse the State for the actual cost of investigating CRIPs for cast-in-place prestressed box girder bridges submitted by the Contractor. The Department will deduct this cost from any moneys due, or that may become due, the Contractor under the contract, regardless of whether or not the proposal is approved or rejected.

DECK CLOSURE POURS.--Where a deck closure pour is shown on the plans, reinforcement protruding into the closure space and forms for the closure pour shall conform to the following:

During the time of placement of concrete in the deck, other than for the closure pour itself, reinforcing steel which protrudes into the closure space shall be completely free from any connection to the reinforcing steel, concrete, or other attachments of the adjacent structure, including forms. The reinforcing steel shall remain free of any connection for a period of not less than 24 hours following completion of the pour.

Forms for the closure pour shall be supported from the superstructure on both sides of the closure space.

SLIDING BEARINGS.--Sliding bearings consisting of elastomeric bearing pads lubricated with grease and covered with sheet metal shall conform to the following requirements:

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.

Sheet metal shall be commercial quality galvanized sheet steel. The sheet metal shall be smooth and free of kinks, bends, or burrs.

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.

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

The peel strength test will be performed after immersing the sample in water for a minimum of 10 days. The bond between elastomer and fabric shall be such that when a sample is tested for separation, it shall have a minimum peel strength of 30 pounds per inch when tested in accordance with California Test 663.

The last 2 sentences of the tenth paragraph of Section 51-1.12H(1), "Plain and Fabric Reinforced Elastomeric Bearings," of the Standard Specifications are amended to read:

Pads shall be available for sampling at least 4 weeks in advance of intended use. All sample pads for testing shall be furnished by the Contractor at the Contractor's expense.

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

One sample bearing shall be furnished to the Engineer from each lot of bearings to be furnished for the contract. Samples shall be available at least 3 weeks in advance of intended use. The sample bearing shall be one of the following:

BEARING PAD THICKNESS AS SHOWN ON THE PLANS	SAMPLE BEARING
2 inches or less.....	Smallest complete bearing shown on the plans.
Greater than 2 inches.....	* 2.25±0.125 inch thick sample not less than 8 inches by 12 inches in plan and cut by the manufacturer from the center of one of the thickest complete bearings.

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

MEASUREMENT AND PAYMENT.--Measurement and payment for concrete in structures shall conform to the provisions in Sections 51-1.22, "Measurement," and 51-1.23, "Payment," of the Standard Specifications and these special provisions.

Full compensation for roughening existing concrete surfaces to a full amplitude of approximately 1/4-inch, where shown on the plans, shall be considered as included in the contract price paid per cubic yard for structural concrete, bridge and no separate payment will be made therefor.

The seventh paragraph of Section 51-1.22, "Measurement," of the Standard Specifications is deleted.

The thirteenth paragraph of Section 51-1.23, "Payment," of the Standard Specifications is amended to read:

Full compensation for waterstops, strip waterstops, and neoprene strip shall be considered as included in the contract price paid per cubic yard for the various items of concrete work involved and no separate payment will be made therefor.

Full compensation for furnishing and installing access opening covers in soffits of new cast-in-place box girder bridges shall be considered as included in the contract price paid per cubic yard for structural concrete, bridge and no separate payment will be made therefor.

Full compensation for furnishing and installing plastic pipe located at vertical drains used behind retaining walls and bridge abutments, including horizontal or sloping drains down slopes and across sidewalk areas, including excavation and backfill involved in placing the plastic pipe, shall be considered as included in the contract price paid per cubic yard for the various items of concrete work and no separate payment will be made therefor.

Full compensation for furnishing and installing steel plates and for forming blockouts for joint seal assemblies shall be considered as included in the contract price paid per cubic yard for structural concrete, bridge and no separate payment will be made therefor.

Full compensation for furnishing and installing precast concrete catcher blocks including bar reinforcing steel, elastomeric bearing pads, shims, and mortar pads shall be considered as included in the contract price paid per cubic yard for structural concrete, bridge, and no separate payment will be made therefor.

10-1.46 MINOR CONCRETE (PIPE ENCASEMENT)

Minor concrete (pipe encasement) shall conform to the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Excavation shall be performed in accordance with the provisions of Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications.

Trench safety shall be in accordance with the provisions of Section 7-1.01E, "Trench Safety," of the Standard Specifications.

Materials shall be new and in accordance with the following:

Portland cement shall be Type II modified and shall conform to the provisions of Section 90-2.01, "Portland Cement," of the Standard Specifications

Aggregate shall conform to the provisions of Section 90-2.02, "Aggregates," of the Standard Specifications

Reinforcement shall conform to the requirements in ASTM Designation: A 615, Grade 60, deformed and shall conform to the provisions of Section 52, "Reinforcement," of the Standard Specifications.

Concrete shall consist of 188 pounds of portland cement per cubic yard and aggregate with a combined grading of one inch maximum as defined in Section 90-3.04, "Combined Aggregate Gradings," of the Standard Specifications.

Construction of pipe encasement shall be against firm, dry earth. After placing reinforcement and prior to placing concrete, the Contractor shall remove all loose material from surfaces that will be in contact with pipe encasement concrete.

The contract price paid per cubic yard for minor concrete (pipe encasement) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in minor concrete (pipe encasement), complete in place, including all structure excavation and structure backfill, furnishing and placing all bar reinforcing steel dewatering necessary to construct minor concrete (pipe encasement), complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer, and no separate payment will be made for these included items.

10-1.47 PRECAST CONCRETE GIRDERS

Precast reinforced concrete girders shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications.

10-1.48 PRECAST PRESTRESSED CONCRETE BRIDGE MEMBERS

Precast prestressed concrete members shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

The anticipated deflection and method of accommodation of deflection of precast prestressed concrete girders, prior to the time the deck concrete is placed, shall be shown on the working drawings in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The deflection shall include the following:

1. Anticipated upward deflection caused by the prestressing forces.
2. Downward deflection caused by the dead load of the girder.
3. Deflection caused by the creep and shrinkage of the concrete for the time interval between the stressing of the girders and the planned placement of the deck.

Such deflection shall be substantiated by calculations that consider the ages of the girder concrete at the time of stressing and the Contractor's planned placement of the deck. All deflection calculations shall be based on the concrete producer's estimate of the modulus of elasticity at the applicable concrete age.

Adjustments to accommodate girder deflections, which occur prior to the time the deck concrete is placed, may include revisions in bearing seat elevations, but any such adjustments shall be limited by the following conditions:

A. The minimum permanent vertical clearance under the structure as shown on the plans shall not be reduced.
B. The profile grade and cross slope of the deck shall not be changed.
C. A minimum of one inch of deck slab concrete between the top of the precast girders and the deck slab reinforcement shall be maintained.

Girders with unanticipated girder deflection and which cannot comply with conditions A, B, and C will be rejected in conformance with the provisions in Section 6-1.04, "Defective Materials," of the Standard Specifications.

Adjustments to accommodate girder deflections will not be considered a change in dimensions. Full compensation for increases in the cost of construction, including increases in the quantity of deck or bearing seat concrete, resulting from adjustments to accommodate girder deflections shall be considered as included in the contract price paid for the various items of work involved, and no additional compensation will be allowed therefor.

Temporary lateral bracing shall be provided for all precast girders. The bracing shall be installed at each end of each girder, except notched ends, prior to the release of the erection equipment from the girder and shall remain in place until 2 days after the concrete diaphragms have been placed. The bracing shall be adequate to prevent overturning of the girders prior to completion of the work and as a minimum shall be capable of resisting a lateral force of 15 pounds per square foot of girder side area applied laterally in either direction to the top of the girder. Girder erection shall not be started until the temporary lateral bracing proposed for use by the Contractor has been approved by the Engineer.

10-1.49 TYPE 6 RETAINING WALL

Type 6 retaining wall, consisting of a reinforced concrete footing and a reinforced concrete masonry unit stem, shall conform to the provisions in Section 51, "Concrete Structures," and Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

Wall stems shall be constructed of reinforced concrete masonry units.

Hollow load-bearing concrete masonry units shall conform to ASTM Designation: C 90, Type II, and shall be of uniform color and size.

Portland cement for grout and mortar shall conform to Section 90-2.01, "Portland Cement," of the Standard Specifications or shall conform to ASTM Designation: C 150, Type II.

Hydrated lime shall conform to ASTM Designation: C 207, Type S.

Mortar sand shall be commercial quality.

Caulking, for sealing expansion joints, shall be a non-sag polysulfide or polyurethane material conforming to the provisions in Federal Specification TT-S-230, Type II.

Mortar for laying masonry units shall consist, by volume, of one part portland cement, 0 to 1/2 parts 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 re-tempered more than one hour after mixing.

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 between 90 percent and 100 percent of the combined grading shall pass the 1/2 inch sieve.

At the option of the Contractor, grout for filling masonry units may be proportioned either by volume or weight. Grout shall contain only enough water to cause it 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.

Grout proportioned by volume shall consist of at least one part portland cement and 4.5 parts aggregate. Aggregate volumes shall be based on a loose, air-dry condition.

Grout proportioned by weight shall contain at least 564 pounds of portland cement per cubic yard.

Concrete masonry unit construction shall be true and plumb. Recesses in the units for horizontal reinforcement shall be provided.

Cleanout openings shall be provided at the bottoms of all cells where height of wall is in excess of 4 feet. The cleanouts shall be sealed before filling with grout, after inspection.

Mortar joints shall be approximately 3/8 inch wide. Units shall be laid with full mortar coverage of the face in both the vertical and horizontal joints, except where weep holes are specified. Vertical joints shall be shoved tight. Exposed joints shall be concave, tooled smooth.

All cells in the hollow unit masonry shall be filled solidly with grout. All grout shall be consolidated at time of pouring by puddling or vibrating. The top lift of grout shall be placed approximately one inch below the top of the units, to provide for cement mortar cap.

The cement mortar cap shall conform to the provisions for mortar.

Splashing, staining or spotting on the exposed face of the wall stem shall be removed.

Pay quantities of the reinforced concrete masonry unit stem for Type 6 retaining walls will be determined by the square feet of completed wall stem, including the cap, measured along the horizontal length and the height from the top of footing to the top of the wall.

The contract price paid per square foot for retaining wall stem (Type 6) shall include full compensation for furnishing all labor, materials, (except reinforcement), tools, equipment, and incidentals, and for doing all the work involved in constructing the reinforced concrete or reinforced concrete masonry unit retaining wall stems, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Measurement and payment of concrete for footing and reinforcement for footing and wall stem shall conform to the provisions in Sections 51, "Concrete Structures," and 52, "Reinforcement," of the Standard Specifications.

The pay quantity of reinforcement has been determined on the basis of the use of the reinforced concrete stem, and no increase or decrease in the quantity of reinforcement to be paid for will be made if the Contractor elects to construct the reinforced concrete masonry unit stem.

10-1.50 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 the section, "Engineering Fabrics," of these special provisions.

STRUCTURE APPROACH DRAINAGE SYSTEM

GEOCOMPOSITE DRAIN.--Geocomposite drain shall consist of a manufactured core not less than 0.25-inch thick nor more than 2 inches 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 2.0 gallons per minute per foot width at a hydraulic gradient of 1.0 and a minimum externally applied pressure of 3,500 pounds per square foot.

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 3 inches at all joints and wrap around the exterior edges a minimum of 3 inches 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 6 inches 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 6-inch 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.

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 180° F. nor more than 230° F.

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 12 to 18 inches or stitched. The preceding roll shall overlap the following roll in the direction the material is being spread or shall be stitched. When the fabric is joined by stitching, it shall be stitched with yarn of a contrasting color. The size and composition of the yarn shall be as recommended by the fabric manufacturer. The stitches shall number 5 to 7 per inch of seam.

Equipment or vehicles shall not be operated or driven directly on the filter fabric.

TREATED PERMEABLE BASE UNDER APPROACH SLAB.--Treated permeable base under structure approach slabs shall consist of constructing either an asphalt treated permeable base or a cement treated permeable base in conformance with Section 29, "Treated Permeable Bases," of the Standard Specifications and these special provisions.

The type of treatment, asphalt or cement, to be used shall be at the option of the Contractor.

Not less than 30 days prior to the start of placing the treated permeable base the Contractor shall notify the Engineer, in writing, which type of treated permeable base will be furnished. Once the Contractor has notified the Engineer of the selection the type to be furnished shall not be changed without a prior written request to do so and approval thereof in writing by the Engineer.

Asphalt treated permeable base shall be placed at a temperature of not less than 200° F. nor more than 250° F. 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. It shall be compacted with a vibrating shoe type compactor or rolled with a roller weighing not less than 1 1/2 tons nor more than 5 tons. 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 material may be spread in one layer. The material shall be compacted with either a vibrating shoe type compactor or with a steel-drum roller weighing not less than 1 1/2 tons nor more than 5-tons. Compaction shall follow within one-half hour after the spreading operation and shall consist of 2-complete coverages of the treated material.

APPROACH SLABS:

Concrete for use in approach slabs shall contain not less than 658 pounds of cement per cubic yard.

Miscellaneous steel parts and all steel components of abutment ties including plates, nuts, washers, and rods shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications. Bar reinforcement that has an unbonded portion shall be galvanized in conformance with the provisions in Section 75-1.05, “Galvanizing,” of the Standard Specifications.

Except as listed herein, structure approach slabs shall be cured for not less than 5 days prior to opening to traffic, unless, at the option of the Contractor, the structure approach slabs are constructed using concrete with a non-chloride Type C chemical admixture.

At the following locations, structure approach slabs shall be constructed using concrete with a non-chloride Type C chemical admixture conforming to these special provisions:

White Avenue Undercrossing, Br. No. 53-853
Park Avenue Undercrossing, Br. No. 53-854

Portland cement for use in concrete using a non-chloride Type C chemical admixture shall be Type II Modified, Type II Prestress, or Type III. Type II Modified and Type III cement shall conform to the provisions in Section 90-2.01, "Portland Cement," of the Standard Specifications. Type II Prestress cement shall conform to the requirements of Type II Modified cement, except the mortar containing the portland cement to be used and Ottawa sand, when tested in conformance with California Test 527, shall not contract in air more than 0.053 percent.

The non-chloride Type C chemical admixture, approved by the Engineer, shall conform to the requirements of 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:

Immediately after fabrication of the 5 test cylinders, the cylinders shall be stored in a temperature medium of 70 ± 3 degrees F until the cylinders are tested.

The 6-hour average strength of the 5 test cylinders shall not be less than 850 psi. No more than 2 test cylinders shall have a strength of less than 800 psi.

Building paper shall be commercial quality No. 30 asphalt felt.

Polyvinyl chloride (PVC) conduit used to encase the abutment tie rod shall be of commercial quality.

The top surface of approach slabs shall be finished in conformance with the provisions in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications. Edges of slabs shall be edger finished.

Approach slabs shall be cured with pigmented curing compound (1) in conformance with the provisions for curing structures in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications.

Structure approach slabs constructed using concrete with a non-chloride Type C chemical admixture shall be cured for not less than 6 hours prior to opening to public traffic. The curing period shall be considered to begin at the start of discharge of the last truck load of concrete to be used in the slab.

If the ambient temperature is below 65° F during the curing period for approach slabs using concrete with a non-chloride Type C chemical admixture, an insulating layer or blanket shall cover the surface. The insulation layer or blanket shall have an R-value rating given in the table below. At the Contractor's option, a heating tent may be used in lieu of or in combination with the insulating layer or blanket.

TEMPERATURE RANGE DURING CURING PERIOD	R-VALUE, MINIMUM
55° F. through 64° F.	1
45° F. through 54° F.	2
40° F. through 44° F.	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 Sections 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, bar reinforcement and miscellaneous bridge metal, and waterstops, shall be considered as included in the contract price paid per cubic yard for structural concrete, approach slab of the type shown in the Engineer's Estimate and no additional compensation will be allowed therefor.

10-1.51 STRUCTURE APPROACH SLABS (TYPE R)

Structure approach slabs (Type R) shall consist of removing portions of existing structures, existing pavement and base including reinforced concrete approach slabs, asphalt concrete surfacing, portland cement concrete pavement, subsealing material and cement treated base and constructing new reinforced concrete approach slabs at structure approaches as shown on the plans and in conformance with these special provisions.

GENERAL.--The thickness shown on the plans for structure approach slabs is the minimum thickness. The thickness will vary depending on the thickness of the pavement and base materials removed.

Voids between the new reinforced structure approach slab and the base material remaining in place that are caused by removal of subsealing material or cement treated base shall be filled, at the option of the Contractor, with aggregate base (approach slab) or structure approach slab concrete.

The Contractor shall establish a grade line for new approach slabs by setting stringlines on each side of the proposed approach slab. The stringlines shall start approximately 100 feet from the structure and extend approximately 50 feet onto the structure. The stringlines shall be adjusted as necessary to provide a smooth profile grade for the new approach slab. The profile grade will be subject to the approval of the Engineer.

The Contractor shall schedule his operations so that the pavement and base materials removed during a work period shall be replaced, in that same work period, with approach slab concrete that shall be cured for at least 6 hours prior to the time the lane is to be opened to public traffic as designated in "Maintaining Traffic" of these special provisions. In the event the existing pavement and base materials are removed and the Contractor is unable, as determined by the Engineer, to construct, finish and cure the new approach slab by the time the lane is to be opened to public traffic, the excavation shall be filled with a temporary roadway structural section as specified in this section, "Structure Approach Slabs (Type R)."

At locations where the removal of existing materials and approach slab construction is not required to be completed within the same work period, the requirements for "Temporary Roadway Structural Section" shall not apply. The Contractor shall have the option of:

1) Curing the approach slab concrete for not less than 5 days prior to opening to public traffic, or
2) Constructing the approach slab using concrete with a non-chloride Type C chemical admixture and curing the approach slab concrete at least 6 hours prior to opening to public traffic.

TEMPORARY ROADWAY STRUCTURAL SECTION.--A sufficient standby quantity, as determined by the Engineer, of asphalt concrete and aggregate base shall be provided at the project site for construction of a temporary roadway structural section where existing approaches to structures are being replaced. The temporary structural section shall be maintained, and later removed as a first order of work when the Contractor is able to construct and cure the approach slab within the prescribed time limit. The temporary structural section shall consist of 0.3-foot thick layer of asphalt concrete over aggregate base.

The aggregate base for the temporary structural section shall conform to the requirements specified under "Aggregate Base (Approach Slab)" of these special provisions.

The asphalt concrete for the temporary structural section shall be produced from commercial quality aggregates and asphalt binder. The grading of the aggregate shall conform to the 3/4 inch maximum medium grading in Section 39-2.02, "Aggregate," of the Standard Specifications and the asphalt binder shall conform to the requirements of liquid asphalt SC-800 in Section 93, "Liquid Asphalts," of the Standard Specifications. The amount of asphalt binder to be mixed with the aggregate shall be approximately 0.3-percent less than the optimum bitumen content as determined by California Test 367.

Aggregate base and asphalt concrete for the temporary structural section shall be spread and compacted by methods that will produce a well-compacted, uniform base, free from pockets of coarse or fine material and a surfacing of uniform smoothness, texture, and density. The aggregate base and the asphalt concrete may each be spread and compacted in one layer. The finished surface of the asphalt concrete shall not vary more than 0.05-foot from the lower edge of a 12-foot straightedge placed parallel with the centerline and shall match the elevation of the existing concrete pavement and structure along the joints between the existing pavement and structure and the temporary surfacing.

The material from the removed temporary structural section shall be disposed of outside the highway right of way in conformance with Section 7-1.13 of the Standard Specifications except that removed aggregate base may be stockpiled at the project site and reused for construction of another temporary structural section. When no longer required, standby material or stockpiled material for construction of temporary structural sections shall be removed and disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13.

REMOVING PORTIONS OF EXISTING STRUCTURES.--Attention is directed to "Existing Highway Facilities" of these special provisions.

REMOVING EXISTING PAVEMENT AND BASE MATERIALS.--The outline of portland cement concrete to be removed shall be sawed full depth with a power-driven concrete saw.

The outlines of excavations in asphalt concrete shall be cut on a neat line to a minimum depth of 0.25-foot with a power-driven concrete saw or wheel-type rock cutting excavator before any asphalt concrete material is removed. These excavations shall be permanently or temporarily backfilled to conform to the grade of the adjacent pavement prior to opening the lane to public traffic. Surplus excavated material may be used as temporary backfill material.

Regardless of the type of equipment used to remove concrete within the sawed outline, the surface of the concrete to be removed shall not be impacted within 1.5 feet of the pavement to remain in place. Removing existing pavement and base materials shall be performed without damage to the adjacent structure or pavement that is to remain in place. Damage to the structure or to pavement that is to remain in place shall be repaired to a condition satisfactory to the Engineer. Damaged pavement shall be removed and replaced with new concrete pavement if ordered by the Engineer. Repairing damage to structures or repairing or removing and replacing damaged pavement outside the limits of structure approach slabs shall be at the Contractor's expense.

Materials removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.

The base material remaining in-place, after removing the existing pavement and base materials to the required depth, shall be graded uniformly, watered, and compacted. The finished surface of the base material at any point shall not extend above the grade approved by the Engineer.

Areas of the base material that are low as a result of over excavation by the Contractor shall be filled, at the Contractor's expense, with structure approach slab concrete at the time and in the same operation that the new concrete is placed.

AGGREGATE BASE (APPROACH SLAB).--The aggregate base (approach slab) for filling voids below the reinforced structure approach slab concrete shall be produced from commercial quality aggregates consisting of broken stone, crushed gravel or natural rough-surfaced gravel, and sand, or any combination thereof. The grading of the aggregate base shall conform to the 3/4 inch maximum grading specified in Section 26-1.02A, "Class 2 Aggregate Base," of the Standard Specifications.

Aggregate base (approach slab) for filling voids below the reinforced structure approach slab concrete shall be spread and compacted by methods that will produce a well-compacted, uniform base, free from pockets of coarse or fine material. The aggregate base shall be watered and compacted to the grade approved by the Engineer. Where the required thickness of aggregate base is 0.67-foot or less, the base may be spread and compacted in one layer. Where the required thickness of aggregate base is more than 0.67-foot, the base shall be spread and compacted in 2 or more layers of approximately equal thickness, The maximum compacted thickness of any one layer shall not exceed 0.67-foot. The finished surface of the base material at any point shall not extend above the grade approved by the Engineer. Areas of the base material that are lower than the grade approved by the Engineer, shall be filled with structure approach slab concrete at the time and in the same operation that the new concrete is placed.

STRUCTURE APPROACH SLAB.--Reinforced concrete approach slabs shall conform to the provisions for approach slabs in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Concrete for use in approach slabs shall contain not less than 658 pounds of cement per cubic yard.

Miscellaneous steel parts and all steel components of abutment ties including plates, nuts, washers, and rods shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

Approach slab concrete that requires a minimum curing period of 6 hours shall be constructed using a non-chloride Type C chemical admixture. Mineral admixture will not be required in this concrete.

Portland cement for use in concrete using a non-chloride Type C chemical admixture shall be Type II Modified, Type II Prestress, or Type III. Type II Modified and Type III cement shall conform to the provisions in Section 90-2.01, "Portland Cement," of the Standard Specifications. Type II Prestress cement shall conform to the requirements of Type II Modified cement, except the mortar containing the portland cement to be used and Ottawa sand, when tested in conformance with California Test 527, shall not contract in air more than 0.053 percent.

The non-chloride Type C chemical admixture shall be approved by the Engineer and shall conform to the requirements in ASTM Designation: C 494 and Section 90-4, "Admixtures," of the Standard Specifications.

The concrete with non-chloride Type C chemical admixture shall be prequalified prior to placement in conformance with the provisions for prequalification of concrete specified by compressive strength in Section 90-9.01, "General," of the Standard Specifications and the following:

Immediately after fabrication of the 5 test cylinders, the cylinders shall be stored in a temperature medium of 70 ± 3 degrees F until the cylinders are tested.

The 6-hour average strength of the 5 test cylinders shall not be less than 850 psi. No more than 2 test cylinders shall have a strength of less than 800 psi.

Building paper shall be commercial quality No. 30 asphalt felt.

Polyvinyl chloride (PVC) conduit used to encase the abutment tie rod shall be of commercial quality.

Bar reinforcement or abutment tie rods in drilled holes shall be bonded in conformance with the provisions for drilling and bonding dowels in Section 83-2.02D(1), "General," of the Standard Specifications.

The top surface of approach slabs shall be finished in conformance with the provisions in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications. The finished top surface shall not vary more than 0.02-foot from the lower edge of a 12-foot straightedge placed parallel with the centerline. Edges of slabs shall be edger finished.

The surface of the approach slab will not be profiled and the Profile Index requirements shall not apply.

Approach slabs shall be cured with pigmented curing compound (1) in conformance with the provisions for curing structures in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications. The minimum curing period as specified in this section-"Structure Approach Slabs (Type R)" shall be considered to begin at the start of discharge of the last truck load of concrete to be used in the slab. Fogging of the surface with water after the curing compound has been applied will not be required. Should the film of curing compound be damaged from any cause before the approach slab is opened to public traffic, the damaged portion shall be repaired immediately with additional compound, at the Contractor's expense. Damage to the curing compound after the approach slab is opened to public traffic shall not be repaired.

If the ambient temperature is below 65° F during the curing period, an insulating layer or blanket shall cover the surface. The insulation layer or blanket shall have an R-value rating given in the table below. 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
55° F. through 64° F.	1
45° F. through 54° F.	2
40° F. through 44° F.	3

Tests to determine the coefficient of friction of the final textured surface will be made only if the Engineer determines by visual inspection that the final texturing may not have produced a surface having the specified coefficient of friction. Tests to determine the coefficient of friction will be made after the approach slab is opened to public traffic, but not later than 5 days after concrete placement. The coefficient of friction will be measured by California Test 342. Portions of completed concrete surfaces that are found to have a coefficient of friction less than 0.35 shall be ground or grooved parallel to the center line in conformance with the provisions in bridge decks of Section 42, "Groove and Grind Pavement," of the Standard Specifications.

JOINTS.--Hardboard and expanded polystyrene shall conform to the provisions in Section 51-1.12D, "Sheet Packing, Preformed Pads and Board Fillers," of the Standard Specifications.

Type AL joint seals shall conform to the provisions in Section 51-1.12F, "Sealed Joints" of the Standard Specifications. The sealant may be mixed by hand-held power-driven agitators and placed by hand methods.

The pourable seal between the steel angle and concrete barrier shall conform to the requirements for Type A and AL seals in Section 51-1.12F(3), "Materials and Installation," of the Standard Specifications. The sealant may be mixed by hand-held power-driven agitators and placed by hand methods. Immediately prior to placing the seal, the joint shall be thoroughly cleaned, including abrasive blast cleaning of the concrete surfaces, so that all foreign material and concrete spillage are removed from all joint surfaces. Joint surfaces shall be dry at the time the seal is placed.

MEASUREMENT AND PAYMENT.--Structural concrete, approach slab (Type R) will be measured and paid for in conformance with the provisions in Sections 51-1.22, "Measurement," and Section 51-1.23, "Payment," of the Standard Specifications and these special provisions.

Full compensation for removing and disposing of portions of existing structures and pavement materials,miscellaneous metal, and pourable seals shall be considered as included in the contract price paid per cubic yard for structural concrete, approach slab (Type R) and no separate payment will be made therefor.

The quantity of aggregate base (approach slab) to be paid for shall include the actual volume of aggregate base (approach slab) used to fill voids below the reinforced structure approach slab concrete, except for the volume of areas low as a result of over excavation. The volume to be paid for will be calculated on the basis of the constructed length, width and thickness of the filled voids. Structure approach slab concrete used to fill voids lower than the approved grade of the base, except for the areas low as a result of over excavation by the Contractor, will be measured and paid for by the cubic yard as aggregate base (approach slab).

No adjustment of compensation will be made for any increase or decrease in the quantity of aggregate base (approach slab) 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 item of aggregate base (approach slab).

The contract price paid per cubic yard for aggregate base (approach slab) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing aggregate base (approach slab) complete in place, including excavation, and removing and disposing of base and subsealing materials, as shown on the plans, as specified in the Standard Specifications and these special provisions and as directed by the Engineer.

Full compensation for furnishing, stockpiling and disposing of standby material for construction of temporary structural sections; and for constructing, maintaining, removing and disposing of temporary structural sections shall be considered as included in the contract price paid per cubic yard for structural concrete, approach slab (Type R) and no separate payment will be made therefor.

Full compensation for drilling and bonding of bar reinforcement or abutment tie rods shall be considered as included in the contract price paid per cubic yard for structural concrete, approach slab (Type R) and no separate payment will be made therefor.

10-1.52 PAVING NOTCH EXTENSION

This work shall consist of extending existing paving notches in conformance with the details shown on the plans and these special provisions.

Concrete for paving notch extension shall be a high-strength material consisting of either magnesium phosphate concrete, modified high alumina based concrete, or portland cement based concrete. Magnesium phosphate concrete shall conform to the provisions for magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions. Modified high alumina based concrete and portland cement based concrete shall be water activated and shall conform to the provisions for single component (water activated) magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions.

At least one hour shall elapse between the time of placing concrete for the paving notch extension and placing concrete for the structure approach slab.

A clean uniform rounded aggregate filler may be used to extend the concrete. The moisture content of the aggregate shall not exceed 0.5 percent. Grading of the aggregate shall conform to the following:

Sieve Size	Percentage Passing
1/2 "	100
No. 16	0-5

The amount of aggregate filler shall conform to the manufacturer's recommendation, but in no case shall the concrete strengths be less than that specified for magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications.

The components of dual component (with a prepackaged liquid activator) magnesium phosphate shall be combined by mixing complete units, supplied by the manufacturer. Portions of units shall not be used. Water shall not be added to dual component magnesium phosphate.

Magnesium phosphate concrete shall not be mixed in containers or worked with tools containing zinc, cadmium, aluminum or copper. Modified high alumina based concrete shall not be mixed in containers or worked with tools containing aluminum.

Concrete shall not be retempered. Finishing tools that are cleaned with water shall be thoroughly dried before working the concrete.

When placing concrete on slopes exceeding 5 percent, the Engineer may require the Contractor to provide a flow controlled modified material.

Modified high alumina based concrete and portland cement based concrete shall be cured in conformance with the provisions in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications. Magnesium phosphate concrete shall not be cured.

The surface temperature of the areas to receive the concrete shall be 40° F. or above when the concrete is placed. The contact surface to receive the magnesium phosphate concrete shall be dry. The contact surfaces to receive the modified high alumina concrete or portland cement based concrete may be damp but not saturated.

The construction joint between the paving notch extension and the existing abutment shall conform to the provisions for horizontal construction joints in Section 51-1.13, "Bonding," of the Standard Specifications. Concrete shall be placed in the spalled portions of the existing paving notch concurrently with the concrete for the paving notch extension.

Bar reinforcing steel shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications.

Structure excavation and backfill shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications.

Drilling of holes and bonding of reinforcing steel dowels shall conform to the provisions for drilling and bonding dowels in Section 83-2.02D(1), "General," of the Standard Specifications.

The quantity of concrete for paving notch extension will be measured by the cubic yard as determined in conformance with the dimensions shown on the plans or other dimensions that may be ordered in writing by the Engineer.

The contract price paid per cubic yard for paving notch extension shall include full compensation for furnishing all labor, materials (including concrete for the paving notch spalled areas), tools, equipment, and incidentals, and for doing all the work involved in constructing the paving notch extension, complete in place, including structure excavation and backfill, reinforcement, and drilling and bonding dowels, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.53 SOUND WALL

DESCRIPTION.--This work shall consist of constructing sound walls of masonry block. Sound walls shall be supported on concrete barriers, retaining walls, footings, or piles as shown on the plans.

The Contractor shall submit 2 sets of elevation and plan layout drawings to the Engineer, as provided in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The drawings shall be to scale and shall show the proposed top and bottom elevation lines. The top and bottom elevation lines shown on the plans are minimum and shall be fully contained in the proposed layout drawings. The drawings shall include, within the limits shown on the plans, the panel sizes, pile spacing, post spacing, footing steps, aesthetic features, locations of expansion joints and access gates. The Contractor shall allow two weeks after complete drawings are submitted for review.

SOUND WALL (BARRIER)(MASONRY BLOCK).--Sound wall (barrier) (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 conform to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications.

Reinforcing bars shall conform to the requirements in ASTM Designation: A 706.

Concrete masonry units shall be hollow, load bearing, conforming to the requirements in ASTM Designation: C 90, medium weight classification, Type II. Standard or open end units may be used. Open end units, if used, shall not reduce the spacing of the bar reinforcement as shown on the plans.

The masonry units shall be nominal size and texture and of uniform color. The color shall be light tan, selected from the manufacturer's standards.

When high strength concrete masonry units with f'm=2500 pounds per square inch are shown on the plans, the high strength masonry units shall have a minimum compressive strength of 3750 pounds per square inch 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 2 inches and shall have a depth of about 3/16 inch.

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 1/2 parts 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.

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 2,500 psi.

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 1/2 inch sieve.

At the option of the Contractor, grout for filling masonry units may be proportioned either by volume or weight. 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 weight 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 weight for regular strength masonry shall contain at least 564 pounds of portland cement per cubic yard. Grout proportioned by weight for high strength masonry shall contain at least 658 pounds of portland cement per cubic yard.

Reinforced concrete masonry unit wall stems shall be constructed with portland cement mortar joints in conformance with the following:

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.

Mortar joints shall be approximately 3/8 inch 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.

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.

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 or heavier. Wooden, aluminum, or plastic spacing devices shall not be used.

Splices in vertical reinforcement shall be made only at the locations shown on the plans.

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 re-consolidated after excess moisture has been absorbed but before plasticity is lost. Grout shall not be sliced with a trowel.

Walls shall be constructed in 4 foot 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.

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.

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 1/2 inch below the top of the last course filled with grout.

Bond beams shall be continuous. The top of unfilled cells under horizontal bond beams shall be covered with metal or plastic lath.

When fresh masonry joins masonry that is partially or totally set, the contact surface shall be cleaned, roughened and lightly wetted.

Surfaces of concrete on which the masonry walls are to be constructed shall be roughened and cleaned, exposing the stone aggregate, and shall be flushed with water and allowed to dry to a surface dry condition immediately prior to laying the masonry units.

Where masonry unit cutting 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.

Masonry shall be protected as specified for concrete structures in Section 90-8, "Protecting Concrete," of the Standard Specifications and these special provisions.

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 are not acceptable as covering materials. The covering shall extend down each side of masonry walls approximately 2 feet.

Splashes, stains or spots on the exposed faces of the wall shall be removed.

ACCESS GATES.--Access gates shall conform to the details shown on the plans and these special provisions.

Timber members shall be tongue and groove Douglas fir sub-flooring free of knotholes. The location of knots of adjoining boards shall be staggered. The construction of the gate shall be with the tongue placed in the up position. The tongue of the top board and the groove of the bottom board shall be removed.

Timber members, steel frames, channels, anchorage devices, mounting hardware, gate rollers, corrugated steel pipe, nylon washers and neoprene tubing shall be of commercial quality.

The one-inch round ladder rungs with non-skid surface shall consist of No. 8 deformed, diamond pattern, bar reinforcing steel of commercial quality.

Gate rollers shall be rigid casters with self-lubricating bearings and hard rubber wheels.

All metal parts and hardware shall be hot-dip galvanized.

Timber surfaces of the access gates shall be primed and then stained with 2 coats of stain to match the adjacent sound wall. Primer and stain shall be of the top grade primer and stain from an established manufacturer. An established manufacturer is one who has manufactured industrial paints and stains to meet custom specifications for at least 10 years.

Where the back side of the masonry wall is to be split faced, or rough surface blocks, the bond beam above the gate opening upon which the upper gate guide is to be mounted shall have smooth sided blocks.

Material from excavation may be used for backfill outside of the pipe landings. Aggregate filling inside the pipe landings shall be a coarse concrete aggregate of commercial quality. Compacting of the aggregate will not be required.

MEASUREMENT AND PAYMENT.--Sound walls (barrier) (masonry block), of the types designated in the Engineer's Estimate, will be measured by the square foot 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 foot for sound wall (barrier) (masonry block) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the sound wall complete in place, including all supports (except retaining walls, 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. Retaining walls, concrete barrier and barrier supports supporting sound walls (barrier) (masonry block) will be measured and paid for as separate items of work.

Sound walls supported on retaining walls without a concrete barrier between them will be measured and paid for by the square foot as sound wall (barrier) (masonry block) except the bottom limit for payment for the sound walls shall be the top of the retaining wall.

MASONRY BLOCK WALL--Masonry block wall shall conform to the provisions in Sections 19, "Earthwork," 52, "Reinforcement," and 90, "Portland Cement Concrete," of the Standard Specifications and for sound wall (masonry block) as shown on the plans and as specified in these special provisions.

The masonry block wall shall extend from the existing masonry wall to the sound wall after all sound wall work is completed. The masonry block wall shall match the existing masonry wall and foundation in height, color and dimensions.

MEASUREMENT AND PAYMENT.--Masonry block walls will be measured by the square foot of wall projected on a vertical plane between the top of footing and top of wall lines shown on the plans or for walls supported on retaining from the top of the retaining wall to the upper elevation line and length of wall.

The contract price paid per square foot for masonry block wall shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the masonry block wall complete in place, including all supports (except retaining walls), anchorages, excavation, backfill, reinforcement and

footing, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer. Retaining walls, masonry block walls (retaining wall) will be measured and paid for as separate items of work.

DOWEL (SMOOTH, EPOXY COATED).--Dowels shall conform to the provisions in Section 75, "Miscellaneous Steel," of the Standard Specifications and these special provisions.

Dowel bars shall be required for transverse weakened plane joints where shown on the plans.

Dowel bars shall be placed parallel to the pavement surface and centerline within a tolerance of $^1/_2$-inch in 18 inches.

The forward movement of the finishing beam or screed shall not be interrupted by the inserting of the dowel bars.

A positive means of marking the locations of the transverse joints shall be provided.

Dowel bars shall be plain, round, smooth, and free from burrs or other deformations detrimental to free movement in the concrete. Dowel bars of the size and length shown on the plans and with at least one end sawed shall be provided. Dowel bars shall be Corrosion Resistant Dowel Bars and shall conform to the requirements in AASHTO M254, Type B, except the core material shall be of steel conforming to the requirements in AASHTO M31, grade 300 or 400, or the equivalent, except that the bend test will not be required. The coating material shall meet the coating material requirements of AASHTO M284. The cut ends of the dowel bars shall be coated. An approved parting compound shall be applied uniformly to the epoxy coated bar before the insertion in the concrete. The type of parting compoundused shall be as recommended by the coating manufacturer. Certified test results showing compliance with all requirements in AASHTO M254 shall be submitted to the Engineer for approval. In particular, the Contractor’s attention is directed to the Pull-Out Test requirement of AASHTO M254. The Pull-Out Test shall be performed on bars to which the proposed bond breaker has been applied, and the test report shall identify the type of parting compound used.

Dowel bars shall be placed by one of the following methods:

1. Automatic Dowel Bar Inserter Method. The automatic dowel bar inserter shall have a successful performance history. The Contractor shall submit documentation regarding performance history of the dowel bar inserter for approval.

   The pavement shall be placed and consolidated to full depth before insertion of the dowel bars.

   Dowel bars shall be inserted into the concrete ahead of the finishing beam or screed.
2. Dowel Bar Assembly as shown on the plans.

Dowel bar assemblies shall be securely anchored and constructed to firmly hold all the dowel bars at the specified depth and alignment. Spacer wires shall be cut after the assemblies are staked in position.

Paving shall not be started until the Dowel Bar Assemblies are in place and approved at least 200 feet in advance of the paving. Paving shall be stopped at any time that approved assemblies are not in place at least 200 feet in advance of the concrete placement operation. This requirement may be waived by the Engineer upon written request by the Contractor and approval by the Department, in areas where access is restricted, or other construction limitations are encountered.

Approval of the initial placement of Dowel Bar Assemblies shall not constitute acceptance of the final position of the dowel bars.

The concrete shall be consolidated around the dowel bars such that no voids exist. Supplemental use of hand held vibrators will not be allowed.

Regardless of the placement method chosen by the Contractor, after the initial day's placement of the concrete pavement, the Contractor shall suspend his operations until the Engineer has sufficient time to inspect dowel positioning to insure proper placement of the dowels is being achieved.

The Contractor shall perform coring of the initial concrete placement, as directed by the Engineer, as part of the dowel placement tolerance verification. A minimum of 6 bars shall be cored. Additional coring shall be provided by the Contractor.

Dowel and tie bar positioning will be randomly checked by the Engineer by coring or other methods. Each day's paving will be checked by the Engineer within 2 calendar days by performing one test for every 2,000 square yards of doweled pavement or fraction thereof. One test shall consist of drilling 2 cores, one on each end of a dowel bar to expose both ends and allow measurement. If the dowel bars are located incorrectly or air voids exist surrounding the dowel bars, additional cores will be required to determine the severity. The location of performing the test shall be selected by the Engineer. Joints containing dowels that do not meet specifications will be rejected. The Contractor shall replace rejected joints by an approved method. No additional payment will be made for replacement of slabs and joints required due to joints (dowel placement) not meeting the specified tolerances.

The positioning of dowels shall be controlled by the Contractor in a manner such that dowels meet the specified tolerances. If at any time dowels are found to be installed improperly, the paving operations will be suspended and operations shall not begin until the Contractor has demonstrated to the Engineer that the problem which caused the improper dowel positioning has been corrected.

Contact joints are those made by placing fresh concrete against hardened concrete at planned locations.

Concrete on both sides of longitudinal contact joints shall be connected with tie bars as shown on the plans.

When the plans require the construction of keyways, the groover portion of the keyway shall be constructed as part of the pavement width being placed.

Transverse weakened plane joints for plain jointed (non-doweled) concrete pavement sections, when adjacent to existing permanent pavements, shall be spaced to match abutting joints or random cracks. Joints shall be matched in location to joints in adjacent slabs or as directed by the Engineer.

Sawed joints shall be constructed before uncontrolled pavement cracking occurs; however, joints shall not be sawed until the concrete has hardened enough to prevent tearing or raveling during the sawing operations. The exact time when sawing will be done shall be determined by the Contractor, but in no case more than 2 hours after final finishing.

Any procedure used to saw joints which results in premature uncontrolled cracking shall be revised immediately. The Contractor shall repair damaged areas or random cracks as specified herein and as directed by the Engineer. Any spalled or chipped concrete along the joints shall be repaired as approved by the Engineer.

Volunteer cracks and spalls and raveling or tearing at sawed joints shall be repaired as hereinafter provided prior to opening the pavement to public traffic.

Volunteer cracks shall be classified as either plastic shrinkage cracks or random cracks.

Plastic shrinkage cracks are generally thosewhich do not usually penetrate the depth of the slab. They may appear either as irregular "map cracking" or as short irregular cracks roughly parallel to each other. The crack length is generally from $^1/_8$-inch to 9 feet and cracks are usually spaced from $^1/_8$-inch to 2 feet apart. They are normally caused by too rapid evaporation of water from the surface. They occur soon after the concrete has been placed.

Plastic shrinkage cracks shall be repaired as hereinafter specified for volunteer cracks unless the cracks exceed 13 feet in cumulative length within a slab area. In such case the slab shall be removed and replaced. Only cracks measuring more than one foot in length shall be used to measure the cumulative length of cracks per slabs. The area of plastic shrinkage cracking in square yards shall be numerically equal to the total length in feet of all shrinkage cracks, except that a short shrinkage crack within 12 inches of a longer crack shall not be measured.

Random cracks are normally located approximately parallel to a sawed joint and extend the full width or length of the slab and usually penetrate the full depth of the slab.

Random cracks shall be repaired as hereinafter specified for volunteer cracks unless the extent of random cracking is so severe as to divide the slab into 3 or more pieces, in which case the slab shall be removed and replaced. If both plastic shrinkage and random cracks occur in the same slab, each type shall be considered separately.

For doweled concrete pavements, if a random transverse crack appears and is not at the proposed weakened plane joint location, the slab shall be removed and replaced.

For plain jointed (non-doweled) pavement, the Contractor will be required to repair all random cracks within 5 feet of any sawed joint by injecting the total length of the crack with epoxy under pressure. All other random cracks, whether longitudinal or transverse to centerline, shall be sawed and sealed in conformance to the provisions of weakened plane joints for concrete pavement of these special provisions.

Where volunteer cracks cross or are partially coincident with sawed joints, either protective measures shall be taken to prevent entry of epoxy into saw cuts sufficient to reduce the calculated minimum groove depth or, at the option of the Contractor, accumulations of epoxy in saw cuts shall be removed by resawing to the calculated minimum depth prior to opening the pavement to any traffic.

Injecting cracks with epoxy shall be performed as directed by the Engineer. No cracks shall be injected with epoxy before a period of 10 days has elapsed after the concrete has been placed. Epoxy injection shall be performed before traffic is permitted on the pavement. When epoxy injection is not performed within 10 calendar days after the pavement is placed, the Engineer may order such work to be started and the Contractor shall complete the work within 10 calendar days after receiving said order.

In making epoxy injection repairs, a surface seal shall be applied to prevent escape of epoxy and entry ports shall be placed at intervals to allow filling the entire length of crack. Surface seal material and injection procedures shall be such as to prevent damaging the texture and appearance of the pavement surface after opening to public traffic. Epoxy shall be injected using in-line mixing equipment. Pressure pots shall not be used. Epoxy specifically designed for pressure injection and conforming to the requirements in AASHTO M235 (ASTM C881), Type IV, shall be used. The Contractor shall submit a written proposal to the Engineer for approval, detailing the equipment, personnel, materials, and procedures to be used for epoxy injection.

The Contractor shall provide 4-inch diameter cores of epoxied cracks at the rate of 5 relatively evenly spaced cores for each 150 linear feet of epoxied crack. If the total length of cracks to be epoxied exceeds 150 linear feet, the rate of coring may be reduced to one core for each additional 100 linear feet of epoxied crack provided the Contractor’s methods and equipment are producing satisfactory results. Cores shall extend through the entire depth of pavement and include the full depth of crack. Location of cores will be determined by the Engineer. Cracks where epoxy has penetrated to less that 80 percent of the crack depth shall have additional epoxy injected until a minimum of 80 percent of the crack depth has been

filled. Such cracks may require additional cores for verification as determined by the Engineer. All holes resulting from coring shall be completely filled with epoxy of the same quality as used to inject the cracks.

For plastic shrinkage cracks, crack or surface sealing as approved by the Engineer may be performed in lieu of epoxy injection. The material used for crack sealing shall be a high molecular weight methacrylate resin as directed by the Engineer. The Contractor shall provide cores of cracks healed or sealed according to the frequency and requirements shown herein for epoxy injection. Cracks of such size or depth that cannot be filled to the depth required, shall be epoxy injected. Regardless of the method of crack repair chosen, verification of material penetration by coring as described above, is required.

Any joints with excessive raveling or tearing and volunteer cracks with spalls more than $^3/_4$-inch deep which exceed $^1/_2$-inch in width and $3^3/_4$ inches in length that occur before pavement is open to public traffic shall be repaired, but only after removing all weak fractured concrete and cleaning surfaces to receive the patch. Patch material shall be determined by the Engineer. An insert, or other means, shall be used to prevent bonding both sides of planned joints together.

Full compensation for dowel (smooth, epoxy coated) shall be considered as included in the contract prices paid per cubic yard for concrete pavement and replace concrete pavement (fast setting hydraulic cement concrete) and no separate payment will be made therefor.

10-1.54 DRILL AND GROUT TIE BARS

Drilling and grouting tie bars shall conform to the details shown on the plans, the provisions in Section 51-1.13, "Bonding," of the Standard Specifications and these special provisions.

Tie bars shall conform to the provisions for bar reinforcement in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

Epoxy coated reinforcing steel tie bars shall be installed in all longitudinal joints between new concrete pavement and existing concrete pavement, as shown on the plans.

Holes shall be drilled by methods that will not shatter or damage the existing concrete pavement.

Drilling and grouting tie bars will be measured and paid for by the unit.

Full compensation for drill and grout tie bar shall be considered as included in the contract price paid per cubic yard for the various types of concrete pavement involved and no separate payment will be made therefor.

10-1.55 DRILL AND BOND DOWELS

Drilling and bonding dowels shall conform to the details shown on the plans, the provisions in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions.

Dowels shall conform to the provisions for bar reinforcement in "Reinforcement" of these special provisions.

If reinforcement is encountered during drilling, before specified depth is attained, the Engineer shall be notified. Unless the Engineer approves coring through the reinforcement, the hole will be rejected and a new hole, in which reinforcement is not encountered, shall be drilled adjacent to the rejected hole to the depth shown on the plans.

Unless otherwise provided, dowels to be bonded into drilled holes will be paid for as bar reinforcing steel (bridge).

Unless otherwise provided, drilling and bonding dowels will be measured and paid for by the linear foot determined by the number and the required depth of holes as shown on the plans, or as ordered by the Engineer.

The contract price paid per linear foot for drill and bond dowel shall include full compensation for furnishing all labor, materials (except reinforcing steel dowels), tools, equipment, and incidentals, and for doing all the work involved in drilling the holes, including coring through reinforcement when approved by the Engineer, and bonding the dowels, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.56 CORE CONCRETE

Coring concrete shall consist of coring 2" diameter holes through reinforced concrete bridge members at Towne Avenue Undercrossing as shown on the plans and in conformance with the requirements in these special provisions.

The holes shall be cored by methods that will not shatter or damage the concrete adjacent to the holes.

Water for core drilling operations shall be from the local domestic water supply or shall not contain more than 1,000 parts per million of chlorides as Cl, nor more than 1,300 parts per million of sulfates as SO_4, nor shall it contain any impurities in a sufficient amount to cause discoloration of the concrete or produce etching of the surface.

Water from core drilling operations shall not be permitted to fall on public traffic, to flow across shoulders or lanes occupied by public traffic, or to flow into gutters or other drainage facilities.

Coring concrete will be measured and paid for by the linear foot as core concrete of the sizes listed in the Engineer's Estimate. The cored concrete will be measured along the centerline of the hole without deduction for expansion joints.

The contract price paid per linear foot for core concrete of the sizes listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in coring the holes, including control of water from core drilling and repairing any damaged reinforcement, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

10-1.57 RETROFIT DOWEL (SMOOTH, EPOXY COATED)

Retrofit dowel (smooth, epoxy coated), conforming to Section 52-1.02B, "Epoxy-coated Bar Reinforcement", of the Standard Specifications, shall be furnished and installed in existing concrete pavement joints where shown in the plans, and in accordance with the following:

The Contractor shall saw cut slots in the pavement as required to place the center of the dowel at mid-depth in the concrete slab. Multiple saw cuts parallel to the centerline may be required to properly remove material from the slot and to provide a level, secure surface for the feet of the dowel bar chairs.

Jackhammers used to break loose the concrete shall have a weight less than 30 pounds. Jackhammers greater than 30 pounds shall not be used for any concrete removal process in order to prevent damage to the existing pavement.

Saw cut slots shall be cut and prepared such that dowel bars can be placed with the following tolerances:

Placed within 1-inch of the center of the existing pavement depth.
Centered over the transverse joint so that $11^1/_2$ to 12-inches of the bar is in each panel.
Placed parallel to centerline and within $^1/_4$-inch of the horizontal and vertical planes.

All exposed surfaces and cracks in the slot shall be sand blasted and cleaned to bare concrete to remove saw slurry, parting compound, or other foreign materials prior to installation of the dowel. The Contractor shall protect the traveling public from this work.

Prior to placement, the dowel bars shall be lightly coated with a parting compound and placed on a chair that will provide a minimum of $^1/_2$-inch clearance between the bottom of the dowel and the bottom of the slot.

The dowel bar chair design shall hold the dowel bar tight in place during placement of the rapid setting concrete material. Rapid setting concrete material shall conform to the requirements specified elsewhere in these special provisions. Any chair design that may allow movement of the bar during the placement of the rapid setting concrete material will be rejected by the Engineer.

Dowel bars chairs for supporting the dowel bars shall be completely epoxy coated or made of a non-metallic material. The dowel bar chair shall hold the bar centered in place in the slot. The dowel bar chairs shall be approved by the Engineer

Immediately prior to placement of the dowel bar and rapid setting concrete material, the Contractor shall caulk the existing transverse joint crack at the bottom and sides of the slot. The caulking shall not be placed any farther than $^1/_2$-inch outside either side of the crack. The transverse joint crack shall be caulked sufficiently to satisfy the above requirements and to prevent the rapid setting concrete material from entering the joint/crack at the bottom or sides of the slot.

A $^3/_8$-inch thick foam core board filler material shall be placed at the middle of the dowel to maintain the transverse joint as shown on the plans. The filler shall fit tightly around the dowel and to the bottom and edges of the slot and be a minimum of 1-inch below the existing concrete surface. In addition, sealant shall be placed where core board contacts the bottom of slot to provide a tight fit. The filler shall be capable of remaining in a vertical position and remain tight with all edges during placement of the rapid setting concrete material. If the filler shifts during placement of the rapid setting concrete material the work shall be rejected and redone at the Contractor’s expense.

Rapid setting concrete material shall be consolidated by using a pencil type vibrator as approved by the Engineer. The Contractor shall not overwork the patching material during the patch consolidation

The surface of the patched dowel bar slots shall be slightly rounded above the existing concrete surface during finishing.

The joint shall be maintained by saw cutting the surface with a hand pushed single blade saw. The cut width shall be $^1/_4$-inch and the depth $1^3/_4$-inch. The cut length shall be 28 inches long centered over the retrofit dowel (smooth, epoxy coated). The transverse joint shall be sawed within 2 hours after placement of the rapid setting concrete material. The joint will be sealed with joint sealant filler.

PARTING COMPOUND

Parting compound will be subject to approval by the Engineer prior to use.

DOWEL BAR END CAP

Dowel bar end caps shall be tight fitting, made of non-metallic material which will allow for $^1/_4$-inch of movement at each end of the bar. The dowel bar end caps will be subject to approval by the Engineer prior to use.

CAULKING FILLER

Caulking filler shall be a silicone sealant. The caulking filler will be subject to approval by the Engineer prior to use.

JOINT FILLER MATERIAL

The joint filler material shall be a closed cell foam faced with poster board material on each side commonly referred to as Foam Core Board by Office Suppliers. The joint filler material will be approved by the Engineer prior to use.

Retrofit dowels (smooth epoxy coated) will be measured as units determined from actual counts in place.

The contract unit price paid for retrofit dowel (smooth, epoxy coated) shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all the work involved in retrofit dowel (smooth, epoxy coated), complete in place, including saw cutting existing concrete pavement and filling with rapid setting concrete material, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

10-1.58 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, silicone sealant conforming to these specifications may be used.

The second through fourth paragraphs of Section 51-1.12F, "Sealed Joints," of the Standard Specifications are amended to read:

Type A and AL joint seals shall consist of a groove in the concrete that is filled with field mixed and placed polyurethane or silicone sealant.

Type B joint seals shall consist of a groove in the concrete that is filled with a preformed elastomeric joint seal.

Joint seal assemblies shall consist of metal or metal and elastomeric assemblies that are anchored or cast into a recess in the concrete over the joint.

The type of seal to be used for the Movement Rating (MR) shown on the plans shall be as follows:

MR	Seal Type
1/2 inch	Type A or Type B
1 inch	Type A (silicone only) or Type B
> 1 inch and ≤ 2 inches	Type B
> 2 inches	joint seal assembly

The first and second paragraphs of Section 51-1.12F(3), "Materials and Installation," of the Standard Specifications are amended to read:

(a) Type A and AL Seal.— The sealant shall consist of a 2 component polyurethane sealant, which will withstand up to ±25 percent movement, or a 2 component silicone sealant, which will withstand up to ±50 percent movement.

Polyurethane and silicone sealants shall be tested in accordance with California Test 435. The sealants shall conform to State Specification 8030-61J-01 and the following requirements:

SPECIFICATION	REQUIREMENT
Modulus at 150 percent elongation	5-75 psi
Width of sealant after 7 days extension and one hour recovery	21/32 inch, max.
Condition 24 hours after notching	Notched or loss of bond 1/4 inch, max.
Condition of water immersed specimen at 7 days	Notched or loss of bond 1/4 inch, max.
Condition of specimen when tested in accordance with ASTM Designation: G 53 using FS 40 UV-B bulbs for a minimum of 25 cycles. The cycle shall be 4 hours UV exposure at 60°C and 4 hours condensate exposure at 40°C	No more than slight checking or cracking.
Grease cone penetration	4.5 - 12.0 millimeters.

State Specifications for polyurethane and silicone sealants may be obtained from the Transportation Laboratory.

Section 51-1.12F(3)(a), "Type A and AL Seal," of the Standard Specifications is amended by adding the following paragraphs after paragraph 8:

A Certificate of Compliance, accompanied by a certified test report, shall be furnished for each batch of polyurethane and silicone sealant in conformance with the provisions in Section 6-1.07, "Certificates of Compliance."

Samples of the two components, not less than one gallon each, from each batch of sealant shall be submitted to the Transportation Laboratory. In addition, samples of manufacturer required primers, not less than one gallon each, shall be submitted. The samples shall be furnished for testing, with the Certificate of Compliance, 30 days in advance of proposed use.

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.

The sixth subparagraph of the first paragraph of Section 51-1.12F(3) (b), "Type A and AL Seal," of the Standard Specifications is amended to read:

Polyethylene foam or rod stock shall be commercial quality, with a continuous, impervious, glazed surface, suitable for retaining the liquid sealant in the joint while hardening.

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

The seal shall be furnished full length for each joint with no more than one shop splice in any 60 ft length of seal.

One field splice per joint may be made at locations and by methods approved by the Engineer. The seals are to be manufactured full length for the intended joint, then cut at the approved splice section and re-matched before splicing. The Contractor shall submit splicing details, prepared by the joint seal manufacturer, to the Engineer for approval prior to beginning splicing work.

The Contractor shall demonstrate the adequacy of the procedures to be used in the work before installing seals in the joints.

Shop splices and field splices shall have no visible offset of exterior surfaces, and shall show no evidence of bond failure.

10-1.59 JOINT SEAL ASSEMBLIES (MAXIMUM MOVEMENT RATING, 4 INCHES)

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.

At the Contractor's option, cleaning and painting of all new metal surfaces of the joint seal assembly, except stainless steel and anchorages embedded in concrete, may be substituted for galvanizing. Cleaning and painting shall be in conformance with the provisions in Section 59-2, "Painting Structural Steel," and Section 91, "Paint," of the Standard Specifications, "Clean and Paint Structural Steel" of these special provisions, and the following:

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:

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.

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.

The Contractor shall submit complete working drawings for each joint seal assembly to the Division of Structure Design (DSD), Documents Unit, P.O. Box 942874, Mail Stop 9, Sacramento, CA 94274-0001 (1801 30th Street, Sacramento, CA 95816), telephone (916) 227-8230, 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 any 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 said Office for final approval and use during construction.

The working drawings shall be supplemented with calculations for each proposed joint seal assembly, as requested by the Engineer. Working drawings shall be either 11" x 17" or 22" x 34" 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-Post mile. 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.

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.

Within 3 weeks after final working drawing approval, one set of the corrected good quality prints on 20 pound (minimum) bond paper (22" x 34" in size) of all working drawings prepared by the Contractor for each joint seal assembly shall be furnished to the Division of Structure Design, Documents Unit.

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.

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 212° F, maximum, percent	40	D 395 Method B (Modified)

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.

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 9.6 inches, measured normal to the longitudinal axis of the assembly, by 20 inches wide. The assembly shall provide a smooth riding joint without slapping of components or wheel tire rumble.

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.

The assembly shall have cast-in-place anchorage components forming a mechanical connection between the joint components and the concrete deck.

The depth and width of the recess shall be as per the detail shown in the plans.

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.

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.

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 linear foot for the joint seal assembly involved, and no additional compensation will be allowed therefor.

10-1.60 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:

Formed relief texture

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.--A test panel at least 4' x 4' in size shall be successfully completed at a location approved by the Engineer before beginning work on architectural textures. The test panel shall be constructed and finished with the materials, tools, equipment and methods to be used in constructing the architectural texture. If ordered by the Engineer, additional test panels shall be constructed and finished until the specified finish, texture and color are obtained, as determined by the Engineer.

The test panel approved by the Engineer shall be used as the standard of comparison in determining acceptability of architectural texture for concrete surfaces.

FORM LINERS.--Form liners shall be used for textured concrete surfaces and shall be installed in conformance with the manufacturer's recommendations, unless other methods of forming textured concrete surfaces are approved by the Engineer. Form liners shall be manufactured from an elastomeric material or a semi-elastomeric polyurethane material by a manufacturer of commercially available concrete form liners. No substitution of other types of formliner material will be allowed. Form liners shall leave crisp, sharp definition of the architectural surface. Recurring textural configurations exhibited by repeating, recognizable shadow patterns shall be prevented by proper casting of form liner patterns. Textured concrete surfaces with such recurring textural configurations shall be reworked to remove such patterns as approved by the Engineer or the concrete shall be replaced.

Form liners shall have the following properties:

Description	ASTM Designation:	Range
Elastomeric material		
Shore A hardness	D 2240	20 to 65
Tensile strength (psi)	D 412	130 to 900
Semi-elastomeric polyurethane		
Shore D hardness	D 2240	55 to 65
Tensile strength (psi)	D 2370	2600 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 8 foot minimum spacing. Small pieces of form liners shall not be used. Grooves shall be aligned straight and true. Grooves shall match at joints between form liners. Joints in the direction of grooves in grooved patterns shall be located only in the depressed portion of the textured concrete. Adjoining liners shall be butted together without distortion, open cracks or offsets at the joints. Joints between liners shall be cleaned before each use to remove any mortar in the joint.

Adhesives shall be compatible with the form liner material and with concrete. Adhesives shall be approved by the liner manufacturer. Adhesives shall not cause swelling of the liner material.

RELEASING FORM LINERS.--Products and application procedures for form release agents shall be approved by the form liner manufacturer. Release agents shall not cause swelling of the liner material or delamination from the forms. Release agents shall not stain the concrete or react with the liner material. For reliefs simulating fractured concrete or wood grain surfaces the application method shall include the scrubbing method using a natural bristle scrub brush in the direction of grooves or grain. The release agent shall coat the liner with a thin film. Following application of form release agent, the liner surfaces shall be cleaned of excess amounts of agent using compressed air. Buildup of form release agent caused by the reuse of a liner shall be removed at least every 5 uses.

Form liners shall release without leaving particles or pieces of liner material on the concrete and without pulling or breaking concrete from the textured surface. The concrete surfaces exposed by removing forms shall be protected from damage.

CURING.--Concrete surfaces with architectural texture shall be cured only by the forms-in-place or water methods. Seals and curing compounds shall not be used.

MEASUREMENT AND PAYMENT.--Architectural treatment will be measured and paid for by the square foot.

The contract price paid per square foot for architectural treatment shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in architectural texture, complete in place, including test panels, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.61 RAPID SETTING CONCRETE PATCHES

This work shall consist of cleaning the surfaces and furnishing, placing, and finishing concrete patches. Concrete patches shall be placed in conformance with the details shown on the plans, the provisions of the Standard Specifications, and these special provisions.

The concrete material shall be a high-strength material consisting of either magnesium phosphate concrete, modified high alumina based concrete or portland cement based concrete. Magnesium phosphate concrete shall conform to the requirements for magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions. Modified high alumina based concrete and portland cement based concrete shall be water activated and

shall conform to the requirements for single component (water activated) magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions.

A clean uniform rounded aggregate filler may be used to extend the concrete. The moisture content of the aggregate shall not exceed 0.5 percent. Grading of the aggregate shall conform to the following:

Sieve Size	Percentage Passing
1/2 "	100
No. 16	0-5

The amount of aggregate filler shall conform to the manufacturer's recommendations, but in no case shall the concrete strengths be less than that specified for magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications.

Mixing of components of dual component (with a prepackaged liquid activator) magnesium phosphate shall be by complete units, supplied by the manufacturer. Portions of units shall not be used. Water shall not be added to dual component magnesium phosphate.

Cleaning the contact surfaces of existing concrete shall be accomplished by abrasive blast cleaning the concrete and exposed reinforcing steel, as necessary, to remove all rust, paint, grease, asphalt or other foreign materials. A minimum of 1/8 inch of concrete shall be removed. Immediately prior to applying the new concrete, the surfaces shall be recleaned by sweeping and pressure jetting, or by other approved means, as necessary to remove debris which has accumulated during construction or after abrasive blast cleaning. The surface temperature of the areas to be covered shall be 40° F. or above when the concrete is applied. Methods proposed to heat said surfaces are subject to approval by the Engineer. The contact surface for the magnesium phosphate concrete shall be dry. The contact surfaces for modified high alumina based concrete or portland cement based concrete may be damp but not saturated.

Magnesium phosphate concrete shall not be mixed in containers or worked with tools containing zinc, cadmium, aluminum or copper. Modified high alumina based concrete shall not be mixed in containers or worked with tools containing aluminum.

Concrete shall not be retempered. Finishing tools that are cleaned with water shall be thoroughly dried before working the concrete.

When placing concrete on slopes exceeding 5 percent, the Engineer may require the Contractor to provide a flow controlled modified material.

Modified high alumina based concrete and portland cement based concrete shall be cured in conformance with the provisions in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications. Magnesium phosphate concrete shall not be cured.

Unless otherwise permitted in writing by the Engineer, public traffic shall not be permitted on the new concrete until at least one hour after final set.

Rapid setting concrete (patch) will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

10-1.62 POLYESTER CONCRETE OVERLAY

This work shall consist of constructing a polyester concrete overlay in conformance with the details shown on the plans and these special provisions.

Before starting deck overlay work on the project, the Contractor shall submit, for approval by the Engineer, a program for public safety associated with use of methacrylate resin and polyester concrete during the construction of the project. Such program shall identify materials, equipment and methods to be used. The Contractor shall not perform any deck overlay work on the project, other than that specifically authorized in writing by the Engineer, until such program has been approved.

If the measures being taken by the Contractor are inadequate to provide for public safety associated with use of methacrylate resin and polyester concrete, the Engineer will direct the Contractor to revise his operations and his public safety program. Such directions will be in writing and will specify the items of work for which the Contractor's program for public safety associated with use of methacrylate resin and polyester concrete are inadequate. No further work shall be performed on these items until the public safety measures are adequate and, if required, a revised program for public safety associated with use of methacrylate resin and polyester concrete has been approved.

The Engineer will notify the Contractor in writing of the approval or rejection of any submitted or revised program for public safety associated with use of methacrylate resin and polyester concrete in not more than 10 working days following submittal.

The State will not be liable to the Contractor for failure to approve all or any portion of an originally submitted or revised program for public safety associated with use of methacrylate resin and polyester concrete, nor for any delays to the work due to the Contractor's failure to submit an acceptable program for public safety associated with use of methacrylate resin and polyester concrete.

Surface preparation shall be as specified in "Prepare Concrete Bridge Deck Surface" of these special provisions.

A prime coat shall be applied to the surfaces to be covered with polyester concrete.

When magnesium phosphate concrete is placed prior to the deck overlay, the magnesium phosphate concrete shall be placed at least 72 hours prior to placing the prime coat.

When modified high alumina based concrete is placed prior to the deck overlay, the prime coat shall not be placed on said concrete until at least 30 minutes after final set.

Polyester concrete shall consist of polyester resin binder and dry aggregate. The resin shall be an unsaturated isophthalic polyester-styrene co-polymer conforming to the following:

POLYESTER RESIN BINDER		
PROPERTY	REQUIREMENT	TEST METHOD
* Viscosity	75 to 200 cps (RVT, No. 1 Spindle, 20 RPM at 77° F.)	ASTM D 2196
* Specific Gravity	1.05 to 1.10 at 77° F.	ASTM D 1475
Elongation	35 percent minimum Type I at 0.45 in./min. Thickness= 0.25±0.03in.	ASTM D 638
	Sample Conditioning: 18/25/50 + 5/70	ASTM D 618
Tensile Strength	2,500 psi minimum Type I at 0.45 in./min. Thickness= 0.25±0.03in.	ASTM D 638
	Sample Conditioning: 18/25/50 + 5/70	ASTM D 618
* Styrene Content	40 percent to 50 percent (by weight)	ASTM D 2369
Silane Coupler	1.0 percent, minimum (by weight of polyester styrene resin)	
PCC Saturated Surface-Dry Bond Strength	500 psi, minimum at 24 hours and 70±2° F.	California Test 551
* Static Volatile Emission	60 gram per square meter, loss, maximum	South Coast Air Quality Management District, Standard Method
* Test shall be performed prior to adding initiator.		

The silane coupler shall be an organosilane ester, gammamethacryloxypropyltrimethoxysilane. The promoter shall be compatible with suitable methyl ethyl ketone peroxide (MEKP) and cumene hydroperoxide (CHP) initiators.

Aggregate for polyester concrete shall conform to the provisions in Section 90-2.02, "Aggregates," of the Standard Specifications and either of the following combined aggregate gradings:

COMBINED AGGREGATE		
Sieve Size	3/8” Max. Percent Passing	No.4 Sieve Max. Percent Passing
1/2”	100	100
3/8”	83 – 100	100
No. 4	65 – 82	62 – 85
No. 8	45 – 64	45 – 67
No. 16	27 – 48	29 – 50
No. 30	12 – 30	16 – 36
No. 50	6 – 17	5 – 20
No. 100	0 – 7	0 – 7
No. 200	0 – 3	0 – 3

Aggregate retained on the No. 8 sieve shall have a maximum of 45 percent crushed particles when tested in conformance with California Test 205. Fine aggregate shall consist of natural sand only.

Aggregate absorption shall not exceed one percent as determined by California Test 206 and 207.

At the time of mixing with the resin, the moisture content of the aggregate, as determined by California Test 226, shall not exceed one half of the aggregate absorption.

The prepared surface shall receive a wax-free, low odor, high molecular weight methacrylate prime coat. The prime coat shall be a resin, and prior to adding initiator the resin shall have a maximum volatile content of 30 percent, when tested in conformance with the requirements in ASTM Designation: D 2369, and conforming to the following:

High Molecular Weight Methacrylate (HMWM) Resin		
PROPERTY	REQUIREMENT	TEST METHOD
* Viscosity	25 cps, maximum, (Brookfield RVT with UL adaptor, 50 RPM at 77° F.)	ASTM D 2196
* Specific Gravity	0.90, minimum, at 77° F.	ASTM D 1475
* Flash Point	180° F., minimum	ASTM D 3278
* Vapor Pressure	1.0 mm Hg, maximum, at 77° F.	ASTM D 323
Tack-free time	400 minutes, maximum at 77° F.	California Test 551
PCC Saturated Surface-Dry Bond Strength	500 psi, minimum at 24 hours and 70±2° F.	California Test 551
* Test shall be performed prior to adding initiator.		

The promoter/initiator system for the methacrylate resin shall consist of a metal drier and peroxide. If supplied separately from the resin, at no time shall the metal drier be mixed with the peroxide directly. The containers shall not be stored in a manner that will allow leakage or spillage from one material to contact the containers or material of the other.

A Material Safety Data Sheet shall be furnished prior to use for each shipment of polyester resin binder and high molecular weight methacrylate resin.

The Contractor shall allow 14 days for sampling and testing of the polyester resin binder and high molecular weight methacrylate resin prior to proposed use.

If bulk resin is to be used, the Contractor shall notify the Engineer in writing 10 days prior to the delivery of the bulk resin to the jobsite. Bulk resin is any resin that is stored in containers in excess of 55 gallons.

Prior to applying the prime coat, the area to receive the prime coat shall be dry and blown clean by compressed air to remove accumulated dust and any other loose material. The surface temperature shall be at least 50° F when the prime coat is applied.

The prime coat shall be uniformly applied to completely cover the surface to receive the polyester concrete. The rate of spread shall be approximately one gallon per 100 square feet of surface.

The prime coat shall be allowed to cure a minimum of 15 minutes before placing polyester concrete. If the primed surface becomes contaminated, the contaminated area shall be cleaned by abrasive blasting and reprimed at the Contractor’s expense.

Polyester concrete shall be placed within 120 minutes after the prime coat has been applied.

Polyester concrete shall be mixed in mechanically operated mixers. Mixer size shall be limited to a nine cubic foot capacity, unless approved by the Engineer. The polyester resin binder in the concrete shall be approximately 12 percent by weight of the dry aggregate; the exact percentage will be determined by the Engineer.

A continuous mixer, employing an auger screw/chute device, may be approved for use by the Engineer upon demonstrating its ability to produce a satisfactory product. The continuous mixer shall 1) be equipped with a metering device that automatically measures and records the aggregate volumes and the corresponding resin volumes and 2) have a readout gage, visible to the Engineer at all times, that displays the volumes being recorded. The volumes shall be recorded at no greater than 5 minute intervals along with the time and date of each recording. A printout of the recordings shall be furnished to the Engineer at the end of each workshift.

The amount of initiator used in polyester concrete shall be sufficient to produce initial set time between 30 and 120 minutes during placement. The initial set time will be determined by using an initial-setting time Gillmore needle in conformance with the requirements of ASTM Designation: C 266. Accelerators or inhibitors may be required to achieve proper set times and shall be used as recommended by the resin supplier.

The resin binder shall be initiated and thoroughly blended just prior to mixing with aggregate. The polyester concrete shall be mixed a minimum of 2 minutes prior to placing.

Polyester concrete shall be placed prior to gelling and within 15 minutes following addition of initiator, whichever occurs first. Polyester concrete that is not placed within this time shall be discarded.

The surface temperature of the area to receive polyester concrete shall be the same as specified above for the prime coat.The finishing equipment used shall strike off the polyester concrete to the established grade and cross section. Finishing equipment shall be fitted with vibrators or other means of consolidating the polyester concrete to the required compaction.

The polyester concrete shall be consolidated to a relative compaction of not less than 97 percent in conformance with tentative California Test 552.

The finished surface of the polyester concrete overlay shall conform to the provisions in Section 51-1.17, “Finishing Bridge Decks,” of the Standard Specifications and these special provisions.

Polyester concrete surfaces shall receive an abrasive sand finish. The sand shall be commercial quality blast sand conforming to the quality and dryness requirements for polyester concrete aggregate as specified in these special provisions. Ninety-five percent of the sand shall pass the No. 8 sieve, and 95 percent shall be retained on the No. 20 sieve.

The sand finish shall be uniformly applied immediately after overlay strike-off and before gelling occurs to provide a minimum uniform coverage of 0.8 pounds per square yard.

The surface texture of polyester concrete surfaces shall be uniform and shall have a coefficient of friction of not less than 0.35 as measured by California Test 342. Any portions of surfaces that do not meet the above provision shall be ground or grooved parallel to the centerline in conformance with the provisions of Section 42, “Groove and Grind Pavement,” of the Standard Specifications until the above tolerance is met.

Traffic and equipment shall not be permitted on the overlay for a minimum of 4 hours following final finishing. Overlays shall be protected from moisture for not less than 4 hours after finishing.

Prior to constructing the overlay, one or more trial overlays shall be placed on a previously constructed concrete base to determine the initial set time and to demonstrate the effectiveness of the mixing, placing, and finishing equipment proposed. Each trial overlay shall be 12 feet wide, at least 6 feet long, and the same thickness as the overlay to be constructed. Conditions during the construction of the overlay and equipment used shall be similar to those expected and to be used for the construction of the polyester concrete overlay.

All materials used in the trial overlays, including the concrete base shall become the property of the Contractor and shall be removed and disposed of in conformance with the provisions in Section 7-1.13, “Disposal of Material Outside the Right of Way,” of the Standard Specifications.

Furnish polyester concrete overlay will be measured by the cubic foot. The volume to be paid for will be determined from calculations based on the quantity of resin binder used and the yield of the specified mix design. The Contractor shall furnish suitable measuring devices to assure correct proportioning of materials and accurate measurements for calculating pay quantities. The pay quantity shall be the calculated quantity of polyester concrete overlay used in the work, exclusive of material used in trial overlays, and any wasted or unused material.

Place polyester concrete overlay will be measured by the square foot. The area to be paid for will be based on the dimensions as shown on the plans.

The contract price paid per cubic foot for furnish polyester concrete overlay shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in furnishing polyester concrete, including polyester resin binder, promoter/initiator and aggregate, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract price paid per square foot for place polyester concrete overlay shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing the polyester concrete overlay, complete in place, including application of prime coat and furnishing, constructing and disposing

of trial overlays and base, and placing formed joints, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for compliance with the requirements for a program for public safety associated with use of methacrylate resin and polyester concrete shall be considered as included in the contract prices paid for the items of work involving polyester concrete overlay and no additional compensation will be allowed therefor.

10-1.63 REINFORCEMENT

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

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

52-1.02A Bar Reinforcement.—Reinforcing bars shall be low-alloy steel deformed bars conforming to the requirements in ASTM Designation: A 706/A 706M, except that deformed or plain billet-steel bars conforming to the requirements in ASTM Designation: A 615/A 615M, Grade 40 or 60, may be used as reinforcement in the following:

1. Slope and channel paving;
2. Minor structures;
3. Sign and signal foundations (pile and spread footing types);
4. Roadside rest facilities; and
5. Concrete barrier Type 50 and Type 60 series and temporary railing.

Deformations specified in ASTM Designation: A 706/A 706M will not be required on bars used as spiral or hoop reinforcement in structures and concrete piles.

Section 52-1.02C, "Welded Wire Fabric," of the Standard Specifications is amended to read:

52-1.02C Welded Wire Fabric.—Welded wire fabric shall be either plain or deformed conforming to the requirements in ASTM Designation: A 185 or ASTM Designation: A 497, respectively.

Section 52-1.02D, "Reinforcing Wires and Plain Bars," of the Standard Specifications is amended to read:

52-1.02D Reinforcing Wire.—Wire used as reinforcement in structures and concrete piles, as shown on the plans, shall be cold drawn steel wire conforming to the specifications of ASTM Designation: A 82.

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

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications 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 Bar Reinforcement," of the Standard Specifications. The Certificate of Compliance shall include all 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 last paragraph of Section 52-1.07, "Placing," of the Standard Specifications is amended to read:

Whenever a portion of an assemblage of bar reinforcing steel that is not encased in concrete exceeds 20 feet in height, the Contractor shall submit to the Engineer for approval, in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," working drawings and design calculations for the temporary support system to be used. The working drawings and design calculations shall be signed by an engineer who is registered as a Civil Engineer in the State of California. The temporary support system shall be designed to resist all expected loads and shall be adequate to prevent collapse or overturning of the assemblage. If the installation of forms or other work requires revisions to or temporary release of any portion of the temporary support system, the working drawings shall show the support system to be used during each phase of construction. The minimum horizontal wind load to be applied to the bar reinforcing steel assemblage, or to a combined assemblage of reinforcing steel and forms, shall be not less than 20 pounds per square foot on the gross projected area of the assemblage.

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

Except when otherwise specified, mechanical lap splicing shall conform to the details shown on the plans, the requirements for mechanical butt splices as specified in this Section 52-1.08, and Sections 52-1.08C, "Mechanical Butt Splices," 52-1.08D, "Qualification of Welding and Mechanical Splicing," and 52-1.08E, "Job Control Tests," and the following:

The mechanical lap splice shall be a unit consisting of a sleeve, in which the reinforcing bars are positioned, and a wedge driven through holes in the sleeve and between the reinforcing bars. The mechanical lap splice shall only be used for splicing non-epoxy-coated deformed reinforcing bars Nos. 4, 5 and 6.

The eighth and ninth paragraphs of Section 52-1.08, "Splicing," of the Standard Specifications are amended to read:

Unless otherwise shown on the plans or approved by the Engineer, splices in adjacent reinforcing bars at any particular section shall be staggered. The minimum distance between staggered lap splices or mechanical lap splices shall be the same length required for a lapped splice in the largest bar. The minimum distance between staggered butt splices shall be 2 feet. Distances shall be measured between the midpoints of the splices along a line which is centered between the axes of the adjacent bars.

Completed butt splices shall develop a minimum tensile strength, based on the nominal bar area, of 63,000 psi for ASTM Designation: A 615/A 615M Grade 40 bars, and of 80,000 psi for ASTM Designation: A 615/A 615M Grade 60 and ASTM Designation: A 706/A 706M bars. If butt splices are made between two bars of dissimilar strengths, the minimum required tensile strength for the splice shall be that required for the weaker bar.

The second sentence of the eleventh paragraph of Section 52-1.08, "Splicing," of the Standard Specifications is amended to read:

Job control tests shall be made on sample splices representing each lot of mechanical butt splices as provided in Section 52-1.08E, "Job Control Tests."

Section 52-1.08B, "Butt Welded Splices," of the Standard Specifications is amended to read:

52-1.08B Butt Welded Splices.— Butt welded splices in reinforcing bars shall be complete joint penetration butt welds conforming to the requirements in AWS D1.4, and the requirements of these specifications and the special provisions. At the option of the Contractor, shop produced resistance butt welds, that are produced by a fabricator who is approved by the Transportation Laboratory, may be used. These welds shall conform to the requirements of these specifications and the special provisions

Only the joint details and dimensions as shown in Figure 3.2,"Direct Butt Joints," of AWS D 1.4-92, shall be used for making complete joint penetration butt welds of bar reinforcement. Split pipe backing shall not be used.

Material used as backing for complete joint penetration butt welds of bar reinforcement shall be a flat plate conforming to the requirements of ASTM Designation: A 709, Grade 36. The flat plate shall be 0.25-inch thick with a width, as measured perpendicular to the axis of the bar, equal to the nominal diameter of the bar, and a length which does not exceed twice the nominal diameter of the bar. The flat plate backing shall be fitted tightly to the bar with the root of the weld centered on the plate. Any bar deformation or obstruction preventing a tight fit shall be ground smooth and flush with the adjacent surface. Tack welds used to fit backing plates shall be within the weld root area so that they are completely consumed by the finished weld. Backing plates shall not be removed.

Butt welds shall be made with multiple weld passes using a stringer bead without an appreciable weaving motion. The maximum stringer bead width shall be 2.5 times the diameter of the electrode and slagging shall be performed between each weld pass. Weld reinforcement shall not exceed 1/8-inch in convexity.

Before any electrodes or flux-electrode combinations are used, the Contractor, at the Contractor's expense, shall furnish certified copies of test reports for all the pertinent tests specified in AWS A5.1, AWS A5.5, AWS A5.18 or AWS A5.20, whichever is applicable, made on electrodes or flux-electrode combinations of the same class, brand and nearest specified size as the electrodes to be used. The tests may have been made for process qualification or quality control, and shall have been made within one year prior to manufacture of the electrodes and fluxes to be used. The report shall include the manufacturer's certification that the process and material requirements were the same for manufacturing the tested electrodes and the electrodes to be used. The forms and certificates shall be as directed by the Engineer.

Electrodes for manual shielded metal arc welding of ASTM Designation: A 615/A 615M, Grade 60 bars shall conform to the requirements of AWS A5.5 for E9018-M or E10018-M electrodes.

Electrodes for manual shielded metal arc welding of ASTM Designation: A 706/A 706M bars shall conform to the requirements of AWS A5.5 for E8016-C3 or E8018-C3 electrodes.

Solid and composite electrodes for semiautomatic gas metal-arc and flux-cored arc welding of Grade 40 reinforcing bars shall conform to the requirements of AWS A5.18 for ER70S-2, ER70S-3, ER70S-6 or ER70S-7 electrodes; or AWS A5.20 for E70T-1, E70T-5, E70T-6 or E70T-8 electrodes.

Electrodes for semiautomatic welding of ASTM Designation: A 615/A 615M, Grade 60 and ASTM Designation: A 706/A 706M bars shall produce a weld metal deposit with properties conforming to the requirements of Section 5.3.4 of AWS D1.1-96 for ER80S-Ni1, ER80S-Ni2, ER80S-Ni3, ER80S-D2, E90T1-K2 and E91T1-K2 electrodes.

Reinforcing bars shall be preheated for a distance of not less than 6 inches on each side of the joint prior to welding.

For all welding of ASTM Designation: A 615/A 615M, Grade 40 or Grade 60 bars, the requirements of Table 5.2, "Minimum Preheat and Interpass Temperatures," of AWS D1.4-92 are superseded by the following:

> The minimum preheat and interpass temperatures shall be 400° F. for Grade 40 bars and 600° F. for Grade 60 bars. Immediately after completing the welding, at least 6 inches of the bar on each side of the splice shall be covered by an insulated wrapping to control the rate of cooling. The insulated wrapping shall remain in place until the bar has cooled below 200° F.

When welding different grades of reinforcing bars, the electrode shall conform to Grade 40 bar requirements and the preheat shall conform to the Grade 60 bar requirements.

In the event that any of the specified preheat, interpass and post weld cooling temperatures are not met, all weld and heat affected zone metal shall be removed and the splice rewelded.

Welding shall be protected from air currents, drafts, and precipitation to prevent loss of heat or loss of arc shielding. The method of protecting the welding area from loss of heat or loss of arc shielding shall be subject to approval by the Engineer.

Reinforcing bars shall not be direct butt spliced by thermite welding.

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

52-1.08C Mechanical Butt Splices.—Mechanical butt splices shall be the sleeve-filler metal type, the sleeve-threaded type, the sleeve-swaged type, the sleeve-filler grout type, the sleeve-lockshear bolt type, the two-part sleeve-forged bar type, or the two-part sleeve-friction bar type, at the option of the Contractor.

The following is added after the third paragraph of Section 52-1.08C, "Mechanical Butt Splices," of the Standard Specifications:

Slip requirements shall not apply to mechanical lap splices.

The following is added after Section 52-1.08C(3), "Sleeve-Swaged Mechanical Butt Splices," of the Standard Specifications:

52-1.08C(4) Sleeve-Filler Grout Mechanical Butt Splices.—The sleeve-filler grout type of mechanical butt splices shall consist of a steel splice sleeve that fits closely over the reinforcing bars with a non-shrink grout filler in the annular space between the reinforcing bars and the sleeve and between the ends of the reinforcing bars.

No vibration or movement of the reinforcing steel or sleeve at the splice shall be allowed while the splice is developing sufficient strength to support the reinforcing bars. The Contractor shall submit complete details of the bracing and clamping system to eliminate all vibration or movement at the splice during setup of the filler in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings."

52-1.08C(5) Sleeve-Lockshear Bolt Mechanical Butt Splices.—The sleeve-lockshear bolt type of mechanical butt splices shall consist of a seamless steel sleeve, 2 serrated steel strips welded to the inside of the sleeve, center hole with centering pin, and bolts that are tightened until the bolt heads shear off and the bolt ends are embedded in the reinforcing bars.

52-1.08C(6) Two-Part Sleeve-Forged Bar Mechanical Butt Splices.— The two-part sleeve-forged bar type of mechanical butt splices shall consist of a shop machined two-part threaded steel sleeve that interlocks two hot-forged reinforcing bars ends. The forged bar ends may be either shop produced or field produced.

52-1.08C(7) Two-Part Sleeve-Friction Bar Mechanical Butt Splices.— The two-part sleeve-friction bar type of mechanical butt splices shall consist of a shop machined two-part threaded steel sleeve whose ends are friction welded, in the shop, to the reinforcing bars ends.

The third paragraph of Section 52-1.08D, "Qualification of Welding and Mechanical Splicing," of the Standard Specifications is amended to read:

Resistance butt welds shall be produced by a fabricator approved by the Transportation Laboratory.

Each operator qualification test for mechanical splices shall consist of 2 sample splices. Each mechanical splice procedure test shall consist of 2 sample splices.

For sleeve-filler, sleeve-threaded, sleeve-lockshear bolt and two-part sleeve friction bar mechanical butt splices, all sample splices shall be made on the largest reinforcing bar size to be spliced by the procedure or operator being tested except that No. 14 bars may be substituted for No. 18 bars.

For sleeve-swaged and two-part sleeve-forged mechanical butt splices, and mechanical lap splices, all sample splices shall be made on the largest reinforcing bar size of each deformation pattern to be spliced by the procedure or operator being tested. When joining new reinforcing bars to existing reinforcement, the qualification test sample bars shall be made with the deformation pattern of the new reinforcement to be joined.

Section 52-1.08E, "Job Control Tests," of the Standard Specifications is amended to read:

52-1.08E Job Control Tests.—When mechanical butt splices, shop produced complete joint penetration butt welded splices, or shop produced resistance butt welded splices are used, the Contractor shall furnish job control tests from a local qualified testing laboratory. A job control test shall consist of the fabrication, under conditions used to produce the splice, and the physical testing of 3 sample splices for each lot of 150 splices.

A lot of mechanical butt splices is defined as 150, or fraction thereof, of the same type of mechanical butt splices used for each combination of bar size and bar deformation pattern that is used in the work.

A lot of shop produced complete joint penetration butt welded splices, or shop produced resistance butt welded splices, is defined as 150, or fraction thereof, of the same type of welds used for each combination of bar size and bar deformation pattern that is used in the work.

When joining new reinforcing bars to existing reinforcement, the job control test shall be made using only the deformation patterns of the new reinforcement to be joined.

A sample splice shall consist of a splice made at the job site to connect two 30-inch, or longer, bars using the same splice materials, position, location, and equipment, and following the same procedures as are being used to make splices in the work. Shorter sample splice bars may be used if approved by the Engineer.

Sample splices shall be made and tested in the presence of the Engineer or the Engineer’s authorized representative.

Sample splices shall be suitably identified with weatherproof markings prior to shipment to the testing laboratory.

For sleeve-threaded mechanical butt splices, the reinforcing bars to be used for job control tests shall be fabricated on a random basis during the cutting of threads on the reinforcing bars of each lot and shipped to the job site with the material they represent.

For shop produced complete joint penetration butt welds, shop produced resistance butt welded splices and all types of mechanical butt splices, except the sleeve-threaded type, the Engineer will designate when samples for job control tests are to be fabricated, and will determine the limits of the lot represented by each job control test.

Should the average of the results of tests made on the 3 sample splices or should more than one sample splice in any job control test fail to meet the requirements for splices, all splices represented by that test will be rejected in accordance with the provisions in Section 6-1.04, "Defective Materials," of the Standard Specifications. This rejection shall prevail unless the Contractor, at the Contractor's expense, obtains and submits evidence, of a type acceptable to the Engineer, that the strength and quality of the splices in the work are acceptable.

Section 52-1.08F, "Nondestructive Splice Tests" of the Standard Specifications is amended to read:

52-1.08F Nondestructive Splice Tests.—All required radiographic examinations of complete joint penetration butt welded splices shall be performed by the Contractor in accordance with the requirements of AWS D 1.4 and these specifications.

Prior to radiographic examination, welds shall meet the requirements of Section 4.4, "Quality of Welds," of AWS D1.4-92.

Radiographic examinations shall be performed on 25 percent of all complete joint penetration butt welded splices from a production lot. The size of a production lot will be a maximum of 100 splices. The Engineer will select the splices which will compose the production lot and also the splices within each production lot to be radiographically examined.

Should more than 12 percent of the splices which have been radiographically examined in any production lot be defective, an additional 25 percent of the splices, selected by the Engineer from the same production lot, shall be radiographically examined. Should more than 12 percent of the cumulative total of splices tested from the same production lot be defective, all remaining splices in the lot shall be radiographically examined.

Additional radiographic examinations performed due to the identification of defective splices shall be at the Contractor's expense.

All defects shall be repaired in accordance with the requirements of AWS D1.4.

Radiographic examinations will not be required for either shop produced complete joint penetration butt welds or shop produced resistance butt welded splices of No. 8 or smaller bars used as spiral or hoop reinforcement.

In addition to radiographic examinations performed by the Contractor, any mechanical or welded splice may be subject to inspection or nondestructive testing by the Engineer. The Contractor shall provide sufficient access facilities in the shop and at the jobsite to permit the Engineer or his agent to perform the inspection or testing.

The Contractor shall notify the Engineer in writing 48 hours prior to performing any radiographic examinations.

The radiographic procedure used shall conform to the requirements of ASME Boiler and Pressure Vessels Code, Section V, Article 2 and the following:

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

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

Radiographs shall be made by either X-ray or gamma ray. Radiographs made by X-ray or gamma rays shall have densities of not less than 2.3 nor more than 3.5 in the area of interest. A tolerance of 0.05 in density is allowed for densitometer variations. Gamma rays shall be from the iridium 192 isotope and the emitting specimen shall not exceed 0.175-inch in the greatest diagonal dimension.

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

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

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

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

An allowable weld buildup of 1/8 inch may be added to the total material thickness when determining the proper penetrameter selection. No image quality indicator equivalency will be accepted. Wire penetrameters or penetrameter blocks shall not be used.

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

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

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

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

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

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

All radiographs shall be interpreted and graded by a Level II or Level III technician who is qualified in accordance with the American Society for Nondestructive Testing's Recommended Practice No. SNT-TC-1A**.** The results of these interpretations shall be recorded on a signed certification and a copy kept with the film packet.

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

All radiographic envelopes shall have clearly written on the outside of the envelope the following information: name of the Contractor's Quality Control Manager (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 Contractor's Quality Control Plan (QCP). In addition, all innerleaves shall have clearly written on them the part description and all included weld numbers, as detailed in the Contractor's QCP.

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," elsewhere 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 3250 pounds per square inch 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. 7 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 accordance with the specifications of 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 as provided 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:

1. 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.

2. 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.

3. The procedure for curing shotcrete surfaces.

4. 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 as specified 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:

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.

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 30 inches. 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 10 inches 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.

Both test panels shall be cured under conditions similar to the actual work.

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.

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 accordance 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 300 square feet or portion thereof of shotcrete placed each day. The cores shall be 3-inches 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 accordance with the requirements of 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 yard for shotcrete and no additional compensation will be allowed therefor.

10-1.65 WATERPROOFING

Waterproofing shall conform to the provisions in Section 54, "Waterproofing," of the Standard Specifications and these special provisions.

Membrane waterproofing shall be applied to the painted undercoat of steel columns in the same manner as provided for waterproofing concrete surfaces.

The exposed surfaces of the membrane waterproofing applied to steel columns shall be of uniform height above ground without unsightly bulges, depressions, or other imperfections.

At the option of the Contractor, a preformed membrane waterproofing system may be furnished and applied in lieu of the asphalt membrane waterproofing specified above. Preformed membrane waterproofing shall conform to the requirements in these special provisions.

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 preformed membrane sheet. The Certificate of Compliance shall include the following information: (1) type of preformed membrane sheet, and (2) the conditioner or primer application rates.

The preformed membrane waterproofing system shall consist of an adhesive, conditioner or primer applied to a prepared surface; a preformed membrane sheet of rubberized asphalt, or polymer modified bitumen; mastic or tape for sealing the edges of the sheet; and a protective covering over the sheet held by an adhesive.

The preformed membrane sheet shall be either permanently applied to a polyethylene film or reinforced with a polypropylene mesh fabric, polyester/polypropylene fabric or a fiberglass mesh fabric. The membrane sheet shall conform to the following requirements:

Property	Test	Requirement	
		Polyethylene Film	Fabric Reinforced
Tensile Strength (Minimum)(1)	ASTM D 882 (2)	20 lbs/in. (3)	20 lbs/in. (3)
Percent Elongation at break (Minimum) (4)	ASTM D 882 (2)	150 percent (3)	25 percent (3)
Pliability	ASTM D 146 (5)	No cracks	No cracks
Thickness (Minimum) (6)		60 mils	60 mils
Rubberized Asphalt Softening Point (Minimum)	AASHTO T 53	165° F.	165° F
Polymer Modified Bitumen Softening Point (Minimum)	AASHTO T 53	210° F	210° F

Notes:
(1) Breaking factor in machine direction.
(2) Method A, average 5 samples.
(3) At 73.4° F. ± 3.6° F.
(4) Machine direction.
(5) 180-degree bend over a one-inch mandrel at 10° F.
(6) Total thickness of preformed membrane sheet and polyethylene film or fabric reinforcement.

Adhesives, conditioners, primers, mastics and sealing tapes shall be manufactured for use with the respective preformed membrane sheet materials and shall be applied according to the manufacturer's recommendations.

The protective covering shall be 1/8 inch hardboard or other material that furnishes equivalent protection. Backfill material and equipment shall not cut, scratch, depress or cause any other damage to the preformed membrane.

Surfaces designated to receive preformed membrane waterproofing shall be thoroughly cleaned of dirt, dust, loose or unsound concrete and other extraneous material and shall be free from fins, sharp edges and protrusions that would, in the opinion of the Engineer, puncture or otherwise damage the membrane. Sharp corners to be covered shall be rounded (outside) or chamfered (inside).

Surfaces shall be dry when components of the preformed membrane waterproofing system are applied.

Preformed membrane waterproofing shall not be applied to any surface until the Contractor is prepared to follow its application with the placing of the protective covering and backfill within a sufficiently short time that the membrane will not be damaged by men or equipment, exposure to weathering, or from any other cause. Damaged membrane or protective covering shall be repaired or replaced by the Contractor at his expense.

All projecting pipe, conduits, sleeves or other facilities passing through the preformed membrane waterproofing shall be flashed with prefabricated or field-fabricated boots, fitted coverings or other devices as necessary to provide watertight construction.

All conditioner or primers shall be thoroughly mixed and continuously agitated during application. Conditioner, primers or adhesive shall be allowed to dry to a tack free condition prior to placing membrane sheets.

The surfaces shall be recoated if membrane sheets are not placed over primer, conditioner or adhesive within the time recommended by the manufacturer.

The preformed membrane sheet shall not be applied in wet or foggy weather, nor when the ambient temperature is below 40° F.

Preformed membrane material shall be placed starting at the bottom and lapped by a minimum of 6 inches at splices and at repairs to holes or tears.

Exposed edges of membrane sheets shall have a trowelled bead of manufacturer's recommended mastic or sealing tape applied after the membrane is placed.

The surface of the preformed membrane shall be cleaned free of dirt and other deleterious material before the protective covering is placed.

The protective covering shall be placed on a coating of adhesive of a type recommended by the manufacturer. The adhesive shall be applied at a rate sufficient to hold the protective covering in position until the backfill is placed.

Preformed membrane waterproofing will be measured and paid for by the square foot as asphalt membrane waterproofing.

10-1.66 COLUMN CASINGS

Column casings shall consist of cleaned and painted structural steel shells filled with grout as shown on the plans and conforming to the provisions in Section 55, "Steel Structures," of the Standard Specifications and these special provisions.

Attention is directed to "Welding Quality Control" of these special provisions.

The requirements of the first sentence of paragraph 3.13.2 of AWS D1.5 will not apply for the field welding of column casings.

Structural steel for column casings shall conform to the requirements in ASTM Designation: A 36/A 36M, or at the Contractor's option, ASTM Designation: A 709/A 709M, Grade 36.

Polyethylene shall have a compressive strength of at least 10 psi at no more than 15 percent deflection determined in conformance with the requirements in ASTM Designation: D 3575, Test B. Polyethylene shall be bonded to the column using a suitable waterproof adhesive applied to the entire contact surface.

The spaces to be occupied by the column casing materials shall be cleared of plants and other materials prior to encasing the column.

Removed plants and other materials shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.

CLEAN AND PAINT STRUCTURAL STEEL.--New metal surfaces, except where galvanized, shall be cleaned and painted in conformance with the provisions in Sections 59-2, "Painting Structural Steel," and 91, "Paint," of the Standard Specifications and these special provisions.

The fifth paragraph in Section 59-1.03, "Application," of the Standard Specifications is amended to read:

> Unless otherwise specified, should 7 days elapse between paint applications, the painted surface shall be water rinsed prior to the next paint application. Water rinsing shall be defined as a pressurized water rinse with a minimum nozzle pressure of 300 psi. During rinsing, the tip of the pressure nozzle shall be placed between 12 and 18 inches from the surface to be rinsed.

The ninth paragraph in Section 59-1.03, "Application," of the Standard Specifications is amended to read:

> Runs, sags, thin and excessively thick areas in the paint film, skips and holidays, or areas of non-uniform appearance shall be considered as evidence that the work is unsatisfactory, and the Contractor may be required to blast clean the areas and reapply the paint.

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

> Structures, other than sign structures, shall be blast cleaned and painted with the total thickness of undercoats before erection. Finish coats and final coats shall be applied after erection. If concrete deck is to be placed on a steel member to be painted, finish coats and final coats shall be applied after concrete deck placement. After erection, deck placement, and before applying subsequent paint, all areas where paint has been damaged or has deteriorated and all exposed unpainted surfaces shall be thoroughly cleaned, all foreign substances shall be removed, and surfaces shall be spot painted with undercoats to the specified thickness. Damaged areas of undercoat paint shall be blast cleaned and painted as specified in the special provisions.

The fourth paragraph in 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 gauge according to Steel Structure Painting Council Specification SSPC-PA2.

Column casing surfaces in contact with grout shall not be considered embedded in concrete.

Column casing surfaces to be painted with waterborne inorganic zinc coating shall be blast cleaned and painted with the single undercoat prior to shipment to the job-site.

CLEANING.--The surfaces to be cleaned and painted shall be dry blast cleaned in conformance with the requirements of Surface Preparation Specification No. 10, "Near White Blast Cleaning," of the Steel Structures Painting Council. Blast cleaning shall leave all surfaces with a dense, uniform, angular, anchor pattern of no less than 1 1/2 mils as measured in conformance with the requirements of ASTM Designation: D 4417.

Mineral and slag abrasives used for blast cleaning steel shall conform to the requirements of Abrasive Specification No. 1, "Mineral and Slag Abrasives," of the Steel Structures Painting Council 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 existing steel.

The color of the final coat of inorganic zinc coating shall closely match Federal Standard 595B No. 36373.

PAINTING.--All blast cleaned surfaces shall receive a single undercoat of waterborne inorganic zinc coating, and exposed surfaces shall receive a minimum of 2 finish coats of an exterior grade latex paint supplied by the manufacturer of the inorganic zinc coating. The single undercoat shall consist of a waterborne inorganic zinc coating conforming to the requirements in AASHTO Designation M 300, Type II, except that: 1) the first 3 sentences of Section 4.7, "Primer Field Performance Requirements," and the entire Section 4.7.1 shall not apply, and 2) zinc dust shall be Type II in conformance with the requirements in ASTM Designation: D 520. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory.

Inorganic zinc coating shall not be applied when the atmospheric or surface temperature is less than 45° F or more than 100° F or 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 single undercoat of inorganic zinc coating shall be not less than 4 mils nor more than 8 mils.

All damaged areas and areas where mudcracking occurs in the inorganic zinc coating shall be blast cleaned and repainted with inorganic zinc coating to the specified thickness.

The inorganic zinc coating shall be tested for adhesion and cure. The locations of the tests will be determined by the Engineer. The sequence of the rinsing and testing operations shall be determined by the Contractor. The testing for adhesion and cure will be performed no sooner than 72 hours after application of the single undercoat of inorganic zinc coating. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to determine the location of the tests and to test the inorganic zinc coating cure. The inorganic zinc coating shall pass both of the following tests:

The inorganic zinc coating shall have a minimum adhesion to steel of 600 psi when measured at 6 locations on each column 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.

The inorganic zinc coating shall exhibit a solid, hard and polished metal surface when firmly scraped with the knurled edge of a quarter. Inorganic zinc coating that is powdery, soft or does not exhibit a polished metal surface, as determined by the Engineer, shall be repaired by the Contractor, at the Contractor's expense, by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

Except as approved by the Engineer, a minimum curing time of 72 hours shall be allowed between application of inorganic zinc coating and water rinsing.

Exposed areas of inorganic zinc coating, where finish coats are specified, shall be thoroughly water rinsed.

The first finish coat shall be applied within 48 hours following the pressure rinsing with fresh water.

The finish coat paint shall be formulated for application to inorganic zinc coating and shall conform to the following:

Property	Value	ASTM Designation
Pigment content, percent	24 max.	D 3723
Nonvolatile content, mass percent	49 min.	D 2369
Consistency, KU	75 min. to 90 max.	D 562
Fineness of dispersion, Hegman	6 min.	D 1210
Drying time at 77°F, 50% RH, 4 mil wet film Set to touch, minutes Dry through, hours	 30 max. 1 max.	D 1640
Adhesion	4A	D 3359, Procedure A

No visible color change in the finish coats shall occur when tested conforming to the requirements of ASTM Designation: G 53 using FS 40 UV-B bulbs for a minimum of 38 cycles. The cycle shall be 4 hours of ultraviolet (UV) exposure at 140° F and 4 hours of condensate exposure at 104° F.

The vehicle shall be an acrylic or modified acrylic copolymer with a minimum of necessary additives.

The first finish coat shall be applied in 2 applications. The first application shall consist of a spray applied mist application. The second application shall be applied after the mist application has dried to a set to touch condition. The first finish coat color shall match Federal Standard 595B No. 36628 The total dry film thickness of both applications of the first finish coat shall be not less than 2 mils.

Except as approved by the Engineer, a minimum drying time of 12 hours shall be allowed between finish coats.

The second finish coat color shall match Federal Standard 595B No. 26408. The total dry film thickness of all applications of the second finish coat shall be not less than 2 mils.

The 2 finish coats shall be applied in 3 or more applications to a total dry film thickness of not less than 4 mils nor more than 8 mils.

The total dry film thickness of all applications of inorganic zinc coating and finish coat paint shall be not less than 8 mils nor more than 14 mils.

GROUTING.--Grouting shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications and these special provisions.

For non-circular columns where the minimum gap to be filled with grout is one inch and the maximum gap is greater than 4 inches, aggregate shall be used to extend the grout, but only to the extent that the cement content of the grout is not less than 846 pounds per cubic yard of grout. California Test 541 will not be required nor will the grout be required to pass through a screen with a 0.07-inch maximum clear opening prior to being introduced into the grout pump. Aggregate shall consist of at least 70 percent fine aggregate and approximately 30 percent pea gravel, by weight. Fine aggregate shall conform to the provisions of Section 90-2, "Materials," of the Standard Specifications. The size of pea gravel shall be such that 100 percent passes the 1/2 inch screen, a minimum 90 percent passes the 3/8 inch screen and not more than 5 percent passes the No. 8 screen.

The Contractor shall limit the height of each lift of grout to minimize undulations and displacements of the surface of the shell during grouting. Undulations in the shell surface, including undulations from fabrication and erection, shall not exceed 1/4 inch per foot nor shall the total displacement from plan location exceed 2 inches at any point. At the Contractors option, a bracing system or other means may be employed to restrain the casing within the specified tolerances. Except where shown on the plans, restraints shall not pass through the columns. The grout shall harden prior to placing the next lift of grout, unless a bracing system is used.

In addition to the above grout lift restrictions, the height of grout lifts for portions of column casings containing polyethylene shall not exceed 10 feet.

Suitable external grout injection valves shall be installed for filling of the casings. The filling operation shall begin at the bottom of the casing. Spacing of the valves shall be such that the grout will fill the gap between the casing and the polyethylene or column.

Casings shall be sealed at the bottom. Grout shall be pumped into the casing such that the grout head is maintained uniformly around the column, and no visible evidence of water or air is ejected at the top of the grout. The grout at the casing top shall be covered with mortar and sloped to drain. Mortar shall conform to the provisions in Section 51-1.135, "Mortar," of the Standard Specifications.

Casings shall be positioned with spacers to center the casing around the existing column at the location shown on the plans. Spacers may be welded to the inside of the casing. Spacers shall not be used in areas occupied by the polyethylene.

Grout shall not be permitted to flow across shoulders or lanes occupied by public traffic, or to flow into gutters or other drainage facilities.

Clamps, valves, injection ports, lifting ears and other accessories shall be completely removed not less than 24-hours after placing grout. Voids shall be filled with mortar and finished flush with the exterior surface of the casing.

MEASUREMENT AND PAYMENT.--Column casings will be measured and paid for in conformance with the provisions in Section 55-4.01, "Measurement," of the Standard Specifications and these special provisions.

The contract price paid per pound for column casing shall include full compensation for furnishing all labor, materials (including polyethylene and adhesive), tools, equipment, and incidentals, and for doing all the work involved in column casings filled with grout, complete in place, including cleaning and painting of structural steel, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.67 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.

Bolts, nuts and washers for use in sign structures shall conform to the following:

Material	Specification
Steel fastener components for general applications:	
Bolts and studs	ASTM: A 307
Headed anchor bolts	ASTM: A 307, Grade B, including S1 supplementary requirements
Nonheaded anchor bolts	ASTM: A 307, Grade C, including S1 supplementary requirements and S1.6 of AASHTO: M 314 supplementary requirements or AASHTO: M 314, Grade 36 or 55, including S1 supplementary requirements.
High-strength bolts and studs	ASTM: A 449, Type 1
High-strength threaded rods	ASTM: A 449, Type 1
High-strength nonheaded anchor bolts	ASTM: A 449, Type 1
Nuts	ASTM: A 563, including Appendix X1[a]
Washers	ASTM: F 844

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

Delete the eleventh paragraph of Section 56-1.03, "Fabrication," of the Standard Specifications.

Ribbed sheet metal panels for box beam-closed truss sign structures shall be fastened to the truss members by bolts as shown on the plans, or by stainless steel blind rivets conforming to Industrial Fasteners Institute, Standard IFI-114, Grade 51. The outside diameter of the rivet body shall be domed and shall be not less than 5/8 inch 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.

Delete Section 56-1.04, "Welding," of the Standard Specifications.

Welding, nondestructive testing of welds, and acceptance and repair criteria for nondestructive testing of welds on steel overhead sign structure members shall conform to the requirements of AWS D1.1 and these special provisions.

Before commencing fabrication of sign structures, the Contractor shall submit 2 sets of working drawings to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings." The working drawings shall include sign panel dimensions, span lengths, post heights, anchorage layouts, proposed splice locations, a snugging and tensioning pattern for anchor bolts and high strength bolted connections, and details for permanent steel anchor bolt templates. The working drawings shall be supplemented with a written quality control program that includes methods, equipment, and personnel necessary to satisfy the requirements specified herein and in the special provisions.

Working drawings shall be 22 inches x 34 inches or 11 inches x 17 inches 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-Post Mile, 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."

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.

Add the following 2 paragraphs after the third paragraph of Section 56-1.03, "Fabrication," of the Standard Specifications:

Surfaces of base plates which are to come in contact with concrete, grout, or washers and leveling nuts shall be flat to within 0.10 inch tolerance in 12 inches, and to within 0.20 inches 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 0.080 inches tolerance in 12 inches, and within 0.10 inch 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 0.080 inches 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 250 microinches. Round holes may be drilled to the exact final diameter. No holes shall be made in members unless the holes are shown on the plans or are approved in writing by the Engineer.

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

High-strength bolted connections, where shown on the plans, shall conform to the provisions in Section 55-3.14, "Bolted Connections," except that only fastener assemblies consisting of a high-strength bolt, nut, hardened washer and direct tension indicator shall be used.

High-strength fastener assemblies, and any other bolts, nuts, and washers attached to sign structures shall be zinc-coated by the mechanical deposition process.

An alternating snugging and tensioning pattern for anchor bolts and high-strength bolted splices shall be used. Once tensioned, high-strength fastener components and direct tension indicators shall not be reused.

For bolt diameters less than 0.40 inches, the diameter of the bolt hole shall be not more than 0.030 inches larger than the nominal bolt diameter. For bolt diameters greater than or equal to 0.40 inches, the diameter of the bolt hole shall be not more than 0.060 inches 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 3/16 inch 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 5/8 inch in diameter. Web splices in ribbed sheet metal panels may be made with similar type blind rivets of a size suitable for the thickness of material being connected.

Spalling or chipping of concrete structures shall be repaired by the Contractor at the Contractor's expense.

Overhead sign supports shall have an aluminum identification plate permanently attached near the base, adjacent to the traffic side on one of the vertical posts, using either stainless steel rivets or stainless steel screws. As a minimum, the information on the plate shall include the name of the manufacturer, the date of manufacture and the contract number.

Steel members used for overhead sign structures shall receive nondestructive testing (NDT) in conformance with AWS D1.1 and the following:

A.

Weld Location	Weld Type	Minimum Required NDT
Welds for butt joint welds in tubular sections, nontubular sections, and posts	CJP groove weld with backing ring	100% UT or RT
Longitudinal seam welds*	PJP groove weld	25% MT
	CJP groove weld	100% UT or RT
Welds for base plate, flange plate, or end cap to post or mast arm	CJP groove weld	25% UT or RT
	Fillet weld	25% MT
* Longitudinal seam welds shall have 60% minimum penetration, except that within 6 inches 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 0.31 inches thick. Contoured shoes shall be used when performing UT on round tubular sections under 50 inches 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 pound for furnish sign structure and no additional compensation will be allowed therefor.

10-1.68 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.

Delete the first three paragraphs of Section 56-2.02B, "Wood Posts," of the Standard Specifications.

The grades and species allowed for wood posts, 4" by 4" nominal size, are select heart redwood; No. 1 heart structural redwood (1050f); No. 2 heart structural redwood (900f); No. 1 structural light framing Douglas fir, free of heart center; No. 1 structural light framing Hem-Fir, free of heart center; or No. 1 structural light framing Southern yellow pine, free of heart center. The grades and species allowed for wood posts, 4" by 6" nominal size, are select heart grade redwood; select heart structural grade redwood (1100f); No. 1 heart structural redwood (950f); No. 2 structural joists and planks, Douglas fir, free of heart center; No. 1 structural joists and planks Hem-Fir, free of heart center; or No. 2 structural joists and planks Southern yellow pine. The grades and species allowed for wood posts larger than 4" by 6" nominal size are select heart redwood; No. 1 heart structural redwood (950f); No. 1 posts and timbers (also known as No. 1 structural) Douglas fir, free of heart center; select structural posts and timbers Hem-Fir, free of heart center; or No. 1 timbers Southern yellow pine, free of heart center.

Posts shall be graded in conformance with the provisions in Section 57-2, "Structural Timber." Sweep shall not exceed-0.08 foot in 10 feet.

Before preservative treatment, the moisture content of Douglas fir, Hem-Fir, and Southern yellow pine posts shall be not more than 25 percent as measured at the midpoint of the post in the outer inch, using an approved type of moisture meter, in conformance with the requirements of ASTM Designation: D 4444.

Type N, Type P, and Type R marker panels mounted on a post with a roadside sign shall be considered to be sign panels and will not be paid for as markers.

Metal (barrier mounted sign), metal (wall mounted sign flush) and metal (wall mounted sign) will be measured and paid for in the same manner as metal (rail mounted sign).

10-1.69 INSTALL SIGN OVERLAY

Sign overlays shall be installed on existing signs as shown on the plans and in conformance with these special provisions.

Sign overlay panels will be furnished by the State as provided under "Materials" of these special provisions.

Self plugging blind rivets for installing sign overlays shall have a 3/16" x 5/8" shank. A number 10 drill shall be used for drilling the rivet holes. If the overlay is not pre-punched, maximum rivet spacing shall be 16 inches.

Install sign overlay will be measured by the square foot.

The contract price paid per square foot for install sign overlay shall include full compensation for furnishing all labor, materials (except sign overlays), tools, equipment, and incidentals, and for doing all the work involved in installing sign overlay panels on existing signs (including fastening hardware), as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.70 PREPARING AND PAINTING CONCRETE

The portions of abutment walls with architectural treatment shall be prepared and painted in accordance with the details shown on the plans, the provisions in Sections 59, "Painting," and 91, "Paint," of the Standard Specifications and these special provisions.

The paint to be applied to concrete surfaces shall conform to the provisions in Section 91-4.05, "Paint; Acrylic Emulsion, Exterior White and Light and Medium Tints," of the Standard Specifications. The color of the paint shall match the adjacent painted area.

Full compensation for preparing and painting concrete shall be considered as included in the contract price per square foot for architectural treatment and no separate payment will be made therefor.

10-1.71 ALTERNATIVE PIPE

Alternative pipe culverts shall conform to the provisions in Section 62, "Alternative Culverts," of the Standard Specifications.

10-1.72 PLASTIC PIPE

Plastic pipe shall conform to the provisions in Section 64, "Plastic Pipe," of the Standard Specifications and these special provisions.

Delete the first, second and fourth paragraphs of Section 64-1.01, "Description," of the Standard Specifications.

This work shal consist of furnishing and installing corrugated or ribbed plastic pipe for culverts, drains and conduits, with all necessary fittings and coupling systems, as shown on the plnas or as directed by the Engineer and as specified in the Standard Specifications and these special provisions.

Plastic pipe shall be either Type C, Type D or Type S corrugated polyethylene pipe, ribbed profile wall polyethylene pipe, or ribbed polyvinyl chloride drain pipe.

Where designated on the plans as smooth interior wall type, plastic pipe shall be, at the option of the Contractor, either Type D or Type S corrugated polyethylene pipe, ribbed profile wall polyethylene pipe or ribbed polyvinyl chloride drain pipe.

Delete the first paragraph of Section 64-1.02, Materials," of the Standard Specifications.

Type C, Type D and Type S corrugated polyethylene pipe shall conform to the requirements in AASHTO Designation: M 294, except as otherwise specified. Corrugated polyethylene pipe shall be manufactured from high density polyethylene (HDPE) virgin compounds.

Delete the first paragraph of Section 64-1.03, "Pipe Thickness, Stiffness and Unit Weight," of the Standard Specifications.

Wall thickness of Type C corrugated polyethylene pipe shall be measured at the inside valley of the corrugation. Wall thickness of Type D corrugated polyethylene pipe shall be measured as the thickness of the inner liner. Wall thickness of Type S corrugated polyethylene pipe shall be the thickness of the inner liner measured between corrugation valleys. Wall thickness of ribbed profile wall polyethylene pipe shall be measured in the gap between ribs. The wall thickness of the various types of polyethylene pipe, measured as specified above, shall equal or exceed the minimum wall thickness values in Table 1. The wall thickness of ribbed profile wall PVC pipe measured in the gap between ribs shall equal or exceed the minimum wall thickness values in Table 3.

Delete Section 64-1.04, "Joints," of the Standard Specifications.

Plastic pipe culvert joints shall conform to either standard or positive joint provisions in Section 61-1.02, "Performance Requirements for Culvert and Drainage Pipe Joints," except that where sleeve joint connections are utilized, the sleeve minimum width shall be 195 mm, and at least 2 corrugations from each pipe to be joined are engaged by the sleeve.

Where watertight joints are not specified, Type S corrugated polyethylene pipe shall incorporate, on each side of the joint, a closed-cell expanded rubber gasket conforming to the requirements in ASTM Designation: D 1056, Grade 2A2. Type D corrugated polyethylene pipe shall incorporate a rubber gasket in a groove on the spigot end of the pipe. The gasket for Type D polyethylene pipe shall conform to the requirements in ASTM Designation: F 477 or D 1056, Grade 2A2. The gaskets described in this paragraph shall be installed by the pipe manufacturer. Pipe shall be stored in a manner that protects the gaskets from weather. Cracks or splits occurring on gaskets will be cause for rejection.

Corrugated polyethylene pipe joints manufactured to conform to the integral joint provisions in Section 61-1.02, "Performance Requirements for Culvert and Drainage Pipe Joints," shall be laid to line and grade with the sections jointed closely. Corrugated polyethylene pipe to be joined by sleeve joints shall be laid to line and grade with the separate sections not more than 40 mm apart and then joined together firmly with at least 2 corrugations from each pipe section engaged in the coupler.

Joints for pipe designated on the plans as watertight, shall be watertight under pressure and all conditions of expansion, contraction and settlement, and shall conform to the provisions for watertightness in Section 61-1.02, "Performance Requirements for Culvert and Drainage Pipe Joints."

Delete the first paragraph of Section 64-1.05, "Earthwork," of the Standard Specifications.

Excavation, backfill and shaped bedding shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications and these special provisions, except at locations where pipe is to be backfilled with concrete, the backfill shall conform to the provisions in Section 64-1.06, "Concrete Backfill," of the Standard Specifications.

10-1.73 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.

Delete the fifth paragraph of Section 65-1.02A(2), "Circular Reinforced Concrete Pipe (Direct Design Method)," of the Standard Specifications.

Shop plans shall conform to the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, and shall be submitted to the Engineer for approval. For initial review, 3 sets shall be submitted to the Office of Structure Design. After review, 6 sets shall be submitted to that Office for final approval and for use during construction.

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 the plans. Where the pipe is to be placed under the traveled way, a relative compaction of not less than 90 percent shall be required unless the minimum distance between the top of the pipe and the pavement surface is the greater of 4 feet or one half of the outside diameter of the pipe.

Except as otherwise designated by classification on the plans or in the specifications, joints for culvert and drainage pipes shall conform to the plans or specifications for standard joints.

When reinforced concrete pipe is installed in conformance with the details shown on the plans, 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 0.50 feet nor more than one foot. The resulting trench below the bottom of the bedding shall be backfilled with structure backfill material in conformance with the provisions in Section 19-3.06, "Structure Backfill," of the Standard Specifications.

The excavation and backfill below the planned elevation of the bottom of the bedding will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

The Outer Bedding shown on the plans shall not be compacted prior to placement of the pipe.

The jacking operations at Route 10 Stations 455+00, 616+60, 644+94 and 723+50 have been classified "Non Gassy" by the State Division of Occupational Safety and Health under Section 8422 of the Tunnel Safety Orders.

10-1.74 CORRUGATED METAL PIPE

Corrugated steel pipe shall conform to the provisions in Section 66, "Corrugated Metal Pipe," of the Standard Specifications and these special provisions.

Delete the first paragraph in Section 66-1.03, "Protective Coatings, Linings and Pavings," of the Standard Specifications.

When required by these special provisions or designated in the Engineer's Estimate, pipes shall be protected with bituminous coating, bituminous lining or have the invert paved with bituminous material or coated with polymerized asphalt. Moisture, dirt, oil, unbonded or incompatible paint, grease, alkalies, or other foreign matter shall be removed from the surface to be coated before the coating material is applied.

Delete the sixth, seventh and eighth paragraphs in Section 66-1.03, "Protective Coatings, Linings and Pavings," of the Standard Specifications.

When linings and pavings are not required, an asphalt mastic coating may be substituted for the bituminous coating on corrugated steel pipe or a polymeric sheet coating may be substituted for bituminous coating on corrugated steel pipe. The asphalt mastic or polymeric sheet coating shall be placed on the outside surface of the pipe, and the insides need not be coated unless otherwise provided in these special provisions.

Asphalt mastic coating shall conform to the requirements in AASHTO Designation: M 243 except that asbestos fibers will not be required. The asphalt mastic material shall be applied uniformly to the surface with a minimum thickness of 0.05-inch at any point. Asphaltic mastic coating shall be applied at the fabrication plant. Any pinholes, blisters, cracks or lack of bond shall be cause for rejection.

Polymeric sheet coating shall conform to the requirements in AASHTO Designation: M 246M 246M. The polymeric sheet coating shall be applied to the galvanized sheet prior to corrugating and, unless otherwise specified in the plans or these special provisions, the thickness shall be not less than 0.010-inch. Any pinholes, blisters, cracks or lack of bond shall be cause for rejection.

Polymerized asphalt invert coating shall be applied in conformance with the requirements in ASTM Designation: A 849 for "Invert Paved Type with Polymer Material (Class P)," except that polymerized asphalt coatings shall be applied by immersion to a minimum thickness of 0.05 inch above the crests and troughs of the corrugations of the interior and exterior invert including pipe ends. Polymerized asphalt material shall conform to the "Requirements for Polymer Coating" contained in ASTM Designation: A 742/A 742M, and the following:

Polymerized asphalt shall be hot-applied thermoplastic material containing a minimum of 7.0 percent styrene-butadiene-styrene block copolymer.

There shall be not more than 0.25 inch undercutting or delamination from the scribe when a minimum 12 inches by 12 inches coupon cut from the coated pipe is exposed for 1000 hours in conformance with the requirements in ASTM Designation: B 117. Cut edges shall be sealed by dipping in a sample of the polymerized asphalt coating heated to the manufacturer's recommended application temperature. There shall be no corrosion or delamination from the sealed edges following exposure as specified.

Delete the last paragraph in Section 66-1.03, "Protective Coatings, Linings and Pavings," of the Standard Specifications.

Damaged protective coatings, linings and invert paving shall be repaired by the Contractor at the Contractor's expense. Bituminous material conforming to the requirements in AASHTO Designation: M 190 or other materials approved by the Engineer shall be used to repair damaged bituminous coatings; asphalt mastic material conforming to the requirements in AASHTO Designation: M 243 shall be used to repair damaged asphalt mastic coatings; and tar base material conforming to the requirements in AASHTO Designation: M 243 shall be used to repair damaged polymeric sheet coatings. The repair of damaged polymerized asphalt coatings shall conform to the requirements in ASTM Designation: A 762, Section 11, "Repair of Damaged Coatings."

Delete the second paragraph of Section 66-2.03B, "Fabrication by Continuous Helical Lock Seam," of the Standard Specifications.

Delete the last paragraph of Section 66-2.03B, "Fabrication by Continuous Helical Lock Seam," of the Standard Specifications.

Sampling and testing for continuous lock seam quality control shall conform to the requirements in California Test 662.

Section 66-3.06, "Damaged Aluminum Coatings," of the Standard Specifications.

In lieu of the requirements in AASHTO Designation: M 36/M 36M, damaged aluminum coatings shall be repaired as provided for damaged galvanizing in Section 75-1.05, "Galvanizing," or Section 66-3.05, "Damaged Galvanizing," of the Standard Specifications.

10-1.75 UNDERDRAINS

Perforated plastic pipe underdrains shall conform to the provisions in Section 68-1, "Underdrains," of the Standard Specifications and these special provisions.

The first paragraph of Section 68-1.01, "Description," of the Standard Specifications is amended to read:

68-1.01 Description.—This work shall consist of furnishing and installing alternative pipe, perforated steel pipe, perforated concrete pipe, perforated aluminum pipe and perforated plastic pipe or tubing underdrains, and furnishing and placing permeable material and filter fabric as shown on the plans or directed by the Engineer, and as specified in these specifications and the special provisions.

Sections 68-1.02A, "Clay Drain Tile," 68-1.02B, "Concrete Drain Tile," 68-1.02C, "Porous Concrete Pipe," 68-1.02E, "Perforated Clay Pipe," 68-1.02G, "Perforated Bituminized-Fiber Pipe," and 68-1.02H, "Perforated Concrete Pipe," of the Standard Specifications are hereby deleted.

The sixth paragraph in Section 68-1.03, "Installing Underdrains," of the Standard Specifications is amended to read:

Lengths of perforated steel pipe and perforated aluminum pipe shall be joined by couplers.

10-1.76 EDGE DRAINS

Edge drains shall conform to the requirements in Section 68-3, "Edge Drains," of the Standard Specifications.

10-1.77 MISCELLANEOUS FACILITIES

Corrugated steel pipe risers and manholes shall conform to the provisions in Section 70, "Miscellaneous Facilities," of the Standard Specifications and these special provisions.

End drain cleanouts shall conform to the provisions in Section 81, "Survey Monuments," of the Standard Specifications and to the details shown on the plans.

Parkway drains shall conform to the details shown on the plans and these special provisions.

Concrete shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications. Reinforcement shall conform to the provisions of Section 52, "Reinforcement," of the Standard Specifications and these special provisions. Galvanized steel angle shall conform to the provisions of Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

Parkway drain will be measured by the unit.

The contract unit price paid for parkway drain shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in parkway drain, complete in place, including structure excavation and backfill and galvanized steel angle, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.78 SLOPE PROTECTION

Slope protection shall conform to the provisions in Section 72, "Slope Protection," of the Standard Specifications and these special provisions.

Rock slope protection fabric shall be woven or nonwoven type fabric, Type A or Type B, at the option of the Contractor.

10-1.79 MISCELLANEOUS CONCRETE CONSTRUCTION

Sidewalks, driveways, cross gutters, curbs and curbs and gutters shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications and these special provisions.

Curb ramp detectable warning surface shall conform to the details shown on the plans and shall not be constructed or installed on curb ramps with a slope that exceeds 6.67 percent. The finished surfaces of the detectable warning surface shall be free from blemishes.

Curb ramp detectable warning surface shall consist of raised truncated domes constructed or installed on curb ramps. The detectable warning surface, at the option of the Contractor, shall be either cast-in-place or stamped into the surface of the curb ramp, or shall be a prefabricated surface installed on the curb ramp. The color of the detectable warning surface shall be yellow conforming to Federal Standard No. 595B, Color No. 33538. Detectable warning surface, either -in-place or stamped into the surface of the curb ramp, shall be painted yellow in conformance with the provisions in Section 59-6, "Painting Concrete," of the Standard Specifications.

Prior to constructing curb ramps with cast-in-place or stamped detectable warning surface, a test panel shall be constructed on the project site and shall be of a size not less than 2 feet by 2 feet. The test panel shall be constructed, finished and cured with the same materials, tools, equipment and methods to be used in constructing the proposed permanent work. Additional test panels shall be constructed as necessary until a panel is produced which demonstrates, to the satisfaction of the Engineer, the ability of the selected procedure to produce a detectable warning surface that meets all of the specified requirements.

Full compensation for constructing or installing curb ramp detectable warning surface shall be considered as included in the contract price paid per cubic yard for minor concrete (miscellaneous construction) and no separate payment will be made therefor.

10-1.80 MINOR CONCRETE (GUTTER)

The gutter behind the retaining wall shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications and these special provisions.

Minor concrete (gutter) will be measured and paid for by the cubic yard.

The contract price paid per cubic yard for minor concrete (gutter) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the gutter, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.81 MISCELLANEOUS IRON AND STEEL

Miscellaneous iron and steel shall conform to the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

Delete Section 75-1.02, "Miscellaneous Iron and Steel," of the Standard Specifications.

Miscellaneous iron and steel items shall conform to the dimensions and details shown on the plans and as specified in the Standard Specification and these special provisions.

At the option of the Contractor, grates shall be fabricated from either structural steel conforming to the requirements in ASTM Designations: A 36/A 37M or A 576 Grades 1021, 1022, 1026, 1029 or 1030, ductile iron castings, or carbon-steel castings.

Welding shall conform to the requirements in AWS D1.1.

Fabrication shall be performed in a workmanlike manner in conformance with the practice in modern commercial shops. Burrs, rough and sharp edges, and other flaws shall be removed. Warped pieces shall be straightened after all fabrication and galvanizing.

Raised pattern plates shall be of commercial quality.

Manhole frames and covers shall be fabricated from gray cast iron.

Unless otherwise specified, all steel items and cast iron lightweight sidewalk frames and covers shall be galvanized in conformance with the provisions in Section 75-1.05, "Galvanizing." Galvanizing shall be performed after fabrication and before assembling component parts. All other cast iron items shall be pained with or dipped in commercial quality asphaltum.

Drainage inlet frames and grates, except those which are to be on bridges, need not be galvanized or coated with asphalt paint.

Frames and grates, or frames and covers shall be matchmarked in pairs before delivery to the work and the grates and covers shall fit into their frames without rocking.

Unless otherwise specified, materials shall conform to the following specifications:

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 ASSHTO 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[a]
Washers	ASTM Designation: F 884
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[a]
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, nuts, studs, threaded rods and nonthreaded anchor bolts	ASTM Designation: F 593 or F 738M
Washers	ASTM Designation: A 240 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
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 standard soil
Steel pipe	Commercial quality welded
Other parts for general applications	Commercial quality

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

Delete the eighth, ninth and tenth paragraphs in Section 75-1.05, "Galvanizing," of the Standard Specifications.

Tapping nuts or other internally threaded parts to be used with zinc coated bolts, anchor bars or studs shall be done after galvanizing and shall conform to the requirements for thread dimensions and overtapping allowances in ASTM Designation: A 562 or A 563M.

When specified, painting of zinc coated surfaces shall be in accordance with the procedures in Section 59-3, "Painting Galvanized Surfaces," of the Standard Specifications.

Delete the second paragraph in Section 75-1.06, "Measurement," of the Standards Specifications.

Scale weightings will not be required when miscellaneous iron and steel, miscellaneous bridge metal, miscellaneous metal (restrainer), or pumping plant metal work are designated as final pay items in the Engineer's Estimate.

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.

Attention is directed to "Welding Quality Control" of these special provisions.

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

Unless otherwise specified, materials shall conform to the following specifications:

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)
Other parts for general applications	Commercial quality
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 which include threaded rods and high-strength nonheaded anchor bolts	ASTM Designation: A 449, Type 1
Nuts	ASTM Designation: A 563, including Appendix X1[(a)]
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[(a)]
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 for general applications:	Alloys 304 or 316
Bolts, screws, nuts and studs which include threaded rods and nonheaded anchor bolts	ASTM Designation: F 593 or F 738M
Washers	ASTM Designation:A 240 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 standard soil
Steel pipe	Commercial quality welded
(a) Zinc-coated nuts that will be tightened beyond snug or wrench tight shall be furnished with a dry lubricant conforming to Supplementary Requirement S2 in ASTM Designation: A 563.	

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. Metal portion of bearings
B. Steel shims
C. 1/8" plate at precast girder notched ends
D. Joint seal protection plate
E. Deck Drainage System
F. 4” Steel Pile Conduits
G.

Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications is amended by adding the following paragraph after paragraph 3:

High-strength bolted connections shall conform to the provisions for high-strength steel fasteners and for bolted connections in Section 55, "Steel Structures."

An approved thread locking system, consisting of a cleaner, primer and anaerobic adhesive, shall be applied where shown on the plans. Lubricants and foreign materials shall be removed from the threaded areas of both parts using the cleaner and small wire brush. The primer shall be applied to cover the threaded areas of both parts. The anaerobic adhesive shall be applied to fill the male threads in the area of the final position of the nut. The nut shall be installed at the location or to the torque shown on the plans, and an additional fillet of anaerobic adhesive shall be applied completely around the exposed junctions of the nut and male part. Full compensation for furnishing and applying the thread locking system shall be

considered as included in the contract price paid for the item of work requiring the system and no separate payment will be made therefor.

Self-tapping screws shall be hex-head, stainless steel or monel metal, installed in holes drilled to fit the self-tapping screws.

For drainage piping 8 inches in diameter or less, which is: (1) enclosed in a box girder cell and exposed for a length not greater than 20 feet, or (2) encased in concrete, the Contractor shall have the option of substituting polyvinyl chloride (PVC) plastic pipe, with the same diameter and minimum bend radius as shown on the plans, for welded steel pipe. The support spacing for PVC plastic pipe shall be 96 in, maximum. The polyvinyl chloride (PVC) plastic pipe shall be Schedule 40 conforming to the requirements of ASTM Designation: D 1785. If polyvinyl chloride (PVC) plastic pipe is substituted for welded steel pipe, the quantity of drainage piping will be computed on the basis of the dimensions and details shown on the plans and no change in the quantities to be paid for will be made because of the use by the Contractor of polyvinyl chloride (PVC) plastic pipe.

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

3. Manhole frames and covers, frames and grates, ladder rungs, guard posts, and access door assemblies.

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

Cast-in-place inserts shall be ferrule loop or cast iron type.

All metal parts of anchorage devices shall be fabricated from steel, except iron castings for cast-in-place inserts shall be malleable iron or ductile iron.

All metal parts of anchorage devices, except mechanical expansion anchors and iron castings for cast-in-place inserts, shall be hot-dip or mechanically galvanized. Mechanical expansion anchors may be hot-dip or mechanically galvanized, made from stainless steel, or coated with electrodeposited zinc conforming to the requirements of ASTM Designation: B 633. Iron castings shall be mechanically galvanized.

The second paragraph in Section 75-1.06, "Measurement," of the Standards Specifications is amended to read:

Scale weights will not be required when miscellaneous iron and steel, miscellaneous bridge metal, miscellaneous metal (restrainer), or pumping plant metal work are designated as final pay items in the Engineer's Estimate.

10-1.83 MISCELLANEOUS METAL (RESTRAINER-ROD TYPE)

Miscellaneous metal (restrainer-rod type) units consisting of high strength rods, bearing plates, couplers, anchorage devices, and incidentals shall conform to the details shown on the plans and the provisions in Section 75-1.035, "Bridge Joint Restrainer Units," of the Standard Specifications and in these special provisions.

Rods assemblies shall conform to the materials and sampling provisions for prestressing steel in Section 50, "Prestressing Concrete," of the Standard Specifications and the following:

The high strength rods shall conform to the requirements of ASTM Designation: A 722, including all supplementary requirements.

All new metal surfaces of restrainer-rod type units shall be cleaned and painted in conformance with the provisions in Sections 59-2, "Painting Structural Steel," and 91, "Paint," of the Standard Specifications and "Clean and Paint Structural Steel" of these special provisions.

Anchorage devices and couplers, conforming to the requirements specified herein, shall be of a type selected by the Contractor and shall include locking devices to prevent turning or loosening.

The anchorage device and coupler shall develop the specified minimum ultimate tensile strength of the steel rod.

The Contractor shall be responsible for determining the required lengths of the rod assemblies.

The rodassemblies shall be shipped as a complete unit including anchorage device and coupler.

Bearing plates shall conform to the requirements of ASTM Designation: A 36.

New concrete adjacent to restrainers shall be placed prior to installing restrainers.

Miscellaneous metal (restrainer-rod type) will be measured and paid for by the pound in the same manner specified for miscellaneous metal (restrainer) in Sections 75-1.06, "Measurement," and 75-1.07, "Payment," of the Standard Specifications.

Full compensation for cleaning and painting of rod type restrainer units shall be considered as included in the contract price paid per pound for miscellaneous metal (restrainer-rod type) and no additional compensation will be allowed therefor.

10-1.84 CHAIN LINK FENCE

Chain link fence shall be Type CL-6 and CL-8 and shall conform to the provisions in Section 80, "Fences," of the Standard Specifications.

Delete Section 80-1.02, "Existing Fences," of the Standard Specifications.

Attention is directed to Sections 7-1.11, "Preservation of Property," of the Standard Specifications and "Indemnification and Insurance," of these special provisions. Fences that are to remain in place and which have been damaged by the Contractor shall be replaced by the Contractor at the Contractor's expense.

10-1.85 CHAIN LINK WALK GATES

Chain link walk gates shall be Type CL-6 or CL-8 conforming to the provisions in Section 80, "Fences," of the Standard Specifications and these special provisions.

Gates shall be installed in existing fences at the locations shown on the plans. Gate installations shall be complete with gate post, latch post, concrete footings, braces, truss rods, and hardware. Gate and latch posts shall be braced to the next existing line post as shown on the plans.

At each gate location, an existing line post shall be removed and the new gate installed so it is centered on the post hole of the removed post. Holes resulting from the removal of line posts shall be backfilled.

Gate mounting and latching hardware shall not contain open-end slots for the fastening bolts.

Chain link fabric for gates shall be of the same mesh size as the existing fence in which the gates are installed.

Openings made in existing fences for installation of gates shall be closed during the working day in which the openings are made and when work is not in progress. Temporary closures shall be made with the existing fence fabric or with additional 6-foot or 8-foot chain link fabric as directed by the Engineer.

Full compensation for making the openings in existing fences, for temporary closing of the openings (including furnishing additional fence fabric if necessary), and for new posts, footings, hardware, braces, and truss rods shall be considered as included in the contract unit price paid for the various sizes of chain link gate (Type CL-6) and (Type CL-8) shown on the Engineer's estimate and no additional compensation will be allowed therefor.

10-1.86 MONUMENTS

Survey monuments shall conform to the provisions in Section 81, "Monuments," of the Standard Specifications.

10-1.87 DELINEATORS

Delineators shall conform to the provisions in Section 82, "Markers and Delineators," of the Standard Specifications and these special provisions.

Delete the first and second paragraphs of Section 82-1.02D, "Target Plates," of the Standard Specifications.

Target plates for highway post markers and Type L object markers installed on a metal post, shall be manufactured from zinc-coated steel sheet or aluminum sheet.

Target plates for Type K object markers shall be of the same color and material as the flexible post.

Delete the first and second paragraphs of Section 82-1.02F, "Reflectors," of the Standard Specifications.

Standard reflex reflectors conforming to the Department of Transportation current specifications for reflex reflectors for traffic signs, delineators and warning devices shall be attached directly to metal target plates on Type K and Type L object markers, and to the back of Class 2 delineator posts with Type E or Type I reflectorization. Copies of the current specifications are available at the Transportation Laboratory. The reflectors shall be of the type, size and color designated on the plans.

Reflectors for flexible target plates on Type K object markers and target plates on Class 2 delineators, and reflectors for Class 1 delineators shall be made from impact resistant retroreflective sheeting as specified in the special provisions. The color of the retroreflective sheeting shall conform to the color designated on the plans and the Chromaticity Coordinates specified in Federal Highway Administration Specification FP-85, or the PR color number specified by the Federal Highway Administration's Color Tolerance Chart.

Reflex reflectors or retroreflective sheeting may be used for object markers and delineators with rigid posts. Retroreflective sheeting shall be used for object markers and delineators with flexible posts.

Delete the first and second paragraphs of Section 82-1.04, "Marker Information," of the Standard Specifications.

Stenciled information for highway post markers shown on the plans or directed by the Engineer shall be painted or at the Contractor's option, the information may be applied with black cutout letters and numerals.

The black cutout letters and numerals shall be die-cut from material conforming to the Department of Transportation current specifications for retroreflective sheeting for use on aluminum signs, except that the material shall be black and opaque. Copies of the current specifications are available at the Transportation Laboratory, Sacramento, California.

Delete the first paragraph of Section 82-1.06, "Payment," of the Standard Specifications.

Items of work, measured as specified in Section 82-1.05, "Measurement," will be paid for at the contract unit price for highway post markers and object markers of the type designated in the contract item, or at the single contract unit price paid for object markers or markers; and the contract unit price paid for delineators of the class designated in the contract item.

Delineators on flexible posts shall be as specified in "Approved Traffic Products," of these special provisions. Flexible posts shall be made from a flexible white plastic which shall be resistant to impact, ultraviolet light, ozone, and hydrocarbons. Flexible posts shall resist stiffening with age and shall be free of burns, discoloration, contamination, and other objectionable marks or defects which affect appearance or serviceability.

Retroreflective sheeting for metal and flexible target plates shall be the retroreflective sheeting designated for channelizers, markers, and delineators conforming to the requirements in ASTM Designation: D 4956-95 and in conformance with the provisions in "Approved Traffic Products," of these special provisions.

10-1.88 INSTALL MEDIAN MILEAGE PANELS

Median mileage panels shall be installedat the locations as shown on the plans or where directed by the Engineer and in conformance with these special provisions.

Target plates will be furnished by the State as provided under "State furnished Materials" of these special provisions. Installation holes in target plates shall be drilled or punched by the Contractor, after determination of type of installation. Target plates shall have only the necessary holes for the specified installation indicated.

Appropriate letters and numerals shall be affixed to the target plates by the Contractor in conformance to the requirements in Section 83, "Markers and Delineators," in the Standard Specifications and "Delineators," elsewhere in these special provisions.

Concrete anchorage devices for installing median mileage panels shall be cast-in-place or resin capsule type, conforming to the provisions of Section 65-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications and as shown on the plans.

Installing median mileage panels will be measured as units determined from actual count of median mileage panels in place.

The contract unit price paid for install median mileage panels shall include full compensation for furnishing all labor (including the affixing of the appropriate letters and numerals to the target plates and providing traffic control necessary to allow accurate and safe determination of median mileage panel locations), materials (except except State furnished target plates), hardware tools, equipment, and incidentals, and for doing all the work involved in installing median mileage panels (including fastening hardware), as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.89 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 first, seventh, eighth, ninth, eleventh, twelfth, eighteenth and twenty-fourth paragraphs in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications.

The rail elements, backup plates, terminal, end and return sections, bolts, nuts and other fittings shall conform to the requirements in AASHTO Designation: M 180, except as modified in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications, as specified in Section 83-1.02, "Materials and Construction," of the Standard Specifications and these special provisions. The rail elements, backup plates, terminal, end and return sections shall conform to Class A, Type 1 W-Beam guard railing as shown in ASSHTO Designation: M 180. The edges and center of the rail element shall contact each post block. Rail elements shall be lapped not less than 12 $^1/_2$ inches and bolted. The rail metal, in addition to conforming to the requirements in AASHTO Designation: M 180, shall withstand a cold bend, without cracking, of 180 degrees around a mandrel of a diameter equal to 2.5 times the thickness of the plate.

At the option of the Contractor, metal beam guard railing shall be constructed using either steel posts or wood posts, both with wood blocks, for line posts. Only one type of line post shall be used for any one continuous length of guard railing.

Steel posts shall be fabricated from steel conforming to the requirements in ASTM Designation: A 36A 36M, unless otherwise specified. Two certified copies of mill test reports of each heat of steel from which steel posts are formed or fabricated shall be furnished to the Engineer.

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 0.40-pound per cubic foot and need not be incised.

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

Before the bolts are inserted, bolt holes shall be filled with a grease, recommended by the manufacturer for corrosion protection, which will not melt or run at a temperature of 150° F.

At the Contractor's option, steel foundation tubes with soil plates attached, shall be either driven, with or without pilot holes, or placed in drilled holes. Any space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer shall be moistened and thoroughly compacted. Wood 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 grease which will not melt or run at a temperature of 150°F or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

Posts shall be placed at equal intervals as shown on the plans, except that the end posts my be spaced closer to adjacent posts if directed by the Engineer.

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

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

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

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

The anchor rods shall be fabricated of steel conforming to the requirements in ASTM Designation: A 36A 36M, A 441or A 572, or ASTM Designation: A 576, Grades 1018, 1019, 1021, or 1026. The eyes shall not be hot forged or formed with full penetration welds. After fabrication, anchor rods with eyes that have been formed with any part of the eye below 1,600° F during the forming operation or with eyes that have been closed by welding shall be thermally stress relieved prior to galvanizing. The completed anchor rod, after galvanizing, shall develop a strength of 50,000 pounds.

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

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

Anchor cable shall be $^{3}/_{4}$-inch preformed 6 x 19, wire strand core or independent wire rope core (IWRC), galvanized in conformance with the requirements in Federal Specification RR-W-401D, right regular lay, manufactured of improved plow steel with a minimum breaking strength of 23 tons. Two certified copies of mill test reports of each manufactured length of cable used shall be furnished to the Engineer. The overall length of each cable anchor assembly shall be as shown on the plans, but shall be a minimum of 6 feet 6 inches.

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

The swaged fitting shall be machined from hot-rolled bars of steel conforming to AISI Designation: C 1035, and shall be annealed suitable for cold swaging. The swaged fitting shall be galvanized before swaging. A lock pin hole to accommodate a $^{1}/_{4}$-inch, plated spring steel pin shall be drilled through the head of the swage fitting to retain the stud in proper position. The manufacturer's identifying mark shall be stamped on the body of the swage fitting.

The one inch diameter stud shall conform to the requirements ASTM Designation: A 449 after galvanizing. Prior to galvanizing, a $^{3}/_{8}$-inch slot for the locking pin shall be milled in the stud end.

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

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

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

One sample of cable properly fitted with swaged fitting and right hand thread stud at both ends as specified above, including a clevis when shown on the plans, 3 feet in total length, shall be furnished to the Engineer for testing.

The portion of the anchor rod to be buried in earth shall be coated with a minimum 20-mil thickness of coal tar enamel conforming to AWWA Standard: C203 or a coal tar epoxy conforming to the requirements in Steel Structures Painting Council Paint Specification No. 16, Coal-Tar Epoxy-Polymide Black Paint or Corps of Engineers Specification, Formula C-200a, Coal-Tar Epoxy Paint.

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

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

Concrete used to construct anchors for terminal anchor assemblies shall be Class B or minor concrete conforming to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications.

Concrete shall be placed against undisturbed material of the excavated holes for terminal anchors. The top 12 inches of holes shall be formed, if required by the Engineer.

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

Delete the second and fifth through seventh paragraphs of Section 83-1.03, "Measurement," of the Standard Specifications.

Except for metal beam guard railing within the pay limits of a terminal system end treatment, metal beam guard railing will be measured by the linear foot along the face of the rail element from end post to end post of the completed railing at each installation. The point of measurement at each end post will be the center of the bolt attaching the rail element to the end post.

When metal beam guard railing is connected to structures, barriers, walls or abutments, the structure, barrier, wall or abutment will be considered the end post and the point used for measuring the rail length shall be the midpoint between the 2 bolts attaching the rail element to the structure, barrier, wall or abutment.

The measurement shall be made along the face of the rail elements without allowance for overlap at rail splices.

The quantity of the various types of terminal systems end treatments for metal beam guard railing will be measured as units determined from actual count in place in the completed work.

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

Delete the second and fifth paragraphs of Section 83-1.04, "Payment," of the Standard Specifications.

The contract unit price paid for the various types of terminal system end treatments for metal beam guard railing shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work involved in furnishing and installing terminal system end treatments, complete in place, including excavation, backfill and disposal of surplus material and connecting the terminal system to new or existing metal beam guard railing, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

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

Full compensation for connecting metal beam guard railing to bridge sidewalks and curbs, bridge railing, barriers, retaining walls, abutments and other flat concrete surfaces, and constructing guard rail layout flares (including special size and spacing of posts) shall be considered as included in the prices paid for the various items of metal beam guard railing work and no additional compensation will be allowed therefor.

TERMINAL SYSTEM (TYPE SRT).—Terminal system (Type SRT) shall be furnished and installed as shown on the plans and as specified in these special provisions.

Terminal system (Type SRT) shall be a SRT-350 Slotted Rail Terminal as manufactured by Syro, Inc., a Trinity Industries Company, and shall include all the items detailed for terminal system (Type SRT) shown on the plans.

Arrangements have been made to insure that any successful bidder can obtain the SRT-350 Slotted Rail Terminal from the manufacturer, Syro, Inc., a Trinity Industries Company, P.O. Box 99, 950 West 400S, Centerville, UT 84014, Telephone (800) 772-7976. The price quoted by the manufacturer for the SRT-350 Slotted Rail Terminal, FOB Centerville, Utah is $865.00, not including sales tax.

The above price will be firm for orders placed on or before December 31, 2000, 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. At the Contractor's option, steel foundation tubes with soil plates attached, shall be either driven, with or without pilot holes, or placed in drilled holes or placed in drilled holes. Space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer shall be moistened and thoroughly compacted. Wood 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 150° F. or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

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 as directed by the Engineer.

10-1.90 CHAIN LINK RAILING

Chain link railing shall conform to the provisions in Section 83-l, "Railings," of the Standard Specifications and these special provisions.

The chain link fabric shall be 9-gage, Type IV, Class B, bonded vinyl coated fabric, conforming to the requirements in AASHTO Designation: M 181.

The strength of the bond between the coating material and steel of the bonded vinyl coated chain link fabric shall be equal to or greater than the cohesive strength of the polyvinyl chloride (PVC) coating material.

10-1.91 METAL BRIDGE RAILING

Pipe handrailing shall conform to the provisions in Section 83-1, "Railings," of the Standard Specifications.

10-1.92 CABLE RAILING

Cable railing shall conform to the provisions in Section 83-1, "Railings," of the Standard Specifications.

10-1.93 CONCRETE BARRIER

Concrete barriers shall conform to the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

The first sentence of Section 83-2.02D, "Concrete Barrier," of the Standard Specifications is revised as follows:

This work shall consist of constructing concrete barriers at the locations and in conformance with the details shown on the plans and in conformance with the provisions in Section 51, "Concrete Structures," and Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

The second and eighth paragraphs of Section 83-2.02D(1), "General," of the Standard Specifications are revised as follows, respectively:

Concrete barriers shall present a smooth, uniform appearance in their final position, conforming to the horizontal and vertical lines shown on the plans or ordered by the Engineer, and shall be free of lumps, sags or other irregularities. The top and exposed faces of the barrier shall conform tot he following requirements when tested with a 12-foot straightedge laid on the surfaces:

a. For concrete barriers Type 50 and 60 series, the top shall not vary more than 0.02-foot from the edge of the straightedge and the faces shall not vary more than 0.04-foot from the edge of the straightedge.

b. For concrete barriers other than Type 50 and 60 series, both the top and faces shall not vary more than 0.02-foot from the edge of the straightedge.

Granular material for backfill between the 2 walls of concrete barrier (Types 50E, 60E, 60GE and 60SE), as shown on the plans, shall be placed without compaction.

The first, second and third paragraphs of Section 83-2.02D(2), "Materials," of the Standard Specifications are revised as follows, respectively:

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

a. The maximum size of aggregate used for extruded or slip-formed concrete barriers shall be at the option of the Contractor, but in no case shall the maximum size be larger than $1^1/_2$-inches nor smaller than $^3/_8$-inches.

b. If the $^3/_8$-inch maximum size aggregate grading is used to construct extruded or slip-formed concrete barriers, the cement content of the minor concrete shall be not less than 658 pounds per cubic yard.

Concrete barriers other than Type 50 and 60 series shall be constructed of Class 2 concrete conforming to the provisions in Section 90, "Portland Cement Concrete."

The concrete paving between the tops of the 2 walls of concrete barrier (Types 50E, 60E, 60GE, and 60SE) and the optional concrete slab at the base between the 2 walls of concrete barrier (Types 50E, 60E, 60GE, and 60SE) shall be constructed of minor concrete conforming to the provisions of Section 90-10, except that the minor concrete shall contain not less than 470 pounds of concrete per cubic yard.

The seventh paragraph of Section 83-2.02D(2), "Materials," of the Standard Specifications is revised as follows:

The sheet metal, neoprene strip and grease required at connections to structures shall conform to the following:

Sheet metal shall be commercial quality galvanized sheet steel, smooth and free of kinks, bends or burrs. Joints in the sheet metal shall be butt joints sealed with plastic duct sealing tape.

Neoprene strip shall conform to the provisions in Section 51-1.14, "Waterstops," of the Standard Specifications.

Grease shall conform to the requirements in Military Specification MIL-S-8660.

The eighth paragraph of Section 83-2.02D(2), "Materials," of the Standard Specifications is revised as follows:

Granular material for backfill between the 2 walls of concrete barrier (Types 50E, 60E, 60GE, and 60SE) shall be earthy material suitable for the purpose intended, having no rocks, lumps or clods exceeding $1^1/_2$-inches in greatest dimension.

The first and second paragraphs of Section 83-2.02D(3), "Construction Methods," of the Standard Specifications are revised as follows:

Type 50 and Type 60 series concrete barriers shall be constructed by either the "cast-in-place with fixed forms" method or the "extrusion or slip form" method or a combination thereof, at the Contractor's option.

Concrete barriers other than Type 50 or 60 series shall be constructed by the "cast-in-place with fixed forms" method.

Section 83-2.02D(4), "Finishing," of the Standard Specifications is revised as follows:

83-2.02D(4) Finishing.--The surface finish of concrete barriers Type 50 and Type 60 series, prior to the application of the curing compound, shall be free from surface pits larger than one-inch in diameter and shall be given a final soft brush finish with strokes parallel to the line of the barriers. Finishing with a brush application of grout will not be permitted.

To facilitate finishing, fixed forms for cast-in-place concrete barriers Type 50 and Type 60 series, shall be removed as soon as possible after the concrete has set enough to maintain the shape of the barrier without support.

Not less than 7 days after placing, exposed surfaces of concrete barriers, Type 50 and Type 60 series, shall receive a light abrasive blast finish so that a uniform appearance is achieved.

The final surface finish of concrete barriers other than Type 50 and Type 60 series shall be Class 1 Surface Finish conforming to the provisions in Section 51-1.18B, "Class 1 Surface Finish," of the Standard Specifications. Alternative final surface finish methods proposed by the Contractor shall be submitted in writing and shall not be used unless approved by the Engineer.

Section 83-2.02D(5), "Curing," of the Standard Specifications is revised as follows:

83-2.02D(5) Curing.--Exposed surfaces of concrete barriers shall be cured with the non-pigmented curing compound (6) conforming to the provisions in Section 90-7.01B, "Curing Compound Method." At the Contractor's option, the formed surfaces of concrete barriers, which are on bridges or walls but which do not support soundwalls, may be cured as provided in Section 90-7.01D, "Forms-In-Place Method," except the forms shall be retained in place for a minimum period of 12 hours after the concrete has been placed. When curing Type 50 and Type 60 series concrete barrier, curing compound shall be applied by a mechanical sprayer capable of applying the curing compound to at least one entire side and the top of the concrete barrier in one application at a uniform rate of coverage. The spray shall be adequately protected against wind.

Concrete barriers shall be constructed on a layer of aggregate base as shown on the plans. Said base shall conform to the provisions of "Aggregate Base" of these special provisions. When concrete barriers are to be constructed on aggregate base, the height of the barriers shall be adjusted to compensate for irregularities in the surface of the finished aggregate base. The amount of adjustment will be determined by the Engineer and will be ordered before the concrete is placed.

Delete the sixth, seventh, ninth, and tenth paragraphs of Section 83-2.03, "Measurement," of the Standard Specifications.

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

Concrete barriers will be measured by the linear foot.

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

Concrete barriers, except Type 50E, Type 60E, Type 60GE, and Type 60SE will be measured along the top of the barrier.

Concrete barriers Type 50E, Type 60E, Type 60GE, and Type 60SE will be measured along the centerline between the 2 walls of the barrier.

Delete the third paragraph of Section 83-2.04, "Payment," of the Standard Specifications.

The fourth paragraph of Section 83-2.04, "Payment," of the Standard Specifications is revised as follows:

The contract prices paid per linear foot for concrete barrier of the type or 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 constructing the concrete barriers, complete in place, including bar reinforcing steel, steel dowels and drilling and bonding dowels in structures, hardware for steel plate barrier, miscellaneous metal, excavation, backfill (including concrete paving form, and granular material or concrete slab used as backfill in Type 50E, Type 60E, Type 60GE, and Type 60SE concrete barrier), and disposing of surplus material and for furnishing, placing, removing and disposing of the temporary railing for closing the gap between existing barrier, the concrete barrier being constructed, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Concrete barrier (type 60 mod) will be measured and paid for as concrete barrier (type 60).

If reinforcement is encountered during drilling, before specified depth is attained, the Engineer shall be notified. Unless the Engineer approves coring through the reinforcement, the hole will be rejected and a new hole, in which reinforcement is not encountered, shall be drilled adjacent to the rejected hole to the depth shown on the plans.

10-1.94 THERMOPLASTIC TRAFFIC STRIPES AND PAVEMENT MARKINGS

Thermoplastic traffic stripes (traffic lines) and pavement markings shall be applied in conformance with the provisions in Sections 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

Where striping joins existing striping, as shown on the plans, the Contractor shall begin and end the transition from the existing striping pattern into or from the new striping pattern a sufficient distance to ensure continuity of the striping pattern.

Delete Section 84-2.02, "Materials," of the Standard Specifications.

The thermoplastic material shall conform to the requirements of State Specification No. 8010-01A or 8010-19A. Glass beads to be applied to the surface of the molten thermoplastic material shall conform to the requirements of State Specification 8010-004 (Type II).

State Specifications for thermoplastic material and glass beads may be obtained from the Transportation Laboratory.

At the option of the Contractor, permanent striping tape as specified in "Approved Traffic Products" of these special provisions, may be placed instead of the thermoplastic traffic stripes and pavement markings specified herein, except that 3M, "Stamark" Series A320 Bisymetric Grade, manufactured by the 3M Company, shall not be used. Pavement tape, if used, shall be installed in conformance with the manufacturer's specifications. If pavement tape is placed instead of thermoplastic traffic stripes and pavement markings, the pavement tape will be measured and paid for by the linear foot as thermoplastic traffic stripe and by the square foot as thermoplastic pavement marking.

10-1.95 PAINT TRAFFIC STRIPES AND PAVEMENT MARKINGS

Painting traffic stripes (traffic lines) and pavement markings shall be applied in conformance with the provisions in Sections 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

Delete the first five paragraphs of Section 84-3.02, "Materials," of the Standard Specifications.

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

Paint Type	Color	State Specification No.
Solvent-Borne Traffic Line	White, Yellow and Black	PT-170A
Waterborne Traffic Line	White, Yellow and Black	8010-20B
Acetone-Based	White, Yellow and Black	PT-150VOC
Waterborne Traffic Line	Blue (Federal Standard 595b, Color No. 35180)	Federal Specification No. TT-P-1952D

Glass beads shall conform to State Specification No. 8010-004 (Type II).

Copies of the State Specifications for traffic paint and glass beads may be obtained from the Transportation Laboratory.

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

Delete the tenth paragraph of Section 84-3.05, "Application," of the Standard Specifications.

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

Paint Type	Square Foot Coverage Per Gallon	
	First Coat	Second Coat
Solvent Borne Paint	408	204
Water Borne Paint	245	245
Acetone-Based Paint	408	204

At the option of the Contractor, permanent striping tapeconforming to the provisions in "Approved Traffic Products" of these special provisions, may be placed instead of the painted traffic stripes and pavement markings specified herein, except that "Stamark" Series A320 Bisymetric Grade pavement tape, manufactured by the 3M Company, shall not be used. Pavement tape, if used, shall be installed in conformance with the manufacturer's specifications. If pavement tape is placed instead of painted traffic stripes and pavement markings, the pavement tape will be measured and paid for by the linear foot as paint traffic stripe and by the square foot as paint pavement marking of the number of coats designated in the Engineer's Estimate.

10-1.96 PAVEMENT MARKERS

Pavement markers shall be placed in conformance to the provisions in Section 85, "Pavement Markers," of the Standard Specifications and these special provisions.

Delete Section 85-1.02, "Type of Markers," of the Standard Specifications.

Pavement markers shall conform to one or more of the following types:

Type A—Non-Reflective White Markers
Type AY—Non-Reflective Yellow Markers
Type C—Red-Clear Retroreflective Markers
Type D—2-Way Yellow Retroreflective Markers
Type G—One-Way Clear Retroreflective Markers
Type H—One-Way Yellow Retroreflective Markers

Certificates of compliance shall be furnished for pavement markers as specified in "Approved Traffic Products" elsewhere in these special provisions.

In Section 85-1.03, "Sampling, Tolerances and Packing", of the Standard Specifications the second requirement under "B. Tolerances" is revised as follows:

2. The entire sample of retroreflective pavement markers shall be tested for reflectance. The failure of 10 percent or more of the original sampling shall be cause for rejection.

Delete Section 85-1.04B, "Non-Reflective Pavement Markers (Plastic)," of the Standard Specifications.

Plastic non-reflective pavement markers Types A and AY shall be, at the option of the Contractor, either polypropylene or acrylonitrile-butadiene-styrene (ABS) plastic type.

Polypropylene non-reflective pavement markers shall consist of polyester resin binder, inert organic filler material and colorant pigments and shall conform to the provisions of the third paragraph in Section 85-1.04A, "Non-Reflective Pavement Markers (Ceramic)," except the requirements for adhesive bond strength in Test a shall be 475 pounds per square inch, minimum, and Tests b, c, g and i shall not apply.

ABS non-reflective pavement markers shall consist of ABS plastic conforming to the requirements in ASTM Designation: D 4673, Designation ABS 1-2-2, and shall conform to the provisions of the third paragraph in Section 85-1.04A, except Tests a, b, c, g and i shall not apply. The bottom of ABS plastic pavement markers shall have areas of integrally formed protrusions projecting from the surface to increase the effective bonding surface area and produce a structural bond with the pavement.

Delete Section 85-1.05B, "Reflective Pavement Markers," of the Standard Specifications.

RETROREFLECTIVE PAVEMENT MARKERS

The exterior surface of the shell shall be smooth and contain one or 2 retroreflective faces of the color specified.

The infrared curves of the plastic resins shall match approved curves on file in the Transportation Laboratory.

The base of the marker shall be flat (the deviation from a flat surface shall not exceed 1.5 mm), rough textured and free from gloss or substances which may reduce its bond to the adhesive. Retroreflective pavement markers shall conform to the following color and testing requirements:

Color

The color of the reflectors, when illuminated by the white light from a sealed-beam automobile headlight as defined by the Society of Automotive Engineers (SAE) Standard J 578, shall be an approved, clear, yellow or red color as designated. Off-color reflection shall constitute grounds for rejection. The daylight color of the marker body shall be compatible with the color of the primary lens, and shall be subject to approval by the Engineer.

Testing

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

Test		Requirement		
1	Adhesive bond strength to bottom surface of the marker using adhesive specified in Sections 95-2.05, "Standard Set Epoxy Adhesive for Pavement Markers," and 95-2.04, "Rapid Set Epoxy Adhesive for Pavement Markers"	500 pounds per square inch minimum		
2	Reflectance	Specific Intensity		
		Clear	Yellow	Red
	0° Incidence Angle, min.	3.0	1.5	0.75
	20° Incidence Angle, min.	1.2	0.60	0.30
	After one year field evaluation	0.30	0.15	0.08
3	Strength	2,000 lbs. min.		
4	Water Soak Resistance	No delamination of the body or lens system of the marker nor loss of reflectance.		

a. Failure of the marker body for filler material prior to reaching 500 pounds per square inch in the bond strength test 1 above shall constitute a failing bond strength test.

b. Deformation of the marker of more than $^1/_8$-inch at a load of less than 2,000 pounds or delamination of the shell and the filler material of more than $^1/_8$-inch regardless of the load required to break the marker shall be cause for rejection of the markers as specified in Section 85-1.03, "Sampling, Tolerances and Packaging."

Delete the first and second paragraphs in Section 85-1.06, "Placement," of the Standard Specifications.

Except as otherwise noted in this Section 85-1.06, pavement markers shall be cemented to the pavement with hot melt bituminous adhesive or Rapid Set Type epoxy adhesive in conformance with the manufacturer's instructions.

In areas of new construction where the markers are protected from all traffic, including the Contractor's vehicles, Standard Set Type adhesive conforming to the provisions in Section 95-2.05 may be used. The protection from traffic shall be for at least 3 hours after marker placement when the pavement surface temperature is 55°F or above, at least 24 hours when the temperature is between 41°F and 55°F, and at least 48 hours when the temperature is 41°F or below.

Delete Section 85-1.08, "Measurement," of the Standard Specifications.

The quantity of retroreflective and non-reflective pavement markers will be measured as units determined from actual count in place.

Delete Section 85-1.09 "Payment," of the Standard Specifications.

The contract price paid for pavement marker (retroreflective) and pavement marker (non-reflective) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and placing pavement markers, complete in place, including adhesives, and establishing alignment for pavement markers, 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 "Traffic Control System For Lane Closure" elsewhere in these special provisions regarding the use of moving lane closures during placement of pavement markers with bituminous adhesive.

Reflective pavement markers shall comply with the specific intensity requirements for reflectance after abrading the lens surface in accordance with the "Steel Wool Abrasion Procedure" specified for pavement markers placed in pavement recesses in Section 85-1.05, "RetroReflective Pavement Markers," of the Standard Specifications.

SECTION 10-2. HIGHWAY PLANTING AND IRRIGATION SYSTEMS

10-2.01 GENERAL

The work performed in connection with highway planting and irrigation systems shall conform to the provisions in Section 20, "Erosion Control and Highway Planting," of the Standard Specifications and these special provisions.

When fluctuations of water pressure and water supply are encountered during normal working hours, plants shall be watered at other times, as often, and in sufficient amounts as conditions may require to keep the soil and plant roots moist during the life of the contract.

Full compensation for watering plants outside normal working hours shall be considered as included in the contract unit prices paid for the plants involved and the contract lump sum price paid for plant establishment work and no additional compensation will be allowed therefor.

PROGRESS INSPECTIONS.--Progress inspections will be performed by the Engineer for completed highway planting and irrigation system work at designated stages during the life of the contract.

Progress inspections will not relieve the Contractor of his responsibility for installation in conformance with the special provisions, plans and Standard Specifications. Work within an area shall not progress beyond each stage until the inspection has been completed; corrective work has been performed; and the work is approved, unless otherwise permitted by the Engineer.

The requirements for progress inspections will not preclude additional inspections of work by the Engineer at other times during the life of the contract.

The Contractor shall notify the Engineer in writing, at least 4 working days prior to completion of the work for each stage of an area and shall allow a minimum of 3 working days for the inspection.

Progress inspections will be performed at the following stages of work:

During pressure testing of the pipelines on supply side of control valves.

During testing of low voltage conductors.

Before planting begins and after completion of the work specified for planting in Section 20-4.03, "Preparing Planting Areas," of the Standard Specifications.

Before plant establishment work begins and after completion of the work specified for planting in Section 20-4.05, "Planting," of the Standard Specifications.

At intervals of one month during the plant establishment period.

10-2.01A COST BREAK-DOWN

The Contractor shall furnish to the Engineer a cost break-down for the contract lump sum items of highway planting and irrigation system.

Cost break-downs shall be completed and furnished in the format shown in the samples of the cost break-downs included in this section. Unit descriptions of work shown in the samples are the minimum to be submitted. Additional unit descriptions of work may be designated by the Contractor. If the Contractor elects to designate additional unit descriptions of work, the quantity, value and amount for those units shall be completed in the same manner as for the unit descriptions shown in the samples. The units and quantities given in the samples are to show the manner of preparing the cost break-downs to be furnished by the Contractor.

The Contractor shall determine the quantities required to complete the work shown on the plans. The quantities and their values shall be included in the cost break-downs submitted to the Engineer for approval. The Contractor shall be responsible for the accuracy of the quantities and values used in the cost break-downs submitted for approval.

No adjustment in compensation will be made in the contract lump sum prices paid for highway planting and irrigation system due to differences between the quantities shown in the cost break-downs furnished by the Contractor and the quantities required to complete the work as shown on the plans and as specified in these special provisions.

The sum of the amounts for the units of work listed in each cost break-down for highway planting and irrigation system work shall be equal to the contract lump sum price bid for the work. Overhead and profit shall be included in each individual unit listed in each cost break-down. Cost break-downs shall be submitted to the Engineer for approval within 30 working days after the contract has been approved. Cost break-downs shall be approved, in writing, by the Engineer before a partial payment for the items of highway planting and irrigation system will be made.

Approved cost break-downs will be used to determine partial payments during the progress of the work and as the basis of calculating the adjustment in compensation for the items of highway planting and irrigation system due to changes ordered by the Engineer. When an ordered change increases or decreases the quantities of an approved cost break-down, the adjustment in compensation will be determined in the same manner specified for increases and decreases in the quantity of a contract item of work in conformance with the provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications.

HIGHWAY PLANTING COST BREAK-DOWN

Contract No. 07-1224U4

UNIT DESCRIPTION	UNIT	APPROXIMATE QUANTITY	VALUE	AMOUNT
ROADSIDE CLEARING	LS	LUMP SUM		
REMOVE EXISTING TREES	EA	44		
MULCH	CY	5857		
COMMERCIAL FERTILIZER	LBS	1287		
PLANT (GROUP A)	EA	5156		
PLANT (GROUP H)	EA	51510		
PLANT (GROUP U)	EA	223		
MAINTAIN EXISTING PLANTS	LS	LUMP SUM		
PLANT ESTABLISHMENT	LS	LUMP SUM		

TOTAL _____

IRRIGATION SYSTEM COST BREAK-DOWN

Contract No. . 07-1224U4

UNIT DESCRIPTION	UNIT	APPROXIMATE QUANTITY	VALUE	AMOUNT
CHECK, TEST AND REMOVE EXISTING IRRIGATION FACILITIES	LS	LUMP SUM		
LOCATE EXISTING CROSSOVERS	LS	LUMP SUM		
CONTROL AND NEUTRAL CONDUCTORS	LS	LUMP SUM		
1" ELECTRIC REMOTE CONTROL VALVE	EA	34		
1 1/4" ELECTRIC REMOTE CONTROL VALVE	EA	65		
1 1/2" ELECTRIC REMOTE CONTROL VALVE	EA	29		
2" ELECTRIC REMOTE CONTROL VALVE	EA	16		
2 1/2" ELECTRIC REMOTE CONTROL VALVE (MASTER)	EA	10		
8 STATION IRRIGATION CONTROLLER (WALL MOUNTED)	EA	4		
12 STATION IRRIGATION CONTROLLER (WALL-MOUNTED)	EA	4		
18 STATION IRRIGATION CONTROLLER (WALL-MOUNTED)	EA	3		
24 STATION IRRIGATION CONTROLLER (WALL-MOUNTED)	EA	2		
2" GALVANIZED STEEL PIPE CONDUIT ON BRIDGE	LF	2930		
3" GALVANIZED STEEL PIPE (SUPPLY LINE ON BRIDGE)	LF	2930		
3/4" PLASTIC PIPE (PR200) (SUPPLY LINE)	LF	14090		
1" PLASTIC PIPE (PR200) (SUPPLY LINE)	LF	9695		
1 1/4" PLASTIC PIPE (PR200) (SUPPLY LINE)	LF	7700		
1 1/2" PLASTIC PIPE (PR200) (SUPPLY LINE)	LF	10315		
2" PLASTIC PIPE (PR200) (SUPPLY LINE)	LF	4700		
2 1/2" PLASTIC PIPE (PR200) (SUPPLY LINE)	LF	22127		

IRRIGATION SYSTEM COST BREAK-DOWN (con't)

Contract No. . 07-1224U4

UNIT DESCRIPTION	UNIT	APPROXIMATE QUANTITY	VALUE	AMOUNT
2 1/2" PLASTIC PIPE (CL315) (SUPPLY LINE)	LF	2260		
SPRINKLER (TYPE A-1)	EA	290		
SPRINKLER (TYPE B-1)	EA	6		
SPRINKLER (TYPE E-5)	EA	2849		
1" FILTER ASSEMBLY UNIT	EA	7		
1 1/2" FILTER ASSEMBLY UNIT	EA	17		
2 1/2" BALL VALVE	EA	32		
2 1/2" GATE VALVE	EA	41		
1" QUICK COUPLING VALVE	EA	28		

TOTAL _____

10-2.02 EXISTING HIGHWAY PLANTING

In addition to the provisions in Section 20 of the Standard Specifications, work performed in connection with existing highway planting shall be in conformance with the provisions in Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

Replacement planting shall conform to the requirements specified under "Preservation of Property" elsewhere in these special provisions.

10-2.02A MAINTAIN EXISTING PLANTS

Existing plants shall be maintained throughout the life of the contract in conformance with these special provisions.

Existing plants shall be watered in conformance with the provisions in Section 20-4.06, “Watering,” of the Standard Specifications.

Existing plants and plant basins to be maintained shall be inspected for deficiencies by the Contractor in the presence of the Engineer. Deficiencies requiring corrective action shall include, but are not necessarily limited to, dead, diseased, or unhealthy plants, missing plant stakes and tree ties, and inadequate plant basins. The inspection shall be completed within 10 working days after the start of work.

After initial deficiencies have been corrected as directed by the Engineer, the Contractor shall continue to maintain existing plants as often as necessary to maintain the area in a neat appearance. The work shall include but not limited to the following:

Weed growth shall be killed before the weeds reach the seed stage of growth or exceed 6 inches in length.

Trash, debris and weeds shall be removed from existing planting areas. Weeds shall be killed prior to removal. Trash, debris and weed removal in ground cover areas shall extend beyond the outer limits of ground cover areas to

the adjacent edges of paving, fences and proposed plants and planting areas, and 6-foot diameter area centered at each existing tree and shrub outside of existing ground cover areas.

Existing plant basins shall be kept well formed and free of silt. If existing plant basins require repairs, and the plant basins contain mulch, the mulch shall be replaced after the plant basins have been repaired.

When a portion of a new automatic irrigation system is completed, the existing plants to be watered by that portion of the irrigation system shall be watered automatically.

Pesticides for maintaining existing plants shall conform to the provisions in “Pesticides” of these special provisions.

If after completion of the initial inspection and correction of deficiencies, the Engineer determines that existing plants show signs of failure to grow, or are so injured or damaged as to render the plants unsuitable for the purpose intended, the existing plants shall be replaced. Removal, disposal and replacement of the existing plants, shall be in conformance with the provisions in "Preservation of Property" of these special provisions.

10-2.02B REMOVE EXISTING PLANTS FOR TRENCHING

Remove existing plants for trenching shall conform to the provisions in Section 20-5.026, "Remove Existing Plants for Trenching," of the Standard Specifications and these special provisions.

Remove existing plants for trenching work shall consist of removing and replacing ground cover, pruning trees and shrubs within trench locations, applying preemergents and disposing of removed ground cover and prunings.

Replacement of removed ground cover within the maximum 5-foot width, as specified in Section 20-5.026 of the Standard Specifications, will be required, except for trenches within 5 feet of fences, curbs, dikes or shoulders.

Trees and shrubs adjacent to dikes, walks, fences, guard railing, and pavement edges may be pruned back 10 feet from these facilities to facilitate trenching work. When trenching is to be performed adjacent to other trees and shrubs that cannot be avoided, the trees and shrubs may be pruned upon receipt of prior written approval of the Engineer.

Pruning shall include removal of deadwood, suckers and broken or bruised branches one inch or larger in diameter. Pruning shall conform to the provisions in Section 20-4.055, "Pruning," of the Standard Specifications.

Removed ground cover and pruned materials shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-l.13, “Disposal of Material Outside the Highway Right of Way,” of the Standard Specifications. At the Contractor's option, removed ground cover and prunings may be reduced to chips. Chipped materials shall be spread within the highway right of way where designated by the Engineer.

Shrubs adjacent to dikes, fences, guard railing, and edge of pavement within the 10-foot pruned area designated above, that in the opinion of the Engineer should be removed after pruning, shall be removed and disposed of. Removing and disposing of the shrubs not otherwise provided for will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

One application of a preemergent pesticide shall be applied to trenched areas in existing ground cover areas and to trenched areas adjacent to fences, curbs, dikes and shoulders. The Engineer will determine when the preemergent pesticide shall be applied.

Where trenching for new irrigation facilities is performed in existing ground cover, sufficient ground cover shall be removed to permit the proper installation of the facilities, but in no case shall the removal width exceed 6 feet.

Ground cover removed within the maximum 6 foot wide removal area shall be replaced with new plants of the same variety as the existing ground cover. Carpobrotus replacement plants shall be cuttings conforming to the provisions in Section 20-2.13, "Plants," of the Standard Specifications and shall be planted 12 inches on center. Other ground cover replacement plants shall be from flats and shall be planted 12 inches on center.

10-2.02C PRUNE EXISTING PLANTS

Pruning of plants shall be consistent with American National Standards Institute (ANSI) A300-1995. "Tree, Shrub and Other Woody Plant Maintenance-Standard Practices," and "Tree-Pruning Guidelines," published by the International Society of Arboriculture (ISBN 1-881956-07-5).

Existing plants, as determined by the Engineer, shall be pruned. Pruning of the existing plants, except as otherwise provided in these special provisions, will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

10-2.03 EXISTING HIGHWAY IRRIGATION FACILITIES

In addition to the provisions in Section 20, "Erosion Control and Highway Planting," of the Standard Specifications, the work performed in connection with the various existing highway irrigation system facilities shall conform to the provisions in Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

Existing irrigation facilities not shown on the plans that are below the ground plane will be marked by the Engineer. Irrigation facilities that were marked by the Engineer and are damaged by the Contractor's operations shall be repaired or

replaced by the Contractor. The replacement of the existing facilities not marked by the Engineer and the work to repair the existing facilities will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

Water shall be maintained in conformance with the provisions in Section 20-5.025, "Maintain Existing Water Supply," of the Standard Specifications.

10-2.03A CHECK AND TEST EXISTING IRRIGATION FACILITIES

Existing irrigation facilities that are to remain or be relocated, and that are within those areas where clearing and grubbing or earthwork operations are to be performed, shall be checked for missing or damaged components and proper operation prior to performing clearing and grubbing or earthwork operations. Existing irrigation facilities outside of work areas that are affected by the construction work shall also be checked for proper operation.

A written list of existing irrigation system deficiencies shall be submitted to the Engineer within 5 working days after checking the existing facilities.

Deficiencies found during checking existing facilities shall be corrected as directed by the Engineer. Corrective work ordered by the Engineer will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

Backflow preventers shall be checked and tested for proper operation by a certified Backflow Preventer Tester. The tester shall hold a valid certification as a Backflow Preventer Tester from the county in which the device to be tested is located or, if the county does not have a certification program for Backflow Preventer Testers, the tester shall have a certificate from one of the following:

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

Tests for proper operation shall conform to the requirements of the county in which the tests are being performed or, if such procedures are not available, the tests shall conform to the requirements in the latest edition of the Guidance Manual for Cross-Connection Control Program, which is available from the California Department of Health Services, Division of Drinking Water and Environmental Management, 601 N. 7th Street, MS 92, P.O. Box 942732, Sacramento, CA 94234-7320, telephone: (916) 327-4097 or (916) 373-6111.

The Engineer shall be notified at least 5 days prior to testing backflow preventers.

One copy of the test results for each backflow preventer tested shall be furnished to the Engineer.

Backflow preventers, installed by the Contractor, failing required tests shall be repaired at the Contractor's expense.

Existing backflow preventers shall be retested one year after the satisfactory completion of the previous test or 10 days prior to completion of the plant establishment period, whichever occurs first.

Length of watering cycles for use of potable water from water meters for checking or testing existing irrigation facilities shall be as determined by the Engineer.

Repairs to the existing irrigation facilities ordered by the Engineer after checking and testing the facilities, and further repairs required thereafter as ordered by the Engineer, except as otherwise provided for under "Maintain Existing Irrigation Facilities" of these special provisions, will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

10-2.03B MAINTAIN EXISTING IRRIGATION FACILITIES

Existing irrigation facilities, where shown on the plans to remain or specified in these special provisions to be maintained, shall be maintained throughout the life of the contract. Prior to the start of maintaining existing irrigation facilities work, the facilities shall be checked for proper operation, and repaired in conformance with the provisions in "Check and Test Existing Irrigation Facilities" of these special provisions.

After the existing facilities have been checked and repaired, the Contractor shall be responsible for the routine maintenance of existing irrigation systems. The work shall include, but not limited to, checking irrigation systems for proper operation and adjusting, repairing or replacing valves, valve boxes, sprinklers, risers, swing joints, wye strainers, valve assembly units and filter assembly units.

The Contractor will not be responsible for maintaining existing water meters, underground pipe supply lines, control and neutral conductors, and electrical conduits. Except as otherwise specified under "Existing Highway Irrigation Facilities" of these special provisions, repair work to these facilities ordered by the Engineer will be paid for as extra work as provided in Section 4-l.03D of the Standard Specifications.

Existing automatic irrigation systems shall be operated automatically during the life of the contract, except manual operation will be allowed for the work during plant replacement, fertilization, weed germination, and the repair of irrigation facilities.

Irrigation controllers shall be programmed by the Contractor for seasonal water requirements. During winter seasons irrigation systems shall be operated automatically a minimum of 2 minutes every 2 weeks.

Irrigation systems and facilities shall be checked for proper operation at least once every 30 days. When required, as determined by the Engineer, adjusting, repairing or replacing irrigation facilities shall be completed within 5 working days after checking of the irrigation systems. Except as provided in these special provisions, repair and replacement of irrigation facilities shall conform to the provisions in "Existing Highway Irrigation Facilities" of these special provisions.

Existing irrigation facilities shown on the plans or specified in the special provisions to be removed, relocated or salvaged shall remain in place until their use is no longer required as determined by the Engineer.

Existing irrigation facilities that are to remain or are to be maintained, relocated or salvaged as part of contract, shall be protected from damage. If the Contractor's operations damage the existing irrigation facilities, the damaged facilities shall be repaired or replaced, at the Contractor's expense, as follows:

Repair or replacement of damaged facilities shall be completed within 10 working days of the damage.

Replaced irrigation facilities shall be new and of equal or better quality than the damaged facility. Replacement irrigation facilities shall be compatible with the irrigation systems to remain.

After repair or replacement of the facilities is complete, the Contractor shall demonstrate to the Engineer that the repaired or replaced facilities operate properly. When remote control valves are repaired or replaced, the valves shall be tested with the irrigation controller in the automatic mode.

Except as provided elsewhere in these special provisions, full compensation for maintaining existing irrigation facilities, including checking irrigation facilities, shall be considered as included in the contract lump sum price paid for irrigation system and no separate payment will be made therefor.

10-2.03C REMOVE EXISTING IRRIGATION FACILITIES

Existing irrigation facilities to be removed, shall be removed and disposed of. Facilities that are more than 6 inches below finished grade may be abandoned in place. Removed facilities 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.

Immediately after disconnecting an existing irrigation facility to be removed or abandoned from an existing facility to remain, the remaining facility shall be capped or plugged, or shall be connected to a new or existing irrigation facility.

10-2.04 HIGHWAY PLANTING

The work performed in connection with highway planting shall conform to the provisions in Section 20-4, "Highway Planting," of the Standard Specifications and these special provisions.

10-2.04A HIGHWAY PLANTING MATERIALS

PLANTS.--The Contractor shall obtain clearance from the County Agricultural Commissioner, as required by law, before planting plants delivered from a source outside the County in which the plants are to be planted. Evidence that clearance has been obtained shall be filed with the Engineer.

Root condition of plants furnished by the Contractor in containers will be determined by removal of earth from roots of not less than 2 plants nor more than 2 percent of the total number of plants of each species or variety, except when container-grown plants are from several sources, the roots of not less than 2 plants of each species or variety from each source will be inspected by the Engineer. In case the sample plants are found to be defective, including but not limited to, root bound or underdeveloped root ball, the State reserves the right to reject the entire lot or lots of plants represented by the defective samples. Plants rendered unsuitable for planting because of this inspection will be considered as samples and will not be paid for.

Carpobrotus and Delosperma cuttings, to the extent available, may be taken from existing plantings within the State highway right of way under permit if the Contractor elects. The State makes no guarantee that there will be sufficient cuttings available from existing plantings on State highway right of way to complete the work. Information concerning areas from which the Contractor will be permitted to remove cuttings may be obtained at the office of the Permit Engineer of District 7.

MULCH.--GREEN MATERIAL.--Mulch shall be woody material. Woody materials shall consist of chipped, shredded or ground green materials such as shrubs, tree trimmings or clean processed wood products.

Deleterious materials such as rocks, glass, plastics, metals, clods, weeds, weed seeds, coarse objects, sticks larger than the specified particle size, salts, paint, petroleum products, pesticides or other chemical residues that would be harmful to plant or animal life shall not exceed 0.1 percent of the mulch volume. Chipping shall include shredding, grinding or any other method used to reduce mulch materials to the specified size. At least 85 percent of the mulch, by volume, shall conform to the particle size specified.

Green materials shall be processed and have reached an internal temperature of 133° F. for a minimum of 15 consecutive days. During the processing period the green material shall have been turned a minimum of 5 times.

Green material shall have a particle size conforming to the provisions for wood chips in Section 20-2.08, "Mulch," of the Standard Specifications.

MULCH.--Mulch for planting basins shall be wood chips. Wood chips produced from tree trimmings may contain leaves and small twigs.

Mulch materials produced from pine trees grown in Alameda, Monterey, Santa Clara, Santa Cruz, San Luis Obispo or San Mateo Counties shall not be used.

Commercial fertilizer (slow release) shall be a pelleted or granular form, shall be slow release, and shall fall within the following guaranteed chemical analysis range:

Ingredient	Percentage
Nitrogen	20
Phosphoric Acid	10
Water Soluble Potash	5

Commercial fertilizer (tablet) shall be a slow release type and shall be in tablet form. Each tablet, as shown on the Plant List on the plans, shall have a mass of 21 ± 1 grams, and shall have the following guaranteed chemical analysis:

Ingredient	Percentage
Nitrogen	20
Phosphoric Acid	10
Water Soluble Potash	5

At the option of the Contractor, two 10 1/2 gram tablets may be used in lieu of each 21-gram tablet designated on the plans or specified in these special provisions. Regardless of the tablet size used, each tablet shall be the slow release type and shall have the same guaranteed chemical analysis as specified for the 21-gram tablets. Each 10 1/2-gram tablet shall have a mass of 10 1/2 ± 0.5-grams.

10-2.04B ROADSIDE CLEARING

Prior to preparing planting areas and , or commencing irrigation trenching operations for planting areas, trash and debris shall be removed from these areas and a distance of 10 feet beyond the edges of those areas. At locations where proposed planting areas are 12 feet or more from the edges of dikes, curbs, sidewalks, fences, walls, paved shoulders and existing planting to remain or to be maintained, the clearing limit shall be 6 feet beyond the outer limits of the proposed planting areas.

In addition to removing trash and debris, the project area shall be cleared as specified herein:

Existing ground cover, within areas shown on the plans to be planted with replacement ground cover, shall be removed.

At the option of the Contractor, removed trees and shrubs may be reduced to chips. Chipped material shall be spread within the project limits at locations designated by the Engineer. Chipped material shall not be substituted for mulch, nor shall the chipped material be placed within areas to receive mulch.

Weeds shall be killed and removed within proposed ground cover areas and within the area extending beyond the outer limits of the proposed ground cover areas to the adjacent edges of shoulders, dikes, curbs, sidewalks, walls, existing planting and fences. At those locations where proposed ground cover areas are 12 feet or more from the adjacent edges of shoulders, dikes, curbs, sidewalks, walls, and fences, the clearing limit shall be 6 feet beyond the outer limits of the proposed ground cover areas.

Weeds shall be killed and removed within proposed planting areas where plants are to be planted in groups or rows 15 feet or less apart and from within an area extending 6 feet beyond the outer limits of the groups or rows of plants.

Weeds shall be killed and removed within an area 6 feet in diameter centered at each plant location where the plants are to be planted more than 15 feet apart and are located outside of ground cover areas.

Weeds shall be killed and removed within an area 6 feet in diameter centered at each liner or seedling plant location where the plants are to be planted more than 15 feet apart. At locations where liner or seedling plants are to be planted less than 10 feet apart, weeds shall be killed and removed within the entire area.

Weeds outside of mulched areas, plant basins, and ground cover shall be controlled by mowing. Limits of mowing shall extend from the weeds to be killed areas out to the edges of pavement, dikes, curbs, sidewalks, and fences.

After the initial roadside clearing is complete, additional roadside clearing work shall be performed as necessary to maintain the areas, as specified above, in a neat appearance until the start of the plant establishment period. This work shall include the following:

Trash and debris shall be removed.
Rodents shall be controlled.
Weed growth shall be killed before the weeds reach the seed stage of growth or exceed 6 inches in length.
Weeds in plant basins, including basin walls, shall be removed by hand pulling, after the plants have been planted.
Areas outside the areas specified to be cleared of weeds shall be mowed.

WEED CONTROL.--Weed control shall also conform to the following:

Stolon type weeds shall be killed with glyphosate.
Tumbleweeds shall be removed by hand pulling before the tumbleweeds reach a height of 6 inches.
Removed weeds and ground cover 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 option of the Contractor, weed growth in mowed areas may be controlled by growth regulators. Growth regulators shall be applied before weeds exceed 12 inches in height.
Areas to be mowed shall be mowed when weed height exceeds 12 inches. Weeds shall be mowed to a height of 2 inches to 6 inches.
Roadside clearing work shall not include work required to be performed as clearing and grubbing as specified in Section 16, "Clearing and Grubbing," of the Standard Specifications.

10-2.04C PESTICIDES

Pesticides used to control weeds shall conform to the provisions in Section 20-4.026, "Pesticides," of the Standard Specifications. Except as otherwise provided in these special provisions, pesticide use shall be limited to the following materials:

Cacodylic Acid
Diquat
Fluazifop-butyl
Glyphosate
Isoxaben (Preemergent)
Sethoxydim
Oxadiazon - 50 percent WP (Preemergent)
Oryzalin (Preemergent)
Pendimethalin (Preemergent)
Prodiamine (Preemergent)
Trifluralin (Preemergent)
Ammonium Sulfate
Melfluidide (Growth regulator)
Napropamide

Granular forms of Oxadiazon or Dichlobenil shall be applied in areas to be covered with mulch.
Preemergents shall be applied prior to the application of mulch. Once the preemergent is applied to the mulch areas, mulch applications shall be completed in that area on the same working day.
Glyphosate shall be used to kill stolon type weeds.
Oxadiazon shall be of the emulsifiable concentration or wettable powder type, except when Oxadiazon is used under mulch in conformance with these special provisions.
Prior to the application of preemergents, ground cover plants shall have been planted a minimum of 3 days and shall have been thoroughly watered.
A minimum of 100 days shall elapse between applications of preemergents.

Except for ground cover plants, preemergents shall not be applied within 18 inches of plants.

Growth regulators shall not be applied within 6 feet of trees, shrubs or vines.

Ammonium sulfate and magnesium chloride shall be used only in areas planted to Carpobrotus or Delosperma. Ammonium sulfate and magnesium chloride shall not be applied in such a manner that allows the pesticides to come in contact with trees or shrubs.

If the Contractor elects to request the use of other pesticides on this project, the request shall be submitted, in writing, to the Engineer not less than 10 working days prior to the intended use of the other pesticides. Except for the pesticides listed in these special provisions, no pesticides shall be used or applied without prior written approval of the Engineer.

Pesticides shall not be applied within the limits of plant basins. Pesticides shall not be applied in a manner that allows the pesticides to come in contact with the foliage and woody parts of the plants.

10-2.04D PREPARING PLANTING AREAS

Preparing planting areas shall consist of preparing holes, preparing trenches, cultivating, germinating weeds, constructing basins and doing any other work necessary to prepare areas for planting, except roadside clearing work, as specified in these specifications and the special provisions and as shown on the plans. Constructing basins shall be considered as part of the work involved in preparing holes and trenches.

The planting areas to be cultivated will be designated in these special provisions or shown on the plans. The outer limits of the areas to be cultivated shall extend one foot beyond the outer rows of plants requiring cultivation, unless otherwise specified or shown on the plans.

Plants adjacent to drainage ditches shall be located so that after construction of the basins, no portion of the basin walls shall be less than the minimum distance shown on the plans for each plant involved.

10-2.04E PLANTING

Plant locations for trees and shrubs shall be adjusted so that no plants closer than 8 feet to an impact, rotary, gear driven or pop-up type sprinkler.

Root protectors shall be installed at the time the plant holes are prepared in conformance with the details shown on the plans, as specified in Section 20-4, "Highway Planting," of the Standard Specifications, and these special provisions. Root protectors shall be placed in the plant holes with approximately 3 inches of the wire cylinder extending above finished grade.

Carpobrotus or Delosperma cuttings shall not be planted in soil that does not contain sufficient moisture at an average depth of 2 inches below the surface.

Trees, shrubs and vines, to be planted in ground cover areas, shall be planted before ground cover plants or cuttings are planted.

Commercial fertilizer and iron sulfate shall be applied or placed at the time of planting and at the rates and amounts shown on the plans.

Commercial fertilizer (pelleted and granular) required during planting by these special provisions or plans, shall be mixed into the plant hole soil a minimum depth of 2 inches near the root ball.

Commercial fertilizer (tablet) required by these special provisions or plans, shall be placed approximately half the depth of the root ball.

Commercial fertilizer required during planting by these special provisions or plans, shall be applied to ground cover plants planted from cuttings or flats immediately after planting, and watered into the soil.

Mulch placed in areas outside of plant basins shall be spread to a depth of not less than 3 inches.

Mulch placed adjacent to earthen drainage ditches shall not be placed within 3 feet of the center line of earthen ditches, within 3 feet of the edge of paved ditches, and within 3 feet of the centerline of drainage flow lines. Mulch shall be applied at the rate shown on the plans or specified in these special provisions and placed in the plant basins or spread in areas as shown on the plans after the plants have been planted. Mulch placed in plant basins shall not come in contact with the plant crown and stem.

Vines planted next to fences shall be tied to the fences with tree tie materials at the time of planting. Vines planted next to walls shall be staked and tied thereto as shown on the plans, at the time of planting.

Foliage protectors shall be installed over the plants within 2 days after the plants have been planted in conformance with the details shown on the plans and as specified in these special provisions.

Support stakes for foliage protectors shall be installed vertically a minimum of one foot deep on opposite sides of the plant in a direction transverse to the prevailing winds. Support stakes shall be either woven through the wire cylinder mesh or fastened to the wire cylinder at 6-inch maximum centers. If the support stakes are woven through the wire cylinder mesh, the support stakes shall be woven in such a manner that holds the wire cylinder against the support stakes at 6-inch maximum centers. The cylinder shall be snug on the support stakes, yet loose enough to be raised for application of pesticides or to perform weeding within the plant basin.

Foliage protectors shall be installed vertically and centered over the plant. When foliage protectors are not installed in plant basins, the bottom of the cylinder shall be cut to match the slope of the ground. Cuts shall be free from sharp points. Sharp points of wire shall be bent-over or blunted.

10-2.04F PLANT ESTABLISHMENT WORK

The plant establishment period shall be Type 2 and shall be not less than 250 working days.

The Engineer will notify the Contractor in writing of the start of the following plant establishment period and will furnish statements regarding days credited to the plant establishment work after the notification.

Type 2 plant establishment period shall be the time between completion of all planting work (except plant establishment work and other items of work specified to be performed for the life of the contract) and acceptance of the contract, provided however, that the contract will not be accepted unless the plant establishment work has been satisfactorily performed for at least the number of working days specified for plant establishment in these special provisions.

If relief from maintenance and responsibility is granted for a completed portion of the work, in conformance with the provisions in Section 7-1.15, "Relief From Maintenance and Responsibility," Type 2 plant establishment period for the completed portion shall be the time between completion of all planting work (except plant establishment work) and the granting of relief from maintenance and responsibility, provided however, that the relief will not be granted unless the plant establishment work in the completed portion of the work has been satisfactorily performed for at least the number of working days specified for plant establishment in the special provisions.

The Contractor shall adequately water plants; replace unsuitable plants; do weed, rodent and other pest control; and perform other work, as determined necessary by the Engineer, every working day during the plant establishment period.

Working days when the Contractor fails to adequately perform plant establishment work, including but not limited to watering plants, replacing unsuitable plants, repairing erosion damage, removing and disposing of trash and debris and doing weed, rodent and other pest control, determined to be necessary by the Engineer, will not be credited as plant establishment working days.

Attention is directed to "Relief From Maintenance and Responsibility" in these special provisions regarding relief from maintenance and protection.

Two applications of commercial fertilizer (slow release) shall be applied to trees, shrubs, vines and ground cover areas when directed by the Engineer. Commercial fertilizer shall be applied at the rates shown on the plans and shall be spread with a mechanical spreader wherever possible.

The center to center spacing of replacement plants for unsuitable ground cover plants shall be determined by the number of completed plant establishment working days at the time of replacement and the original spacing in accordance with the following:

ORIGINAL SPACING (Inches)	SPACING OF REPLACEMENT GROUND COVER PLANTS (Inches)		
	Number of Completed Plant Establishment Working Days		
	1-125	126-190	191-250
9"	9"	6"	6"
12"	12"	9"	6"
18"	18"	12"	9"
24"	24"	18"	12"
36"	36"	24"	18"

During the plant establishment period, the plants shall be watered utilizing the Remote Irrigation Control System (RICS) software program. A watering schedule shall be submitted to the Engineer for use during the plant establishment period.

Weeds within plant basins, including basin walls and ground cover, shall be controlled by hand pulling.

Weeds within mulched areas and ground cover, but outside of plant basins, shall be controlled by killing.

Weeds outside of mulched areas, plant basins, ground cover, the median, and paved areas shall be controlled by mowing. At locations where proposed planting areas are 12 feet or more from the edges of existing plantings to remain and from shoulders, dikes, curbs, sidewalks, fences, and walls, the mowing limit shall be 6 feet beyond the outer limits of the proposed planting area.

Vines shall be trained onto fences and walls or through cored holes in walls.

At the option of the Contractor, a growth regulator may be applied to mowed areas, provided the growth regulator is approved in advance by the Engineer and the growth regulator is applied in conformance with these special provisions. If a growth regulator is approved and applied, the growth regulator shall be at the Contractor's expense.

At the option of the Contractor, plants of a larger container size than those originally specified may be used for replacement plants during the first 125 working days of the plant establishment period. The use of plants of a larger container size than those originally specified for replacement plants shall be at the Contractor's expense.

After 125 working days of the plant establishment period have been completed, replacement of plants, except for ground cover plants, shall be one gallon size for seedlings, pot and liner size plants; 5-gallon size for one gallon size plants; 15-gallon size for 5-gallon size plants; and other plant replacement plants shall be the same size as originally specified..

When ordered by the Engineer, one application of a preemergent pesticide conforming to the provisions in "Pesticides" of these special provisions, shall be applied between 40 and 50 working days prior to completion of the plant establishment period. This work will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

The Contractor shall be required to adequately water plants, replace unsuitable plants, perform weed, rodent and other pest control and perform other work, as determined necessary by the Engineer, every working day during the plant establishment period.

Working days when the Contractor fails to adequately perform plant establishment work, including, but not limited to watering plants, replacing unsuitable plants, repairing erosion damage, removing trash and debris and performing weed, rodent and other pest control, determined necessary by the Engineer, will not be credited as plant establishment working days.

When the Engineer determines that the plant stakes are inadequate to support the plants during the plant establishment period, the plant stakes shall be replaced, at the Contractor's expense, with a larger diameter stake adequate to support the plant. Plant stakes shall be removed at any time during the plant establishment period when determined by the Engineer.

A watering schedule program for each irrigation controller shall be submitted to the Engineer for approval not less than 40 working days prior to the completion of the plant establishment period. If the Engineer determines the submitted watering schedule is unacceptable, a revised watering schedule shall be submitted to the Engineer for approval within 5 working days after receiving notice that the previously submitted schedule is unacceptable.

Written instructions on the use and adjustment of the installed irrigation controllers shall be given to the Engineer during the plant establishment period. The approved watering schedule program shall be implemented by the Contractor not less than 10 working days prior to the completion of the plant establishment period. The programming shall not relieve the Contractor of the responsibility to apply sufficient water as conditions may require to keep the plants in a healthy condition.

The final inspection shall be performed in conformance with the provisions in Section 5-1.13, "Final Inspection," of the Standard Specifications and shall be completed a minimum of 20 working days before the estimated completion of the contract.

The contract lump sum price paid for plant establishment work shall include full compensation for furnishing all labor, materials (including pesticides, commercial fertilizer and replacement plants), tools, equipment, and incidentals, and for doing all the work involved in establishing plants, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-2.05 IRRIGATION SYSTEMS

Irrigation systems shall be furnished and installed in conformance with the provisions in Section 20-5, "Irrigation Systems," of the Standard Specifications, except materials containing asbestos fibers shall not be used.

PIPE-Pipe and fittings for irrigation systems shall be as specified in these specifications and the special provisions.

Unless otherwise shown on the plans, risers and threaded nipples for irrigation facilities shall be Schedule 80, PVC 1120 or PVC 1220, polyvinyl chloride (PVC) pipe conforming to the requirements in ASTM Designation: D 1785.

Steel Pipe-Steel pipe and couplings and wrought iron couplings shall conform to the requirements in ASTM Designation: A 53, standard weight, galvanized, except that the zinc coating shall be not less than 90 percent of the amount specified in that ASTM Designation. Fittings, except couplings, shall be galvanized malleable iron, banded and threaded, conforming to the requirements in ANSI Standard: B16.3, Class 150.

Plastic Pipe-Plastic pipe for irrigation systems will be shown on the plans as plastic pipe supply line and plastic pipe irrigation line.

Plastic Pipe Supply Line--Plastic pipe supply line shall be polyvinyl chloride (PVC) of the types and classifications shown on the plans or specified in the special provisions. Plastic pipe supply line shall be approved by the National Sanitation Foundation, and shall conform to the requirements in either ASTM Designation: D 2241 or D 2672, except that plastic pipe supply line with a bell socket formed as an integral part of the pipe for use with rubber ring gaskets shall conform to the requirements in ASTM Designation: D 2241. The belled portion of the pipe for use with rubber ring gaskets shall conform to the requirements in ASTM Designation: D 3139, except for the dimensional ratio, shall be formed to maintain uniformity in alignment and roundness and shall be free of irregularities and defects.

The wall thickness of the bell shall be not less than the specified minimum wall thickness of the pipe or not less than the minimum thickness that will provide a joint assembly with a Hydrostatic Design Basis Category not lower than that of the Hydrostatic Design Basis Category of the pipe.

For pipe with wall thickness of the bell less than the specified minimum wall thickness of the pipe the Contractor shall furnish to the Engineer the following:

a. A Certificate of Compliance from the manufacturer of the pipe, conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications, certifying that the joint assembly conforms to the requirements in ASTM Designation: D 3139.

b. Detailed drawings of the joints, including all dimensions, along with certified copies of the tests performed to verify that the Hydrostatic Design Basis Category for the joint assembly is not lower than the Hydrostatic Design Basis Category of the pipe.

c. Certified copies of the laboratory qualifying tests for the Internal Pressure Test and for the Vacuum Test.

d. A minimum of 2 samples of each size and each Class of pipe, not less than 2 feet long, together with gaskets.

Items b and c above may be submitted to the Transportation Laboratory on an annual basis or more often when required because of manufacturer's design changes. The Certificate of Compliance for pipe used on a specific project may refer to prior submittals, giving date of original submittal and any other information needed to identify the documents.

The wall thickness of the bell end of the pipe may exceed maximum allowable wall thickness of the pipe for a length not to exceed 24 inches from the end of the pipe.

Bell end pipe conforming to the requirements in ASTM Designation: D 2672 may be marked with either ASTM Designation: D 2672 or D 2241. Gasketed bell end pipe shall be marked in conformance with the requirements in ASTM Designation: D 2241.

Plastic pipe supply line and fittings that are on the supply side of control valves and are 2 inches or larger in diameter shall be either the rubber ring gasket type or the solvent cemented type, except that all pipe and fittings installed in conduits shall be the solvent cemented type. All other plastic pipe supply line and fittings shall be the solvent cemented type.

Schedule 40 plastic pipe supply lines shall conform to the requirements in ASTM Designation: D1785.

Threaded fittings and fittings to be solvent cemented to plastic pipe supply line shall be injection molded PVC, Schedule 40, conforming to the requirements in ASTM Designation: D 2466.

Fittings equipped with rubber ring gaskets for supply line shall be either injection molded PVC plastic pipe fittings, conforming to the requirements in ASTM Designation: D 2466 or D 3139, or machined pipestock fittings, conforming to the requirements in ASTM Designation: D 2241, with the exception in both applications of the dimensions and configurations of the barrel portion which receives the rubber ring. Rubber rings shall conform to the requirements in ASTM Designation: F 477.

Solvent cement and primer for PVC plastic pipe and fittings for supply line shall be of commercial quality specifically manufactured for use with rigid PVC plastic pipe and fittings and shall be applied separately. Solvent cement shall conform to the requirements of the local Air Quality Management District. The solvent cement and primer used shall be made by the same manufacturer. The color of the primer shall contrast with the color of the pipe and fittings.

20-2.15B(2) Plastic Pipe Irrigation Line

Plastic pipe irrigation line shall be polyethylene pipe conforming to the provisions in this Section 20-2.15B(2), as shown on the plans or as specified in the special provisions.

Polyethylene pipe shall conform to the requirements in ASTM Designation: D 1248, Type I, Class C and shall withstand a 60-minute hydrostatic pressure of 50 pounds per square inch when tested in conformance with the requirements in ASTM Designation: D 1598.

Wall thicknesses of polyethylene pipe shall conform to the following when determined in conformance with the requirements in ASTM Designation: D 2122.

Pipe Size Nominal	Minimum* (Inches)	Maximum* (Inches)	Range (Percent)

(Inches)			
1/2	0.050	0.070	12
5/8	0.055	0.075	12
3/4	0.060	0.080	12

* as measured at any point on the cross section

The polyethylene pipe shall provide leak-free, non-separating connections suitable for the purpose intended when connected to the fittings specified herein.

Polyethylene pipe shall show no evidence of failure when tested by the following environmental test:

Environmental Stress Cracking Test - For each test, use 6 randomly selected 10-inch long specimens. Insert a 10 percent oversized barbed fitting into one end of each specimen. The barbed fitting shall have an outside diameter which is 10 percent greater than the maximum outside barb diameter specified in Table 1 of ASTM Designation: D 2609 for the pipe size being tested. Place the specimens in a 10 percent "Igepal CO-630" solution at 122°F for a 24-hour period. After 24 hours, examine the specimens for failure.

Utility grade polyethylene pipe will not be acceptable.

A Certificate of Compliance for the polyethylene pipe shall be furnished to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications

Fittings to be used with polyethylene pipe shall be the compression type, shall be of commercial quality, and shall be recommended by the manufacturer of the polyethylene pipe. Fittings shall have female sockets with an internal barb to provide a positive pipe-to-fitting connection that will not separate at the designed pressure.

CONDUIT--Conduit for irrigation crossovers shall conform to these special provisions.

Conduit placed by jacking or drilling shall be welded steel pipe conforming to the requirements in ASTM Designation: A 53. Welded steel pipe shall be either black or galvanized pipe and shall have welded or threaded joints.

The minimum wall thickness for the various sizes of welded steel pipe shall conform to the following:

Nominal Pipe Size (Inches)	Minimum Wall Thickness (Inches)
3	0.216
4	0.237
6 and larger	0.250

Pipe with wall thickness greater than above specified may be required to withstand jacking or drilling operations. Additional wall thickness required shall be determined by the Contractor and shall be furnished at the Contractor's expense.

Conduit placed in open trenches shall be corrugated high density polyethylene pipe (CHDPE), corrugated steel pipe, corrugated aluminum pipe or acrylonitrile-butadiene-styrene (ABS) composite pipe. The size and kind of conduit to be installed will be designated in the Engineer's Estimate or specified in the special provisions. When alternative conduit is designated in the Engineer's Estimate or specified in these special provisions, the kind of conduit to be installed shall be selected by the Contractor from the allowable kinds of alternative conduit specified in these special provisions.

Corrugated high density polyethylene pipe shall conform to the requirements in ASTM Designation: F 667, or shall be Type S conforming to the requirements in AASHTO Designation: M 294. Couplings and fittings shall be as recommended by the pipe manufacturer.

Corrugated steel pipe and corrugated aluminum pipe shall conform to the provisions in Section 66, "Corrugated Metal Pipe," of the Standard Specifications. The nominal thickness of metal sheets for the pipe shall be 0.064-inches for corrugated steel pipe and 0.060-inches for corrugated aluminum pipe. Coupling bands and coupling band hardware for corrugated steel pipe and corrugated aluminum pipe shall conform to the provisions in Section 66, "Corrugated Metal Pipe," of the Standard Specifications.

Acrylonitrile-butadiene-styrene (ABS) composite pipe and couplings shall conform to the requirements in ASTM Designation: D 2680. Couplings shall be Type SC (solvent cemented).

SPRINKLERS--Sprinklers shall conform to the requirements in these special provisions and as shown on the plans.

EMITTERS--Emitters shall conform to the requirements in these special provisions and as shown on the plans.

FLUSH VALVES--Flush Valves shall be garden valves. Garden valves shall conform to the provisions in Section 20-2.22 "Garden Valves," of the Standard Specifications.

PLASTIC PIPE (LOCATOR)--Plastic Pipe (locator) shall be Schedule 40 white polyvinyl chloride (PVC) pipe.

QUICK COUPLING VALVES--Quick coupling valves shall be 3/4-inches double slot type, with self-closing cap unless otherwise shown on the plans. Except for the cap, quick coupling valves shall be of brass or bronze construction.

GARDEN VALVES--Garden valves shall be the inverted nose type of brass or bronze construction with female thread inlet, replaceable seat washer, rising valve stem within a protective collar, male thread hose outlet and furnished with a loose key (handle).

CONTROL VALVES--Control valves shall be electric remote control or the manual type, straight or angle pattern globe valves, and shall be of glass filled nylon, brass, bronze, or cast iron construction as shown on the plans or specified in these special provisions. All metal parts of glass filled nylon valves shall be stainless steel or brass. Cast iron bodied valves shall have replaceable, nonferrous, metallic seats. Compression disks or diaphragms in valves shall be replaceable. Valves shall be of the same size as the pipeline which the valves serve, unless otherwise shown on the plans.

Control valves shall be capable of withstanding a cold water working pressure of 150 pounds per square inch. Valve handles shall be brass, bronze or steel.

Electric remote control valves shall conform to the following:

A. Valves shall be normally closed type.

B. Valves shall be completely serviceable from the top without removing the valve body from the system.

C. Valves shall be equipped with a device that will regulate and adjust the flow of water and shall be provided with a manual shutoff. The manual shutoff for valves larger than 3/4-inches shall be operated by a cross handle.

D. Valves for each irrigation controller shall be the same model series and shall be compatible with the model series of the irrigation controller.

F. Valve solenoids shall operate on the low voltage AC current supplied from the irrigation controller.

G. Valves shall be provided with manual bleeding devices.

H. Valves shall be equipped with internal diaphragms installed in the valve body casting.

I. Valve inlets and outlets shall have threaded fittings.

VALVE BOXES--Valve boxes and valve box covers shall be precast portland cement concrete, fiberglass or reinforced plastic and shall conform to the special provisions. Valve box covers shall be marked "WATER" in cast-in letters not less than 1-inch high.

Valve boxes shall not have side openings.

BACKFLOW PREVENTERS--Backflow preventers shall be one of the approved reduced pressure principle devices listed by the California Department of Health Services, Division of Drinking Water and Environmental Management, 601 North 7th Street, Mailing Station (MS) 92, P.O. Box 942732, Sacramento, CA 94234-7320.

Backflow preventers shall be factory assembled and shall include 2 checkvalves, one pressure differential relief valve, 2 shut-off valves and 4 test cocks.

Backflow preventer and valves shall be the same size as the pipeline in which they are installed, unless otherwise shown on the plans.

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

CONCRETE--Concrete for irrigation facilities, unless otherwise specified, shall be produced from commercial quality aggregates and cement and shall contain not less than 470 pounds of cement per cubic meter. Hand mixing of the concrete will be permitted.

FILTER ASSEMBLY UNITS--Filter assembly units shall conform to the requirements in the special provisions.

FLEXIBLE HOSE--Flexible hose shall be nonrigid polyvinyl chloride (nonrigid PVC) hose conforming to the requirements in ASTM Designation: D 2287, Cell-type 6464500.

Wall thicknesses of nonrigid PVC hose shall conform to the following when determined in conformance with the requirements in ASTM Designation: D 2122.

Hose Size Nominal (Inches)	Minimum Wall Thickness* (Inches)	Range (Percent)
1/2	3.73	12
3/4	3.91	12
1	4.55	12

* as measured at any point on the cross section

The hose shall provide leak-free, non-separating connections suitable for the purpose intended when connected to the fittings specified herein.

Fittings for flexible hose shall be injection molded PVC, Schedule 40, conforming to the requirements in ASTM Designation: D 2466. Fittings shall be solvent cemented type.

Solvent cement for flexible hose and fittings shall be of commercial quality specifically manufactured for use with nonrigid PVC hose. Primer for flexible hose fittings shall be the same as specified for plastic pipe supply line fittings.

GATE VALVES--Gate valves shall be either flanged, threaded or ring type, iron or bronze body, bronze trimmed valves with rising (internally threaded) or non-rising stem, and shall withstand a cold water working pressure of 150 pound per square inch. Gate valves shall be of the same size as the pipeline which the valves serve, unless otherwise shown on the plans.

UNIONS--Unions shall be brass or malleable iron. Unions shall withstand the working pressure range provisions for the pipes with which the unions are used.

WYE STRAINERS--Wye strainers shall have a cast iron or all-bronze body with a removable stainless steel or monel strainer. Wye strainers shall be capable of withstanding a cold water working pressure of 150 pound per square inch. Wye strainers at backflow preventer assemblies shall be equipped with a gate valve at the outlet. All other wye strainers shall be equipped with a garden valve at the outlet.

The strainer screen for the wye strainer in a backflow preventer assembly shall have an open area equal to at least 3 times the cross-sectional area of the pipe based on an iron pipe size and shall be 20-mesh woven wire mesh or perforated sheet with 0.045-inch diameter holes.

All other wye strainers shall be equipped with 40-mesh strainer screens.

ELECTRICAL EQUIPMENT AND MATERIALS--All electrical equipment and materials shall conform to the provisions in Section 86-1.02, "Regulations and Code," of the Standard Specifications and these specifications.

Irrigation Controllers--Irrigation controllers shall conform to the provisions specified herein and the special provisions.

Irrigation controllers (battery) shall operate on batteries of the type and size recommended by the manufacturer of the controllers. Other irrigation controllers shall operate on 120-V, 60 Hz AC, and shall supply 24- to 30-V, 60 Hz AC for operating electric remote control valves.

Irrigation controllers shall be housed in pedestal or wall-mounted enclosures as designated in the Engineer's Estimate, or as specified in the special provisions or as shown on the plans.

Irrigation controllers not installed in irrigation controller enclosure cabinets shall be weatherproof, shall be constructed of fiberglass or metal and shall have a door lock for which 2 keys shall be provided.

Electrical Conduit--Electrical conduit shall conform to the provisions in Sections 86-2.05A, "Material," and 86-2.05B, "Use," of the Standard Specifications

Pull Boxes--Pull boxes shall be No. 5 or larger unless otherwise shown on the plans, and shall conform to the provisions in Section 86-2.06A, "Materials." Pull box covers for pull boxes used solely for electrical service shall be marked in conformance with the provisions in Section 86-2.06B, "Cover Marking," of the Standard Specifications. All other irrigation system pull box covers shall be marked "SPRINKLER CONTROL" in conformance with the provisions in Section 86-2.06B, "Cover Marking," of the Standard Specifications.

Conductors--Conductors shall conform to the provisions in Section 86-2.08, "Conductors," of the Standard Specifications and the provisions specified herein.

Conductors for operation below 50-volts shall be rated for direct burial and shall be the underground feeder type identified as (UF) with a minimum thickness of polyvinyl chloride insulation of 56 mils for conductors No. 10 and smaller and 70 mils for conductors No. 8 and larger.

Electric Remote Control Valves--Electric remote control valves shall conform to the provisions in Section 20-2.23, "Control Valves," of the Standard Specifications and these special provisions.

PRIMERS AND PAINTS--Primers and paints for application on metal and wood surfaces shall be the best quality grade of the type specified in the special provisions and shall be manufactured by a recognized paint manufacturer. Thinners and coloring tints shall conform to the paint manufacturer's recommendations. Coatings shall not be thinned except as recommended by the paint manufacturer for application. Each application of paint shall be compatible with the previous application and shall be from paint made by the same manufacturer. Testing of primers and paints will not be required.

Materials shall be commercial quality unless otherwise specified. Materials containing asbestos fibers shall not be used. Materials shall conform to the provisions in Section 20-2, "Materials," of the Standard Specifications.

Irrigation crossovers shall include conduits, water line crossovers, sprinkler control crossovers and appurtenances. Sizes of the conduits, water line crossovers and sprinkler control crossovers shall be as shown on the plans or as specified in these special provisions.

Attention is directed to the requirements specified under "Obstructions" elsewhere in these special provisions, regarding work over or adjacent to existing underground facilities. Excavation for proposed irrigation facilities shall not be started until the existing underground facilities have been located.

Only pipeline trenches and excavation pits for supply lines being supplied from one water service point shall be open at one time. After pressure testing is complete, trenches and pits excavated for pipe supply lines, being supplied from one water service point, shall be backfilled prior to commencing excavations for pipe supply lines being supplied from another water service point.

Solvent cement and primer for PVC plastic pipe and fittings for supply line shall be of commercial quality specifically manufactured for use with rigid PVC plastic pipe and fittings and shall be applied separately. Solvent cement shall conform to the requirements of the local Air Quality Management District. The solvent cement and primer used shall be made by the same manufacturer. The color of the primer shall contrast with the color of the pipe and fittings.

Gate valves, 3 inches and larger in size, shall be furnished with a square lug and shall be operated by use of long shank keys. Prior to acceptance of the contract, 3 long shank keys shall be delivered to the Engineer.

Quantities of galvanized steel pipe and plastic pipe supply lines and irrigation lines, and the quantities of welded steel pipe conduit to be paid for by the linear foot will be determined from the slope length designated by the Engineer. Pipe and conduit placed in excess of the lengths designated will not be paid for.

Quantities of control valves, gate valves, quick coupling valves, filter assembly units, irrigation controllers and sprinklers to be paid for by the unit will be determined from actual count in place.

Irrigation system work will be paid for as individual items as follows:

The contract lump sum price for control and neutral conductors; the contract prices per linear foot for galvanized steel pipe and plastic pipe supply lines, and irrigation lines; the contract price per linear foot for welded steel pipe conduit; and the contract unit prices for control valves, gate valves, quick coupling valves, check valves, filter assembly units, irrigation controllers and sprinklers.

The items to be paid for will be designated on the Engineer's Estimate.

When irrigation system work is to be paid for at a contract lump sum price for irrigation system, the price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing the irrigation system, complete in place, including excavation and backfill, replacing subbase, base, and pavement where pipe supply lines an conduits are installed through paved areas, testing and checking the irrigation system, maintaining existing water supply, removing existing irrigation facilities and removing existing plants for trenching, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for retesting existing backflow preventers shall be considered as included in the contract lump sum price paid for plant establishment work and no additional compensation will be allowed therefor.

Full compensation for removing existing plants for trenching work shall be considered as included in the contract prices paid per linear foot for the various sizes of plastic pipe (supply line) involved and no additional compensation will be allowed therefor.

PIPE AND CONDUIT ANCHORS.--Anchors used to attach galvanized steel pipe supply lines and sprinkler control conduits (electrical conduits) to the exterior surfaces of concrete structures and walls shall consist of metal straps and anchoring devices. Metal straps shall be made of steel and shall be fabricated to the details and dimensions shown on the plans. Concrete anchorage devices shall be mechanical expansion or resin capsule types installed in drilled holes or cast-in-place insert types. The anchorage devices shall be a complete system, including threaded studs, hex nuts and cut washers. thread dimensions for externally threaded concrete anchorage devices shall conform to the requirements in ANSI Standard: B1.1 having Class 2A tolerances or ANSI Standard: B1.13M having Grade 6g tolerances. Thread dimensions for internally threaded concrete anchorage devices shall conform to the requirements in ANSI Designation: A 563 or A 563M.

Holes for anchorage devices shall conform to the following:

1. Holes shall not be drilled closer than 0.5-foot to the edge of a concrete structure.
2. Holes shall be drilled with drills approved by the Engineer.
3. Holes shall be relocated if reinforcing steel is encountered. Abandoned holes shall be filled with portland cement concrete mortar conforming to the provisions in Section 51-1.135, "Mortar," of the Standard Specifications.
4. Holes shall be drilled to a minimum depth of 8 times the diameter of the anchor bolt or stud anchor.

Full compensation for installing anchors and for attaching galvanized steel pipe supply lines and sprinkler control conduits to exterior surfaces shall be considered as included in the contract lump sum price paid for irrigation system and no additional compensation will be allowed therefor.

VALVE BOXES.--Valve boxes shall conform to the provisions in Section 20-2.24, "Valve Boxes," of the Standard Specifications, except as otherwise provided herein.

Valve boxes shall be reinforced plastic.

Covers for plastic valve boxes shall be glass fiber reinforced plastic or plastic.

Valve boxes shall be identified on the top surface of the covers by labels containing the appropriate abbreviation for the irrigation facility contained in the valve box as shown on the plans. Valve boxes that contain remote control valves shall be identified by the appropriate letters and numbers (controller and station numbers). Labels for valve boxes shall conform to the provisions in Section 20-5.03F, "Valves and Valve Boxes," of the Standard Specifications.

10-2.05A ELECTRIC AUTOMATIC IRRIGATION COMPONENTS

IRRIGATION CONTROLLERS.--

Electrical components for electric automatic irrigation systems shall include irrigation controllers with enclosures; base stations; field units; remote control valves; valve boxes; pull boxes; electrical conduits; conductors between controllers, pumps and valves; moisture sensors; flow sensors; remote control valve actuators; and all appurtenances, incidentals and accessories required for proper installation and operation of the electrical portions of the systems. electrical components for electric automatic irrigation systems shall not include electrical service.

Irrigation controllers shall be single, solid-state independent controllers conforming to the following:

1. Irrigation controllers shall be fully automatic and shall operate a complete 14-day or longer irrigation program.
2. A switch or switches shall be provided on the face of the control panel that will turn the irrigation controller "on" or "off" and provide for automatic or manual operation. Manual operation shall allow cycle start at the desired station and shall allow activation of a single station.
3. The watering time of each station shall be displayed on the face of the control panel.
4. The irrigation controller and the low voltage output source shall be protected by fuses or circuit breakers. The controller shall also be protected by special fuse circuitry that detects and displays when a fuse blows.
5. The irrigation controller mechanism, panel, and circuit board shall be connected to the low voltage control and neutral conductors by means of plug and receptacle connectors located in the irrigation controller enclosure. The irrigation controller shall be equipped with a quick-connect terminal strip for fast installation.
6. Each station shall have a variable or incremental timing adjustment with a range of 12 hours to a minimum of one minute.
7. Irrigation controllers shall be capable of 4 independent program schedules with 8 start times each.
8. Irrigation controllers shall have an output that can energize a pump start circuit or a remote control valve (master).

9. Irrigation controllers shall be manufactured by the same company and be equipped with a removable battery and programmable front panel.

10. Where direct burial conductors are to be connected to the terminals strip, the conductors shall be connected with the proper size open-end crimp-on wire terminals. No exposed wire shall extend beyond the crimp of the terminal and the wires shall be parallel on the terminal strip.

Attention is directed to the requirements specified in Section 10-3, "Signals, Lighting and Electrical Systems," of these special provisions, regarding electrical power for irrigation controllers and irrigation controller enclosure cabinets.

ELECTRIC REMOTE CONTROL VALVES.--Electric remote control valves shall conform to the following:

Control valves shall be electric remote control type, straight pattern globe valves, and shall be of brass construction as shown on the plans or specified in these special provisions. Compression disks or diaphragms in valves shall be replaceable. Valves shall be of the same size as the pipeline which the valves serve, unless otherwise shown on the plans. Control valves shall be capable of withstanding a cold water working pressure of 150 pounds per square inch. Valve handles shall be brass.

Electric remote control valves shall also conform to the following:

1. Valves shall be normally closed type.
2. Valves shall be completely serviceable from the top without removing the valve body from the system.
3. Valves shall be equipped with a device that will regulate and adjust the flow of water and shall be provided with a manual shutoff. The manual shutoff for valves larger than 3/4 inch shall be operated by a cross handle.
4. Valves for each irrigation controller shall be the same model series and shall be compatible with the model series of the irrigation controller.
5. Valve solenoids shall operate on the low voltage AC current supplied from the irrigation controller.
6. Valves shall be provided with manual bleeding devices.
7. Valves shall be equipped with internal diaphragms installed in the valve body casting.
8. Valve inlets and outlets shall have threaded fittings.

PULL BOXES.--Pull box installations shall conform to the provisions in Section 20-5.027I, "Conductors, Electrical Conduits and Pull Boxes," of the Standard Specifications.

CONDUCTORS.--Low voltage, as used in this subsection "Conductors" shall mean 36 volts or less.

Low voltage control and neutral conductors in pull boxes and valve boxes, at irrigation controller terminals, and at splices shall be marked as follows:

Conductor terminations and splices shall be marked with adhesive backed paper markers or adhesive cloth wrap-around markers, with clear, heat-shrinkable sleeves sealed over the markers.

Non-spliced conductors in pull boxes and valve boxes shall be marked with clip-on, "C" shaped, white extruded polyvinyl chloride sleeves. Marker sleeves shall have black, indented legends of uniform depth with transparent overlays over the legends and "chevron" cuts for alignment of 2 or more sleeves.

Markers for the control conductors shall be identified with the appropriate number or letter designations of irrigation controllers and station numbers. Markers for neutral conductors shall be identified with the appropriate number or letter designations of the irrigation controllers.

New control and neutral conductors that are to replace existing control and neutral conductors shall be the same size and color as the existing control and neutral conductors being connected to.

The color of low voltage neutral and control conductor insulation, except for the striped portions, shall be homogeneous throughout the entire thickness of the insulation.

Insulation for conductors may be UL listed polyethylene conforming to UL44 test standards with a minimum insulation thickness of 0.04 inch for wire sizes 10AWG and smaller.

Splices for low voltage control and neutral conductors shall conform to the provision in Sections 86-2.09C, "Connectors and Terminals, "86-2.09D, "Splicing and Terminations," and 86-2.09E, "Splice Insulation," except "Method B" splice insulation, as shown on the plans, shall not be used. Tape used for insulating splices shall be a polyvinyl chloride type.

Conductors shall be installed in electrical conduit when conductors are to be surface mounted, installed in or on bridge structures, installed under paved areas, installed in conduit for water line crossovers and sprinkler control crossovers, or placed in concrete. Surface-mounted conduits, conduits installed in or on bridge structures; conduits

installed in concrete; and conduits installed by jacking or drilling shall be the rigid steel type. All other electrical conduit, including electrical conduit installed in irrigation crossover conduits for water line crossovers and sprinkler control crossovers and conduits under paved areas shall be non-metallic.

Electrical conduit shall conform to the provisions in Sections 86-2.05A, "Material" and 86-2.05B, "Use," of the Standard Specifications.

At the option of the Contractor, other types of splice sealing materials and methods may be used provided other materials and methods have been approved in writing by the Engineer prior to installation of the connectors.

Prior to granting relief from maintenance and responsibility, as provided in these special provisions, the functional test, in conformance with the provisions in Section 20-5.027J, "Testing," of the Standard Specifications, shall be satisfactorily completed, and instruction shall be given to the Engineer on the use and adjustment of the installed irrigation controllers.

Full compensation for furnishing and installing electrical conduit for control and neutral connectors shall be considered as included in the contract lump sum price paid for irrigation system and no separate payment will be made therefor.

Full compensation for sprinkler control crossovers, water line crossovers, pavement markers, pull wires, pull boxes and appurtenances, and for pressure testing the water line crossover in the conduit shall be considered as included in the contract lump sum price paid for irrigation system and no separate payment will be made therefor.

10-2.05B REMOTE CONTROL VALVE ACTUATOR SYSTEM

A remote control valve actuator system shall consist of a portable (hand held) receiver, a transmitter, a field carrying case, an AC power charging unit, and a receiver connector. The remote control valve actuator equipment shall be manufactured by the same manufacturer as the irrigation controller and shall be fully compatible with the irrigation controller. The receiver and transmitter shall comply with Federal Communications Commission (FCC) Rules and Regulations, Part 15, as of the date of manufacture.

The receiver connector shall be attached directly to the terminal strip of each irrigation controller and continue out to the socket head mounted to the outside of the irrigation controller enclosure cabinet as shown on the plans. The connector shall have an 18-inch jacketed multi-conductor cable with a spade lug terminal and shall have a "D" subminiature connector with gold plated contacts which allows the receiver unit to be plugged directly into the connector. The connector housing shall be weather resistant thermoplastic with a hinged socket head cap with a screw to be used as a locking mechanism. The socket head cap screw shall be operated by means of a key which will be provided by the manufacturer.

The receiver shall be plugged into the receiver connector and shall operate the stations of the irrigation controller on radio signals from the transmitter. The receiver shall receive radio signals a minimum distance of one mile. Receiver circuitry shall be protected from overload by a field replaceable fuse. The receiver shall operate on 24-volts AC.

The transmitter shall be capable of providing a 2-way FM, radio signal for a minimum range of one mile to the receiver located at the irrigation controller enclosure cabinet. The transmitter shall have a digital key pad and instant actuation of the stations, master valves or pumps in random, numerical or reverse numerical sequences by pressing a single key for each function. The transmitter shall allow for remote data retrieval, manual control and programming. The transmitter shall operate a master valve or pump independently of the controller stations. The transmitter shall transmit a radio frequency of 27.250 MHz.

The power source for the portable units shall consist of an internal charged battery pack which shall be recharged by the charging unit. The charging unit shall have an input of 110 volts AC, and an output of 24 volts AC at 1.5 amperes.

The field carrying case shall allow complete and convenient operation of the unit while in the case.

Before the irrigation system functional test begins one complete remote control valve actuator system, except for receiver connectors, shall be delivered to the Engineer.

Full compensation for the remote control valve actuator system shall be considered as included in the contract unit price paid for the various irrigation controllers involved and no additional compensation will be allowed therefor.

10-2.05C IRRIGATION SYSTEMS FUNCTIONAL TEST

Functional tests for irrigation controllers and associated automatic irrigation systems shall conform to the provisions in Section 20-5.027J, "Testing," of the Standard Specifications and these special provisions.

The functional test for each irrigation controller and associated automatic irrigation system served by a single electric service point, or a group of irrigation controllers and associated automatic irrigation systems served by a single electric service point, shall consist of not less than one complete cycle of operation. The length of the cycle will be determined by the Engineer. If unsatisfactory performance of any system develops, the condition shall be corrected and the test repeated until one complete cycle of satisfactory operation is obtained.

Tests shall demonstrate to the Engineer, through one complete cycle of the irrigation controllers in the automatic mode, that the associated automatic components of the irrigation systems operate properly. If automatic components of

the irrigation systems fail a functional test, these components shall be repaired at the Contractor's expense and the testing repeated until satisfactory operation is obtained.

Associated automatic components shall include, but not be limited to, remote control valve actuator systems, remote control valves, and rain sensors.

Upon completion of work on an irrigation system, including correction of deficiencies and satisfactory functional tests for the systems involved, the plants to be planted in the area watered by the irrigation system may be planted, provided the planting areas have been prepared as specified elsewhere in these special provisions.

10-2.05D PIPE

PLASTIC PIPE.--Plastic pipe supply lines shall be polyvinyl chloride (PVC) 1120 or 1220 pressure rated pipe with minimum pressure ratings (PR) as shown on the plans.

Plastic pipe supply lines less than 3 inches in diameter shall have solvent cemented type joints. Primers shall be used on the solvent cemented type joints.

Plastic pipe irrigation lines shall be installed not less than 12 inches below the finished grade, measured to the top of the pipe.

Fittings for plastic pipe supply lines with a pressure rating (PR) of 315 shall be Schedule 80.

10-2.05E SPRINKLERS

Sprinklers shall conform to the type, pattern, material and operating characteristics listed in the "Sprinkler Schedule" shown on the plans.

Flexible risers shall be ultraviolet (UV) resistant, brown in color and shall conform to the details shown on the plans.

When required, risers for sprinklers shall contain a device that will automatically and instantly stop the flow of water from a riser when the riser is broken on the downstream side of the device. The device shall be installed as recommended by the manufacturer of the device.

Risers for sprinklers on slopes shall be set perpendicular to the plane of the slope.

Full compensation for furnishing and installing flow shutoff and pressure compensation devices on risers shall be considered as in included in the contract unit price paid for each type of sprinkler involved and no separate payment will be made therefor.

10-2.05F FILTER ASSEMBLY UNIT

A filter assembly unit shall consist of a filter housing, a reusable filter cartridge, a ball valve, fittings, pipe and valve box as shown on the plans.

Filter assembly units shall withstand a cold water working pressure of 150 pounds per square inch.

Filter housings shall be manufactured of reinforced polypropylene plastic.

Filter cartridges shall be threaded plastic rings attached to one another to produce a reusable cylindrical form filter. Filters shall be capable of 140-mesh filtration.

Ball valves in filter assembly units shall be polyvinyl chloride (PVC). The ball seats shall be high molecular weight-high density polyethylene.

10-2.05G FINAL IRRIGATION SYSTEM CHECK

A final check of existing and new irrigation facilities shall be performed not more than 20 working days prior to acceptance of the contract.

The length of watering cycles using potable water measured by water meters for the final check of irrigation facilities will be determined by the Engineer.

Remote control valves connected to existing and new irrigation controllers shall be checked for automatic performance when controllers are in the automatic mode.

Unsatisfactory performance of irrigation facilities installed or modified by the Contractor shall be repaired and rechecked at the Contractor's expense until satisfactory performance is obtained, as determined by the Engineer.

Repair or replacement of existing irrigation facilities due to unsatisfactory performance shall conform to the provisions in "Existing Highway Irrigation Facilities" of these special provisions.

Nothing in this section, "Final Irrigation System Check," shall relieve the Contractor of full responsibility for making good or repairing defective work or materials found before the formal written acceptance of the entire contract by the Director.

Full compensation for checking the irrigation systems prior to the acceptance of the contract shall be considered as included in the contract lump sum price paid for plant establishment work and no additional compensation will be allowed therefor.

SECTION 10-3. SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

10-3.01 DESCRIPTION

Traffic signals and lighting, highway advisory radio (HAR), sign and flashing beacon, lighting, and sign illumination, electric service (irrigation), ramp metering systems (RMS), traffic monitoring stations (TMS), automatic vehicle classification (AVC), changeable message sign (CMS) and electrical systems, communication conduit, fiber optic communication system routing and electrical systems for the closed circuit television system, described in Sections 10-3 through Sections 10-9, shall conform to applicable rules and regulations of the Federal Communications Commission and the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and these special provisions.

Lighting equipment is included in the following structures:

Fairplex Drive Overcrossing (Bridge No. 53-0874)
Dudley Street Undercrossing (Bridge No. 53-852)
Park Avenue Undercrossing (Bridge No. 53-854)
Towne Avenue Undercrossing (Bridge No. 53-0858)
Cleveland Street Ped UC (Bridge No. 53-852)
College Avenue Ped. UC (Bridge No. 53-1019)
Indian Hill Boulevard UC (Bridge No. 53-860)

Communication conduit is included in the following structures:

Mountain Avenue Ped. UC (Bridge No. 55-1018)
Fairplex Drive Overcrossing (Bridge No. 53-0874)
Dudley Street Undercrossing (Bridge No. 53-852)
Park Avenue Undercrossing (Bridge No. 53-854)
Garey Avenue Undercrossing (Bridge No. 53-855)
Towne Avenue Undercrossing (Bridge No. 53-0858)
San Antonio Avenue UC (Bridge No. 53-859)
Indian Hill Boulevard UC (Bridge No. 53-860)
Cleveland Street Ped UC (Bridge No. 53-852)
College Avenue Ped. UC (Bridge No. 53-1019)
San Jose Wash Bridge (Bridge No. 53-1825)
White Avenue Undercrossing (Bridge No. 53-853)
Mills Avenue Undercrossing (Bridge No. 54-0453)

Traffic signal work is to be performed at the following locations:

(Location 1) - Route 10 Westbound on ramp-McKinley Avenue at Garey Avenue
(Location 2) - Route 10 Eastbound on ramp-McKinley Avenue at Orange Avenue
(Location 3) - Route 10 Eastbound on ramp-Route 10 Eastbound off ramp at Towne Avenue
(Location 4) - Route 10 Westbound off ramp-Vinton Avenue at Towne Avenue
(Location 5) - Route 10 Westbound off ramp and Route 10 Eastbound off ramp at
(Location 6) - Route 10 Westbound off ramp at Indian Hill Boulevard

Closed circuit television system work is to be performed at the following locations:

CCTV Camera (Location SB425) - PM 42.5, Northbound Route 57 south of Route 10.
CCTV Camera (Location SB429) - PM 42.9, Westbound Route 10 west of Fairplex Drive.
CCTV Camera (Location SB442) - PM 44.2, Westbound Route 10 west of Dudley Street.
CCTV Camera (Location SB451) - PM 45.1, Eastbound Route 10 west of White Avenue.
CCTV Camera (Location SB478) - PM 47.8, Westbound Route 10 West of Indian Hill Boulevard.

The Traffic Management Center is located at 120 South Spring Street, Los Angeles, California 90012.

10-3.02 ABBREVIATIONS AND GLOSSARY

The following Abbreviations and Glossary apply to Section 10-3. through Section 10-8 of these special provisions.

Abbreviations:

ABAM:	22 AWG, twisted-pair cable with PVC jacket and aluminum shield.
ADM:	Add Drop Multiplexer.
AFC:	Automated Frequency Control.
AGC:	Automatic gain control.
AIS:	Alarm Indication Signal.
AISI:	American Iron and Steel Institute.
AMI:	Alternate Mark Inversion (a data transmission protocol.)
ANSI:	American National Standards Institute.
APD:	Avalanche Photo diode.
API:	Application Program Interface.
APL:	Average picture level.
APS:	Automatic Protection Switch.
AWM:	Appliance Wiring Material.
B3ZS :	Bipolar 3 Zero Subsitution.
B8ZS:	Bipolar 8 Zero Substitution
BER:	Bit error rate.
BERTS:	Bit Error Rate Test Set.
BITS:	Building Integrated Timing Supply.
BNC:	Bayonet Navy Connector.
bps:	Bits per second.
BPV:	Bipolar Violation.
CCD:	Charge-Coupled Device.
CCIR:	International Radio Consultative Committee.
CCK:	Camera Control Keypad.
CCR:	Camera Control Receiver
CCT:	Camera Control Transmitter.
CCTV:	Closed Circuit Television.
cfm:	Cubic feet per minute.
CFR:	Code of Federal Regulations.
CIDH:	Cast In Drilled Hole.
CMIP:	Common Management Information Protocol.
CMISE:	Common Management Information Service Entity.
CMP:	Configuration Management Plan.
CMS:	Changeable Message Sign.
CODEC:	Coder - Decoder.
CPU:	Central Processing Unit.
CRT:	Cathode Ray Tube.
D4:	4th version of the D-signal format for time division multiplexers.
dB:	Decibel.
dBm:	Decibel referred to milliwatt.
dBrn:	Decibel above reference noise.
DCC:	Digital Communications Channel.
DCE:	Data communications equipment.
DCN:	Digital Communications Network.
DCS:	Digital Cross-Connect System.
DIP Switches	Small in-line switches that have two states(on and off), that are mounted on a single multiple-switch unit.
DOS:	Disk Operating System.

DS-1:	Digital Signal Level 1. Digital Transmission Rate - 1.544 megabits per second.
DS-3:	Digital Signal Level 3. Digital Transmission Rate - 44.876 megabits per second.
DSX-1:	Digital Signal Cross-Connect Level 1.
DSX:	Digital Cross Connect.
DTE:	Data Circuit Terminating Equipment.
EIA:	Electronics Industries Association.
EMT:	Electrical Metallic Tubing.
ESF:	Extended Superframe or Extended Superframe Format (4).
F/O or FO:	Fiber optic.
FDDI	Fiber Distributed Data Interface
FDU:	Fiber Distribution Unit.
FRP:	Fiberglass Reinforced Plastic.
FXS:	Foreign Exchange Subscriber.
GFCI:	Ground Fault Circuit Interrupter.
GUI	Graphical User Interface.
HAR:	Highway Advisory Radio.
HVAC:	Heating Ventilation and Air Conditioning.
Hz:	Hertz.
IEEE:	Institute of Electrical and Electronics Engineers.
IRE:	IRE is a SMPTE Standard video reference level.
JEDEC:	Joint Electron Device Engineering Council (Cooperative effort between EIA and NEMA.)
LOS:	Loss of Signal.
M13:	Multiplexer, 28 DS-1 circuits to 1 DS-3 circuit.
MHz:	Megahertz.
MPTE:	Society of Motion Picture and Television Engineers.
NE:	Network Element.
NEMA:	National Electrical Manufacturers Association.
nm:	nanometer.
NMS:	Network Management System.
NRZ:	Non-return to Zero.
NTSC:	National Television Standards Committee.
OAM&P:	Operations, Administration, Maintenance and Provisioning.
OC-12:	Optical Carrier level 12.
OC-3:	Optical Carrier level 3.
OC:	Optical Channel.
OD:	Outside Diameter.
OEM	Original Equipment Manufacturer.
OS Gateway Interface:	Open System Gateway Interface.
OSHA:	Occupational Safety and Health Administration.
OSI:	Open System Interconnect.
OTDR:	Optical Time Domain Reflectometer.
p-p:	Peak to Peak.

PC:	Personal Computer.
PCB:	Printed circuit board.
PIN:	P-type, intrinsic, N-type.
PM:	Performance Monitoring.
POSIX:	Portable Operating System for Computer Environments (IEEE standard.)
ppm	Periodic Pulse Metering
PRBS:	Pseudo-Random Bit Sequence pattern.
QRSS:	Quasi-Random Signal Source.
REA:	United States Rural Electrification Administration.
RETMA:	Radio-Electronics-Television Manufacturers Association (Former name of EIA.)
RF:	Radio Frequency.
RG:	Regulatory Guide.
RMS:	Ramp Metering Station.
RMS:	Root-mean-square.
RTS:	Request to send.
SF:	Superframe Format (D4).
SM:	Singlemode.
SMFO:	Singlemode Fiber Optic.
SONET:	Synchronous Optical Network.
SSOVP:	Solid State Over-voltage Protector.
SSPC:	Steel Structures Painting Council.
ST:	Type of Connector.
STS-1:	Synchronous Transport Signal Level 1. SONET Digital Transmission Rate - 51.840 megabits per second.
STS:	Synchronous Transport Signal.
TDM:	Time Division Multiplexer.
THHN:	Heat Resistant thermoplastic with Nylon Jacket Conductor.
THWN:	Moisture and Heat Resistant Thermoplastic with Nylon Jacket Conductor.
TIA:	Telecommunications Industries Association.
TL-1:	Transaction Language 1.
TLP:	Transmission Level Point.
TMC:	Traffic Management Center.
TSG:	Test Signal Generator.
TSI:	Time Slot Interchange.
UNC:	Unified National Coarse.
UNIX:	Specific operating system found in real-time applications.
UV:	Ultraviolet.
V:	Volt.
VAC:	Volts, Alternating Current.
VIC:	Video Interface Cable.
VID:	Video Identification and Date/Time Display.
VSK:	Video switch keypad.
VSM:	Video switch matrix.
VT-1.5:	Virtual Tributary-Level 1.5 (1.728 Mb/s.).
VT:	Virtual Tributary.
W:	Watt.

WFM:	Waveform Monitor.
WTO:	Wire Transit Only.
X.11, X.25:	specific protocol standards generated by the International Telecommunications Union (formerly CCITT.)
XHHW:	Moisture and Heat Resistant Cross Linked Synthetic Polymer Conductor.

Glossary:

ADM.--A single-stage multiplexer/demultiplexer point where full access can be gained along a fiber route operating at the OC-3, OC-12 or OC-48 line rate. Traffic can be added or dropped at the DS-1, DS-3, STS-1 or higher level per the needs of the application.

Asynchronous.--A network where transmission system payloads are not synchronized and each network terminal runs on its own clock.

Breakout.--The type of fiber optic cable containing additional strength members to allow connectors to be installed without straining the optical fibers.

Cable Storage Cabinet.--A cabinet for holding excess cable slack for protection. The cable storage cabinet allows the user flexibility in equipment location and the ability to pull cable back for resplicing.

CCITT.--The technical organization of the United Nations specifically for telecommunications, now the International Telecommunications Union. They function through international committees of telephone administrations and private operating agencies.

Channel.--(1) An information path between a discrete input and a discrete output. (2) One single input to a multiplexer or output from a demultiplexer.

Connector Module Housing (CMH).--A patch panel used in the FDF to terminate singlemode fibers with most common connector types. It may include a jumper storage shelf and a hinged door.

Connector.--A mechanical device used to provide a means for attaching to and decoupling from a transmitter, receiver, or another fiber (such as on a patch panel).

Connectorized.--A term that describes a fiber to which a connector has been affixed.

Couplers.--Couplers are devices which mate two fiber optic connectors to facilitate the transition of optical light signals from one connector into another. Couplers may also be referred to as: adapters, feed-throughs, and barrels. They are normally located within FDF's mounted in panels. They may also be used unmounted, to join two simplex fiber runs.

Drop-and-continue.--This is an advanced bandwidth management feature that permits simultaneous pass-through and tributary routing of designated time slots. Thus, traffic passing from an east-facing optical channel to a west-facing optical channel can exit at a tributary, spur, or inter-shelf interface at the same time. This drop-and-continue functionality allows traffic to be transferred between rings and also allow traffic to be routed through two separate nodes.

DS-1 Card.--A plug in module or circuit pack that contains ports for two or more DS-1 circuits.

Fiber Distribution Frame (FDF).--A rack mounted system that is usually installed in the TMC, that consists of a standard equipment rack, fiber routing guides, horizontal jumper troughs, fiber distribution units (FDU), connector module housings (CMH), and splice module housings (SMH). The FDF serves as the "home" for the passive fiber optic components from cable breakout, for connection by jumpers, to the electronics.

Fiber Distribution Unit (FDU).--An enclosure containing both a Connector Module Housing (CMH) and a Splice Module Housing enclosure.

Field Cabinet.--A roadside cabinet used for housing controllers or communications equipment.

Grooming.--Consolidating or segregating traffic from various locations, for example, DS0's or DS1's, over a larger bandwidth facility like DS-1's or DS-3's, for better bandwidth and equipment efficiency.

High Speed Interface Position.--The position within a SONET shelf that is allocated for the high speed interface like OC-3 or OC-12 optics.

Interconnection.--An electronic, fiber optic or electrical connection between controller unit, located inside a controller cabinet, and other components housed in other enclosures.

Intermediate Distribution Frame Room (IDF room).--An access point that consolidates or terminates transmission media connecting the equipment to the MDF.

Jitter.--Short waveform variations caused by vibration, voltage fluctuations, control system instability, and so forth.

Jumper.--A short fiber optic cable that has connectors installed on both ends.

Light Source.--A portable piece of fiber optic test equipment that, in conjunction with a power meter, is used to perform end-to-end attenuation testing. It contains a stabilized light source operating at the designed wavelength of the system under test.

Line-switched Ring.--A ring topology in which there are two fibers working in a bi-directional mode, where each fiber provides a path for half of the active traffic, as well as a path for half of the protection traffic. The line-switched ring is defined by Bellcore TR-1230.

Line.--A transmission medium with equipment at both ends used to transport information between two network elements.

Mux/Demux.--Multiplexer/demultiplexer.

Network Element.--Any active component or piece of equipment on the communications network.

Non-Return to Zero (NRZ).--A digital line code in which the signal level is low for a 0 bit and high for a 1-bit, and does not return to zero between successive 1 bits.

Non-revertive.--Defaulted to remain on the protection facility when an error has been cleared. The service has to be manually switched back to the service or working facility in this mode of operation.

OC-12 Card.--Optical interface circuit pack or module working at the OC-12 rate.

Office Alarm(Interface).--A point within an office or node where an equipment alarm could be connected.

Optical Time Domain Reflectometer (OTDR).--Fiber optic test equipment that uses optical backscatter to measure the power loss between two points and the corresponding distance. It provides a visual and printed display of the relative location of system components such as fiber sections, splices and connectors and as the losses that are attributed to each component or defect in the fiber.

Orderwire.--A channel used by installers to expedite the provisioning of lines.

Overhead.--Extra bits in a digital stream used to carry information besides traffic signals. Orderwire, for example, would be considered overhead information.

Patchcord.--A short jumper.

Path-switched Ring.--A ring topology in which there are two unidirectional paths for the signal to cross the network. Although one path is active and the other path is protection, the signal is transmitted in both directions, one direction active and the other protection. Path switching is defined by Bellcore TR-496.

Path.--A logical connection between a point where an STS or VT is multiplexed to the point where it is demultiplexed.

Personality.--The unique customization of system parameters to make the system more user friendly to any particular individual.

Pigtail.--Relatively short length of fiber optic cable that has a connector installed on only one end.

Power Meter.--A portable piece of fiber optic test equipment that, in conjunction with a light source, is used to perform end-to-end attenuation testing. It contains a detector that is sensitive to light at the designed wavelength of the system under test. Its display indicates the amount of power injected by the light source that arrives at the receiving end of the link.

Protection Ratio.--The proportion of working devices to "hot-standby" or "protection" devices in a working system. A 1:n indicates one protective device for n active components.

Provisioning.--Assigning a value to a system parameter or setting up a circuit or service by inputting the appropriate parameters into the system.

Repeater.--A device in which received signals are amplified, restored or reshaped to compensate for distortion and/or attenuation prior to retransmission.

Revertive.--Defaulted to return to the working facility when the error has been corrected.

Ring.--A circular closed loop network topology comprising of one or more stations. Information is sequentially passed from one station to the next in the ring.

Shelf.--The smallest integral unit within a typical 7 foot high, 23 inch wide SONET equipment bay that houses a discrete OC-3 or OC-12 SONET terminal, alone with the associated STS-1, DS-3 or DS-1 plug-in circuit packs or cards. The typical dimensions of a shelf is 540 mm high, 535 mm wide and 305 mm deep.

Single-ended Maintenance and Control.--A system capability that allows access to a full complement of integrated operations, administration, maintenance, and provisioning functions, using industry-standard interfaces, from a single or remote control location.

SONET Terminal.--Equipment comprised of a SONET multiplexer/demultiplexer that is located at both ends of a point-to-point configuration.

SONET.--A standard for optical transport that defines optical carrier levels and their electrically equivalent synchronous transport signals.

Splice Closure.--Normally installed in a splice vault, a splice closure is an environmentally sealed container used to organize and protect splice trays. The container allows splitting or routing of fiber cables from multiple locations.

Splice Module Housing (SMH).--The SMH stores splice trays as well as pigtails and short cable lengths.

Splice Tray.--A container used to organize and protect spliced fibers.

Splice Vault.--A splice vault is used to house splice closures.

System Gain(Optical).--The overall gain, expressed in dB, of the transmission path between the optical transmitter and receiver and can be determined by subtracting the receiver sensitivity from the end-of-life transmitter power.

Time Slot Interchange.--A capability of the SONET Multiplexer to provide bandwidth management for through traffic in the ADM, hub and ring applications. This capability allows any VT-1.5 or STS-1 time slot in an east-facing optical channel to be routed to any VT-1.5 or STS-1 time slot in a west-facing optical channel as desired.

Traffic Hairpinning.--A feature in SONET nodes that allows any VT-1.5 or STS-1 time slot on one tributary to be looped back to any VT-1.5 or STS-1 time slot on another tributary.

Transaction Language 1.--A machine-to-machine communications language that is a subset of CCITT's human-machine language.

Unidirectional Ring.--A ring topology where active traffic flows in one direction and protection is provided by the other.

Virtual Tributary.--A signal designed for transport and switching of sub-STS-1 payloads.

Wavelength Range (Optical).--The operating limits of a lightwave system expressed in the magnitude or length of the light waves, usually expressed in nanometers (nm).

10-3.03 AUTOMATIC VEHICLE CLASSIFICATION (AVC) STATION

Automatic vehicle classification (AVC) station shall consist of installing an automatic vehicle classification monitoring assembly (including automatic vehicle classification unit, Model 170-based Model 334 controller cabinet, modem, piezoelectric axle sensors, epoxy grout for axle sensor installation, and all auxiliary harnesses), Model 334 controller cabinet foundation, inductive loop detectors, pull boxes, conduits, conductors and incidentals, as shown in plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The Contractor shall construct the automatic vehicle classification (AVC) controller cabinet foundation as shown on the plans for Model 332 and 334 cabinets (including furnishing and installing anchor bolts) and shall relocate the existing model 170-based Model 334 controller cabinet on said foundation, and shall make all field wiring connections to the terminal blocks in the controller cabinet. A listing of field conductor terminations for the automatic vehicle classification (AVC) controller cabinet will be supplied to the Contractor at the site of work.

The automatic vehicle classification monitoring assembly shown on the plan to be reused including existing automatic vehicle classification unit, modem and piezoelectric axle sensors shall be protected and kept in good condition.

Inductive loop detector sensors and piezo-electric axle sensors for automatic vehicle classification station and the installation thereof shall conform to the provisions under "Detectors" and "Piezoelectric Axle Sensors" elsewhere in these Special Provisions.

Automatic vehicle classification unit will be maintained by State forces. The Contractor's responsibility shall be limited to that provided for in Section 6-1.02, "State-Furnished Materials," of the Standard Specifications.

Attention is directed to Section 86-2.14C, "Functional Testing," of the Standard Specifications.

10-3.04 COST BREAK-DOWN

Cost break-downs shall conform to the provisions in Section 86-1.03, "Cost-Break-Down," of the Standard Specification and these special provisions

The Contractor shall determine the quantities required to complete the work shown on the plans. The quantities and 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.

No adjustment in compensation will be made in the contract lump sum prices paid for the various electrical work items due to differences between the quantities shown in the cost break-down furnished by the Contractor and the quantities required to complete the work as shown on the plans and as specified in the Standard Specifications and these special provisions.

The sum of the amounts for the units of work listed in the cost break-down for electrical work shall be equal to the contract lump sum price bid for the work. Overhead, and profit shall be included in each individual unit listed in the cost break-down, however, costs for traffic control system shall not be included. Bond premium, temporary construction facilities, plant and other items will not be paid for under the various electrical work items and shall be included in the mobilization bid item for the entire project.

At the Engineer's discretion the approved cost break-down may be used to determine partial payments during the progress of the work and as the basis of calculating the adjustment in compensation for the item or items of electrical work due to changes ordered by the Engineer. When an ordered change increases or decreases the quantities of an approved cost break-down, the adjustment in compensation may be determined at the Engineer's discretion in the same manner specified for increases and decreases in the quantity of a contract item of work in accordance with Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications.

The Engineer shall be furnished a cost break-down for each contract lump sum item of work described in this Section 10-3.

The cost break-down shall be submitted to the Engineer for approval within 15 days after the contract has been approved. The cost break-down shall be approved, in writing, by the Engineer before any partial payment for the items of electrical work will be made.

The cost breakdown shall, as a minimum, include the following items:

foundations - each type
standards and poles - list by each type

conduit and innerduct - list by each size and installation method
pull boxes, communication pull boxes and splice vault - each type
conductors and fiber optic cables - each size and type
service equipment enclosures
signal heads and hardware - each type
loop detectors - each type
luminaires - each type
CCTV cameras assembly and pan/tilt unit
CCTV Camera, data and video node cabinet enclosures
334-TV cabinet
camera control receivers
DS-1 optical modem
video multiplexers/demultiplexers
D4-channel banks
fiber distribution unit
video transmitter
video receivers
splice vault
fiber optic splice closure
twisted pair splice closure
telephone bridges
terminal blocks - each type
testing

10-3.05 EQUIPMENT LIST AND DRAWINGS

A maintenance manual shall be furnished for all installed controller units, CCTV camera, camera receivers and auxiliary equipment. The maintenance manual and operation manual may be combined into one manual. The maintenance manual or combined maintenance and operation manual shall be submitted at the time the controllers are delivered for testing or, if ordered by the Engineer, prior to purchase. The maintenance manual shall include, but need not be limited to, the following items:

(a) Specifications
(b) Design characteristics
(c) General operation theory
(d) Function of all controls
(e) Trouble shooting procedure (diagnostic routine)
(f) Block circuit diagram
(g) Geographical layout of components
(h) Schematic diagrams
(i) List of replaceable component parts with stock numbers

FIELD CABINETS

Each field cabinet connected to the communications system under this contract shall be supplied with the following documentation stored in a re-sealable water resistant folder mounted on the inside of the cabinet door:

CCTV CAMERA
A copy of the as-built video channel assignment table
A copy of the as-built fiber assignment tables
A copy of the as-built twisted pair assignment tables
A copy of the as-built system schematic diagrams
A copy of element reference table

CMS/TMS/RMS

A copy of the as-built wiring diagram for the communications elements at that site
A copy of the as-built data node circuit assignment tables
A copy of the as-built twisted pair assignment tables
A copy of the as-built system schematic diagrams
A copy of element reference table

DATA NODE

A copy of the as-built wiring diagram for the communications elements at that site
A copy of the as-built data node circuit assignment tables
A copy of the as-built fiber assignment tables
A copy of the as-built twisted pair assignment tables
A copy of the as-built system schematic diagrams
A copy of element reference table

VIDEO NODE

A copy of the as-built fiber assignment tables
A copy of the as-built system schematic diagrams

CABLE NODE

A copy of the as-built wiring diagram for the communications elements at that site
A copy of the as-built video channel assignment table
A copy of the as-built data node circuit assignment tables
A copy of the as-built fiber assignment tables
A copy of the as-built twisted pair assignment tables
A copy of the as-built system schematic diagrams
A copy of element reference table

Additional information may be supplied by the Engineer to be used to produce the documentation listed above by adding the related information that applies to the project.

Full compensation for field cabinet documentation shall be included in the lump sum price paid for system testing and documentation and no additional payment will be allowed therefor.

10-3.06 MAINTAINING EXISTING AND TEMPORARY ELECTRICAL SYSTEMS

Traffic signal system shutdowns shall be limited to periods between the hours of 9:00 a.m. and 3:00 p.m.

The Contractor shall carry out work on existing lighting and sign illumination system subject to the following restrictions:

Existing lighting and sign illumination systems shall not be disconnected or disrupted before 9:00 a.m. or after 3:00 p.m. of any day.

The Contractor shall carry out work on existing CMS subject to the following restrictions:

No CMS shall be disconnected or disrupted on a weekend, beginning at 9:00 p.m. Friday evening until 9:00 a.m. Monday morning.

No CMS shall be disconnected or disrupted before 9:00 a.m. or after 10:00 p.m. of any day.

No CMS shall be disconnected or disrupted between the hours of 3:00 p.m. and 7:00 p.m. of any day.

No CMS controller shall be disconnected from AC power for more than 15 minutes in any 24 hour period without written approval from the Engineer.

The Contractor shall carry out work on existing ramp metering system or traffic monitoring station controller subject to the following restrictions:

No ramp metering system or traffic monitoring station controller shall be disconnected or disrupted between the hours of 6:00 a.m. and 9:00 a.m., and from 3:00 p.m. to 7:00 p.m., Monday through Friday.

No ramp metering system or traffic monitoring station controller shall be disconnected from its electrical power for more than 15 minutes in any 24 hour period without prior written approval from the Engineer.

The Contractor shall obtain written approval from the Engineer, not less than 72 hours prior to any testing, disconnection or disruption of service from the existing lighting and sign illumination systems and CMS site.

RAMP METERING AND SURVEILLANCE CONTROLLER RESTRICTIONS

The Contractor shall carry out ramp metering and surveillance controller turn off subject to the following restrictions:

No more than three (3) individual 170 controller locations, each with its own unique controller ID number, as indicated on the plans, shall be subject to disruption at any time during construction .

No ramp metering or surveillance controller shall be disconnected or disrupted between the hours of 6:00 AM and 9:00 AM, and from 3:00 PM to 7:00 PM, Monday through Friday.

No ramp metering or surveillance controller shall be disconnected from its electrical power source for more than 15 minutes in any 24 hour period without prior written approval from the Engineer.

The Contractor shall obtain written approval from the Engineer, not less than two working days prior to any testing, disconnection or disruption of services, from any ramp metering, traffic monitoring , or surveillance controller site.

The tenth paragraph of Section 86-1.05, "Maintaining Existing and Temporary Electrical Systems," of the Standard Specifications is amended to read:

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

10-3.07 EXCAVATION AND BACKFILLING

The third paragraph of Section 86-2.01, "Excavating and Backfilling," of the Standard Specifications is amended to read:

The excavation shall be backfilled in conformance with the provisions in Section 19-3, "Structure Excavation and Backfill." Backfill placed in conduit trenches which are to be outside of slope lines and not under pavement shall be compacted to a relative compaction of not less than 90 percent. Backfill on slopes and in areas where pavement is to be constructed shall be compacted to a relative compaction of not less than 95 percent.

10-3.08 FOUNDATIONS

Foundations for CCTV camera pole shall conform to the provisions on Section 86-2.03, "Foundations," of the Standard Specifications.The first paragraph of Section 86-2.03, "Foundations," of the Standard Specifications is amended to read:

Portland cement concrete shall conform to Section 90-10, "Minor Concrete," of the Standard Specifications and these special provisions except concrete for reinforced pile foundation shall contain not less than 470 pounds of cement per cubic yard. Placement of concrete shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

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

Except when located on structures, foundations for posts, standards and pedestals shall be placed "in the solid" and monolithic except for the top 2 inches which shall be placed after the post, standard or pedestal is in proper position.

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

After each post, standard and pedestal on structures is in proper position, mortar shall be placed under the base plate as shown on the plans. The exposed portions shall be formed to present a neat appearance. Mortar shall consist of one part by volume of portland cement and 3 parts of clean sand, shall contain only sufficient moisture to permit packing and shall be cured by keeping it damp for 3 days.

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

Anchor bars or studs and nuts, except for Type 30 and Type 31 lighting standards, shall conform to ASTM Designation: A 307. Headed anchor bolts for foundations shall conform to the specifications of ASTM Designation: A 307, Grade B with S1 supplementary requirements. At the option of the contractor, nonheaded anchor bolts for foundations shall conform either to the specifications of ASTM Designation: A 307, Grade C or to the provisions in AASHTO Designation: M 314, Grade 36 or 55 with S1 supplementary requirements. When nonheaded anchor bolts conforming to the specifications of ASTM Designation: A 307, Grade C are furnished, the end of each fabricated anchor bolt shall be either coded by end stamping as required in ASTM Designation: A 307 or the end that projects from the concrete shall be permanently coded with a green color by the manufacturer. High strength anchor bolts, bars or studs for Type 30 and Type 31 lighting standards shall conform to ASTM Designation: A 325, A 325M or A 449 and shall comply with the mechanical requirements in ASTM Designation: A 325 or A 325M after galvanizing. Nuts and washers for high strength anchor bolts shall conform to ASTM Designations: A 563 or A 563M, and F 476 or F 476M, respectively. In addition to the requirements in ASTM Designation: A 449, studs shall be marked on either end as required for bolt heads.

10-3.09 STANDARDS, STEEL PEDESTALS AND POSTS

Where the plans refer to the side tenon detail at the end of the signal mast arm, the applicable tip tenon detail may be substituted.

The sign mounting hardware shall be installed at the locations shown on the plans.

The sign panels will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

Handholes for signal standards shall be located 90° clockwise from the traffic signal mast arm.

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.

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

Standards with an outside diameter of 12 inches or less shall be round. Standards with an outside diameter greater than 12 inches shall be round or multisided. Multisided standards shall have a minimum of 12 sides which shall be convex and shall have a minimum bend radius of 4 inches.

10-3.10 CONDUIT

The first, second, third, fourth, and fifth subparagraphs of the first paragraph of Section 86-2.05A, “Material,” of the Standard Specifications are amended to read:

1. Type 1. Hot-dip galvanized rigid steel conduit conforming to the requirements in UL publication UL 6 for Rigid Metallic Conduit. The zinc coating will be tested in conformance with the requirements in ASTM Designation: A 239.
2. Type 2. Hot-dip galvanized rigid steel conduit conforming to Type 1 above and coated with polyvinyl chloride or polyethylene. The exterior thermoplastic coating shall have a minimum thickness of 35 mils.
3. Type 3. Rigid non-metallic conduit conforming to the requirements in the UL Standard for Rigid Non-Metallic Conduit (Publication UL 651). Type 3 conduit shall be installed at underground locations only.
4. Type 4. Liquid tight flexible metal conduit shall consist of conduit with a liquidtight, non-metallic, sunlight-resistant jacket over an inner flexible metal core. Type 4 conduit shall be UL listed for use as the grounding conductor.
5. Type 5. Intermediate steel conduit (IMC) conforming to the requirements in UL Publication 1242 for Intermediate Metallic Conduit. Type 5 conduit shall only be used when specified.

The sixth subparagraph of the third paragraph of Section 86-2.05B, "Use," of the Standard Specifications is amended to read:

6. From an overhead sign to the adjacent pull box shall be size 2”.

Conduit, to be installed underground shall be Type 1, unless otherwise specified. Detector termination conduits shall be Type 1.

Type 3 conduit shall be used for communication trunk line, including runs in elevated concrete slabs, except as shown on the plans, and shall not be exposed in any areas.

Communication conduit shall be installed by the methods shown on the plans except as specified in these special provisions and as directed by the Engineer. A flat, woven, lubricated, polyester tape with a minimum tensile strength of 1800 pounds shall be placed in all conduits. At least 4 feet of tape shall extend beyond the termination. The tape shall be marked with sequential distances not less than every 39 inches.

The conduit in a foundation and between a foundation and the nearest pull box shall be Type 1.

Conduits containing fiber optic cable shall be the rigid non-metallic type, except as shown on the plans.

Conduit from a splice vault or pull box to the conduit enclosure on a bridge structure shall be the rigid steel type and extend 18 inches inside the conduit enclosure.

When communicationconduit is installed in a trench, after the bedding material is placed and conduit installed, the trench shall be backfilled with commercial quality concrete, containing not less than 376 pounds of portland cement per cubic yard, to not less than 4 inches above the conduit before additional backfill material is placed.

When conduit is placed in a trench under paved shoulders, after the bedding material is placed and conduit installed, the trench shall be backfilled with cement slurry backfill as specified above to within 0.10 foot of existing shoulder surface.

Conduits located within the same trench shall have not less than 2-inches separation.

Trenches shall be less than or equal to 8 inches width.

Immediately prior to installing conductors, cables and innerducts, all conduits shall be blown out with compressed air until all foreign material in removed. After conductors and cables 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.

Conduit shall not be installed by trenching along the pavement of freeway lanes except in those section of the highway where there is insufficient clearance to locate a longitudinal trench off the traveled way, or where obstructions off the traveled way would necessitate bends in the conduits in excess of those allowed.

Where conduits are shown on the plans to be installed parallel and adjacent to each other, they shall be installed together in a common trench as shown on the conduit installation details. Should the Contractor choose to install the conduits in separate trenches, only the "shared trench" quantities of trenching will be paid.

Power conduits placed in the same trench as communication conduits shall not terminate in communication pull boxes or splice vault.

Communication conduits shall not terminate in pull boxes containing power conductors.

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.

Trenching method shall not be allowed across freeway lanes, connectors, or ramps.

The eleventh paragraph of Section 86-2.05C, "Installation," of the Standard Specifications is amended to read:

> A No. 12 copper pull wire or a pull rope shall be installed in conduits which are to receive future conductors. The pull rope shall consist of a flat, woven, lubricated, soft-fibered polyester tape with a minimum tensile strength of 500 pounds and shall have printed sequential measurement markings at least every 3 feet. At least 2 feet of pull wire or rope shall be doubled back into the conduit at each termination.

The last subparagraph in the eighteenth paragraph of Section 86-2.05C, "Installation," of the Standard Specifications is amended to read:

> All excavated areas in the pavement shall be backfilled, except for the top 0.10-foot by the end of each work period. The top 0.10-foot shall be placed within 3 calendar days after trenching.

COMMUNICATION CONDUIT

Communication conduit shall conform to the provisions in Section 86-2.05, "Conduit," of the Standard Specifications and these special provisions.

Conduit shall enter splice vaults and pull boxes through knockouts. Conduits entering the ends of these boxes shall be vertically and horizontally aligned with the conduits at the opposite end of the box. Conduit ends shall not extend beyond the interior wall face of splice vaults and pull boxes. The space around conduits through end walls of splice vaults and pull boxes shall be filled with portland cement mortar conforming to the provisions in Section 51-1.135, "Mortar," of the Standard Specifications. In no case shall a conduit body or pull box be used in lieu of a specified bend to change the direction of the communication conduit run, except where specified.

No bends shall be placed in a section of conduit in excess of those indicated in the plans without the approval of the Engineer. The total degrees of bending in a section of conduit between pull boxes shall not exceed a total of 180 degrees, except where specified otherwise.

Changes in indicated conduit bends may be made in order to suit field conditions, as long as the change reduces the degree of the bend or increases the radius of the bend. In no case shall be degree of bending be increased without the approval of the Engineer.

Minimum bending radius for 2-inch communication conduit shall be 24 inches and minimum bending radius for 4-inch communication conduit shall be 48 inches. Bends of greater than 22 degrees shall be factory bends and bends greater than 45 degrees shall be galvanized rigid steel with any necessary adapters.

Deflections from the indicated communication conduit routing to avoid obstructions shall not exceed one inch per foot. Conduit from the typical trench sections shall not deflect by more than one inch per foot from the alignment preceding or following pull boxes and splice vaults.

Adjacent to overcrossings or bridge foundations, the Contractor shall trench and install conduit in the shoulder as close as possible to the edge of traveled way and so that a minimum of 5 feet from the outside face of footing or pile cap is maintained.

FIBERGLASS CONDUIT

Fiberglass conduit shall conform to the following specifications.

GENERAL: Fiberglass conduit and components shall comply with the specifications in ANSI/NEMA Standards Publication TC-14A or TC-14B. Fiberglass conduit components shall be free of defects including delaminations, foreign inclusions, etc. Fiberglass conduit components shall be nominally uniform (as commercially practical) in color, density, and physical properties. Fiberglass conduit shall be straight and the ends shall be cut square and true.

CONDUIT SIZES: Fiberglass conduit shall be supplied in 20-foot minimum lengths.

SYSTEM COMPONENTS: Fiberglass conduit components shall include compatible fittings, adapters, expansion joints, and factory bends at nominal radii of 2, 3, and 4 feet for size 2-inch, 3-inch and 4-inch, respectively.

MATERIAL: Fiberglass conduit system components shall be produced from heat cured, corrosion resistant epoxy resin and continuous fiberglass rovings. Materials shall be manufactured for use at temperatures from (-40°F to 230°F). Fiberglass conduit components shall be manufactured using a homogeneously dispersed UV inhibitor. When exposed to direct diurnal sunlight, the UV inhibitor shall prevent the degradation of all physical material properties, except for surface cosmetic appearance. Materials shall contain no halogens above trace levels and shall be fire resistant.

JOINING METHOD: Joints shall be water tight and withstand a minimum 1,000 pounds of pullout tension.

STIFFNESS: Under a load of 90 pounds per linear foot of conduit, the deflection of the inside diameter shall not exceed 5 percent.

IMPACT RESISTANCE: The minimum impact resistance values for the fiberglass conduit shall be as follows when measured as described in ASTM Designation: D2444-70, using a 20 pound. tup "B" with a 2-inch radius nose.:

2" conduit	30 ft. -lbs.
3" conduit	50 ft. -lbs.
4" conduit	80 ft. -lbs.

1-1/4-INCH INNERDUCT

Wherever fiber optic cable is used, except breakout cable, innerduct shall be installed to provide protection for the fiber optic cable. A separate innerduct shall be installed for each SM fiber optic cable along the communications trunk mainline as shown on the plans. A single innerduct may be used for multiple fiber optic cables in communications branch lines using 3-inch conduit or as shown on the plans.

All innerduct shall be 1-1/4-inch smooth, ribbed or corrugated high tensile polyethylene duct. Innerduct shall have the following characteristics:

Inner diameter ≥ 1-1/4 inch, nominal.
Environmental stress crack resistance in excess of 2000 hours at 148˚ F., no failures.
Cold impact resistance to -105°F not brittle until -148°F.
Minimum tensile strength of 600 pounds for finished product.
Minimum crush strength of 650 pounds.

Coefficient of friction shall be less than 0.4 unlubricated on nonmetallic conduit and with common polyethylene cable jackets.

Different innerducts within the same conduit shall be different colors, and consistent throughout the project. The colors shall be yellow for 60 SMFO cable used for multiplexed video/data and a contrasting color approved by the Engineer for the 12 SMFO cable used for CCTV camera to video distribution. The exterior of the innerduct shall be marked with sequential measurement markings each foot.

Innerduct shall be installed using a cable pulling lubricant recommended by the innerduct manufacture and a non-abrasive pull tape conforming to the provisions in "Conduit" of these special provisions. If innerduct is to be installed with adjacent cables in the same conduit, the innerduct and the cable shall be installed together in one operation. All ends shall be smoothed to prevent scraping of the cable. The dynameometer shall be used to record installation tension and a tension limiting device shall be used to prevent exceeding the maximum pulling tension during installation. The tension shall be set to the manufacturer's maximum limit. The pulling tension shall be recorded for each innerduct run. The innerduct shall not be stressed beyond the minimum bending radius allowed by either the innerduct or fiber optic cable manufacturer.

Immediately prior to installing cables, innerduct shall be blown out with compressed air until all foreign material is removed. After cables have been installed, the ends of innerducts shall be sealed with an approved type of sealing compound.

CONDUIT AND INNERDUCT SEALING PLUGS

Conduit plugs shall be removable and reusable. Plugs shall be preformed commercial plugs that prevent the passage of dirt water and gas into conduit and Innerduct. Plugs sealing conduit or innerduct containing cable or conductors shall be the split type that permits installation or removal without removing cables or conductors.

Sealing plugs that seal conduits containing innerducts or cables shall seal all innerducts or cables simultaneously with one self-contained assembly having an adjustable resilient filler of neoprene or silicone rubber clamped between backing plates and compressed with stainless steel hardware. To provide suitable sealing between varying cable sizes and innerducts, split neoprene or silicone rubber adapting sleeves, used singularly or in multiples shall be inserted within the body of the plug.

Sealing plugs that seal innerducts containing cable or conductors shall seal cable or conductors simultaneously with one self-contained assembly having an adjustable resilient filler of neoprene or silicone rubber clamped between backing plates and compressed with stainless steel hardware. To provide suitable sealing between varying cable sizes and innerducts, split neoprene or silicone rubber adapting sleeves, used singularly or in multiples shall be inserted within the body of the plug.

Sealing plugs that seal empty conduits or innerducts shall have an eye or other type of capturing device (on the side of the plug to the inside of the conduit or innerduct) to attach the pull tape or pull rope so that it will be easily accessible when the plug is removed.

Sealing plugs shall be capable of withstanding a pressure of 15 psi.

Full compensation for sealing plugs shall be considered to be included in the price paid per linear foot for the various sizes of conduit and innerduct involved and no separate payment will be made therefor.

10-3.11 WARNING TAPE

Warning tape shall be furnished and installed in the trench, over new conduits to receive fiber optic cable, as shown on the plans. The warning tape shall consist of 4-inch wide bright orange pigmented polyolifin film with a bold printed message of approximately 3/4-inch black characters on one side. The message shall be: "CAUTION. BURIED FIBER OPTIC CABLE - CALTRANS (213) 897-0340", repeated at approximately 36-inch intervals. The tape shall be placed with the warning side up.

The warning tape shall not delaminate nor shall the message smear when wet. The tape and the printed message shall be resistant to insects and shall not degrade when exposed to alkalis, acids and other corrosive elements commonly found in soil. It shall have a minimum of 80 pounds tensile strength and a minimum of 700 percent elongation before breakage.

Warning tape shall be Condux International, Inc.; Allen System, Inc.; Reef Industries, Inc., or equal.

Full compensation for warning tape shall be considered as included in the contract price paid per linear foot for the various sizes of conduit involved and no separate payment will be made therefor.

10-3.12 COLORED CONCRETE BACKFILL

Slurry concrete backfill for the installation of conduits that will contain FO cable shall be a medium to dark, red or orange color to clearly distinguish the concrete backfill from other concrete and soil. Concrete shall be pigmented by the addition of commercial quality cement pigment to the concrete mix. The red or orange concrete pigment shall be LM Scofield Company; Orange Chromix Colorant; Davis Colors; or equal.

For trenches in pavement areas, only the top 4 inches of concrete backfill will be required to be pigmented concrete. At the option of the Contractor, the full depth may have the pigment.

Full compensation for colored concrete backfill shall be considered as included in the price paid per linear foot for the various sizes of conduit involved and no separate payment will be made therefor.

10-3.13 PULL BOXES

The first paragraph of Section 86-2.06C, "Installation and Use," of the Standard Specifications is amended to read:

86-2.06C Installation and Use. Pull boxes shall be installed at the location shown on the plans and shall be spaced at no more than 200-foot intervals. The Contractor may, at the Contractor's expense, install additional pull boxes to facilitate the work.

The second paragraph of Section 86-2.06C, "Installation and Use," of the Standard Specifications is amended to read:

The bottoms of pull boxes installed in the ground or in sidewalk areas, shall be bedded in crushed rock as shown on the plans and shall be grouted prior to the installation of conductors. The grout shall be between 0.5-inch and one inch thick and shall be sloped toward the drain hole. A layer of roofing paper shall be placed between the grout and the crushed rock sump. A one inch drain hole shall be provided in the center of the pull box through the grout and the roofing paper. Grout shall be placed in between the pull box and pull box extension as shown on the plans.

Pull boxes for communication system routing will be measured as units determined from actual count in place. Pull boxes to be paid for as units shall be those units designated on the plans or ordered by the Engineer.

Additional pull boxes for communication system routing shall not be installed without the Engineer's written approval. All pull boxes for communication system routing shall be installed in the unpaved area immediately adjacent to the paved shoulder or behind guard rail or to be determined by the Engineer. Communication conduit shall be directed from the shoulder to the boxes with 15 degree (maximum) sweeps. Dikes disturbed by communication conduit installation shall be replaced in kind,. and will be paid for as extra work as provided in Section 4-l.03D of the Standard Specifications.

TRAFFIC PULL BOXES

Attention is directed to Section 86-2.06B, "Cover Marking," and Section 86-2.06C, "Installation and Use," of the Standard Specifications. In addition, traffic pull boxes and covers shall have a vertical proof-load strength of 25,000 pounds. The 25,000 pound load shall be distributed through a 9" x 9” x 2" steel plate according to Federal Specification RR-F-621e. This load shall be placed anywhere on the box and cover for a period of one minute without causing any cracks or permanent deformations.

The No. 3 1/2(T) and No. 5(T) pull boxes shall be reinforced with a galvanized Z-bar welded frame and cover similar to that shown on the plans for No. 6(T) pull boxes. Frames shall be anchored to the boxes by means of 1/4-inch x 2 1/4-inch long concrete anchors. Four concrete anchors shall be provided for the No. 3 1/2(T) pull box, one placed in each corner. Six concrete anchors shall be provided for each No. 5(T) and No. 6(T) pull box, one placed in each corner and one placed near the middle of each of the longer sides.

Hold down screws shall be 3/8-inch hex flange cap screws of Type 316 stainless steel. The nut shall be zinc plated carbon steel and shall be made vibration resistant with a wedge ramp at the root of the thread. The nut shall be spot welded to the underside of, or fabricated with, the galvanized Z-bar pull box frame.

Steel covers shall be countersunk approximately 1/4-inch to accommodate the bolt head. The bolt head shall not extend more than 1/8-inch above the top of the cover when tightened down. A 1/4-inch tapped hole and brass bonding screw shall be provided.

Concrete placed around and under traffic pull boxes as shown on the plans shall contain a minimum of 564 pounds of portland cement per cubic yard.

After the installation of traffic pull boxes, the steel covers shall be installed and kept bolted down during periods when work is not actively in progress at the pull box. When placing the steel cover for the final time, the cover and the Z-bar frame shall be cleaned of all debris and securely tightened down.

10-3.14 COMMUNICATION PULL BOXES

Communication pull boxes and covers shall have a vertical proof-load strength of 25,000 pounds. The 25,000 pound load shall be distributed through a 9" x 9" x 2" steel plate according to Federal Specification RR-F-621e. This load shall be placed anywhere on the box and cover for a period of one minute without causing any cracks or permanent deformations.

The communication pull boxes shall be reinforced with a galvanized Z-bar welded frame and cover similar to that shown on the plans for No. 6(T) pull boxes. Frames shall be anchored to the boxes by means of 1/4-inch x 21/4-inch long concrete

anchors. Six concrete anchors shall be provided for each communication pull box, one placed in each corner and one placed near the middle of each of the longer sides.

Hold down screws shall be 3/8-inch hex flange cap screws of Type 316 stainless steel. The nut shall be zinc plated carbon steel and shall be made vibration resistant with a wedge ramp at the root of the thread. The nut shall be spot welded to the underside of, or fabricated with, the galvanized Z-bar pull box frame.

Steel covers shall be countersunk approximately 1/4-inch to accommodate the bolt head. The bolt head shall not extend more than 1/8-inch above the top of the cover when tightened down. A 1/4-inch tapped hole and brass bonding screw shall be provided.

Communication pull boxes shall have " CALTRANS COMMUNICATION" marking on the steel cover.

The opening of communication pull boxes shall have the following dimensions.

Pull Box Type	Width (±one-inch)	Length (±one-inch)
Communication	17 inches	30 inches

Concrete placed around and under communication pull boxes as shown on the plans shall contain a minimum of 564 pounds of cement per cubic yard.

After the installation of communication pull boxes, the steel covers shall be installed and kept bolted down during periods when work is not actively in progress at the pull box. When placing the steel cover for the final time, the cover and the Z-bar frame shall be cleaned of all debris and securely tightened down.

Communication pull boxes shown on the plans in the shoulder are shown for general location only. Exact location shall be outside the paved shoulder.

Communication pull boxes will be measured as units determined from actual count in place. Communication pull boxes to be paid for as units shall be those units designated on the plans or ordered by the Engineer.

10-3.15 SPLICE VAULTS

Splice vaults shall be 60" L x 30" W x 30" D nominal inside dimensions and shall conform to Section 86-2.06, "Pull Boxes," of the Standard Specifications and these special provisions. Covers shall be in one or 2 sections. Hold down bolts or cap screws and nuts shall be of brass, stainless steel or other non-corroding metal material. Each cover portion shall have inset lifting pull slots. Cover marking shall be "CALTRANS COMMUNICATION" on each cover section. Enclosures, covers and extensions shall be concrete gray color. Vaults and covers may be constructed of reinforced portland cement concrete or of non-PCC material.

Non-PCC vaults and covers shall be of sufficient rigidity that when a 100-pound concentrated force is applied perpendicularly to the midpoint of one of the long sides at the top while the opposite long side is supported by a rigid surface, it shall be possible to remove the cover without the use of tools. When a vertical force of 1,500 pounds is applied, through a 1/2-inch by 3-inch by 6-inch steel plate, to a non-PCC cover in place on a splice vault, the cover shall not fail and shall not deflect more than 1/4-inch.

Splice vaults shall be installed as detailed and where shown on the plans. Splice vaults and covers shall have an AASHTO HS 20-44 rating, except the splice vaults installed in the following situations, may be rated for AASHTO H5 loads (25 percent of HS 20-44):

a. Behind structures, retaining walls, barrier railing or guard railing.
b. In sidewalk areas.
c. In other areas protected from vehicular traffic as directed by the Engineer.

Splice vaults shall be installed at grade in paved areas, and one-inch above grade in unpaved areas.

Splice vaults shown on the plans in the shoulder are shown for general location only. Exact location shall be outside the paved shoulder.

Metallic or non-metallic cable racks shall be installed on the interior of both sides of the splice vaults. The rack shall be capable of supporting a load of 100 pounds, minimum, per rack arm. Racks shall be supplied in lengths appropriate to the box in which they will be placed. Rack arms shall not be less than 6 inches in length. All metallic cable racks shall be fabricated from ASTM Designation: A36 steel plate and shall be hot-dip galvanized after fabrication. Steel plate, hardware and galvanizing shall be in accordance with the requirements of Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

10-3.16 CONDUCTORS AND WIRING

Splices shall be insulated by "Method B" or, at the Contractor's option, splices of conductors shall be insulated with heat-shrink tubing of the appropriate size after thoroughly painting the spliced conductors with electrical insulating coating.

The minimum insulation thickness, at any point, for Type USE, RHH or RHW wire shall be 1/25 inch for conductor sizes No. 14 to No. 10, inclusive, and 1/18 inch for No. 8 to No. 2, inclusive. The minimum insulation thickness, at any point, for Type THW and TW wires shall be 1/32 inch for conductor sizes No. 14 to No. 10, inclusive, 1/25 inch for No. 8, and 1/18 inch for No 6 to No 2, inclusive.

SIGNAL INTERCONNECT CABLE

Signal Interconnect Cable (SIC) shall be the 7#14 AWG as shown on the plans.

Section 86-2.08, "Conductors," of the Standard Specification is amended by adding the following paragraph:

A Certificate of Compliance conforming to the provisions of Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be submitted by the manufacturer with each type of cable to be used on the project.

Section 86-2.08A, "Conductor Identification," of the Standard Specifications is amended to read:

86-2.08A Conductor Identification

Circuit	Signal Phase or Function	Identification			Size
		Insulation Colors[k]		Band Symbols[f]	
		Base	Stripe[a]		
Vehicle Signals[d]	2,6	Red, Yel, Brn	Blk	2,6	14
	4,8	Red, Yel, Brn	Ora	4,8	14
	1,5	Red, Yel, Brn	None	1,5	14
	3,7	Red, Yel, Brn	Pur	3,7	14
	Ramp Meter 1	Red, Yel, Brn	None	NBR	14
	Ramp Meter 2	Red, Yel, Brn	Blk	NBR	14
Pedestrian Signals[d]	2p,6p	Red, Brn	Blk	2p,6p	14
	4p,8p	Red, Brn	Ora	4p,8p	14
	1p,5p	Red, Brn	None	1p,5p	14
	3p,7p	Red, Brn	Pur	3p,7p	14
Pedestrian Push Buttons[d]	2p,6p	Blu	Blk	P-2,P-6	14
	4p,8p	Blu	Ora	P-4,P-8	14
	1p,5p	Blu	None	P-1,P-5	14
	3p,7p	Blu	Pur	P-3,P-7	14
Traffic Signal Controller Cabinet	Ungrounded between Service	Blk	None	CON-1	6
	Switch & Cabinet	Red	None	CON-2	6
Highway Lighting Pull Box to Luminaire[i]	Ungrounded-Line 1	Blk	None	NBR	14
	Ungrounded-Line 2	Red	None	NBR	14
	Grounded	Wht	None	NBR	14
Multiple Highway Lighting	Ungrounded-Line 1	Blk	None	ML1	10
	Ungrounded-Line 2	Red	None	ML2	10

Lighting Control	Ungrounded to PEU	Blk	None	C1	14
	Switching leg from PEU unit or SM transformer	Red	None	C2	14
Multiple Service	Ungrounded-Line 1 (Signals)	Blk	None	NBR[e]	6
	Ungrounded-Line 2 (Lighting)	Red[j]	None	NBR[e]	8
Sign Lighting[h]	Ungrounded-Line 1	Blk	None	SL-1	10
	Ungrounded-Line 2	Red	None	SL-2	10
Flashing Beacons[g]	Ungrounded between Flasher and Beacons	Red or Yel	None	F-Loc. c	14
Grounded and Common	Pedestrian Push Buttons	Wht	Blk	NBR	14
	Signals and Multiple Lighting	Wht	None	NBR	10
	Flashing Beacons and Sign Lighting	Wht	None	NBR	12
	Lighting Control	Wht	None	C-3	14
	Multiple Service	Wht	None	NBR	14
Railroad Pre-Emption		Blk	None	R	14
Spares		Blk	None	NBR	14

NBR = No Band RequiredPEU=Photoelectric unit

a On overlaps, insulation is striped for first phase in designation. E.g., phase (2+3) conductor is striped as for phase 2.
b Band for overlap and special phases as required.
c Flashing beacons having separate service do not require banding.
d These requirements do not apply to signal cable.
e "S" if circuit is switched on line side of service equipment by utility.
f Band conductors in each pull box and near ends of termination points. On signal light circuits, a single band may be placed around 2 or 3 ungrounded conductors comprising a phase.
g Ungrounded conductors between service switch and flasher mechanism shall be black and banded.
h Conductors between ballasts and sign lighting lamps shall be No. 16 and color shall correspond to the ballast leads.
i Both conductors between external high intensity discharge (H.I.D.) ballast and lamp socket shall be black.
j Black acceptable for size No. 2 and larger. Tape ends for 20” with indicated color.
k Color Code: Yel-Yellow, Brn-Brown, Blu-Blue, Blk-Black, Wht-White, Ora-Orange, Pur-Purple.

All single conductors and cables, except detector lead-in cables, shall have clear, distinctive and permanent markings on the outer surface throughout the entire length showing the manufacturer's name or trademark, insulation type letter designation, conductor size, voltage rating and the number of conductors in a cable.

Conductor insulation shall be of a solid color or of basic colors with a permanent colored stripe as detailed in the above table unless otherwise specified. Solid or basic colors shall be homogeneous through the full depth of insulation. Identification stripes shall be continuous over the entire length of the conductor. For conductor sizes No. 2 and larger, the insulation may be black and the ends of the conductors shall be taped with electrical insulating tape of the required color for a minimum of 20 inches.

The first paragraph of Section 86-2.08B, "Multiple Circuit Conductors," of the Standard Specifications is amended to read:

86-2.08B Multiple Circuit Conductors.— Conductors for multiple circuits shall be UL or ETL listed and rated for 600-V operation. The insulation for No. 14 through No. 4 conductors shall be one of the following:

1. Type TW polyvinyl chloride conforming to the requirements in ASTM Designation: D 2219.

2. Type THW polyvinyl chloride.
3. Type USE, Type RHH or Type RHW cross-linked polyethylene.

The second paragraph of Section 86-2.08B, “Multiple Circuit Conductors,” of the Standard Specifications is amended to read:

At any point, the minimum thickness of any Type TW, THW, USE, RHH or RHW insulation shall be 1/18-inch for conductor sizes No. 14 to No. 10, inclusive, and 1/16-inch for No. 8 to No. 2 inclusive.

The third paragraph of Section 86-2.08B, “Multiple Circuit Conductors,” of the Standard Specifications is amended to read:

The insulation for No. 2 and larger conductors shall be one of the types listed above or shall be Type THWN.

The forth paragraph of Section 86-2.08B, “Multiple Circuit Conductors,” of the Standard Specifications is amended to read:

Conductors for wiring wall and soffit luminaires shall be stranded copper, with insulation rated for use at temperatures up to 125°C.

The fifth paragraph of Section 86-2.08B, "Multiple Circuit Conductors," of the Standard Specifications is amended to read:

Overhead lighting conductors shall be No. 8, or larger, medium hard drawn copper with weatherproof covering.

Section 86-2.08C, "Series Circuit Conductors," of the Standard Specifications is amended to read:

86-2.08C Series Circuit Conductors.—Conductors for series circuits shall be No. 8, shall be rated for 500-V operation and shall be insulated 150 mils minimum thickness polyvinyl chloride conforming to the requirements in ASTM Designation: D 2219, or polyethylene conforming to the requirements in ASTM Designation: D1351.

The first paragraph of Section 86--.08D, "Signal Cable," of the Standard Specifications is amended to read:

86-2.08D Signal Cable.— Where shown on the plans, signal cable shall be installed in lieu of individual conductors. Signal cable shall not be spliced, except for the 28-conductor signal cable when it is shown on the plans to be spliced.

The second paragraph of Section 86-2.08D, “Signal Cable,” of the Standard Specifications is amended to read:

Each signal cable, except 28-conductor, shall be marked, in each pull box, showing the signal standard to which it is connected.

The first paragraph of the fourth subsection entitled "Twelve-Conductor Cable (12CSC)," of Section 86-2.08D, "Signal Cable," of the Standard Specifications is amended to read:

Twelve-Conductor Cable.— The 12-conductor signal cable shall consist of eleven No. 14 conductors and one No. 12 conductor. The cable jacket shall have a minimum average thickness of 1/16-inch and shall have a minimum thickness at any point of 3/64-inch. The nominal outside diameter of the cable shall not exceed 25/32-inch. The color code for the No. 12 conductor shall be white. The color code and functional connections for the No. 14 conductors shall be as follows, unless otherwise approved by the Engineer:

The first paragraph of Section 86-2.09, "Wiring," of the Standard Specifications is amended to read:

86-2.09 Wiring.— Conductors shall be run in conduit, except overhead and temporary installations and where conductors are run inside poles. Wiring shall be done in conformance with the regulations and code listed in Section 86-1.02, "Regulations and Code," and the following additional requirements:

The second paragraph of Section 86-2.09A, "Circuitry," of the Standard Specifications is amended to read:

Traffic signal indication conductors shall not run to a terminal block on a standard unless they are to be connected to a signal head that is mounted thereon.

The third paragraph of Section 86-2.09B, "Installation," of the Standard Specifications is amended to read:

When new conductors are to be added or existing conductors are to be removed from existing conduit, all conductors shall be removed; the conduit shall be cleaned as provided in Section 86-2.05C, "Installation," and both old and new conductors, as shown on the plans, shall be pulled into the conduit as a unit.

Section 86-2.09C, "Connectors and Terminals," of the Standard Specifications is amended by adding the following paragraph:

Connectors and terminal lugs for conductor sizes No.8 and smaller shall be soldered by the hot iron, pouring or dipping method. Open flame soldering will not be permitted.

The fifth subparagraph of the first paragraph of Section 86-2.09D, "Splicing and Terminations," of the Standard Specifications is amended to read:

5. Ungrounded traffic signal indication conductors to a terminal compartment or signal head on a standard may be spliced to through conductors of the same phase in the pull box adjacent to the standard.

The first sentence of the tenth paragraph of Section 86-2.09E, "Splice Insulation," of the Standard Specifications is amended to read:

The Contractor may, at the Contractor's option, use either of the following splice insulation methods:

The first paragraph of Section 86-2.10, "Bonding and Grounding," of the Standard Specifications is amended to read:

86-2.10 Bonding and Grounding.— Metallic cable sheaths, metal pull box covers, metal conduit, equipment grounding conductors, ballast and transformer cases, service equipment, sign switches and metal poles and pedestals shall be made mechanically and electrically secure to form a continuous system, and shall be effectively grounded. Bonding jumpers shall be copper wire or copper braid of the same cross sectional area as No. 6 for series lighting systems and No. 8 or larger for all other systems. The jumper size shall be increased to match the load or the circuit breaker size, or shall be as shown on the plans. Equipment grounding conductors shall be color coded to Code requirements or shall be bare.

The second paragraph of Section 86-2.10, "Bonding and Grounding," of the Standard Specifications is amended to read:

The bonding jumper in standards with handholes and traffic pull box lid cover shall be attached by a 3/16-inch 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 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 cap has been placed on foundation.

The sixth paragraph of Section 86-2.10, "Bonding and Grounding," of the Standard Specifications is amended to read:

For equipment grounding purposes in Type 3 conduit, a No. 6 copper wire shall be run continuously in circuits used for series lighting, and a No. 8, minimum, copper wire shall be run continuously in all other circuits. The bonding wire size shall be increased to match the circuit breaker size, or shall be as shown on the plans. Where Type 3 conduit is to be installed for future conductors, the copper wire may be omitted. Equipment bonding and grounding conductors are not required in conduits which contain only loop lead-in cable or signal interconnect cable or both.

The seventh paragraph of Section 86-2.10, "Bonding and Grounding," of the Standard Specifications is amended to read:

At each multiple service disconnect location, a ground electrode shall be furnished and installed. Ground electrodes shall be one-piece, 10-foot, minimum, lengths of galvanized steel rod or pipe not less than 3/4-inch in diameter, or of copper clad steel rod not less than 5/8-inch in diameter. Ground electrodes shall be installed in conformance with the

provisions of the Code. The service equipment shall be bonded to the ground electrode by use of a ground clamp or exothermic weld and No. 6 or larger copper wire enclosed in a size 16 or larger diameter conduit.

TELEPHONE CABLE

Telephone cable shall consist of 4 No. 18 AWG conductors with braided copper shield and an outer jacket. Each conductor shall have a minimum of 16 tinned copper strands. Conductor insulation shall be rubber or thermoplastic rated for 600 V. Insulation of the four conductors shall be color coded with one each of the following colors:

Black, white, red and green.

Jacket shall be neoprene, polyethylene or polyvinyl chloride with a nominal thickness 0.035 inches. Outside diameter of the cable shall not exceed 0.35-inches.

The telephone cable for ramp metering system and automatic vehicle classification station shall be terminated on terminal boards in the ramp metering and traffic monitoring station controller cabinets with the shield bonded to the ground bus. Approximately 2 feet of cable shall be neatly coiled in the telephone demarcation boxes for the traffic monitoring station controller cabinets. The telephone cable shall be run from controller cabinets to telephone demarcation boxes without splices, except in runs greater than 1000 feet in length, where splices will be permitted at 500-foot intervals.

SCREENED TRANSMISSION CABLE

Screened transmission cable (STC) shall be RG-58C/U coaxial cable. Cable shall be rated for direct burial. Sufficient cable to reach the nearest pull box will be supplied with each Piezo-electric axle sensor. The Contractor shall be responsible for supplying additional cable required to reach the existing Model 334-controller cabinet and for splicing the new cables to the existing cables.

Splices of screened transmission cable shall be made with appropriate splice kits as recommended by the piezoelectric axle sensor manufacturer and as approved by the Engineer. Examples of available splice kits are the Focus Ruggedized Splice Kit and the 3M Scotch #82-F1 Flexible Power Cable Inline Splicing Kit. Other splice kits may be used with the approval of the Engineer.

Fiber optic cable and twisted pair cable are provided for elsewhere in these special provisions.

10-3.17 SERVICE

Continuous welding of exterior seams in service equipment enclosures is not required.

Each service shall be provided with up to 2 main circuit breakers which shall disconnect ungrounded service entrance conductors. Where the "Main" circuit breaker consists of 2 circuit breakers as shown on the plans or required in the special provisions, each of the circuit breakers shall have a minimum interrupting capacity of 42,000 amperes, rms.

The fifth sentence of the seventh paragraph of Section 86-2.11, "Service," of the Standard Specifications is amended to read:

Multiple-pole breakers shall be the internal trip type.

Section 86-2.11, "Service," of the Standard Specifications is amended by adding the following paragraph:

A barrier type terminal block rated for 40 A, minimum, shall be provided in each service equipment enclosure. The terminal block shall have a minimum of 12 positions with terminals rated at Size No. 8 or larger, to accept the field wires indicated on the plans. Field wires shall be terminated using crimped, insulated loop connectors.

The ninth paragraph of Section 86-2.11, "Service," of the Standard Specifications is amended to read:

Types II and III service equipment enclosures shall be fabricated from galvanized sheet steel, or fabricated from sheet steel and zinc or cadmium plated after fabrication, or shall be fabricated from aluminum. Fabrication of service equipment enclosures shall conform to the provisions in Section 86-3.04A, "Cabinet Construction." Steel enclosures shall be painted in conformance with the provisions in Section 86-2.16, "Painting." Overlapping exterior seams and doors shall meet the requirements for Type 3R enclosures specified in the NEMA Enclosure Standards.

Service conduits between the utility owned power poles and the service equipment enclosures shall not be installed until service locations have been verified by the serving utility.

Where a new service is to be installed, the Contractor shall notify the Engineer in writing at least 5 working days prior to the date service is required.

10-3.18 TESTING

The first paragraph of Section 86-2.14A, "Materials Testing," of the Standard Specifications is amended to read:

86-2.14A Materials Testing.— Material and equipment to be tested shall be delivered to either the Transportation Laboratory or a testing location designated by the Engineer. Acceptance testing will be performed by the State.

The second paragraph of Section 86-2.14A, "Materials Testing," of the Standard Specifications is amended to read:

The Contractor shall allow 30 calendar days for State testing from the time the material or equipment is delivered to the State test site. All shipping, handling, and related transportation costs associated with testing shall be borne by the Contractor. When equipment being tested has been rejected for failure to comply with the specifications, the Contractor shall allow 30 calendar days for State retesting. The retesting period shall begin when the corrected equipment is made available at the test site.

The third paragraph of Section 86-2.14A, "Materials Testing," of the Standard Specifications is amended to read:

In the event equipment submitted for testing does not comply with specifications, the Contractor shall remove the equipment within 5 working days after notification that the equipment is rejected. In the event the equipment is not removed within that period, it may be shipped to the Contractor at the Contractor’s expense.

The forth paragraph of Section 86-2.14A, "Materials Testing," of the Standard Specifications is amended to read:

All testing subsequent to rejection of the equipment for failure to comply with specification requirements will be at the expense of the Contractor. Deductions to cover the cost of that testing will be made from any moneys due or which may become due the Contractor under the contract.

The fifth paragraph of Section 86-2.14A, "Materials Testing," of the Standard Specifications is amended to read:

The Contractor will be notified when testing of the equipment has been completed and it shall be the Contractor's responsibility to pick-up the equipment at the test site and deliver the equipment to the site of the work.

The sixth paragraph of Section 86-2.14A, "Materials Testing," of the Standard Specifications is amended to read:

Testing and quality control procedures for Model 170 and Model 2070 controller assemblies shall conform to the requirements in "Transportation Electrical Equipment Specifications," and "Traffic Signal Control Equipment Specifications," issued by the State of California, Department of Transportation, and to all addenda thereto current at the time of project advertising.

The seventh paragraph of Section 86-2.14A, "Materials Testing," of the Standard Specifications is amended to read:

Testing and quality control procedures for all other traffic signal controller assemblies shall conform to the requirements in the NEMA TS Standards for Traffic Control Systems.

FUNCTIONAL TESTING

Section 86-2.14C, "Functional Testing," of the Standard Specifications is amended by adding the following paragraph.

Acceptance of new or modified traffic signals shall be made only after all traffic signal circuits have been thoroughly tested.

10-3.19 PAINTING

The seventh paragraph of Section 86-2.16, "Painting," of the Standard Specifications is amended to read:

Existing equipment to be painted in the field, including State-furnished equipment, shall be washed with a stiff bristle brush using a solution of water containing one ounce of heavy duty detergent powder per gallon. After rinsing, all surfaces shall be wire brushed with a coarse, cup shaped, power-driven brush to remove all poorly bonded paint, rust, scale, corrosion, grease or dirt. Any dust or residue remaining after wire brushing shall also be removed prior to priming.

10-3.20 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.

The types of service for the irrigation controllers and irrigation controller enclosure cabinets shall conform to the following:

Electric service (irrigation) shall be a metered 120/240-volt, single-phase service in a Type III service equipment enclosure. A single-pole, 20-A circuit breaker shall be installed in the existing Type III service equipment enclosure. The circuit breaker shall be of the same manufacturer and model and interrupting capacity as the existing circuit breakers.

10-3.21 NUMBERING ELECTRICAL EQUIPMENT

The numbers and edge sealer shall be placed on the equipment where designated by the Engineer.

When new numbers are to be placed on existing or relocated equipment, the existing numbers shall be removed.

Reflective numbers shall be applied to a clean surface. Only the edges of the numbers shall be treated with edge sealer.

Five digit, self-adhesive equipment numbers shall be placed for all electroliers, soffit lighting, sign lighting and service pedestals. On service pedestals, the numbers shall be placed on the front door. On electroliers, the numbers shall be placed as shown on Standard Plan ES-6A.

10-3.22 STATE-FURNISHED TRAFFIC MONITORING STATION 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 the 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 all 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 maintainthe controller assemblies. The Contractor's responsibility shall be limited to that provided for in Section 6-1.02, "State-Furnished Materials," of the Standard Specifications.

10-3.23 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 onthe plans,the Standard Specifications, and these special provisions. Irrigation controller enclosure cabinet shall have the following features:

1. A closed cell neoprene gasket around door.
2. A stainless steel full length door hinge.
3. Welded construction fabricated from 12-gage Type 304 stainless steel.
4. Louver ventilation.
5. Padlock shield.
6. Size shall be 35 inch (H) x 23 inch (W) x 11 inch (D) for single enclosure.
7. The controller enclosure cabinet shall be bolted to the concrete foundation as recommended by the manufacturer.
8. Grounding rod.

The cover, 12-gage retainer frame, 12-mesh wire screen exhaust slot and 1/4 inch studs shown on Standard Plan ES-4D will not be required.

A padlock with a removable core mortise cam cylinder shall be installed with the lock core for the irrigation controller enclosure cabinet. The cam cylinder shall be capable of receiving the State's lock core. The State's lock core is a "Best" No. 21B72 construction core. Keys shall be removable from the locks in the locked position only. Two keys for each door lock shall be delivered to the Engineer.

The padlock shackle shall be 3/4 inch in height and 5/16 inch in diameter and shall have a 7-pin housing. Padlock shall be corrosion resistant and have a dust cover.

Irrigation controller enclosure cabinet doors shall not be provided with integral door locks. The plywood mounting panel shall be 3/4 inch 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 irrigation plans.

Duplex convenience receptacles shall have ground-fault circuit interruption as defined by the Code. Circuit interruption shall occur on 6 milliamperes of ground-fault current and shall not occur on less than 4 milliamperes. Receptacles shall be installed in a weatherproof housing with rainproof lift covers.

A solid-state automatic shut-off rain sensor unit shall be installed for irrigation controller enclosure cabinets. The rain sensor unit shall automatically interrupt the master remote control valves after approximately 1/8 inch (3.2 mm) of rain has fallen. The irrigation system shall automatically be enabled again when the accumulated rainfall evaporates from the rain sensor unit collection cup. Rain sensor units shall be rated 24 to 30 volts, AC. Static charge protection shall be included to protect against lightning damage.

An antenna extension for the remote control valve acuator shall be provided for each irrigation controller enclosure cabinet. Antenna extensions shall consist of the following:

1. Jack to jack bulkhead adapter with neoprene gasket fitted into a pre-drilled hole in the top of the cabinet.
2. 3 feet of coaxial cable with bayonet nut connector (BNC) plugs on each end.

Equipment, except field wiring, shall be installed in the irrigation controller enclosure cabinet in a shop prior to field installed.

A complete maintenance and operations manual for each type of controller installed shall be submitted to the Engineer when the schematic wiring diagrams are placed inside of the controller enclosure or cabinet door.

Irrigation controller enclosure cabinets will be measured by the unit as determined from actual count in place.

10-3.24 VEHICLE SIGNAL FACES AND SIGNAL HEADS

Lamps for vehicular traffic signal units will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

Section 86-4.01, “Vehicle Signal Faces,” of the Standard Specifications is amended by adding the following paragraph:

Top openings of signal faces shall be sealed with neoprene gaskets.

Section 86-4.01A, "Optical Units," of the Standard Specifications is amended to read:

86-4.01A Optical Units

Each optical unit for yellow and green section shall consist of a lens, a reflector or reflector assembly, a lamp receptacle and a clear traffic signal lamp, conforming to the following:

Lenses, reflectors, reflector assemblies, lamp receptacles, lamps, wiring and light distribution shall conform to the requirements in ITE Publication: ST-008B.

Each lens shall be of best quality glass, true to color and free of imperfections.

All reflectors shall conform to the requirements in ITE Publication: ST-008B except that reflectors shall be made of silvered glass or of specular aluminum with an anodic coating. Reflector ring holder shall be made of cast aluminum.

A single piece formed metal reflector ring holder may be used.

Each optical unit for red sections shall conform to the provisions in Section 86-4.02, "Light Emitting Diode Signal Module."

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

86-4.01C Electrical Components.— Lamp receptacles and wiring shall conform to ITE Publication: ST-008B. The metal portion of the medium base lamp socket shall be brass, copper or phosphor bronze.

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

86-4.01A Visors.— Each signal section shall be provided with a removable visor conforming to the requirements in ITE Publication: ST-008B. Visors are classified, on the basis of lens enclosure, as full circle, tunnel (bottom open), or cap (bottom and lower sides open). Unless otherwise specified, visors shall be the tunnel type.

Section 86-4, "TRAFFIC SIGNAL FACES AND FITTINGS" of the Standard Specifications is amended by adding the following section:

LIGHT EMITTING DIODE SIGNAL MODULE

The 12-inch red sections, the 8-inch red sections and the red arrow sections traffic signal faces shall utilize light emitting diode signal modules. Each light emitting diode signal module shall consist of an assembly that utilizes light emitting diodes as the light source. Each light emitting diode signal module shall be designed to be installed in the door frame of a standard traffic signal housing.

Light emitting diode signal modules shall be from the same manufacturer and each size shall be the same model.

Light emitting diode signal modules shall be sealed units with 2 conductors for connecting to power, a printed circuit board, a power supply, a red lens and gasket, and shall be weatherproof after installation and connection. The circuit board and power supply shall be contained inside the light emitting diode signal module. Circuit boards shall conform to Chapter 1, Section 6, of the "Transportation Electrical Equipment Specifications" published by the State of California, Department of Transportation.

Conductors for light emitting diode signal modules shall be 3 feet in length, with terminals attached, and shall conform to the provisions in Section 86-4.01C, "Electrical Components."

Connections shall be to the terminal block in the signal face or shall utilize an adapter that screws into the medium base lamp socket. Contacts shall be brass. Splices will not be allowed.

The lens of the light emitting diode signal module shall be integral to the unit, shall be convex with a smooth outer surface and shall be made of ultraviolet stabilized plastic or glass. The lens shall be capable of withstanding ultraviolet (UV) (direct sunlight) exposure for a minimum period of 48 months without exhibiting evidence of deterioration.

The light emitting diode signal module shall be sealed in the door frame with a one-piece ethylene propylene rubber (EPDM) gasket.

The light emitting diodes shall utilize Aluminum Indium Gallium Phosphate (AlInGap) technology and shall be the ultra bright type or equivalent rated for 100,000 hours of continuous operation from –40°C to +74°C.

The individual light emitting diodes shall be wired such that physical damage or the failure of one light emitting diode will result in the loss of not more than 5 percent of the light emitting diode signal module light output.

Maximum power consumption requirements for light emitting diode signal modules shall be as follows:

LED Signal Module	Power Consumption	
	25°C	74°C
12-inch Circular	25.0 W	30.0 W
8-inch Circular	15.0 W	18.0 W
12-inch Arrow	15.0 W	18.0 W

Light emitting diode signal modules shall be rated for a minimum useful life of 48 months.

Physical and Mechanical Requirements:

Light emitting diode signal modules shall be designed as retrofit replacements for optical units of standard traffic signal sections and shall not require special tools for installation. Light emitting diode signal modules shall fit into existing traffic signal section housings built in conformance with the requirements in the Institute of Transportation Engineers (ITE) publication ST-008B, "Vehicle Traffic Control Signal Heads (VTCSH)" without modification to the housing.

Installation of light emitting diode signal modules shall not require the removal of material in the traffic signal section except the optical unit components, that is, lens, gaskets, lamp, lamp socket and reflector. Installed light emitting diode signal modules shall fit securely in the door frame and shall be weathertight.

Light emitting diode signal modules shall have a maximum weight of 4.4 pounds.

The lens may be tinted or may use transparent film or materials with similar characteristics to enhance "ON/OFF" contrasts. The use of tinting or other materials to enhance "ON/OFF" contrasts shall not affect chromaticity and shall be uniform across the face of the lens.

If a polymeric lens is used, a surface coating or chemical surface treatment shall be used to provide front surface abrasion resistance.

Light emitting diode signal modules shall be rated for use in the operating temperature range of -40°C to +74°C.

Light emitting diode signal modules shall be protected against dust and moisture intrusion in conformance with the requirements in NEMA Standard 250-1991 for Type 4 enclosures to protect the internal components.

Light emitting diode signal modules shall be single, self-contained devices, not requiring on-site assembly for installation into existing traffic signal housing. The power supply for the light emitting diode signal module shall be integral to the unit.

The light emitting diode signal module assembly shall be manufactured to withstand mechanical shock and vibration from high winds and other sources.

Enclosures containing either the power supply or electronic components of light emitting diode signal modules shall be made of UL94VO flame retardant materials. The lens of the light emitting diode signal module is excluded from this specification.

Each light emitting diode signal module shall have the manufacturer's name, trademark, model number, serial number, lot number and the month and year of manufacture permanently marked on the back of the light emitting diode signal module.

The following operating characteristics shall be identified: rated voltage, power consumption and volt-ampere (VA).

Each light emitting diode signal module shall have prominent and permanent vertical markings for correct indexing and orientation within a signal housing. The markings shall consist of an "UP" arrow, or the word "UP" or "TOP".

Photometric Requirements:

The minimum initial luminous intensity values for light emitting diode signal modules shall conform to the requirements in Section 11.04 of the Institute of Transportation Engineers (ITE) publication ST-008B, "Vehicle Traffic Control Signal Heads (VTCSH)" at 25°C.

Light emitting diode signal modules shall meet or exceed 85 percent of the standard light output values specified in the VTCSH, after 48 months of continuous use over the temperature range of -40°C to +74°C in a traffic signal operation.

The measured chromaticity coordinates of light emitting diode signal modules shall conform to the requirements for chromaticity in Section 8.04 and Figure 1 of the VTCSH over the temperature range of -40°C to +74°C.

In addition to the specifications for circular light emitting diode signal modules, light emitting diode red arrow signal modules shall conform to the following:

The light emitting diode red arrow signal module indication shall conform to the requirements in Section 9.01 of the VTCSH for arrow lenses. The light emitting diodes shall be spread evenly across the illuminated portion of the arrow area. Each light emitting diode signal section indication shall provide an average luminous intensity of 5500 cd/m2. Measurements shall be performed at rated operating voltage of 120 VAC.

Electrical:

Light emitting diode signal modules shall operate over a voltage range from 95 V to 135 V (ac) at a frequency of 60 Hz ±3 Hz. The light emitting diode circuitry shall prevent perceptible flicker over the specified voltage range. The fluctuations of line voltage shall have no visible effect on the luminous intensity of the indications. Rated voltage for the measurements shall be 120 V.

Wiring and terminal blocks shall conform to the requirements in Section 13.02 of the VTCSH. Two secured, color coded, 600 V, 20 AWG minimum, jacketed wires, conforming to the National Electric Code, rated for service at or greater than 105°C, are to be provided for electrical connection for each light emitting diode signal module.

The light emitting diode signal module on-board circuitry shall include voltage surge protection to withstand high-repetition noise transients as specified in Section 2.1.6 of NEMA Standard TS2-1992.

Light emitting diode signal modules shall be operationally compatible with currently used controller assemblies (solid state load switches, flashers and conflict monitors).

Light emitting diode signal modules and associated on-board circuitry shall meet Federal Communications Commission (FCC) Title 47, SubPart B, Section 15 regulations concerning the emission of electronic noise.

Light emitting diode signal modules shall provide a power factor of 0.90 or greater while operating throughout the temperature range of -40°C to +74°C.

Total harmonic distortion (current and voltage) induced into an AC power line by a light emitting diode signal module shall not exceed 20 percent while operating throughout the temperature range of -40°C to +74°C.

Testing:

The light emitting diode signal modules tested or submitted for testing shall be representative of typical average production units. Circular light emitting diode signal modules shall be tested in conformance with the requirements in California Test 604. Optical testing shall be performed with the light emitting diode signal module mounted in a standard traffic signal section but without a visor or hood attached to the signal section.

Design Qualification Testing:

Design Qualification Testing shall be performed by the manufacturer on new light emitting diode signal module designs, and on an existing design when a major design change has been implemented.

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

Manufacturer's test data shall be submitted with test units for Transportation Laboratory verification of Design Qualification Testing data.

The sample light emitting diode signal modules shall be energized for a minimum of 24 hours, at 100 percent on-time duty cycle, at or greater than 74°C before performing Design Qualification Testing. For Design Qualification Testing, parameters measured shall include but not be limited to:

The luminous intensity measurements shall be taken over the temperature range of -40°C to +74°C.

Color requirements shall be measured while operating throughout the temperature range of 40°C to +74°C.

Specified parameters shall be measured and used for quality comparison of Production Quality Assurance current measurement on production light emitting diode signal modules.

Light emitting diode signal modules shall be tested for compatibility with the controller unit, conflict monitor and load switch. Each light emitting diode signal module shall be connected to the output of a standard load switch connected to a voltage supply between the values of 95 V (ac) and 135 V (ac) with the input to the load switch in the "OFF" position. The voltage developed across each light emitting diode signal module so connected shall not exceed 10 V rms as the input AC voltage is varied from 95 V (ac) rms to 135 V (ac) rms.

Mechanical vibration testing shall conform to the requirements in Military Specification MIL-STD-883, Test Method 2007, using 3 four-minute cycles along each x, y and z axis, at a force of 2.5 Gs, with a frequency sweep from 2 Hz to 120 Hz. The loosening of the lens, of internal components or other physical damage shall be cause for rejection.

Temperature cycling shall be performed in conformance with the requirements in Military Specification MIL-STD-883, Test Method 1010. The temperature range shall be according to "Environmental Requirements." A minimum of 20 cycles shall be performed with a 30 minute transfer time between temperature extremes and a 30-minute dwell time at each temperature. Light emitting diode signal modules shall be tested under operating conditions. Failure of a light emitting diode signal module to function properly or evidence of cracking of the light emitting diode signal module lens or housing after temperature cycling shall be cause for rejection.

Moisture resistance testing shall be performed on light emitting diode signal modules in conformance with the requirements in NEMA Standard 250-1991 for Type 4 enclosures. Evidence of internal moisture after testing shall be cause for rejection.

Production Quality Control Testing:

The following Production Quality Control tests shall be performed on each new light emitting diode signal module prior to shipment:

A single point measurement with a correlation to the intensity requirements of Section 1.04 of the VTCSH may be used.

The ambient temperature for this measurement shall be greater than 77°F.

Each light emitting diode signal module not meeting minimum luminous intensity requirements according to Table 1 of VTCSH for circular indications, or 511 cd/ft2 for arrow indications shall be rejected. The manufacturer shall retain test results for 7 years.

For the burn-in period, each light emitting diode signal module shall be energized at rated voltage for a 30 minute stabilization period before the measurement is made.

Each light emitting diode signal module shall be tested for rated initial intensity after burn-in.

Each light emitting diode signal module shall be tested for required power factor after burn-in.

Each light emitting diode signal module shall be measured for current flow in amperes after burn-in. The measured current values shall be compared against rated values resulting from design qualification measurements under "Design Qualification Testing." The current flow shall not exceed the rated value. The measured ampere values with rated voltage shall be recorded as volt-ampere (VA) on the product labels.

Each light emitting diode signal module shall be visually inspected for exterior physical damage or assembly anomalies. Careful attention shall be paid to the surface of the lens to ensure that no scratches, abrasions, cracks, chips, discoloration or other defects are apparent. Defects shall be cause for rejection.

Production Quality Assurance Testing:

Production Quality Assurance Tests may be performed on each new light emitting diode signal module. The number of units tested (sample size) shall be determined by the quantity of each model in the shipment. The sample size shall conform to the requirements of American National Standard Institute/Acceptance Sampling in Quality Control, ANSI/ASQC Z1.4.

The State will determine the sampling parameters to be used for the random sample testing.

Specified parameters may be tested on the sample.

Acceptance or rejection of the shipment shall conform to the requirements in ANSI/ASQC Z1.4 for shipments which are sampled randomly.

Upon rejection of the shipment, the vendor shall arrange for pick-up of the shipment at no cost to the State.

Certificate of Compliance:

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." The certificate shall certify that the light emitting diode signal modules comply with the requirements in these specifications. The certificate shall also include a copy of applicable test reports on the light emitting diode signal modules.

Section 86-4.02, "Directional Louvers," of the Standard Specifications is renumbered to Section 86-4.03, "Directional Louvers."

The sixth paragraph of Section 86-4.03, “Backplates,” of the Standard Specifications is amended to read:

In lieu of the screws shown on the plans, plastic backplates may be fastened to the plastic signal face using self-threading No. 10 steel screws. The screws shall have an integral or captive flat washer and a hexagon head slotted for a standard screwdriver, and shall be stainless steel or steel with a zinc or black oxide finish.

10-3.25 PEDESTRIAN SIGNALS

Lamps for Type A pedestrian signals will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

Pedestrian signal modification kits for Type A pedestrian signals shall be designed to convert an existing pedestrian signal face to the message symbols specified in Section 86–4.05A(1), "Pedestrian Signal Faces," of the Standard Specifications and these special provisions. The modified signal face shall conform to the requirements in Section 86-4.05A(1), "Type A," of the Standard Specifications and these special provisions.

The second paragraph of Section 86-4.05A(1), "Type A," of the Standard Specifications is amended to read:

Each reflector assembly shall consist of a double reflector or 2 single reflectors. Each reflector shall be made of either aluminum or plastic. Reflectors shall conform to the requirements in Institute of Traffic Engineers Publication: ST-008B, "Vehicle Traffic Control Signal Heads." Plastic reflectors shall consist of molded or vacuum-formed plastic with a vacuum-deposited aluminum reflecting surface. The plastic material shall not distort when the reflector is used with the lamp of the wattage normally furnished with the signal. In addition, the UL nonmechanical loading temperature of the material shall exceed, by at least 10°C, the maximum temperature in the signal section with the lamp "ON" and measured in an ambient air temperature of 25°C in conformance with the requirements in UL Publication UL 746B. Each completed reflector shall, when operated with the appropriate lamp and lens, provide the message brightness specified.

The first paragraph of Section 86-4.05A(1), "Type A," of the Standard Specifications is amended to read:

86-4.05A(1) Type A.— Each Type A signal shall consist of a housing, two-color message plate, a reflector assembly, one incandescent lamp and one Light Emitting Diode Module conforming to the provisions in Section 86-4.07, "Light Emitting Diode Pedestrian Signal Face 'Upraised Hand' Module," with sockets and a front screen.

The first paragraph of Section 86-4.05B, “Front Screen,” of the Standard Specifications is amended to read:

86-4.05B Front Screen.— One of the following types of front screen shall be provided on each Type A signal:

The first paragraph of Section 86-4.05F, "Control," of the Standard Specifications is amended to read:

86-4.05F Control.— All pedestrian signals shall be capable of being controlled by the solid-state switching devices specified for traffic signal controller assemblies.

Section 86-4.05, "Pedestrian Signal Faces," of the Standard Specifications are amended by adding the following section:

LIGHT EMITTING DIODE PEDESTRIAN SIGNAL FACE "UPRAISED HAND" MODULE

The pedestrian signal face "Upraised Hand" section shall utilize a light emitting diode (LED) module.

Each light emitting diode pedestrian signal module shall consist of an assembly that utilizes light emitting diodes as the light source for pedestrian signal faces in lieu of an incandescent lamp.

Light emitting diode pedestrian signal modules shall be designed to mount in the standard lamp socket of an existing Type A pedestrian signal housing. the installing of a light emitting diode pedestrian signal module shall not require modification to the standard lamp socket or reflector.

Light emitting diode pedestrian signal modules shall be from the same manufacturer.

The circuit board and power supply shall be integral to the unit. Printed circuit boards shall conform to Chapter 1, Section 6 of the "Transportation Electrical Equipment Specifications" published by the State of California, Department of Transportation.

Light emitting diode pedestrian signal modules shall not require a specific mounting orientation or have a variance in light output, pattern or visibility for any mounting orientation.

The light emitting diode shall utilize Aluminum Indium Gallium Phosphate (AlInGAP) technology and shall be the ultra bright type or equivalent rated for 100,000 hours of continuous operation from -40°C to +74°C.

The individual light emitting diodes shall be wired such that physical damage or the failure of one light emitting diode will result in the loss of not more than 5 percent of the pedestrian signal module light output.

Maximum power consumption requirements for light emitting diode pedestrian signal modules shall be 15.0 W at 25°C and 18.0 W at 74°C.

The luminance of the "UPRAISED HAND" symbol shall be 3750 cd/m^2 minimum. The color of "UPRAISED HAND" shall be Portland orange conforming to the requirements of the Institute of Transportation Engineers Standards: "Pedestrian Traffic Control Signal Indications" and the "Manual on Uniform Traffic Control Devices." The height of each symbol shall be not less than 10 inches and the width of each symbol shall be not less than 6 1/2 inches.

The uniformity ratio of an illuminated symbol shall not exceed 4 to 1 between the highest luminance area and the lowest luminance area.

Light emitting diode pedestrian signal modules shall be rated for a minimum useful life of 48 hours.

Physical and Mechanical Requirements:

Light emitting diode pedestrian signal modules shall be designed as retrofit replacements for existing optical units and shall not require special tools for installation. Light emitting diode pedestrian signal modules shall fit into existing pedestrian signal face housings built according to the specifications of "Vehicle Traffic Control Signal Heads (VTCSH)" without modification to the housing.

Installation of light emitting diode pedestrian signal modules shall only require removal of the lamp.

Light emitting diode pedestrian signal modules shall be rated for use in the operation temperature range of -40°C to +74°C.

Light emitting diode pedestrian signal modules shall be single, self-contained devices, not requiring on-site assembly for installation into existing Type A housing. The power supply for the light emitting diode pedestrian signal modules shall be integral to the unit.

Light emitting diode pedestrian signal modules shall be manufactured to withstand mechanical shock and vibration from high winds and other sources.

Enclosures containing either the power supply or electronic components of light emitting diode pedestrian signal modules shall be made of UL94VO flame retardant materials.

Each light emitting diode pedestrian signal module shall have the manufacturer's name, trademark, model number, serial number, lot number and the month and year of manufacture permanently marked on the back of the module.

The following operating characteristics shall be identified: rated voltage, power consumption and volt-ampere (VA).

Photometric Requirements:

The minimum initial luminous intensity values for light emitting diode pedestrian signal modules shall be 3750 cd/m$^{2.}$

Light emitting diode pedestrian signal modules shall meet or exceed 85 percent of 3750 cd/m^2 after 48 months of continuous use over the temperature range of -40°C to +74°C in a traffic signal operation.

The measured chromaticity coordinates of light emitting diode pedestrian signal modules shall conform to the chromaticity requirements in Section 5.3.2.1 and Figure C of the VTCSH while operating thoughout the temperature range of -40°C to +74°C.

Electrical:

Light emitting diode pedestrian signal modules shall operate at a frequency of 60 Hz ±3 Hz over a voltage range from 95 V to 135 V (ac). The circuitry of light emitting diode pedestrian signal modules shall prevent perceptible flicker over the voltage range specified above. The fluctuations of line voltage shall have no visible effect on the luminous intensity of the indications. Rated voltage for the measurements shall be 120 V.

On-board circuitry of the light emitting diode pedestrian signal modules shall include voltage surge protection to withstand high-repetition noise transients as stated in Section 2.1.6 of NEMA Standard TS2-1992.

Light emitting diode pedestrian signal modules shall be operationally compatible with currently used controller assemblies (solid state load switches, flashers and conflict monitors).

Light emitting diode pedestrian signal modules and associated on-board circuitry shall meet Federal Communications Commission (FCC) Title 47, SubPart B, Section 15 regulations concerning the emission of electronic noise.

Light emitting diode pedestrian signal modules shall provide a power factor of 0.90 or greater while operating throughout the temperature range of -40°C to +74°C.

Total harmonic distortion (current and voltage) induced into an AC power line by a light emitting diode pedestrian signal modules shall not exceed 20 percent while operating throughout the temperature range of –40°C to +74°C.

Testing:

The light emitting diode pedestrian signal modules tested or submitted for testing shall be representative of typical average production units. Modules shall be tested in conformance with the requirements in California Test 604. Optical testing shall be performed with the module mounted in a Type A Housing but without a visor or hood attached to the housing.

Design Qualification Testing:

Design Qualification Testing shall be performed by the manufacturer on new light emitting diode pedestrian signal module designs, and on an existing design when a major design change has been implemented.

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

Manufacturer's test data shall be submitted with test units for Transportation Laboratory verification of Design Qualification Testing data.

The sample light emitting diode pedestrian signal modules shall be energized for a minimum of 24 hours, at 100 percent on-time duty cycle, at or greater than 74°C before performing Design Qualification Testing. For Design Qualification Testing, specifications measured shall include but not be limited to:

The luminous intensity measurements shall be taken over the temperature range of -40°C to +74°C.

Color requirements shall be measured while operating throughout the temperature range of 40°C to +74°C.

Specified parameters shall be measured and used for quality comparison of Production Quality Assurance current measurement on production modules.

Modules shall be tested for compatibility with the controller unit, conflict monitor and load switch. Each module shall be connected to the output of a standard load switch connected to a voltage supply between the values of 95 V (ac) and 135 V (ac). The voltage developed across each module so connected shall not exceed 10 V rms as the input voltage is varied from 95 V (ac) rms to 135 V (ac) rms.

Mechanical vibration testing shall be in conformance with the requirements in Military Specification MIL-STD-883, Test Method 2007, using 3 four-minute cycles along each x, y and z axis, at a force of 2.5 Gs, with a frequency sweep from 2 Hz to 120 Hz. The loosening of the lens, of internal components or other physical damage shall be cause for rejection.

Temperature cycling shall be performed in conformance with the requirements in Military Specification MIL-STD-883, Test Method 1010. The temperature range shall be according to "Environmental Requirements." A minimum of 20 cycles shall be performed with a 30 minute transfer time between temperature extremes and a 30 minute dwell time at each temperature. Modules under test shall be tested under operating conditions. Failure of a module to function properly or evidence of cracking of the module lens or housing after temperature cycling shall be cause for rejection.

Moisture resistance testing shall be performed on modules mounted in a standard pedestrian signal housing in conformance with the requirements in NEMA Standard 250-1991 for Type 4 enclosures. Evidence of internal moisture after testing shall be cause for rejection.

Production Quality Control Testing:

The following Production Quality Control tests shall be performed on each new light emitting diode pedestrian signal module prior to shipment:

The ambient temperature for this measurement shall be greater than 25°C.

Each module not meeting minimum luminous intensity of 3750 cd/m^2 shall be cause for rejection.

The light emitting diode pedestrian signal module tested or submitted for testing shall be representative of typical average production units. The manufacturer shall retain test results for 7 years.

For the burn-in period, each light emitting diode pedestrian signal module shall be energized at rated voltage for a 30 minute stabilization period before the measurement is made.

After burn-in period, each light emitting diode pedestrian signal module shall be tested for rated initial intensity and for required power factor.

Each light emitting diode pedestrian signal module shall be measured for current flow in amperes after burn-in. The measured current values shall be compared against rated values resulting from design qualification measurements under "Design Qualification Testing." The current flow shall not exceed the rated value. The measured ampere values with rated voltage shall be recorded as volt-ampere (VA) on the product labels.

Each light emitting diode pedestrian signal module shall be visually inspected for exterior physical damage or assembly anomalies. Defects shall be cause for rejection.

Production Quality Assurance Testing:

Production quality assurance tests may be performed on each new light emitting diode pedestrian signal module.

The number of units tested (sample size) shall be determined by the quantity of each model in the shipment. The sample size shall conform to the requirements of American National Standard Institute/Acceptance Sampling in Quality Control, ANSI/ASQC Z1.4.

The State will determine the sampling parameters to be used for the random sample testing.

Specified parameters may be tested on the sample.

Acceptance or rejection of the shipment shall conform to the requirements in ANSI/ASQC Z1.4 for shipments which are sampled randomly.

Upon rejection of the shipment, the vendor shall arrange for pick-up of the shipment at no cost to the State.

Certificate of Compliance:

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." The certificate shall certify that the light emitting diode pedestrian signal modules comply with the requirements of these specifications. The certificate shall also include a copy of applicable test reports on the modules.

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

86-4.06 Signal Mounting Assemblies.— Signal mounting assemblies shall consist of 1-1/2" standard steel pipe or galvanized conduit, necessary fittings, slip-fitters and terminal compartments. Pipe fittings shall be ductile iron, galvanized steel, aluminum alloy Type AC-84B No. 380 or bronze. Mast arm slip-fitters, post top slip-fitters and terminal compartments shall be cast bronze or hot-dip galvanized ductile iron. After installation, any exposed threads of galvanized conduit brackets and areas of the brackets damaged by wrench or vise jaws shall be cleaned with a wire brush and painted with 2 applications of approved unthinned zinc-rich primer (organic vehicle type) conforming to the requirements in Section 91, "Paint." Aerosol cans shall not be used.

The first paragraph of Section 86-4.07C(3), "Flasher," of the Standard specifications is amended to read:

86-4.09C(3) Flasher.— The flasher shall conform to the requirements in Section 8, "Solid-State Flashers," of NEMA Standards Publication No. TS 1.

The flasher shall be a solid-state device with no contact points or moving parts.

The flasher shall provide 2 output circuits to permit alternate flashing of signal faces and shall be capable of carrying a minimum of 10 A per circuit at 120 V.

The first paragraph of Section 86-4.07C(6), "Dimming Relay," of the Standard Specifications is amended to read:

86-4.07C(6) Dimming Relay.— A heavy duty dimming relay shall be provided to reduce the voltage to the lamps at night.

Heavy duty relays shall be designed for continuous duty. Relays shall operate during ambient temperatures from -18°C to 71°C. Each relay shall operate in the 8-pin Jones-type socket shown on the plans.

Relays shall be provided with double-pole, double-throw contacts. Contact points shall be of fine silver, silver-alloy or superior alternative material. Contact points and contact arms shall be capable of operation for 250,000 cycles with 20 A of tungsten load per contact at 120 V (ac), 60 Hz.

Coils shall have a power consumption of 10 VA or less and shall be designed for continuous duty on 120 V (ac).

Heavy duty relays shall be enclosed with a removable, clear plastic cover.

10-3.26 DETECTORS

Loop detector sensor units will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

Splice insulation shall be as provide under "Conductors and Wiring," elsewhere in these special provisions.

Loop detector lead-in cable shall be Type B.

Detector loops shall be Type E. For Type E detector loops, sides of the slot shall be vertical and the minimum radius of the slot entering and leaving the circular part of the loop shall be 1 1/2 inches. Slot width shall be a maximum of 5/8-inch. Loop wire for circular loops shall be Type 2. Depth of slots of circular loops shall be as shown on plans not to exceed the depth of pavement.

The depth of loop sealant above the top of the uppermost loop wire in the sawed slots shall be as shown on plans.

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.

The second paragraph of Section 86-5.01, "Vehicle Detectors," of the Standard Specifications is amended to read:

> All sensor units, control units and amplifiers shall conform to the provisions for the TEES as specified in Section 86-3.03, "Model 170 and Model 2070 Controller Assemblies." The units shall not be affected by transient voltages when tested in conformance with the requirements in California Test 667.

The third paragraph of Section 86-5.01A(5), "Installation Details," of the Standard Specifications is amended to read:

> Slots cut in the pavement shall be washed clean, blown out and thoroughly dried before installing conductors. Residue resulting from slot cutting operations shall not be permitted to flow across shoulders or lanes occupied by public traffic and shall be removed from the pavement surface by vacuuming or other approved method before any residue flows off of the pavement surface. Residue from slot cutting operations shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13.

The sixth paragraph of Section 86-5.01A(5), "Installation Details," of the Standard Specifications is amended to read:

> Loop conductors shall be installed without splices and shall terminate in the nearest pull box. In addition to the requirements for splices in detector circuits, the open end of cable jackets or tubing shall be sealed in a manner similar to the splicing requirements to prevent the entrance of water. The loops shall be joined in the pull box in combination of series and parallel so that optimum sensitivity is obtained at the sensor unit. Final splices between loops and lead-in cable shall not be made until the operation of the loops under actual traffic conditions is approved by the Engineer.

10-3.27 STATE-FURNISHED PIEZOELECTRIC AXLE SENSORS

Piezoelectric axle sensors (without installation plates) and epoxy grout (for installation of axle sensors only) will be State-Furnished as provided under "Materials" of these special provisions.

Piezoelectric axle sensors consist of a one square-inch cross section aluminum U-shaped channel that contains the piezo cable surrounded by an elastomer. Each sensor is approximately 6feet in length and comes with a screened coaxial transmission cable (STC) attached. The sensors are installed in a combination of one inductive loop detector and two axle sensors per lane. The exact location of the piezoelectric axle sensors and inductive loop detector combination will be as determined by the Engineer.

Installation shall be as shown on the plans, as specified in these special provisions,and as directed by the Engineer.

The piezoelectric axle sensor shall be installed flush with the road surface by cutting a channel in the pavement. The measurements for the channel are -2 1/2 inches in width, 1 3/4-inches in depth, and 6 1/2 feet in length. The channel shall be perpendicular to the direction of travel. A slot shall be cut from the end of the channel to the nearest pull box. The sensor is then properly positioned in the channel using installation plates and wire ties. The channel is then filled with epoxy grout. The epoxy grout shall be adequately set before re-opening the lane to traffic..

Temperature of epoxy grout components shall be between 70°F to 80°F. before mixing.

The temperature of the sawed pavement channel shall be between 70°F and 100°F before epoxy grout is poured, and shall be maintained at a minimum of 70°F, and a maximimum of 120°F during cure time.

When pavement temperature is too low, fan-forced portable heater, or similar tool, shall be used to heat the channel before the grout is poured. After the sensor is installed, the pavement around the channel may be heated. Care shall be taken not to scorch the axle sensors or epoxy grout.

All sawed pavement slots containing screened transmission cable shall be filled with elastomeric sealant.

Full compensation for inductive loops and piezoelectric axle sensors shall include furnishing all labor, materials, tools, equipment, testing and incidentals and for doing all the work involved in installing inductive loops and piezoelectric axle sensors, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer, shall be considered as included in the contract lump sum price paid for the various items requiring inductive loops and piezoelectric axle sensors as shown on the plans and no additional and separate compensation will be allowed therefor.

10-3.28 PEDESTRIAN PUSH BUTTONS

Section 86-5.02, "Pedestrian Push Buttons," of the Standard Specifications is amended by adding the following subparagraph to the third paragraph:

Actuator shall have a minimum diameter of 2 inches.

At the option of the Contractor, pedestrian push button housings may be the plastic type.

10-3.29 LUMINAIRES

Section 86-6.01, "High Pressure Sodium Luminaires," of the Standard Specifications is amended by adding the following to the sixth paragraph:

a. a vertical plane at a minimum peak acceleration level of 1.0 g peak-to-peak sinusoidal loading (same as 0.5 g peak) with the internal ballast installed, for a minimum of 2 million cycles without failure of any luminaire parts.

Ballasts shall be the lag regulator type.

10-3.30 PEDESTRIAN UNDERCROSSING FIXTURES

Pedestrian undercrossing fluorescent lighting fixtures shall conform to the details shown on the plans and these special provisions.

The design of the fixture shall be submitted to the Engineer for approval before fabrication of the fixtures is started. If deemed necessary by the Engineer, one complete prototype fixture shall be delivered to the Engineer for approval at least 30 calendar days before fabrication of the contract fixtures.

The shell of the fixture shall be cast aluminum alloy, industrial type or Federal Class 18 aluminum, 1/4 inch minimum thickness.

The door shall be one piece of 6061-T6 aluminum alloy 1/8 inch minimum thickness.

The lens units in the door section shall be formed of 1 1/2 inch methyl methacrylate rod, cut and fire glazed to provide a clear finish or, of cast units, providing equivalent tolerances and finish. Units shall conform to the dimensions shown on the plans.

The lenses shall be secured to the door section with an extruded lens retainer of 6063-T5 aluminum alloy conforming to the lens shape. The lens retainers shall fit the full length of the lens on both sides. Lens retainers which are continuous for the full length of the 3 lenses will be permitted. "Zee" bars of 5052-H32 or 5005-H14 aluminum alloy, 1/16 inch minimum thickness, may be substituted for the extruded lens retainer.

The continuous piano hinge shall be of Type 1100 aluminum alloy. The piano hinge shall be riveted to the door section with 1/8 inch aluminum rivets. Matching holes shall be drilled in the piano hinge and the lower edge of the fixture. The door assembly shall be attached after the shell is in place by 3/8 inch 8-32 stainless steel, self-tapping screws.

A captive, positive keyed, screw-type, latching device requiring a special wrench, shall be provided at the upper edge to secure the door in the closed position as shown on the plans. Two special wrenches shall be delivered to the Engineer.

A neoprene gasket shall be attached to the frame to provide a cushion between the shell and the door.

A chain or other satisfactory device shall be provided to prevent the door from coming in contact with the undercrossing wall when in the fully open position.

The fixture shall be held in place by three 3/8" x 8" anchor bolts with 2 nuts as shown on the plans.

Surfaces of the fixtures in contact with concrete and with anchor bolts and nuts shall be painted with a thick application of alkali-resistant bituminous paint. The paint shall conform to the requirements in Military Specification MIL-P-6883.

Each fixture shall contain an F48T12/CW, rapid start fluorescent lamp with recessed, double contact base installed on the back side of the door directly behind the lens.

Lampholders shall be listed by UL for outdoor use without an enclosure and with 1,500-milliampere rapid start, fluorescent lamps. The lampholder for each lamp shall be of the spring- loaded type.

The distance between the face of the lampholders for each lamp shall be designed to provide a compression of at least 0.10-inch on the spring type lampholder when the lamp is in place. The lamp shall have positive mechanical and electrical contact when the lamp is in place. The socket on the spring type lampholder shall have sufficient travel to permit installation of the lamp. Springs shall not be a part of the current carrying circuit.

The ballast shall be the high power factor type with weatherproof leads for operation of one 48-inch rapid start lamp. Ballasts shall be listed by UL for outdoor operation on 110-125-volt AC, 60 Hz circuits and rated at 1,500 milliamperes.

Wiring connections in the fixtures shall be terminated on a molded, phenolic, barrier type, 2-pole terminal block rated at 15 amperes, 600 volts AC and shall have integral type white waterproof marking strips. Current carrying parts of the terminal blocks shall be insulated from the fixture with integral plugs or strips to provide an insulating value in excess of the line to ground flashover voltage. If the Contractor elects to use sectionalized terminal blocks, each section shall be provided with an integral barrier on each side and shall be capable of rigid mounting and alignment.

Conductors from the ballast leads to lampholders shall be No. 16, minimum size, stranded, UL listed copper appliance wiring material (AWM). Splicing of lampholder conductors to the ballast leads shall be done by use of mechanically secure connectors.

Sufficient slack shall be provided in conductors to allow the fixture door to be fully opened.

Holes for one-inch conduit shall be provided in both ends of the fixture. Unused holes shall be plugged with pressed metal closures.

Exposed surfaces of the fixture shall be clean, uniform in appearance and free from defects such as improper fit, dents, deep scratches and abrasions, burrs, roughness, off-square ends, holes off center or jagged, surface irregularities and other significant defects. Screws for attaching components to fixture door such as "Zee" bars, ballasts and terminal block shall be tapped into door from inside only. No screwheads, nuts or other fasteners shall be removable from the outside.

Defective parts of the fixture, as determined by the Engineer before or after the fixture is installed, shall be removed and replaced at the Contractor's expense.

10-3.31 SIGN LIGHTING FIXTURES—MERCURY

The third and forth subparagraphs under "Auto Transformer Regulator Ballasts," under subsection F, "Ballast," of Section 86-6.05, "Sign Lighting Fixtures – Mercury," of the Standard Specifications are amended to read:

(3) The lamp current crest factor shall not exceed 2.0 at rated input voltage.
(4) Ballast losses shall not exceed 45 W.

10-3.32 PHOTOELECTRIC CONTROLS

Contactors shall be the mechanical armature type.

10-3.33 RELOCATING EXISTING CHANGEABLE MESSAGE SIGN SYSTEM

Attention is directed to "Sign Structures" of these special provisions.

The Contractor shall install the existing changeagle message sign (CMS) assembly on the sign structure, and shall make the field wiring connections to the terminal blocks in the sign assembly and in the controller cabinet as shown on the plans and in conformance with these special provisions.

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.

State forces will maintain the sign assemblies. The Contractor's responsibility shall be limited toconformance with the provisions in Section 6-1.02, "State-Furnished Materials," of the Standard Specifications.

Overhead sign structures are provided for elsewhere in these special provisions.

10-3.34 REMOVING, REINSTALLING OR SALVAGING ELECTRICAL EQUIPMENT

Salvaged electrical materials shall be hauled to Department of Transportation Recycling Center, 1698 West Mission Boulevard, Pomona, California 91766, and stockpiled.

The Contractor shall provide the equipment, as necessary, to safely unload and stockpile the material. Call Recycling Center at (909) 629-3577. A minimum of 2 working days' notice shall be given prior to delivery.

The third paragraph of Section 86-7.01, "Removing Electrical Equipment," of the Standard Specifications is amended to read:

Attention is directed to the provisions in Section 7-1.11, "Preservation of Property," of the Standard Specifications "Indemnification and Insurance" of the special provisions. The Contractor will be required to repair or replace, at the

Contractor's expense, any electrical equipment to be salvaged which, as determined by the Engineer, has been damaged or destroyed by reason of the Contractor's operations.

The fourth paragraph of Section 86-7.02, "Reinstalling Removed Electrical Equipment," of the Standard Specifications is amended to read:

Existing materials required to be reused and found to be unsatisfactory by the Engineer shall be replaced by new material and the cost therefor will be paid for as extra work as provided in Section 4-1.03D.

10-3.35 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 first paragraph of Section 86-8.01, "Payment," of the Standard Specifications is amended to read:

The contract lump sum price or prices paid for signal, ramp metering, flashing beacon, lighting, sign illumination, traffic monitoring station, highway advisory radio systems, closed circuit television system, or combinations thereof; for modifying or removing those systems; for temporary systems; or the lump sum or unit prices paid for various units of those systems; or lump sum or per meter price paid for conduit of the various sizes, types and installation methods listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in furnishing and installing, modifying, or removing the systems, combinations or units thereof, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer, including any necessary pull boxes (except when the type required is shown as a separate contract item); excavation and backfill; concrete foundations (except when shown as a separate contract item); pedestrian barricades; furnishing and installing illuminated street name signs; installing State-furnished sign panels on pedestrian barricades, on flashing beacon standards, and on traffic signal mast arms; restoring sidewalk, pavement and appurtenances damaged or destroyed during construction; salvaging existing materials; and making all required test.

The fifth paragraph of Section 86-8.01, "Payment," of the Standard Specifications is amended to read:

When shown as a separate contract item by the lump sum or per foot, interconnection conduit and cable shall include all interconnection conductors, but shall only include conduit and pull boxes containing interconnection cable and no other conductors. The quantity of interconnection conduit and cable to be paid for by the foot shall be the length of that conduit. Compensation for conduit containing interconnection cable and other conductors shall be considered as included in the contract price paid for the item requiring the other conductors.

The contract price paid per linear foot for conduit of various sizes, types and installation methods as shown on plans, shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing the conduit on the bridge structures and other methods shown on the plans, complete in place, including all trenching and backfill material required and pull boxes not otherwise paid for, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract price paid per linear foot for 1-1/4 inch innerduct as shown on plans, shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing 1-1/4 inch innerduct, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract unit price paid for pull boxes of the size and types as shown on plans, shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the installing of pull boxes of various sizes , complete in place, including No. 5 (T) and No. 6 (T) traffic pull boxes, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for the various items including electric service (irrigation) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in electrical service (irrigation) for irrigation controller, complete in place, including numbering electrical equipment ,conductors, conduit and pull boxes to the pull box adjacent to the irrigation controller enclosure cabinets and irrigation controllers, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for changeable message sign electrical system, CMS # 80 relocation shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in changeable message sign electrical system, CMS # 80 relocation, complete in place, including removing and salvaging of the existing changeable message and installing CMS power cables, CMS conduit, State-furnished changeable message sign control cables 6P18 and 12P18, conductors, pull boxes and incidentals, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for lighting (city) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing conduits of various sizes and types, conductors, pull boxes, lighting standards with mast arms, and incidentals, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for automatic vehicle classification location shall include full compensation for furnishing all labor, materials, tools, including splice kits, equipment, and incidentals, and for doing all the work involved in modifying automatic vehicle classification station, including installing conduits, conductors, pull boxes, inductive loop detectors, piezo-electric axle sensors, and splicing and extending screened transmission cable (STC) to existing Model 334 controller cabinet, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for communication conduit and pull box installation on bridge structures shall be considered as included in the contract lump sum price paid for lighting and sign illumination and no separate payment will be made therefor.

The contract unit price paid for communication pull boxes as shown on plans, shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing of communication pull boxes complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

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

The contract lump sum price paid for modify HAR sign and flashing beacon (Location SB 459) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in modify HAR sign and flashing beacon (Location SB 459), complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract unit price paid for adjust pull box shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in adjust pull box, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for Type III-BF/III-CF service equipment enclosure shall be considered as included in the contract lump sum price paid for the various items requiring service equipment enclosure as shown on the plans, and no additional compensation will be allowed therefor.

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Full compensation for irrigation controller enclosure cabinets shall be considered as included in the contract lump sum price paid for irrigation system and no additional compensation will be allowed therefor.

SECTION 10-4. COMMUNICATIONS AND CLOSED CIRCUIT TELEVISION CABLE PLANT

10-4.01 FIBER OPTIC OUTSIDE PLANT CABLE

10-4.01A GENERAL

Each fiber optic outside plant cable (FOP) for this project shall be all dielectric, gel filled, duct type, with loose buffer tubes and shall conform to these special provisions. The singlemode fiber optic (SMFO) cables shall interconnect the equipment at the communications hub building with the equipment at the communications nodes. SMFO fibers shall contain singlemode (SM) dual-window (1310 nm and 1550 nm) fibers.

Fiber optic cables shall be supplied in the configurations shown on the plans and specified in these special provisions.

The optical fibers shall be contained within loose buffer tubes. The loose buffer tubes shall be stranded around an all dielectric central member. Aramid yarn and/or fiberglass shall be used as a primary strength member, and a medium or high density polyethylene outside jacket shall provide for overall protection.

All fiber optic (F/O) cable on this project shall be from the same manufacturer, who is regularly engaged in the production of this material.

The cable shall be qualified as compliant with Chapter XVII, Title 7, Part 1755.900 of the Code of Federal Regulations, "REA specification for filled fiber optic cables."

comply with all the requirements of the United States Department of Agriculture Rural Electrification Administration specifications REA-PE-90.

10-4.01B FIBER CHARACTERISTICS

Each optical fiber shall be glass and consist of a doped silica core surrounded by concentric silica cladding. All fibers in the buffer tube shall be usable fibers, and shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of these specifications.

The coating shall be a dual layered, UV cured acrylate. The coating shall be mechanically or chemically strippable without damaging the fiber.

The cable shall comply with the optical and mechanical requirements over an operating temperature range of -40°C to +70°C. The cable shall be tested in accordance with EIA-455-3A (FOTP-3), "Procedure to Measure Temperature Cycling Effects on Optical Fiber, Optical Cable, and Other Passive Fiber Optic Components." The change in attenuation at extreme operational temperatures (-40°C to +70°C) for the singlemode fiber shall not be greater than 0.20 dB/km, with 80 percent of the measured values no greater than 0.10 dB/km. The attenuation shall be measured singlemode fiber measurement is made at 1310 nm and 1550 nm. For multimode fiber, the range shall not be greater than 0.50 dB/km with 80 percent of measured values no greater than 0.25 dB/km. The multimode fiber measurement is made at 1300 nm.

The multimode fiber shall meet EIA/TIA-492AAAA-1989, "Detail Specification for 62.5 µm Core Diameter/125 µm Cladding Diameter Class Ia Multimode, Graded Index Optical Waveguide Fibers." For all fibers the attenuation specification shall be a maximum attenuation for each fiber over the entire operating temperature range of the cable.

Multimode and singlemode fFibers within the finished cable shall meet the requirements in the following table: NEW** (07)** Fiber Characteristics Table ParametersValueModeSingleTypeStep IndexCore diameter8.3 µm (nominal)Cladding diameter125 µm ±1.0 µmCore to Cladding Offset≤1.0 µmCoating Diameter250 µm ±15 µmCladding Non-circularity defined as: [1-(min. cladding dia. ÷max. cladding dia.)]x100	≤2.0%
Proof/Tensile Test	50kpsi, min.
Attenuation:	
@ 1,310 nm	≤0.4 dB/km
@ 1,550 nm	≤0.4 dB/km
Attenuation at the Water Peak	≤2.1 dB/km @ 1383 ±3 nm
Chromatic Dispersion:	
Zero Dispersion Wavelength	1301.5 to 1321.5 nm
Zero Dispersion Slope	≤0.092 ps/(nm2*km)
Maximum Dispersion:	≤3.3 ps/(nm*km) for 1285 nm to 1330 nm <18 ps/(nm*km) for 1550 nm
Cut-Off Wavelength	<1250 nm
Mode Field Diameter (Petermann II)	9.3 ±0.5 µm at 1310 nm 10.5 ±1.0 µm at 1550 nm

10-4.01C COLOR CODING

Optical fibers shall be distinguishable from others in the same buffer tube by means of color coding according to the following:

1. Blue (BL)	7. Red (RD)
2. Orange (OR)	8. Black (BK)
3. Green (GR)	9. Yellow (YL)
4. Brown (BR)	10. Violet (VL)
5. Slate (SL)	11. Rose (RS)
6. White (WT)	12. Aqua (AQ)

The colors shall be targeted in accordance with the Munsell color shades and shall meet EIA/TIA-598 "Color Coding of Fiber Optic Cables."

The color formulation shall be compatible with the fiber coating and the buffer tube filling compound, and be heat stable. It shall not fade or smear or be susceptible to migration and it shall not affect the transmission characteristics of the optical fibers and shall not cause fibers to stick together.

10-4.01D CABLE CONSTRUCTION

General.--The fiber optic cable shall consist of, but not be limited to, the following components:

A. Buffer tubes
B. Central member
C. Filler rods
D. Stranding
E. Core and cable flooding
F. Tensile strength member
G. Ripcord
H. Outer jacket

Buffer tubes.--Loose buffer tubes shall provide clearance between the fibers and the inside of the tube to allow for expansion without constraining the fiber. The fibers shall be loose or suspended within the tubes and shall not adhere to the inside of the tube. Each buffer tube shall contain 1, 2, 6 or 12 fibers. SM and MM fibers shall not be mixed within the same buffer tube.

The loose buffer tubes shall be extruded from a material having a coefficient of friction sufficiently low to allow free movement of the fibers. The material shall be tough and abrasion resistant to provide mechanical and environmental protection of the fibers, yet designed to permit safe intentional "scoring" and breakout, without damaging or degrading the internal fibers.

Buffer tube filling compound shall be a homogenous hydrocarbon-based gel with anti-oxidant additives. It shall be and used to prevent water intrusion and migration. The filling compound shall be non-toxic and dermatologically safe to exposed skin. It shall be chemically and mechanically compatible with all cable components, non-nutritive to fungus, non-hygroscopic and electrically non-conductive. The filling compound shall be free from dirt and foreign matter and shall be readily removable with conventional nontoxic solvents.

Buffer tubes shall be stranded around a central member by a method, such as the reverse oscillation stranding process, that will prevent stress on the fibers when the cable jacket is placed under strain, such as the reverse oscillation stranding process.

Each buffer tube shall be distinguishable from other buffer tubes in the cable by using the same means of color coding as specified above for fibers.

Central Member.--The central member, which functions as an anti-buckling element, shall be a glass reinforced plastic rod with similar expansion and contraction characteristics as the optical fibers and buffer tubes. To ensure the proper spacing between buffer tubes during stranding, provide a symmetrical, a linear overcoat of polyethylene may be applied to the central member to achieve the optimum diameter.

Filler rods.--Fillers may be included in the cable cross-section. Filler rods should be either solid medium or high density polyethylene. The diameter of filler rods shall be the same as the outer diameter of the buffer tubes.

Stranding.--Completed buffer tubes shall be stranded around the overcoated central member using stranding methods, lay lengths and positioning such that the cable shall meet mechanical, environmental and performance specifications. A polyester binding shall be applied over the stranded buffer tubes to hold them in place. Binders shall be applied with sufficient tension to secure the buffer tubes to the central member without crushing the buffer tubes. The binders shall be non-hygroscopic, non-wicking (or rendered so by the flooding compound), and dielectric with low shrinkage.

Core and Cable Flooding.--The cable core interstices shall be filled with a polyolefin based compound to prevent water ingress and migration. The flooding compound shall be homogeneous, non-hygroscopic, electrically non-conductive, and non-nutritive to fungus. The compound shall also be nontoxic, dermatologically safe and compatible with all other cable components.

Tensile Strength Member.--Tensile strength shall be provided by high tensile strength aramid yarns and/or fiberglass which shall be helically stranded evenly around the cable core and shall not adhere to other cable components.

Ripcord.--The cable shall contain at least one ripcord under the jacket for easy sheath removal.

Outer jacket.--The jacket shall be free of holes, splits, and blisters and shall be medium or high density polyethylene (PE) with minimum nominal jacket thickness of 37 mils. Jacketing material shall be applied directly over the tensile strength members and flooding compound and shall not adhere to the aramid strength material. The polyethylene shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus.

The jacket or sheath shall be marked with the manufacturer's name, the words "Optical Cable," the number of fibers, year of manufacture, and sequential measurement markings every meter. The actual length of the cable shall be within ±1 percent of the length marking. The marking shall be in a contrasting color to the cable jacket. The height of the marking shall be approximately 0.1 inch (2.5 mm).

10-4.01E GENERAL CABLE PERFORMANCE SPECIFICATIONS

The F/O cable shall withstand water penetration when tested with a one meter static head or equivalent continuous pressure applied at one end of a one meter length of filled cable for one hour. No water shall leak through the open cable end. Testing shall be done in accordance with EIA-455-82 (FOTP-82), "Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable."

A representative sample of cable shall be tested in accordance with EIA-455-81A (FOTP-81), "Compound Flow (Drip) Test for Filled Fiber Optic Cable." No preconditioning period shall be conducted. The cable shall exhibit no flow (drip or leak) at 176ºF (80°C) as defined in the test method.

Crush resistance of the finished F/O cables shall be 220 N/cm applied uniformly over the length of the cable without showing evidence of cracking or splitting when tested in accordance with EIA-455-41 (FOTP-41), "Compressive Loading Resistance of Fiber Optic Cables." The average increase in attenuation for the fibers shall be ≤0.10 dB at 1550 nm (singlemode) for a cable subjected to this load. The cable shall not exhibit any measurable increase in attenuation after removal of load. Testing shall be in accordance with EIA-455-41 (FOTP-41), except that the load shall be applied at the rate of 0.118 inch to 0.787 inch (3 mm to 20 mm) per minute and maintained for 10 minutes.

The cable shall withstand 25 cycles of mechanical flexing at a rate of 30 ±1 cycles/minute. The average increase in attenuation for the fibers shall be ≤0.20 dB at 1550 nm at the completion of the test. Outer cable jacket cracking or splitting observed under 10x magnification shall constitute failure. The test shall be conducted in accordance with EIA-455-104 (FOTP-104), "Fiber Optic Cable Cyclic Flexing Test," with the sheave diameter a maximum of 20 times the outside diameter of the cable. The cable shall be tested in accordance with Test Conditions I and II of (FOTP-104).

Impact testing shall be conducted in accordance with EIA-455-25 (FOTP-25) "Impact Testing of Fiber Optic Cables and Cable Assemblies." The cable shall withstand 20 impact cycles. The average increase in attenuation for the fibers shall be ≤0.20 dB at 1550 nm. The cable jacket shall not exhibit evidence of cracking or splitting.

The finished cable shall withstand a tensile load of 2700 N without exhibiting an average increase in attenuation of greater 0.20 dB. The test shall be conducted in accordance with EIA-455-33 (FOTP-33), "Fiber Optic Cable Tensile Loading and Bending Test." The load shall be applied for one-half hour in Test Condition II of the EIA-455-33 (FOTP-33) procedure.

10-4.01F PACKAGING AND SHIPPING REQUIREMENTS

Documentation of manufacturer’s compliance to the required optical fiber specifications shall be provided to the Engineer prior to ordering the material.

Attention is directed to "Fiber Optic Testing," elsewhere in these special provisions.

The completed cable shall be packaged for shipment on reels. The cable shall be wrapped in a weather and temperature resistant covering. Both ends of the cable shall be sealed to prevent the ingress of moisture.

Each end of the cable shall be securely fastened to the reel to prevent the cable from coming loose during transit. Six feet of cable length on each end of the cable shall be accessible for testing.

Each cable reel shall have a durable weatherproof label or tag showing the manufacturer's name, the cable type, the actual length of cable on the reel, the Contractor's name, the contract number, and the reel number. A shipping record shall also be included in a weatherproof envelope showing the above information and also include the date of manufacture, cable characteristics (size, attenuation, bandwidth, etc.), factory test results, cable identification number and any other pertinent information.

The minimum hub diameter of the reel shall be at least thirty times the diameter of the cable. The F/O cable shall be in one continuous length per reel with no factory splices in the fiber. Each reel shall be marked to indicate the direction the reel should be rolled to prevent loosening of the cable.

Installation procedures and technical support information shall be furnished at the time of delivery.

10-4.02 CABLE INSTALLATION

Prior to installation of the optical fiber cable, the contractor shall test the cable on the shipping reel as prescribed in paragraph 10-4. "Arrival on Site." The Contractor shall submit the manufacturer's recommended procedures for pulling the

fiber optic cable to the Engineer for review and approval at least 20 working days prior to installing cables. Mechanical aids may be used to assist cable installation. A tension measuring device or break away swivel shall be placed between the end of the cable grip and pull rope, to ensure that the tension does not exceed 80 percent of recommended tension or 2225 N, whichever is less. The cable grips for installing fiber optic cable shall have a ball bearing swivel to prevent the cable from twisting during installation.

During cable installation, the bend radius shall be maintained at a minimum of twenty times the outside diameter of the cable. The cable shall not be stressed beyond the minimum bend radius at any time during installation.

F/O cable shall be installed using a cable pulling lubricant recommended by the F/O cable and/or the innerduct manufacturer and a non-abrasive pull tape conforming to the provisions described under "Conduit" elsewhere in these special provisions. The Contractor's personnel shall be stationed at each splice vault and pull box through which the cable is to be pulled to lubricate and prevent kinking or other damage.

F/O cable shall be installed without splices except where specifically allowed on the plans or described in these special provisions. The 12 SMFO cables used for video distribution shall be spliced only at splice vaults associated with cameras or video nodes. The trunk cable (multiplexed data/video) shall be spliced only at splice vaults associated with data nodes, video nodes access nodes or cable nodes. The Engineer may allow additional splices between these specified locations. The slack shall be divided equally on each side of the splice closure.

A minimum of 60 feet of slack shall be provided for each unspliced cable at each splice vault. A minimum of 30 feet of slack shall be provided for each cable at each fiber optic splice closure. Slack shall be provided at pull boxes as shown in the plans.

Following installation of the cable in duct, all duct entrances in cabinets, pull boxes and vaults shall be sealed with duct sealing compound to prevent the ingress of moisture, foreign materials and rodents.

Unless shown or provided otherwise, only one F/O cable shall be installed in each innerduct.

10-4.03 SPLICING

Optical fibers shall be spliced using the fusion type and shall not exceed 0.07 dB loss per splice.

The completed splices shall be placed in a splice tray. The splice tray shall then be placed in the splice closure.

Termination splices shall join the fibers in the F/O cable span to the fibers in pigtails. The termination splices shall be placed in a splice tray and the splice tray(s) shall then be placed in the fiber distribution unit (FDU). The individual fibers shall be looped one full turn within the splice tray to avoid macro bending. A two inch-minimum bend radius shall be maintained during installation and after placing in the optical fiber splice tray. Each fiber shall be individually restrained in a splice tray. The optical fibers in buffer tubes and the placement of the optical fibers in the splice tray shall be such that there is no discernible tensile force on the optical fiber.

All splices shall be protected with a thermal shrink sleeve.

All fibers shall be labeled in the splice tray with permanent vinyl markers. Pigtail ends shall also be labeled to identify the destination of the fiber.

10-4.04 CABLE LABELING

Labeling of the twisted pair cables and fiber optic cables shall conform to the following.

GENERAL.--The following abbreviations for each component shall be used in the labeling of cables:

A -- Automated Weather Station
B -- Beacons for the HAR (Bridged)
C -- Camera Control (Bridged)
DN -- Data Node
H -- Highway Advisory Radio (HAR)
I -- Irrigation Controllers (Bridged Circuit)
J -- Census (Compliance) Stations
M -- 170 Modem Circuit for Traffic Monitoring and Ramp Meter Stations (Bridged)
P -- Pump Stations
S -- Changeable Message Sign (CMS)
T -- Tunnel SCADA
V -- Automatic Vehicle Classification Sites (AVC)
VN -- Video Node
W -- Weigh-In-Motion Station (WIM)

Components shall be identified with the two letter route abbreviations plus a three digit post mile (two digits and a tenth with no decimal), the circuit or component number, the direction, or the district. The direction used in the labeling shall be

the direction from which the circuit enters a data node, where the numbers 1, 2, 3, and 4 would represent north, south, east, and west respectively.

For freeway routes, the following abbreviations shall be used:

ROUTE	ABBR.	NAME
2	GL	Glendale Fwy
5	GS/SA *	Golden State/Santa Ana Fwy
10	SM/SB *	Santa Monica/San Bernardino Fwy
27	TC	Topanga Canyon Fwy
30	FT	Foothill Fwy
47	TI	Terminal Island Fwy
57	OR	Orange Fwy
60	PO	Pomona Fwy
71	CO	Corona Fwy
91	AR	Artesia Fwy
101	SA/HO/VE*	Santa Ana /Hollywood /Ventura Fwy
105	GA	Glenn Anderson Fwy
110	PA/HA *	Pasadena /Harbor Fwy
118	SS	Santa Susana Fwy/Simi Valley Fwy
134	VE	Ventura Fwy
170	HO	Hollywood Fwy
210	FT	Foothill Fwy
405	SD	San Diego Fwy
605	SG	San Gabriel Fwy
710	LB	Long Beach Fwy

* The freeway name changes according to the section of freeway.

The following numbers shall be used for each communication hub:

HUB NO.	ABBR.	LOCATION
1	ELA	East Los Angeles Interchange
2	SGV	Route 605/10 Interchange
3	NWK	Route 605/5 Interchange
4	LAX	Route 405/105 Interchange
5	NHD	Route 101/170 Interchange
6	TMC	Traffic Management Center
7	SAT	VSAT Satellite Hub Route 2/134 Interchange

Each cable shall be labeled with a colored stainless steel tag. The tag shall be from 3/8-inch to 1/2-inch tall by 3 inches to 3.5 inches wide. Characters shall be embossed and at least 3/16-inch. The tag shall be affixed to the cable with two 3.16-inch wide stainless steel ties.

Twisted pair cables shall be labeled with red tags and fiber optic cables shall be labeled with yellow tags.

TWISTED PAIR CABLES.--Labeling of the twisted pair cables shall be in the cabinets, pull boxes, data nodes and communication hubs.

Labeling shall be identified as follows:

LABEL I.D.	LABELING DESCRIPTION
W _ _ _ _ _ DN _ _ _ _ _	WIM, route and Post Mile ; data node, route and Post Mile
H _ _ _ _ _ DN _ _ _ _ _	HAR, route and post mile; data node, route and Post Mile
V _ _ _ _ _ DN _ _ _ _ _	AVC, route and Post Mile; data node, route and Post Mile
J _ _ _ _ _ DN _ _ _ _ _	Census Station, route and Post Mile; data node, route and Post Mile
M _ _ _ DN _ _ _ _ _	Modem circuit, circuit number; data node, route and Post Mile
S _ _ _ DN _ _ _ _ _ DN _ _ _ _ _	CMS, CMS number; closest data node, route and Post Mile; furthest data node, route and Post Mile
I _ DN _ _ _ _ _	Irrigation, controller direction; data node, route and Post Mile
P _ DN _ _ _ _ _	Pump Station, direction; data node, route and Post Mile
C _ DN _ _ _ _ _	Camera control, direction; data node, route and Post Mile
B _ DN _ _ _ _ _	Beacon, direction; data node, route and Post Mile
A _ DN _ _ _ _ _	Automated Weather Station, direction; data node, route and Post Mile

FIBER OPTIC CABLES.--Fiber optic cable labeling shall be at the 334-TV cabinets, splice vaults, data nodes, video nodes, and communication hubs.

The fiber optic cable labeling shall be identified as follows:

LABEL I.D.	DESCRIPTION
C _ _ _ _ _ VN _ _ _ _ _	Camera, camera number; video node, route and Post Mile
VN _ _ _ _ _ HUB _	Video node, route and Post Mile; hub, hub number
DN _ _ _ _ _ HUB _	Data node, route and Post Mile; hub, hub number
HUB _ HUB _	Hub, hub number; hub, hub number
HUB _ DIST _ _	Hub, hub number; district, district number

SAMPLE CABLE LABELING.--The following are labeling identification samples for twisted pair and fiber optic cables:

TWISTED PAIR SAMPLE LABELING I.D.'s	DESCRIPTION
HSD002DNSD002	HAR, Route 405 and Post Mile 0.2; data node, Route 405 and Post Mil2e 0.1
M009DNSD002	Modem circuit, circuit number 9; data node, Route 405 and Post Mile 0.2
S039DNSD267SD187	CMS, CMS number 39; closest data node, Route 405 and Post Mile 26.7; furthest data node, Route 405 and Post Mile 18.7
C2SD054	Camera control, from south direction; data node, Route 405 and Post Mile 5.4

FIBER OPTIC SAMPLE LABELING I.D.'S	DESCRIPTION
CSD010VNSD054	Camera, camera number SD010; video node, Route 405 and Post Mile 5.4
VNSD054HUB4	Video node, Route 405 and Post Mile 5.4; hub, hub number 4
HUB 4 HUB 6	Hub, hub number 4; Hub, hub number 6
HUB 4 DIST 12	Hub, hub number 4; district, district number 12

PAYMENT.--Full compensation for labeling of cables shall be considered as included in the item requiring the cables and no separate payment will be made therefor.

10-4.05 FIBER OPTIC SPLICE CLOSURES

The fiber optic splice closure shall consist of an outer closure, an inner closure and splice trays, and shall conform to the following special provisions.

The fiber optic splice closure shall be designed for a temperature range of-20º to 160º (-30°C to +70°C).

The size of the closure shall allow all the fibers of the largest fiber optic cable to be spliced to a second cable of the same size, plus 12 additional pigtails. The closures shall be not more than 34 inches (864 mm) in length and not more than 8 inches (203 mm) in diameter. The closures shall be designed for butt splicing.

All materials in the closures shall be non-reactive and shall not support galvanic cell action. The outer-closure shall be compatible with the other closure components, the inner closure, splice trays, and cables.

The end plate shall consist of two sections and shall have capacity for two fiber optics communication cables and 12 fiber optics pigtails or four fiber optic cables.

The outer-closure shall protect the splices from mechanical damage, shall provide strain relief for the cable, and shall be resistant to salt corrosion.

The outer-closure shall be waterproof, and re-enterable. The outer-closure shall be flash-tested at 103 kPa.

The inner-closure shall be of metallic construction.

The inner-closure shall be compatible with the outer closure and the splice trays and shall allow access to and removal of individual splice trays.

The splice trays shall be compatible with the inner-closure and shall be constructed of rigid plastic or metal.

Adequate splice trays shall be provided to splice all fibers of the communication cable with the greatest fiber count entering the closure, plus 12 pigtails.

The Contractor shall install the fiber optic splice closure in the vaults where splicing is required. Separate closures shall be used for the distribution and trunk cables. The fiber optic splice closures shall be securely fastened to the vault using standard hardware found in communications manholes.

The Contractor shall provide all mounting hardware required to securely mount the closures to the vault.

The fiber optic splice closure shall be mounted horizontally in a manner that allows the cables to enter at the end of the closure without exceeding any minimum bending radius specification.

Upon completion of the splices, the splice trays shall be secured to the inner closure.

The closure shall be sealed using a procedure recommended by the manufacturer that will provide a waterproof environment for the splices. Encapsulant shall be injected between the inner and outer closures.

Care shall be taken at the cable entry points to ensure a tight salt resistant and waterproof seal is made which will not leak upon aging. It is acceptable to have multiple pigtails enter the fiber optic splice closure through one hole as long as all spaces between the cables are adequately sealed.

10-4.06 PASSIVE CABLE ASSEMBLIES AND COMPONENTS

The F/O cable assemblies and components shall be compatible components, designed for the purpose intended, and manufactured by a company regularly engaged in the production of material for the fiber optic industry. All components or assemblies shall be best quality, non-corroding, with a design life of at least 20 years. All components or assemblies of the same type shall be from the same manufacturer.

10-4.07 FIBER OPTIC CABLE TERMINATIONS

10-4.07A GENERAL

Fiber optic cable terminations shall include pigtails and jumpers. Breakout cables shall comply with the specifications for pigtails. Fiber optic outside plant cable entering a building shall be routed through rigid steel conduit as required by the NEC, except where a transition to F/O inside plant (FOIP) cable is shown on the plans. The cable shall continue within the conduit to the designated termination point for distribution "breakout."

All components shall be the size and type required for the specified fiber.

All FOIP cable on this project shall be from the same manufacturer, who is regularly engaged in the production of this material.

DISTRIBUTION BREAKOUT

Once the fiber optic cables arrives within the a hub building, main or intermediate distribution frame (MDF/IDF) room, it shall be routed within conduit to a wall or ceiling mounted cable storage cabinet, as shown on the plans, where a minimum of 20 feet of spare cable shall be coiled for future use. The cable shall then be terminated in a routed to its appropriate fiber distribution frame (FDF).

The jacketed cable shall be lashed with tie wraps to the rack prior to entering the FDF. The cable shall also be tie-wrapped to the inside of the FDF near the point of entry.

The cable jacket, aramid yarn and filler rods shall be removed exposing the buffer tubes. The exposed length of the buffer tubes shall be at least the length recommended by the hardware manufacturer which allows the tubes to be secured to the splice tray. Buffer tubes shall be secured to the splice tray. The remainder of the tubes shall be removed to expose lengths of the individual fibers sufficient for routing on the splice tray, as described in "Splicing," elsewhere in this Section 10-4. Moisture blocking gel shall be removed from the exposed buffer tubes and fibers. Manufacturer directions shall be followed to ensure that throughout the specified temperature range gel will not flow from the end of the buffer tube. The individual fibers shall be stripped and prepared for splicing.

FIBER OPTIC CABLE ASSEMBLIES

Cable assemblies (jumpers and pigtails) shall be products of the same manufacturer. The cable used for cable assemblies shall be made of fiber meeting the performance requirements of these special provisions for the F/O cable being connected, except that the operating temperature shall be modified to -4°F to +158°F (-20°C to +70°C), and cable attenuation shall not exceed 0.7 dB at 1300 nm.

Manufacturer's attenuation test results shall be provided for all cable assemblies.

Pigtails.--Pigtails shall be of simplex (one fiber) construction, in 900-μm tight buffer form, surrounded by aramid for strength, with a connector on one end. The outer jacket shall be yellow PVC with a nominal diameter of (3 mm) 0.118 inch, marked with the manufacturer's identification information. All pigtails shall be at least one meter in length. Pigtails installed in conduit shall follow the installation procedures outlined for fiber optic cables, except that the pulling tension shall not exceed 200 pounds.

Patchcords.--Patchcords may be of simplex or duplex design. Duplex jumpers shall be of duplex round cable construction, and shall not have zipcord (siamese) construction. All patchcords shall be at least 6 feet in length, sufficient to avoid stress and allow orderly routing. Patchcords shall have connectors on both ends.

The outer jacket of duplex patchcords shall be yellow. The two inner simplex jackets shall be contrasting colors to provide easy visual identification for polarity.

Connectors.--Connectors shall be of the ceramic ferrule ST type. Indoor ST connector body housings shall be either nickel plated zinc or glass reinforced polymer construction. Outdoor ST connector body housing shall be glass reinforced polymer. No index-matching fluids, gels or anti-reflection coating shall be applied to the end of the fiber.

The ST connector operating temperature range shall be -4°F to +158°F (-20°C to +70°C). Insertion loss shall not exceed 0.4 dB, and the return reflection loss shall be at least 35 dB. Connection durability shall be less than a 0.2 dB change per 500 mating cycles per EIA-455-21A (FOTP-21). All terminations shall provide a minimum 222-N pull out strength. The installed ST connector loss shall be less than 0.9 dB. Factory test results shall be documented and submitted to the Engineer prior to installing any connectors. Connectors shall have a yellow color body or boot.

All connectors shall be factory installed and tested. There shall be no installation of connectors in the field.

All unmated connectors shall have protective caps installed.

ST Couplers.--The ST couplers shall be made of nickel plated zinc or a glass reinforced polymer that is consistent with the material forming the associated ST connector body. The design mechanism for mounting the coupler to the FDU connector panel may be flanged or threaded but shall coincide with the FDU panel punch-outs.

All coupler sleeves shall be ceramic of the split clamshell or clover leaf design.

The temperature operating range for couplers shall be the same as that specified for the ST connectors.

FIBER DISTRIBUTION FRAME

The fiber distribution frame (FDF) unit shall consist of a EIA 19-inch rack, a compartment for termination and distribution cable tray and a compartment for a splice drawer. The termination and distribution cable trays shall accommodate 60 singlemode optical fibers. The termination and distribution cable trays shall have sufficient tray areas for excess optical fiber storage with provisions to assure that the optical fibers do not exceed a two-inch bend radius. The termination and distribution cable trays shall include a designation strip for identification of the 60 singlemode optical fibers. Each splice drawer shall include two splice trays with each splice tray capable of accommodating 60 fusion type splices. Each splice drawer shall allow for storage of excess lengths of the optical fibers of fiber optic cables. Each fiber distribution unit shall be provided with cable clamps to secure fiber optic cables to the chassis.

INSTALLATION

The Contractor shall install sufficient quantity of fiber distribution units to terminate all fibers in the largest cable. The fiber distribution unit shall be mounted in the equipment racks as shown on the plans. At each fiber distribution unit, the Contractor shall terminate the optical fibers of the two fiber optic cables . The optical fibers shall be spliced to the singlemode optical fiber cables assemblies within the splice tray(s). The optical fibers shall be of appropriate lengths to allow for future splicing with the splice drawer and shall be appropriately identified (tagged). All splices shall be fusion type and shall be arranged within the splice trays of the fiber distribution unit in accordance with the organizational design of the splice trays. Appropriate protective coating shall be applied to all fusion splices.

Full compensation for fiber distribution unit shall be considered as included in the contract prices paid for the item requiring fiber distribution unit and no separate payment will be made therefor.

10-4.08 FIBER OPTIC TESTING

GENERAL

Testing shall include the tests on elements of the passive fiber optic components: (1) at the factory, (2) after delivery to the project site but prior to installation, (3) after installation but prior to connection to any other portion of the system. The Contractor shall provide all personnel, equipment, instrumentation and materials necessary to perform all testing. The Engineer shall be notified two working days prior to all field tests. The notification shall include the exact location or portion of the system to be tested.

Documentation of all test results shall be provided to the Engineer within 2 working days after the test involved. The Contractors attention is directed to "As-Builts" elsewhere in these special provisions, regarding the requirements for recording test results.

A minimum of 15 working days prior to arrival of the cable at the site, the Contractor shall provide detailed test procedures for all field testing for the Engineer's review and approval. The procedures shall include the tests involved and how the tests are to be conducted. Included in the test procedures shall be the model, manufacturer, configuration, calibration and alignment procedures for all proposed test equipment.

FACTORY TESTING

Documentation of compliance with the fiber specifications as listed in the Fiber Characteristics Table shall be supplied by the original equipment manufacturer. Before shipment, but while on the shipping reel, 100 percent of all fibers shall be tested for attenuation. Copies of the results shall be (1) maintained on file by the manufacturer with a file identification number for a minimum of 7 years, (2) attached to the cable reel in a waterproof pouch, and (3) submitted to the Contractor and to the Engineer.

ARRIVAL ON SITE

The cable and reel shall be physically inspected on delivery and the attenuation shall be measured for 100 percent of the fibers. The failure of any single fiber in the cable to comply with these specifications, is cause for rejection of the entire reel. Test results shall be recorded, dated, compared and filed with the copy accompanying the shipping reel in a weather proof envelope. Attenuation deviations from the shipping records of greater than five percent shall be brought to the attention of the Engineer. The cable shall not be installed until completion of this test sequence and the Engineer provides written approval. Copies of traces and test results shall be submitted to the Engineer. If the test results are unsatisfactory, the reel of F/O cable shall be considered unacceptable and all records corresponding to that reel of cable shall be marked accordingly. The unsatisfactory reels of cable shall be replaced with new reels of cable at the Contractor's expense. The new reels of cable shall then be tested to demonstrate acceptability. Copies of the test results shall be submitted to the Engineer.

OUTDOOR SPLICES

The Contracor shall verify the quality of each splice prior to sealing the splice closure.

SYSTEM CABLE VERIFICATION AT COMPLETION

OTDR Testing.--Once the passive cabling system has been installed and is ready for activation, 100 percent of the fiber links shall be tested with the OTDR for attenuation at wavelengths of both 1310 nm and 1550 nm. Test results shall be recorded, dated, compared and filed with previous copies. A hard copy printout and a electronic copy on a DOS based (3.5 inch) disk of traces and test results shall be submitted to the Engineer. The OTDR shall be capable of recording and displaying anomalies of at least 0.02 dB.

Power Meter and Light Source.--At the conclusion of the OTDR testing, 100 percent of the fiber links shall be tested end to end with a power meter and light source, in accordance with EIA Optical Test Procedure 171, and in the same wavelengths specified for the OTDR tests. These tests shall be conducted in both directions and the differential in test results shall not exceed 0.5 dB. Test results shall be recorded, compared, and filed with the other recordings of the same links. Test results shall be submitted to the Engineer.

Cable Verification Worksheet.--The Cable Verification Worksheet shown in Appendix A shall be completed for 100 percent of all links in the fiber optic system, using the data gathered during cable verification. The completed worksheets shall be included as part of the system documentation in the As-Built plans.

Test Failures.--If the link loss measured from the power meter and light source exceeds the calculated link loss, or the actual location of the fiber ends does not agree with the expected location of the fiber ends (as would occur with a broken fiber), the fiber optic link will not be accepted. The unsatisfactory segments of cable, or splices shall be replaced with a new segment of cable or splice at the Contractor's expense. The OTDR testing, power meter and light source testing and Cable Verification Worksheet shall be completed for the repaired link to determine acceptability. Copies of the test results shall be submitted to the Engineer. The removal and replacement of a segment of cable shall be interpreted as the removal and replacement of a single contiguous length of cable connecting two splices, two connectors. The removal of only the small section containing the failure and therefore introducing new unplanned splices, will not be allowed.

APPENDIX A
Cable Verification Worksheet

Contract No. _____ Contractor: _____

Operator: _____ Date: _____

Link Number: _____ Fiber Number: _____

Test Wavelength (Circle one): 1310 nm 1550 nm

Expected Location of fiber ends:
End 1: _____End 2: _____

OTDR Test Results:	_____ dB	1A
Forward Loss:	_____ dB	1B
Reverse Loss: [(1A + 1B)/2]	_____ dB	1C
Average Loss:		
Power Meter and Light Source Test Results:		
Forward Loss:	_____ dB	2A
Reverse Loss:	_____ dB	2B
Average Loss [(2A + 2B)/2]:	_____ dB	2C
Calculated Fiber Loss		
Length of the link (from OTDR):	_____ km	3A
Allowed loss per km of fiber:	0.4 dB/km	3B
Total Allowed Loss due to the fiber (3A * 3B):	_____ dB	3C
Calculated Splice Loss		
Number of Splices in the Link:	_____	4A
Allowed Link Loss per Splice:	0.10 dB	4B
Total Allowed Loss due to Splices (4A * 4B):	_____ dB	4C
Calculated Link Loss		
Connector Loss:	0.9 dB	5A
Total Link Loss (5A + 3C + 4C):	_____ dB	5B
Cable Verification:		
Compare Power Meter Average Loss to Calculated Link Loss (2C - 5B):	_____ dB	6A

If the value of 6A is greater than zero, the link has failed the Test.
See Test Failures elsewhere in these special provisions.

To Be Completed by Caltrans:

Resident Engineer's Signature: _____ Cable Link Accepted: _____

10-4.09 TWISTED PAIR CABLE

Twisted pair cable shall be supplied in the configurations shown on the plans and specified in these special provisions. The twisted pair cable shall meet the requirements of REA Specification PE-39 and the following:

Conductors shall consist of a solid wire of plain annealed high conductivity copper, smoothly drawn, circular in section, uniform in quality, free from defects and having a conductor size of number of 22 AWG. Each conductor shall be insulated with a colored, high density polyethylene jacket. Insulated conductors shall be uniformly twisted to form pairs. The twisted length of the pairs shall vary to minimize cross talk. A non-hygroscopic dielectric tape shall be wrapped around the insulated pairs. A laid up core shall be wrapped with aluminum tape and bonded with an overlap to provide 100 percent shielding. A black, high molecular weight, medium or low density, polyethylene jacket shall be extruded over the shield. Filling compound materials used in the cable shall not support galvanic action.

The cables shall be color-coded using the REA standard color code.

Packing.--The cable shall be supplied on reels. Each reel shall be transported to the site using cable reel trailers and shall have the following information clearly labeled on it:

Customer.
Customer order number.
Reel number.
Destination.
Ship date.
Manufactured date.
Manufacturer's name.
Cable code.
Length of cable.

Cable shall be transported to the project site using cable reel trailers. Care shall be taken at all times to avoid scraping, denting, or otherwise damaging the cable before, during or after installation. Damaged cable shall be replaced by the Contractor without additional compensation.

Installation.--Cable shall be installed in duct in the field in accordance with the plans. Duct ends shall have all rough ends smoothed to prevent scraping the cable. A manufacturer recommended lubricant shall be applied to the cable to reduce friction between the cable and the duct. Mechanical aids and pulling cable or ropes shall be used as required. Personnel shall be stationed at each cabinet, splice vault and pull box through which the cable is to be pulled to observe and lubricate the cable. All exposed cable ends shall be protected from moisture ingress.

The cable shall not be stressed beyond the manufacturer's minimum bending radius at any time. A dynamometer shall be used to measure installation tension and a tension limiting device shall be used to prevent exceeding the manufacturer's maximum pulling tension specification during installation. The tension limit shall be set at or below the manufacturer's maximum limit. The maximum measured pulling tension shall be recorded for each run of cable.

A single loop of cable shall be provided at each pull box in accordance with the plans. Cable shall be trained to the splice vault wall opposite any power cables, tied with nylon ties and labeled with vinyl marking bands.

A minimum of 40 feet of slack shall be provided for each unspliced cable at each splice vault.

Following installation of the cable in the duct, all duct entrances at pull boxes, vaults and cabinets shall be sealed with duct sealing compound to prevent the ingress of moisture, foreign materials, and rodents. The cables shall be spliced, maintaining the pair count and REA color code. Cable markers shall be used to identify the cable and pair count. All field splices shall be made in twisted pair splice closures located in the splice vaults. The cable shall be securely fastened in place within pull boxes, vaults and cabinets.

Testing.--The Contractor is responsible for all testing and documentation required to establish approval and acceptance of the cable, its installation and in operation during the system integration testing. The following identifies the specific quality control requirements for this specification.

Cables shall be tested at the factory to ensure the cable complies with the manufacturer's specifications. The Contractor shall record the reel number from which the cable came, the identification of the pairs measured, and the results of continuity and insulation tests. Half of the twisted wire pairs in each reel of cable shall be tested for insulation breakdown and continuity prior to installation in ducts.

As a post-installation check, the Contractor shall measure the continuity and insulation resistance of the cable pairs in each length of cable after installation. The Contractor shall measure these parameters on each pair and record and submit the results to the Engineer.

The Contractor shall carry out system integration testing to ensure that the twisted pair cables perform as specified when used in operation with equipment installed under these special provisions and plans.

10-4.10 TERMINAL BLOCK

The terminal blocks shall have replaceable protector modules and be installed in equipment cabinets , at cable nodes and at data nodes.

Terminal Blocks.--Terminal blocks shall terminate twisted-pair communications cables and each pair shall terminate on distinct terminals using compression, screw-down terminals. The terminal blocks shall be a C-310 style and include REA or AT&T approved solid state, over-voltage protection. Terminal blocks installed in field equipment cabinets, including but not limited to, ramp meters, traffic monitoring stations, weigh in motion stations, traffic signals, and CCTV camera locations, shall be 12 pair protected terminal blocks. Terminal blocks installed at data nodes, hub buildings, or cable nodes shall be protected premises entry type and terminate 50 pairs and use 5-pin plug in type protectors. The terminals shall terminate wire sizes of No. 22 AWG to No. 18 AWG. The current rating shall be not less than 2 A.

Terminal blocks shall be systematically arranged inside the cabinet to allow termination of cables. The terminal block and the station-protection modules shall be properly installed along the lower side of the equipment cabinet, opposite the power terminations.

The terminal block and the station protection modules shall be properly installed along the lower side of the equipment cabinet, opposite the power terminations. Each pair of the incoming twisted pair communications cables shall be properly terminated inside the equipment cabinet as indicated in the schematics and twisted pair splice tables. Terminations shall be made sequentially and no more than one wire from the communications cable shall be connected to one terminal and marked properly to show the pair number.

All cable cores shall be labeled with cable markers at each end for proper core identification.

Terminal Protector.--The terminal protector incorporated in the terminal blocks shall be field installable and replaceable solid state over-voltage protection (SSOVP) module. The SSOVP shall have tin-alloy plated outside plant, central office and grounding pins. The SSOVP will operate in the 300 VDC surge range with a response time of less than 20 ns.

The solid state over-voltage protection (SSOVP) module is a 5-pin unit that will be installed in a C-310 style terminal block. The SSOVP will have an on-state voltage of less than 5 V at 100 A within 10 µs.

10-4.11 TWISTED PAIR SPLICE CLOSURE

Twisted pair splice closures shall come in two sizes: twelve inches and twenty-four inches. The closures shall to be installed inside communication pull boxes or splice vaults for every drop from the twisted pair cable to an equipment location and at mid-span splices as shown on the plans and shall conform to the following:

The twisted pair splice closure shall have external dimensions not exceeding 24 inches in length by 3 inches in diameter. In the communications pull boxes, the length shall be limited to 12 inches. The twisted pair splice closure shall consist of a neoprene sleeve, and shall be secured with hose clamps. The closure shall protect the cable splices from water and mechanical damage and shall be resistant to salt corrosion. All material of the twisted pair splice closure and associated mounting accessories shall be non-reactive and the completed assembly shall not support galvanic cell action. The twisted pair splice closure shall be waterproof, encapsulated with re-enterable material, and shall be sealed with a gasket. Wire connections shall be of the insulation displacement type with water blocking gel, (3-M Scotchlocks, AMP Pica-bonds or equivalent). The manufacturer's instructions shall be explicitly followed during installation of the twisted pair splice closure.

The closure shall be mounted securely inside the communications pull box or vault as shown on the plans. The closure shall be properly grounded and the cable sheaths bonded using bonding clamps. The trunk cables shall be identified as "IN" or "OUT" depending upon their location relative to the splice (toward the communications node or away from the communications node). A tape collar shall be placed around the two trunk cables and the drop cable at the location required by the splice closure. The splice closure shall be fitted to the splice and the hose clamps tightened over the cables.

Each pair of the drop cable shall be properly spliced to the designated pair in the trunk cable as indicated in the twisted pair splice tables. The splice conductors shall be securely crimped onto the wires, using manufacturer approved installation tools.

The closures shall be provided along with a splice kit, which shall contain all hardware items. Hardware shall include, but not be limited to, vinyl tape, bonding clamps, splice connectors, No. 14 AWG, insulated wire, spacer tapes, and terminal lugs.

Continuity shall be tested and confirmed prior to final assembly of the splice closure. After installing, splicing, and terminating the twisted pair cables, the Contractor shall test the cables for grounds, shorts, splits, and opens. The Contractor shall measure and record the loop resistance from the adjacent data node for all pairs at each terminal location. This resistance shall not exceed 34Ω per thousand feet or the Contractor shall record all data and shall correct any problems per manufacturer's instruction. The Contractor shall record all data for review by the Engineer.

10-4.12 PAYMENT

The contract price paid per linear foot for fiber optic cable of the types and sizes listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in fiber optic cable of the types and sizes involved, complete in place, including fiber optic testing, fiber distribution unit, marking and labeling fiber optic cable, cable tray and splicing, 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 splice vault shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in splice vault, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract price paid per linear foot for twisted pair cable of the sizes listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in twisted pair cable of the sizes involved complete in place, including protected terminal blocks, 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 twisted pair splice closure shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in twisted pair splice closure 12 inches and twisted pair splice closure 24 inches, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for terminal blocks shall be considered as included in the contract lump sum price paid for the items requiring the terminal blocks and no additional compensation will be allowed therefor.

SECTION 10-5. CLOSED CIRCUIT TELEVISION EQUIPMENT

10-5.01 GENERAL

Closed circuit television equipment shall conform to all rules and regulations of the Federal Communications Commission (FCC) and shall conform to the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and these special provisions

Prototype equipment is not acceptable. All equipment shall be current standard production units and shall have been in production for a minimum of 6 months. Rebuilt or reconditioned equipment will not be allowed.

All rack mounted equipment and card cage assemblies shall have metal filler plates to cover any unused channel slots or card slots.

CCTV camera locations shall include CCTV camera assembly, pan tilt unit, camera control receiver and modem, single video transmitter, 334-TV cabinet and all the necessary cables and other equipment to provide a fully functional site. CCTV locations that coincide with video nodes may omit the single video transmitter and associated single video receiver in the video node by routing the video coax cable to the video multiplexer in the video node.

The Contractor shall arrange to have a technician, qualified to work on the closed circuit television equipment and employed by the closed circuit television equipment manufacturer or his representative, present at the time the equipment is turned on.

10-5.02 CLOSED CIRCUIT TELEVISION CAMERA LOCATION

Closed circuit television (CCTV) camera at various locations shall consist of providing service, installing Type 334-TV cabinet, closed circuit television camera assembly, camera control receiver, modem, pan/tilt unit, camera pole, camera junction box, CCTV wiring, single video transmitter, sign truss mounts where required and other required equipment at locations as shown on the plans.

The 334-TV cabinet and control equipment shall consist of a 334-TV cabinet, video transmitter, camera control receiver and camera control modem as described elsewhere in these special provisions and plans.

CCTV locations that coincide with video nodes shall omit the single video transmitter and associated single video receiver in the video node by routing the video coaxial cable to the video multiplexer in the video node and shown on the plans.

Before installation, the Contractor shall test to verify that all equipment functions in accordance with manufacturer's specifications. After installation, all CCTV camera location equipment shall be tested as described elsewhere in these special provisions.

10-5.03 CLOSED CIRCUIT TELEVISION CAMERA POLE

Camera poles shall conform to the provisions in Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications and these special provisions.

The CCTV camera pole shall be made from sheet steel and the pole shall be hot-dip galvanized after fabrication in accordance with the provisions in Section 75-1.05, "Galvanizing," of the Standard Specifications. The pole shall be fabricated to the dimensions and with all the accessories as shown in the plans.

The horizontal plane of the pan and tilt base plate shall be perpendicular to the vertical plane of the CCTV camera pole. The CCTV camera pole shall be erected plumb. The vertical axis of the erected CCTV camera pole shall be within three inches of the theoretical vertical axis when measured without the action of sunlight or wind.

A junction box shall be installed on the camera pole approximately 6 inches from the top of the pole as shown on the plans and described elsewhere in these special provisions.

10-5.04 SIGN TRUSS MOUNT

The Contractor shall provide camera pole and camera mounts on existing sign trusses as shown on the plans.

The Contractor shall field verify all dimensions and shall provide shop drawings to the Engineer for approval prior to fabrication. The camera pole and camera mount shall be mechanically connected to the truss structure as shown on the plans. No field welding will be permitted. The mount shall have drilled holes provided to mount the pole or manual adjust head as shown on the plans.

The camera/housing assembly shall be mounted at the proper elevation and shall be set at the proper vertical and horizontal angles to provide a clear and unobstructed view of the freeway.

All mounting plates and brackets shall be fabricated from ASTM Designation: A36 steel plate and shall be hot-dip galvanized after fabrication. Steel plate, hardware and galvanizing shall be in accordance with the requirements of Section 75, "Miscellaneous Metal," of the Standard Specifications.

The truss mount shall be capable of supporting a camera/housing load of 198 pounds.

A junction box shall be installed on the camera pole approximately 6 inches from the top of the pole as shown on the plans and described elsewhere in these special provisions.

10-5.05 PAN AND TILT UNIT

The pan and tilt unit will consist of the pan and tilt unit itself along with any electrical or communication interfaces required to perform the functions specified. The pan and tilt unit shall operate reliably over extended periods of time with little or no maintenance, be weather-resistant under a full range of environmental conditions and provide repeatable day-to-day operation.

PERFORMANCE

The pan and tilt unit shall meet the following performance specifications:

Load Rating	Greater than 80 lb
Braking: Pan and Tilt	Mechanical or Electrical to limit coasting
Overload Protection	Motors: Impedance protected
Construction	Corrosion resistant steel or aluminum
Angular Travel	Pan: At least 350 degrees Tilt: At least +30 degrees to -90 degrees
Motor Reversal	Instantaneous

The pan and tilt unit with camera assembly mounted shall be able to withstand a wind load of 145 km/h.

ELECTRICAL SPECIFICATIONS The pan and tilt unit shall meet the following specifications:

Power requirements	120 VAC ± 15%, 60 Hz ± 5%
Power consumption	less than 100 W
Duty cycle	Pan: continuous Tilt: intermittent
Pan and tilt position preset	Positions camera to a predetermined azimuth, elevation and lens position

The cable connector shall be fully weather protected.

PHYSICAL SPECIFICATIONS

The pan and tilt unit shall meet the following physical specifications:

Size	Less than 16” (H) x 14” (W) x 8” (D)
Weight	Less than 55 lb
Pan Speed	Greater than or equal to 6 degrees/second
Tilt Speed	Greater than or equal to 3 degrees/second
Gears	Hardened steel
Mounting (Base)	7” ± 1/8” dia. bolt circle
Camera Mount	Compatible with camera housing
Bearings on Rotating Surfaces	Heavy duty roller type
Overload Protection	Provided - internal

SHOCK AND VIBRATION SPECIFICATIONS

The pan and tilt unit shall meet the following vibration specifications:

Shock	15 g
Vibration	5-60 Hz with 0.082 inch total excursion, and 5 g rms vibration from 60-1000 Hz

The pan and tilt unit shall not incur any physical damage after a shock, return to normal operation immediately and operate within the specified vibration.

ENVIRONMENTAL SPECIFICATIONS

The pan and tilt unit shall meet the following environmental specifications:

Operating temperature	-10˚F to + 140˚F
Finish	Weather resistant paint or polyurethane
Seals	"O" ring or gaskets for all weather protection of pan and tilt unit and cables.

PAN AND TILT STOPS

The pan and tilt unit shall have both mechanical and electrical pan and tilt stops. The settings of these pan and tilt stops shall be determined by the Engineer.

INSTALLATION

The Engineer will notify the Contractor of the pan and tilt stops for the pan and tilt unit for the Contractor to set prior to installation check. Installation check shall be done by the Contractor in the presence of the Engineer. The operation of the pan and tilt unit will be performed at the 334-TV cabinet adjacent to the freeway pole(s) where the camera is mounted. The Contractor shall furnish a color video monitor, for testing only, to view the actual camera image. The Engineer shall direct adjustments for pan and tilt presets and pan and tilt stops, to be made by the Contractor. Upon completion of the installation, the Engineer shall verify operation of the pan and tilt unit.

The Contractor shall provide ten copies of the operation and maintenance manuals for the pan and tilt unit.

10-5.06 CAMERA CONTROL RECEIVER

The camera control receiver (CCR) shall include all auxiliary equipment required to interface with the communication subsystem, outdoor pan and tilt units, and the CCTV camera assemblies.

Functional Description.--The camera control receiver shall receive commands from the existing camera control transmitter (CCT) in the TMC and decode them into the switch closures, that are used to operate and orient a CCTV camera. In addition, the camera control receiver shall generate outputs to control ancillary equipment and operations as defined elsewhere in these special provisions. The CCR shall be connected to the camera control transmitter by cable, providing an analog voice circuit equipped with multipoint modems. These modems may be internal or external to the CCR. The CCR shall be completely compatible and interchangeable with the Javelin Model JO408R-CCR receiver and be fully compatible with the existing Javelin Model JO1400R camera control transmitter and Javelin Model JO4100DT camera control keypad located in the traffic management center.

Functional Requirements.--The command messages addressed to the CCR shall cause an immediate response. In response to command messages, the state of the control relays shall be engaged for a specific period of time and returned automatically to a neutral state. If the action is to continue, an additional command from the transmitter shall be required. This shall provide a fail-safe mode of operation should communications be interrupted between the CCR and the existing CCT in the TMC.

The specific length of time that any command remains latched shall be determined by the operational impact of that command, system and component requirements. Commands for camera movement and adjustment, such as, pan, tilt, iris and lens control shall use shorter latching times on the order of milliseconds, compared to external contact closures that shall latch for periods of seconds to minutes. The manufacturer shall provide documented evidence that the chosen time intervals for the latched commands do not negatively affect the operation of the camera, lens or the pan and tilt unit.

One set of dry contacts shall be permanently latched until a second command is received by the CCR. This function will be used to turn on communications equipment at selected sites. This communications equipment will remain operational until disengaged by the operator.

The CCR and modem shall provide an EIA-232-D compatible interface in addition to the twisted pair terminals for the modem. If the modem is internal to the CCR, all communication and control signals between the modem and CCR shall appear at the EIA-232-D interface. In addition, it shall be possible to communicate with the CCR by way of the EIA-232-D interface and exercise all CCR functions.

The CCR shall be designed for continuous operation in outdoor weather conditions when installed in Type 334-TV, or equivalent, cabinets.

The CCR communication protocol shall be fully compatible with the existing CCT communication protocol and shall provide the following:

Signaling rate of 9600 bps shall be used to communicate with the existing CCT in the TMC.
Configure the transmission rate of the equipment to 9600 bps.

A unique address shall be used to identify and accept commands sent from the camera control transmitter. This unique address shall be included in all signals sent from the CCR to the CCT.

Parity checks on each byte and any additional cyclic redundancy codes (CRC) or checksums required to ensure that random or fortuitous noise is not interpreted by the CCR as a valid message from the existing CCT in the TMC.

The CCR shall only transmit to the existing CCT in the TMC, in response to a valid poll or command message which contains a unique address for the CCR.

Transmissions to different CCRs shall share a single communication channel without interference or erroneous operation.

The CCR shall acknowledgment of all correct messages.

Unique commands shall be provided to exercise all functions of the CCR.

The Contractor shall provide the Engineer with detailed descriptions of the CCR communication protocol and interface specifications and a license agreement to develop devices to interface with the existing CCT.

The CCR shall provide the following functions:

The CCR shall receive and decode signals from the existing CCT in the TMC and activate pan, tilt, zoom, focus, iris and auxiliary functions at the remote camera site in the camera and pan, tilt and zoom unit. The CCR shall provide both local automatic and remote manual iris adjustment and shall provide control for automatic or manual shutter speed with the selections made by commands initiated from the existing CCT in the TMC.

The CCR shall provide the capability to locally store and activate a minimum of 15 camera preset positions. The preset information shall be digitally stored at the CCR. Presets shall be assignable and activated from the existing CCT in the TMC. In the event of a power failure preset settings shall be maintained. The CCR or CCT shall be able to re-calculate the preset values should the pan/tilt unit be replaced.

The CCR shall provide the capability of transmitting positioning feedback information from the pan, tilt, and zoom potentiometers to the existing CCT in the TMC using an eight bit, or equivalent, digital format. The positioning feedback information shall only be transmitted when a command requesting positioning feedback is received from the existing CCT in the TMC.

The CCR shall include the capability to process and implement a minimum of three auxiliary control signals. For example, auxiliary control signals may provide needed control of heaters, washers and wipers on cameras, etc. At least two of the auxiliary control signals shall be latching. At least three inputs capable of sensing a dry contact closure shall also be provided.

The CCR shall provide local control functions for pan, tilt, zoom, focus, and other operations. These control functions shall be performed from a portable unit communicating through a serial port on the CCR. A switch shall be provided to defeat remote commands from the existing CCT in the TMC and allow the activation of all local control functions.

The failure of a single CCR unit or its associated modem shall not cause any other units to become inoperative or damage to its associated camera.

If communications to the CCR are interrupted, the CCR shall cause the camera to remain in the current position or move it to a preset position as a user option.

Operational Requirements.--The Contractor shall provide a certification from the original equipment manufacturer that the CCR (using a modem) will interface and operate over a standard telephone company voice grade line as required by these special provisions when it is correctly connected to existing pan and tilt units and zoom lenses. In addition, the CCR shall meet the following requirements:

Electrical.--The CCR shall operate from a 120 VAC ±10 percent, at 60 Hz ±5 percent, power source and incorporate an internal, regulated power supply. The maximum power consumption shall be 45 W. Protection from power brown outs, current surges or voltage spikes of up to 1000 V shall be provided. The lens driver circuit shall provide power at the appropriate voltage for zoom, focus and iris controls, listed elsewhere in these special provisions. The pan and tilt driver circuit shall provide power at the appropriate voltages to control the movement of the pan and tilt unit.

Physical.--The CCR shall be supplied in a durable enclosure suitable for mounting in an EIA 19-inch rack . The maximum dimensions of the CCR shall be 8” (H) x 19” (W) x 14” (D).

The CCR shall be fully operational over an ambient temperature range of -10°F to +122°F with relative humidity from 5 to 90 percent. The CCR enclosure shall have all necessary bulkhead connectors for access to all required external cables.

Functional Testing of CCR.--The Contractor shall perform a functional test to verify that the CCR to be placed in the cabinet works in accordance with these special provisions before installing the CCR. The CCR shall be installed as shown on the plans. The Contractor shall confirm equipment placement with the Engineer before installing any equipment.

The Contractor shall test the camera control system for the following functions:

After installing all equipment at each CCTV site, the Contractor shall confirm the operation of the camera control receiver and modem using test equipment and other necessary equipment that emulates all the functions of the existing CCT in the TMC and modem, and shall document all results.

After installing all camera control receivers and modems and the communication system, the Contractor shall demonstrate the operation of the camera control system and shall assign all system parameters using test equipment that emulates all the functions of the camera control keypad, camera control transmitter and modem from the TMC and shall keep test equipment in operation until witnessed and approved by the Engineer.

Test equipment that emulates all the functions of the camera control transmitter and modem shall address all camera control receivers (CCR) and shall operate all remote control functions, including pan and tilt, zoom, focus, set up, and recall a minimum of ten preset positions per remote CCR address. The response to the test equipment signals shall appear to be immediate.

10-5.07 MODEM

The modem shall provide the interface between the camera control receiver and existing camera control transmitter over voice grade communications-lines. The modem units shall comply with the requirements of the Federal Communications Commission rules and regulations part 68 for direct connection to a common carrier telephone line. The modems shall be interchangeable and compatible with the existing General DataComm Series 9600RP modem installed at the existing CCT.

Functional Requirements.--The modem shall have the transmission range over a minimum of 37,000 feet of No. 22 AWG, twisted pair cable, with a bit error rate of better than one in 1×10^5 in an operational environment.

The modem shall provide full duplex communication compliant with CCITT standard modem signaling at 9.6 kbps with fall back to 7.2 kbps and 4.8 kbps over two or four wire dial up lines or leased lines with switch or control command selection. The modem shall comply with the requirements of EIA-Std-485.

The modem shall use a standard EIA-232-D interface and shall be configured as data circuit communication equipment (DCE), as defined by that standard. The modem shall raise Clear to Send On after it detects Request to Send On. Pulse width distortion shall be defined as the difference between the pulse width into one modem EIA-232-D port and the output pulse width from the EIA-232-D port of an inter-connected modem. Pulse width shall be measured in units of time between the mark-to-space and space-to-mark transitions of any particular data bit measured in accordance with EIA-404-A.

The modem shall not effect the operation of other modems or CCR's on the same circuit in the event of modem failure or power loss.

Electrical.--The modem shall operate from a power source of 115 VAC ±15 percent at 60 Hz ±5 percent unless it is internal to the CCR and operates from the internal CCR power supply. The maximum power consumption shall be not more than 15 W. The modem shall be protected from spikes on the communication circuits and power lines of up to 1000 V.

Physical.--If not integral to the CCR, modem shall mount in an EIA 19-inch rack and shall not occupy more than three standard rack units. The modem shall operate over an ambient temperature of 32°F to 122°F with a relative humidity between 5 percent to 90 percent.

10-5.08 CAMERA JUNCTION BOXES

The camera junction box shall be a NEMA Type 3R, mounted on the camera poles as shown in the plans. The nominal dimensions of the camera junction box shall be 18 inch (H) x 14 inch (W) x 9 inch (D).

The camera junction boxes shall be securely mounted on the camera support structure using stainless steel straps. The mounting hardware or method shall not impede the operation of the door. The connections shall be weather tight grommets. The camera junction box shall be mounted on the side of the pole away from freeway traffic.

10-5.09 CLOSED CIRCUIT TELEVISION WIRING

The CCTV wiring shall be installed between the camera assembly, pan and tilt unit and the camera control receiver, and shall consist of outdoor cables and enclosed cables. The CCTV wiring shall be compatible with the camera assembly, pan and tilt unit and the camera control receiver.

CCTV wiring and connectors shall be configured to make the CCTV subsystem completely operational.

A bonding wire shall be provided between the junction box and the Type 334-TV cabinet.

All cables shall be:

Installed without damaging the conductors or insulation.
Installed without kinks.
Handled in accordance with manufacturers specifications and recommended bending radius.
Run continuously between terminations without splices.
Installed with sufficient slack for equipment movement.
Neatly tagged at both terminations to indicate source, destination and function.

All cables, cable assemblies and connectors shall meet all National Electrical Code standards with regards to voltage, current and environmental ratings. Specifications of all cables, cable assemblies, and connectors with strain relief backshells intended for use by the Contractor shall be submitted to the Engineer as part of the shop drawings for review and approval. The Contractor shall test the cables for continuity prior to and after installation. Cables shall be installed as shown on the plan sheet "CCTV Electrical Diagram Pan and Tilt."

10-5.10 OUTDOOR CABLES

The outdoor cables shall be installed between the camera junction box, the pan/tilt unit and the camera assembly, and shall be compatible with the camera assembly and pan and tilt unit. The outdoor camera assembly cables shall:

have a minimum of 9pairs routed to the pan/tilt unit;
have a minimum of 12 pairs and a coaxial cable, routed to the camera housing;
have a single bare, solid copper No. 8 AWG ground wire routed to the cabinet ground rod.

The cable between the pan/tilt unit and junction box shall have a MIL-C-26482, 21 contact, 16 AWG connector plug on one end, and a connector compatible with the pan/tilt unit on the other.

The cable between the camera housing and junction box shall have a MIL-C-26482, 21 contact, 16 AWG connector plug on one end, and a connector compatible with the camera housing on the other.

Neoprene tubing shall be installed between the camera junction box and the pan and tilt unit. The cables and connectors shall be installed to allow removing the camera and the camera housing without removing the pan and tilt unit.

The Contractor shall be responsible for all testing and documentation required to establish approval and acceptance of the production, installation, and operation of these materials and equipment.

10-5.11 ENCLOSED CAMERA CONTROL CABLES

The enclosed camera control cables shall connect the camera junction box to the camera control receiver located in the cabinet and shall consist of:

One -- RG6A/U coaxial cable.
One -- No. 8 AWG bonding wire.
One -- 9 pair conductor, No. 18 AWG, tinned copper stranded, individually shielded control cable:
One -- 12 pair conductor, No. 18 AWG, tinned copper stranded, individually shielded cable.

Each conductor in the cables shall be insulated with a polypropylene jacket, color coded for positive identification, have a resistance of 23.4 Ω/km at 20°C or less and be stranded.

Each conductor pair, in the twisted pair cables, shall be shielded with an aluminum-polyester tape wrap with a copper drain wire.

The cables between the junction box and the CCR shall have a MIL-C-26482, 21 contacts - 16 AWG connector receptacle on one end, and shall be compatible with the CCR at the other end. See plan sheet titled "CCTV Electrical Diagram Pan and Tilt" for details.

Each cable shall have an overall PVC jacket of no less than 0.045 inch (1.14 mm) thickness.

The RG-6A/U coaxial cable shall be Comm/Scope No. F59SSEF, Alpha 9006A, Manhattan M4204, or approved equal.

10-5.12 MODEL 170 BASED CABINETS

The Model 334 based cabinets shall conform to the provisions of the "Traffic Signal Control Equipment Specifications" (TSCES) issued by the State of California, Department of Transportation, and to all addendums thereto current at the time of project advertising.

Each Type 1 cabinet shall consist of a housing 1 (A or B) and mounting cage 1, as described in Chapter 6 of the TSCES for Model 334 cabinets.

Police panels will not be required.

Foundations for housing Type 1 shall conform to the details on Standard Plan ES-4B and as shown on Contract Plans for Model 332 and 334 cabinets.

Section 86-3.01, “Controller Assemblies,” of the Standard Specifications is amended by adding the following paragraph:

Field conductors No. 12 and smaller shall terminate with spade type terminals. Field conductors No. 10 and larger shall terminate in spade type or ring type terminals.

The first paragraph of Section 86-3.07, "Controller Cabinet," of the Standard Specifications is amended to read:

86-3.07 Controller Cabinet.— Unless otherwise specified, controller cabinets for other than Type 90 and Model 170/2070 controllers shall conform to the following:

The third paragraph of Section 86-3.07A, "Cabinet Construction," of the Standard Specifications is amended to read:

Exterior welds shall be ground smooth. Edges shall be filed to a radius of 0.03125-inch, minimum.

The first sentence of forth paragraph of Section 86-3.07A, "Cabinet Construction," of the Standard Specifications is amended to read:

Cabinets fabricated from cold rolled steel shall be finished with a polymeric or an enamel coating system conforming to Color No. 14672 of Federal Standard 595B.

The eleventh paragraph of Section 86-3.07A, "Cabinet Construction," of the Standard Specifications is amended to read:

The police panel shall be mounted on the door as shown on the plans, and equipped with a lock keyed for a master police key. Two keys shall be furnished with each cabinet for the police lock. Each police key shall have a shaft at least 1 3/4 inches in length. Police panels shall not be furnished for controller assemblies that do not control traffic signals.

The first paragraph of Section 86-3.07B, "Cabinet Ventilation," of the Standard Specifications is amended to read:

86-3.07B Cabinet Ventilation.—Each controller cabinet shall be provided with 8 screened, raintight vent holes, in diameter or larger, in the lower side or bottom of the cabinet, or at the option of the Contractor, louvered vents with a permanent metal mesh or 4-ply woven polypropylene air filter held firmly in place, which will permit the fan to pass the volume of air specified, may be substituted.

The second paragraph of Section 86-3.07B, "Cabinet Ventilation," of the Standard Specifications is amended to read:

Each controller cabinet shall be equipped with an electric fan with ball or roller bearings and a capacity of at least 100 ft^3/min.

The fan shall be thermostatically controlled and shall be manually adjustable to turn on between 90°F and 149°F with a differential of not more than 43°F between automatic turn on and turn off. The cabinet fan circuit shall be fused at 125 percent of the ampacity of the fan motor installed.

The fan and cabinet vent holes shall be located with respect to each other so as to direct the bulk of the air flow over the controller unit or through the ventilating holes of the controller unit where those holes exist.

CABINET WIRING

The first sentence of first paragraph of Section 86-3.07C, "Cabinet Wiring," of the Standard Specifications is amended to read:

Conductors used in controller cabinet wiring shall be No. 22, or lager, with a minimum of 19 strands.

The first paragraph of Section 86-3.07D, "Cabinet Accessories," of the Standard Specifications is amended to read:

86-3.07D Cabinet Accessories.— The following accessories shall be furnished with each cabinet assembly for other than Type 90 and Model 170/2070 controllers:

Labels:

A permanent printed, engraved or silk screened label shall be provided for the following equipment and for all other removable items of equipment:

1. Receptacles for relays and switching devices.
2. Switches, fuses and circuit breakers.

Labels shall conform to the designations on the cabinet wiring diagram. Labels for all shelf-mounted equipment shall be on the face of the shelf below the item. Labels for wall-mounted equipment shall be below the item.

Convenience Receptacle
The first paragraph of Section 86-3.08K, "Convenience Receptacle," of the Standard Specifications is amended to read:

86-3.08K Convenience Receptacle.— A convenience receptacle shall be mounted in a readily accessible location inside the cabinet.

Convenience receptacle shall be a duplex, 3-prong, NEMA Type 5-15R grounding type outlet and shall conform to the requirements in UL Standard 943.

Lighting Fixture
The first paragraph of Section 86-3.09K, "Lighting Fixture," of the Standard Specifications is amended to read:

86-3.09K Lighting Fixture.— Each cabinet shall be provided with a fluorescent lighting fixture mounted on the inside top of the cabinet near the front edge. Fixture shall be provided with an F15T8, cool white lamp operated from a normal power factor UL or ETL listed ballast.

The "On-Off" switch for the lighting fixture shall be either of the following:

(A) A toggle switch mounted on the inside door panel.
(B) A door-activated switch that turns the light on when the door is open, and off when the door is closed.

The first paragraph of Section 86-3.09, "Components," of the Standard Specifications is amended to read:

Components.— Components used in the construction of control equipment for other than Type 90 and Model 170/2070 controllers shall conform to the following:

10-5.13 TYPE 334-TV CABINETS

The Type 334-TV cabinets shall include a Model 170 based cabinet, power distribution assembly, thermostatically controlled fan, door locks, 19-inch equipment racks, all necessary mounting hardware and wiring, foundation and anchor bolts and other equipment as shown on the plans and specified in these special provisions. The Model 170 based cabinet is specified elsewhere in these special provisions.

The Contractor shall install a power distribution assembly at the bottom of the 483-mm equipment rack, inside the Type 334-TV cabinet in accordance with the plans. The power distribution assembly shall consist of the following: one 30 A, 120 or 240 V minimum, single or double pole main breaker; three 15 A, 120 V minimum, single pole secondary breakers; four standard duplex 117 VAC receptacles; and one duplex, three prong, NEMA Type 5-15R grounded utility type outlet with ground fault interrupter. The power distribution assembly shall protect the equipment powered by the assembly from power transients. Over voltage protection shall be provided for the power distribution assembly and shall contain as a minimum, a surge arrestor which shall reduce the effect of power line voltage transients and be rated as follows:

Recurrent peak voltage	212 V
Energy rating (minimum)	50 J
Power dissipation, average	0.85 W
Peak current for pulses less than 6 µs	2,000 A
Standby current for 60 Hz sinusoidal	1 mA or less

The Contractor shall install a thermostatically controlled fan in the Type 334-TV cabinets. The fan shall provide shall provide 150 cfm of ventilation. The fan shall be activated when the temperature inside the cabinet exceeds 75°F and shut off when the temperature is less than 65°F. All vents shall be filtered.

The Contractor shall provide prime power to the cabinet and perform all internal wiring in accordance with these special provisions and plans.

The Contractor shall provide all necessary mounting hardware and wiring to install and commission the equipment in new and existing cabinets as shown on the plans. The Contractor shall test all cabinet assemblies and demonstrate the correct function of all controls in the presence of the Engineer.

The Contractor shall construct each Type 334-TV cabinet foundation as shown on the plans including furnishing and installing anchor bolts, and shall make all field wiring connections to the cabinet.

All cabinet assemblies shall be tested to demonstrate the correct function of all controls in the presence of the Engineer.

Full compensation for modifying and installing the Type 334-TV cabinets, as described in these special provisions and as shown on the plans, shall be considered as included in the contract lump sum price paid for the various items of work requiring Type 334-TV cabinets at various locations and no additional compensation will be allowed therefor.

10-5.14 SINGLE VIDEO TRANSMITTER

The single video transmitter shall accept any NTSC baseband video signal and convert it to an optical signal suitable for launching into singlemode fiber.

The video interface to the video transmitter shall be a nickel plated, bulkhead female BNC-style connector with a gold plated contact. The video transmitter shall accept a composite video signal at a level of 1.0 V peak to peak between sync tip and reference white, as measured on an oscilloscope. The transmitter shall operate as specified when the peak-to-peak value of the signal varies between 0.71 and 1.4 V. The nominal input impedance shall be 75 Ω and the return loss shall be at least 30 dB in compliance with EIA RS 250 medium haul for an unbalanced connection.

The video signal shall modulate the optical source to produce a frequency modulated optical signal. The optical emitter shall have a center wavelength in the range of 1300 nm to 1330 nm at 77ºF (25˚C). The transmitter shall interface to fiber with an ST style compatible connector. The video transmitter launch power shall be defined as the power launched by the transmitter into at least one meter of the singlemode fiber optic cable, installed for CCTV camera locations. The video transmitter launch power shall be at least 18 dB greater than the video receiver sensitivity. The optical modulation bandwidth required by the video transmitter for specified video link performance shall be 60 MHz, minimum.

The single video transmitter shall include all mounting hardware necessary to mount it in the EIA standard 19-inch equipment rack in each cabinet. The size and mounting arrangements shall be consistent with the space allocated in the cabinet layout plans. It shall be mounted in a manner which allows easy access to all connections and indicators. It may be mounted in a video transmitter mainframe supplied and installed in accordance with these special provisions and plans.

The single video transmitter shall operate over a temperature range of 32°F to 122°F. Power shall be supplied from existing 120 VAC ±15 percent, 60 Hz ±5 percent power receptacle inside the cabinet reserved for communications equipment. The video transmitter shall include a power supply, which may be external to the remainder to the video transmitter components. The power supply shall supply all voltages required by the video transmitter for operation, and a panel indicator visible from the front that shows DC power on shall be provided.

The Contractor shall perform pre-installation testing to verify that the single video transmitter and single video receiver are compatible, meet manufacturers specifications and the requirements of these special provisions.

Installation of single video transmitters.--The single video transmitters shall be installed at the cabinet locations and shown on the cabinet layouts as shown on the plans. The Contractor shall coordinate the physical space required by the video transmitters with the allocated space.

Prior to installation, the operation of all equipment shall be verified using the same type of fiber it is to be installed with. The fiber optic path for each video link shall have been tested and verified in accordance with these special provisions and plans prior to the video transmitter installation.

The Contractor shall connect the correct optical pigtail to the optical connector on the video transmitters. The Contractor shall neatly train all pigtails together when routing them along the same path and the support rails in the equipment racks. No cables shall be installed with a bend radius less than the manufacturer's minimum recommended bending radius.

The Contractor is responsible for all testing and documentation required for approval and acceptance of the production, installation and operation at these materials and equipment. All indicators shall be verified to function correctly.

The Contractor shall input a video test signal into the single video transmitter and use a variable optical attenuator to set the optical power at the receiver to the single video receiver sensitivity level. The optical signal shall then be connected to the single video receiver with a monitor connected to its output. The Engineer shall then qualitatively assess the monitor output. The signal-to-noise and signal-to-low frequency noise shall be measured and recorded.

Attention is directed to "System Testing and Documentation," elsewhere in these special provisions regarding testing the single video transm.

10-5.15 SINGLE VIDEO RECEIVER

The single video receiver shall be connected to the single video transmitter by optical fiber to form a video link having a center wavelength in the range of 1300 nm to 1330 nm at 77ºF (25ºC). The video link is to provide point-to-point transmission and reception of a full motion NTSC baseband video signal using an optical fiber as the transmission medium.

The single video receiver shall receive the optical signal launched into the singlemode optical fiber by the corresponding video transmitter. The optical interface to the receiver shall be an ST-style connector. The video receiver shall use a PIN photo diode or an avalanche photo diode to convert the optical signal into an electrical signal. The receiver sensitivity shall be defined as the minimum optical power required to operate at the minimum video link performance specifications. The video receiver shall have an optical dynamic range of at least 10 dB. If the saturation level of the receiver is not greater than the received signal level plus one dB, attenuators shall be installed between the fiber and the transmitter to attenuate the

received signal level. The video output interface from the video receiver shall be a nickel-plated, bulkhead female BNC-type connector with a gold plated contact.

The baseband video signal output from the video receiver, while it is receiving an optical signal from the video transmitter at an average power level equal to the video receiver sensitivity shall meet the following performance specifications defined and measured in accordance with EIA-250 medium haul for end-to-end modified performance:

Output signal level per RIA 250.
Amplitude vs. frequency characteristic.
Chrominance to luminance gain inequality.
Chrominance to luminance delay inequality.
Field time waveform distortion.
Line time waveform distortion.
Insertion gain variation.
Differential gain.
Differential phase -- less than or equal to 5 degrees.
Signal-to-noise ratio -- equal to or better than 50 dB weighted.
Signal-to-low frequency noise ratio.

The single video receiver installation shall include all mounting hardware necessary to mount it in the EIA standard 19-inch equipment rack in each cabinet. The size and mounting arrangements shall be consistent with the space allocated in the cabinet layout plans. It shall be mounted in a manner that allows easy access to all connections and indicators. It may be mounted in a video receiver mainframe supplied and installed in accordance with these special provisions and plans.

The single video receiver shall operate over a temperature range of 32°F to 122°F. Power shall be supplied from an existing 120 VAC ±15 percent, 60 Hz ±5 percent, power receptacle inside the cabinet reserved for communications equipment. The video receiver shall include a power supply, which may be external to the single video receiver. The power supply shall supply all voltages required by the video receiver for operation, and panel indicators visible from the front of the receiver that show DC power on and received optical signal present.

Prior to installing any equipment in the field cabinets, the Contractor shall verify that the single video transmitter and single video receiver are compatible, meet manufacturers specifications and the requirements of these special provisions.

Installation of single video receivers.--The video receivers shall be installed at the cabinet locations identified in the plans. The Contractor shall coordinate the physical space required by the video receivers with the allocated space.

Prior to installation, the operation of all equipment shall be verified using the same type of fiber the equipment is to be installed with. The fiber optic path for each video link shall have been tested and verified in accordance with these special provisions and plans prior to the video receiver installation.

Optical attenuators shall be provided such that the optical power received at the single video receiver is the maximum possible within the dynamic range.

The Contractor shall connect the correct optical pigtail to the optical connector on the video receivers. The Contractor shall neatly train all pigtails together when routing them along the same path and the support rails in the equipment racks. No cables shall be installed with a bend radius less than the manufacturer's minimum recommended bending radius.

The Contractor is responsible for all testing and documentation required for approval and acceptance of the production, installation and operation of this equipment. All indicators shall be verified to function correctly.

Attention is directed to "System Testing and Documentation" elsewhere in these special provisions regarding testing the single video receivers.

10-5.16 CAMERA ASSEMBLY

The camera assembly shall consist of a camera housing assembly, CCTV camera, CCTV camera lens, and external cable and connectors. The camera assembly shall be protected from brown outs and voltage spikes to 1000 V or brown outs.

The Contractor shall verify that the units work in accordance with manufacturer's specifications before installation. All CCTV camera location equipment shall also be tested after installation as described elsewhere in these special provisions.

CLOSED CIRCUIT TELEVISION CAMERA

The CCTV camera shall operate reliably under a full range of environmental and lighting conditions and shall provide clear and usable images. All cameras supplied on this project shall be fully interchangeable and meet the following specifications.

PERFORMANCE

The following are the performance specifications for the camera:

Optical device	Color CCD interline transfer
Optical device size	1/2 inch
Pixels	682 (horiz.) x 492 (vertical) min.
Horizontal resolution	430 television lines minimum
Minimum usable illumination	1 lx (measured with fl.4 lens)
Scanning system	525 lines 2:1 interlace
Back focus adjustment	Required

ELECTRICAL SPECIFICATIONS

The following are the electrical specifications for the camera:

Operating voltage	120 VAC ± 15%
Power consumption	Less than 7.5 W
Video output signal	Standard NTSC color TV
Motorized-Iris connector	Required
Video output connector	Standard BNC bulkhead on rear of camera
Signal to noise ratio	50 dB at 1.0 V p-p (with AGC off) and 15 lx
Synchronization	Internal sync or line lock
Video output level	1.0 V p-p (75 Ω composite)
Gain control	Automatic
Automatic white balance	Required

The Contractor shall provide the camera with a suitable power supply that operates with an AC input voltage.

The camera shall have automatic gain control (AGC) in order to be able to handle the range of lighting extremes from very low light night scenes to full sunlight conditions. If the AGC control is switchable, the Contractor shall set the AGC to the "on" position.

The camera shall be equipped with an electronic shutter with adjustable speeds. The Contractor shall set the shutter speed of the camera at 1/60th of a second.

PHYSICAL SPECIFICATIONS

The following are the physical specifications for the camera:

Lens mount	C type
Camera mount	1/4 inch - 20 UNC (minimum of two located on bottom)
Maximum weight	1.6 pounds without lens
Maximum dimensions	2.75” (H) x 2.75” (W) x 8.5 (D) (body)

ENVIRONMENTAL SPECIFICATIONS

The following are the environmental specifications for the camera:

Operating temperature	14°F to 122°F
Storage temperature	-40°F to 140°F
Operating humidity	20 to 80% non-condensing
Storage humidity	20 to 90% non-condensing

SHOCK AND VIBRATION SPECIFICATIONS

The following are the shock and vibration specifications for the camera:

Shock	15 g
Vibration	5-60 Hz with 0.082 inch total excursion, and 5 g rms vibration from 60-1000 Hz.

The CCTV camera shall not incur any physical damage after a shock, return to normal operation immediately and operate within the specified vibration.

INSTALLATION

The Contractor shall install and fully adjust the camera with the associated lens, power supplies, housings, and all necessary cabling, etc., to make the assembly completely operational.

The Contractor shall firmly attach the camera to the housing. The Contractor shall exercise care to tighten the camera mount within the torque limits specified by the camera manufacturer.

The Contractor shall properly terminate all of the electrical cables to the camera and firmly attach them.

The camera shall be mounted in the housing within 1/4-inch of the optical window. This distance is measured with the lens attached and adjusted to its maximum physical length.

The Contractor shall mount the camera in the housing such that the lens is centered in the optical window.

The Contractor shall adjust the back-focus adjustment on the camera such that the lens focus is properly set and maintained over the zoom range. This adjustment shall be made such that when the zoom is adjusted from long range (telephoto) to wide angle that no refocusing is necessary.

The Contractor shall provide ten copies of the operation and maintenance manuals for the camera.

CLOSED CIRCUIT TELEVISION CAMERA LENS

The CCTV camera lens shall work properly in conjunction with the camera as well as all of the other video system components. It shall operate reliably and produce clear images when properly adjusted and meet the following specifications.

PERFORMANCE

The following are the performance specifications for the lens:

Format	1/2 inch, minimum
Mount	C
Zoom magnification range	10:1
Zoom focal length range	7.5 mm to 75 mm, or 8 mm to 80 mm
Aperture range	F1.2 to F560, minimum
Iris type	Motorized iris

ELECTRICAL SPECIFICATIONS

The following are the electrical specifications for the lens:

Operating voltage	±12 VDC
Iris position without power	Closed

When the camera is pointed at a very bright object and or when the camera and lens is first turned on, the image produced by the lens and camera combination should not optically "oscillate" (i.e., produce an image that alternates from too light to too dark) or otherwise be unstable. The lens and camera combination should react to temporary overload situations (such as described above) in a smooth and rapid fashion and with minimum overshoot.

The motorized-iris cable shall be strain relieved or sufficiently rugged such that the cable will not fail at the point where it leaves the lens assembly.

OPTICAL SPECIFICATIONS

The following are the optical specifications for the lens:

When the power is removed from the lens, the lens iris shall automatically close.

The lens shall incorporate an integral variable-density filter.

The lens shall include mechanical and/or electrical means to protect the motors from over running in the extreme position.

ENVIRONMENTAL SPECIFICATIONS

The following are the environmental specifications for the lens:

Operating temperature	–14°F to +122°F (min. range).
Storage temperature	–40°F to 14°F
Operating humidity	20 to 80% non-condensing
Storage humidity	20 to 90% non-condensing

PRESETS

The lens shall be supplied with zoom and focus preset position potentiometers.

INSTALLATION

The Contractor shall adjust the back-focus adjustment on the camera such that the lens focus is properly set and maintained when adjusting the focal length from zoom to wide angle. The Contractor shall make this adjustment with the lens iris at full open position. This adjustment shall be made such that when the zoom is adjusted from long range (telephoto) to wide angle, no refocusing is necessary.

The Contractor shall provide operation and maintenance manuals for the lens as described under "System Testing and Documentation" elsewhere in these Special Provisions.

CAMERA HOUSING

The camera housing shall house the camera and CCTV camera lens. It shall protect the camera and CCTV camera lens from rain, dust, wind and other elements. It shall offer ease of accessibility for maintenance, have a sufficiently large interior dimension to house the camera and lens, offer a means of securing the camera and lens and allow for entry of required cables to make an operational system. The camera housing shall be mounted to the pan/tilt unit specified elsewhere in these special provisions.

PERFORMANCE

Size	At least 8.0-inch Dia., 16.0-inch Length
Camera mounting	Platform mount with adjustment fore and aft

The camera housing shall protect the camera and lens assembly from dirt, rain and other adverse environmental conditions.

The camera housing shall be purge pressurized by the contractor during installation. The pressure shall be between 48 kPa to 69 kPa and the pressurizing gas shall be dry nitrogen.

ELECTRICAL SPECIFICATIONS

Power requirements	120 VAC ±15%, 60 Hz ±5%
Power consumption	Less than 170 W
Elect. connector	Single sealed multi-pin for all video, power and control cabling

The Contractor shall provide the sealed mating connector and wire it to the appropriate outdoor cables.

PHYSICAL SPECIFICATIONS

Construction	All aluminum
Finish	White, light beige or gray enamel
Mounting	Four, 1/4-inch 20 UNC on enclosure bottom
Weight	Less than 45 lbs. excluding heater
Interior dimensions	Suitable for camera, lens and wiring
Pressure valve	Schraeder Type W pressure relief

The interior of the housing unit shall provide an adjustable camera sled for mounting the camera and lens assembly. If cameras of low centerline profile are used, then the contractor shall provide a means of elevating the camera for proper lens clearance. The Contractor shall position the lens in the center of the housing window.

The housing shall include a sun shield or shroud. The purpose of the sun shroud shall be to protect the housing from the direct rays of the sun. The sun shroud shall be made specifically for the model of housing that is selected.

SHOCK/VIBRATION SPECIFICATIONS

Shock	15 g
Vibration	5-60 Hz with 0.082 inch (2.0 mm) total excursion, and 5 g rms vibration from 60 to 1000 Hz.

The camera housing shall not incur any physical damage after a shock, return to normal operation immediately and operate within the specified vibration.

INSTALLATION

Upon completion of the installation by the Contractor, the Engineer shall verify proper installation of the housing and camera/lens assembly.

10-5.17 PAYMENT

The contract lump sum price paid for CCTV Camera at various locations shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in CCTV Camera installation, complete in place, including CCTV poles, foundations, cabinets and ancillary or incidental items required to provide a fully equipped and operational system at each location, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for video node, data node and CCTV Camera (Location SB425) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in video node, data node and CCTV Camera (Location SB425), complete in place, including CCTV poles, foundations, cabinets and ancillary or incidental items required to provide a fully equipped and operational system at each location, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for CCTV Camera and data node (Location SB478) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in CCTV Camera and data node (Location SB478), complete in place, including CCTV poles, foundations, cabinets and ancillary or incidental items required to provide a fully equipped and operational system at each location, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for the technician from the manufacturer shall be considered as included in the contract price paid for the items involved and no additional compensation will be allowed therefor.

SECTION 10-6. COMMUNICATION EQUIPMENT

10-6.01 GENERAL

Communication equipment shall conform to all rules and regulations of the Federal Communications Commission (FCC) and shall conform to the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and these special provisions.

The Contractor shall arrange to have a technician, qualified to work on the communication equipment and employed by the communications equipment manufacturer or his representative, present at the time the equipment is turned on.

Prototype equipment is not acceptable. All equipment shall be current standard production units and shall have been in production for a minimum of six months. Rebuilt or reconditioned equipment will not be allowed.

All equipment racks shall be industrial grade and conform to EIA standard RS-310-D.

All rack mounted equipment and card cage assemblies shall have metal filler plates to cover any unused channel slots or card slots.

10-6.02 COMMUNICATIONS EQUIPMENT

The communications equipment shall consist of equipment video interface cable and two DS-1 optical modems. The video demultiplexer, equipment, video interface cable, and two DS-1 optical modems shall be furnished to the Engineer after the units have been tested.

The video demultiplexer, and DS-1 optical modem and DSX-1 jackfield are described elsewhere in these special provisions.

DATA NODE

The equipment at each data node shall consist of Type 334-TV cabinet D4 channel bank equipped with channel cards and a DS-1 optical modem. The channel cards supplied for each channel of the 24 channel D4 channel bank unit shall be as indicated on Data Node Circuit Assignment Tables as shown on the plans.

In addition to what is shown on the plans each D4 channel bank shall contain one each 4-wire transmit only (4WTO) and one each 2-wire foreign exchange (FXS) channel card for a protection circuit. The equipment shall also include any ancillary or incidental items required to provide full equipment operation at each location.

EQUIPMENT AT VIDEO NODE

The equipment at each video node shall consist of Type 334-TV cabinet, video multiplexer, single video receivers and other equipment as shown on the plans to provide full equipment operation at each location.

10-6.03 CABLE NODE

The cable node assembly shall consist of a No. 50 pair terminal blocks and a single fiber distribution unit housed in a Type 334-TV cabinet. The fiber distribution unit shall consist of termination and distribution cable tray assembly for 60 single mode fiber optics. The termination and distribution cable trays shall have sufficient tray area for excess optical fiber storage with provisions to assure that the optical fibers do not exceed two-inch bend radius.

The termination and distribution cable trays shall include a designation strip for identification of the 60 optical fibers. All fibers shall be labeled in the splice tray with permanent vinyl markers. Fiber bonds shall also be labeled to identify the physical designation of each individual fiber strand.

10-6.04 VIDEO MULTIPLEXER AND DEMULTIPLEXER

The video multiplexer shall consist of FM (Frequency Modulation) video modulators, a RF (Radio Frequency) combiner, splitter and a singlemode fiber optic transmitter. The demultiplexer shall consist of a fiber optic receiver and FM video demodulatorsThe video multiplexer and demultiplexer shall mount in an EIA 19-inch equipment rack, either as separately mountable sub-units or as a card cage. The equipment shall include all necessary hardware mounting and adapters. The video multiplexer and the demultiplexer, including power supply, shall each occupy no more than 17 1/2 vertical inches of rack space and shall be fully configured for not less than 16 video channels as shown on the plans.

Each system component described below shall be mounted on one or more PC boards. In addition, one PC board may support two or more functional components or the partial function of a component with the exception of the power supply, which shall be mounted on a separate PC board or boards. All electronic components shall be mounted on PC boards. The PC boards shall be easily replaceable without requiring special tools.

All specifications for the video multiplexer and demultiplexer equipment shall be met over an operating temperature range of 32°F to 122°F. The power supply for the video multiplexer and demultiplexer equipment shall be powered from a 120 VAC, 60 Hz power receptacle location in the 334-TV cabinet as shown on the plans.

VIDEO MODULATOR

The modulator shall accept any NTSC baseband video signal and convert it to a frequency-modulated electrical signal suitable for mixing or combining with other electrical signals to produce a composite broadband signal to the optical transmitter. The video modulator shall be capable of modulating the input video signal using an FM scheme, onto any one of 16 frequencies in the range of 50 to 550 MHz. The output frequency of the modulator shall be remotely selectable.

Each modulators shall consist of either plug-in modules that fit into the multiplexer card cage or 19 inch rack mountable units. The video inputs to the modulator shall be nickel plated, female BNC connectors with a gold plated contact. The nominal input impedance shall be 75 Ω and the return loss shall be at least 30 dB. Each modulator shall operate as specified with a 0.7 V to 1.4 V peak to peak composite input video signal. The modulator shall continue to operate satisfactorily with an input level of 0.5 V to 2.0 V.

After selection of the appropriate output frequency, any video modulator shall be interchangeable with any other video modulator in the subsystem. A female BNC bulkhead connector of the same design as the video input connector, or a female F bulkhead connector shall be installed at the rear of the module to deliver the modulated signal output. Either type of connector shall be designed to interface with 75 Ω coaxial cable.

Test points shall be provided on the front panel of the video modulator to allow in-service measurement of relevant signals without causing any disturbances in the output of the video modulator. Indicators shall be provided on the front panel of the video modulator to allow operator verification of the correct performance of the video modulator.

RF COMBINER AND SPLITTER

The RF combiner and splitter shall be capable of combining the outputs of 16 video modulators. It shall operate over the frequency range of 5 to 600 MHz. In addition, it shall provide attenuation of each input that is uniform across all inputs within ±1 dB. The RF combiner and splitter shall provide a high degree of isolation between each input with the worst case isolation being 30 dB at 550 MHz.

The RF combiner and splitter shall provide a return loss of greater than 20 dB at all taps. It shall have an input and output impedance of 75 Ω and shall be constructed with female F bulkhead connectors. All unused RF combiner and splitter inputs and outputs shall be terminated with 75 Ω resistive loads.

FIBER OPTIC TRANSMITTER

The fiber optic transmitter shall accept as an input from the RF combined and splitter in the configuration of various video modulators in quantities as shown on the plans. The bandwidth of the input of the fiber optic transmitter shall be 5 to 550 MHz. The fiber optic transmitter shall use a laser with center wavelength in the range of 1300 nm to 1330 nm at 75°F. The spectral width shall not exceed 10 nm. The laser shall operate at 1310 nm and provide an optical launch power of 0 dBm. The combined electrical signal from the modulators shall modulate the laser and be coupled into a singlemode optical fiber. The transmitter launch power shall be defined as the power launched by the laser into one meter of step-index optical fiber having a mode field diameter of 10 µm. The transmitter launch power shall be at least 20 dB greater than the receiver sensitivity and greater than -8 dBm.

A female BNC bulkhead connector shall be installed at the rear of the module to accept the input signal. The connector shall be designed to interface with 75 Ω coaxial cable. The fiber optic transmitter shall use an ST style compatible connector and be compatible with the fiber optic cable Type ST connector mating connector on the fiber optic cable specified in these special provisions.

Test points shall be provided on the front panel of the fiber optic transmitter to allow in-service measurement of relevant signals without causing any disturbances in the output of the fiber optic transmitter.

Indicators shall be provided on the front panel of the video modulator to allow operator verification of the correct performance of the fiber optic transmitter. The video transmitter shall be capable of interfacing with and operating over fiber optic cable as specified elsewhere in these special provision.

FIBER OPTIC RECEIVER

The fiber optic receiver shall receive the optical signal launched into a singlemode optical fiber by the transmitter and output an electrical signal suitable for splitting and demodulating. The fiber optic receiver shall employ an avalanche photo diode (APD) as the input sensing device. The receiver shall be designed to operate in accordance with the above indicated special provisions with an optical input power range of -8 dBm to -20 dBm. The fiber optic receiver shall provide sufficient RF output power to directly drive, or feed a wide band RF line amplifier to drive, a minimum of 16 video demodulators to at least middle range of the demodulators required input power levels. The input power level to any of the video demodulators shall not be effected by loading changes to the other video demodulators feed by the fiber optic receiver.

The fiber optic receiver shall be equipped with an AGC system that shall maintain an RF signal output level consistent with the requirements of the video demodulator under varying optical power input conditions. A front panel control shall be provided to allow operator override and adjustment of the AGC system within ±5 dB of the nominal output level.

The fiber optic receiver shall be compatible with the fiber optic cable specified in these special provisions. The fiber optic receiver shall be equipped with a Type ST connector compatible with the mating connector on the fiber optic cable. A female BNC bulkhead connector shall be installed at the rear of the module to deliver the output signal. The connector shall be designed to interface with 75 Ω coaxial cable.

Test points shall be provided on the front panel of the fiber optic receiver to allow in-service measurement of relevant signals without causing any disturbances in the output of the fiber optic receiver.

Indicators shall be provided on the front panel of the fiber optic receiver to allow operator verification of the correct performance of the fiber optic receiver.

VIDEO DEMODULATOR

The video demodulators shall consist of either plug-in modules that fit into the demultiplexer card cage or 19-inch rack mountable units. The video demodulator shall receive an RF signal output of the fiber optic receiver, with a bandwidth of 50 to 550 MHz, to an electrical baseband NTSC video signals.

The video demodulator shall be capable of demodulating any one of 16 frequencies in the range of 50 to 550 MHz comprising the input RF signal. The frequency to be demodulated shall be remotely selectable. The video demodulator shall provide as an output one baseband video signal as specified by the RS-170 Standard. After selection of the appropriate frequency, any video demodulator shall be interchangeable with any other video demodulator in the subsystem.

A female BNC bulkhead connector shall be installed at the rear of the video demodulator to accept the RF input signal. The connector shall be designed to interface with 75 Ω cable. A female BNC bulkhead connector shall be installed at the rear of the video modulator to deliver the output video signal. The female BNC connector shall be nickel plated except for the center contact which shall be gold plated. The female BNC connector shall be designed to interface with a 75 Ω coaxial cable.

Test points shall be provided on the front panel of the video demodulator to allow in-service measurement of relevant signals without causing any disturbances in the output of the video demodulator.

Indicators shall be provided on the front panel of the video demodulator to allow operator verification of the correct performance of the video demodulator.

RACK FRAME AND POWER SUPPLY

The rack frame and power supply shall contain all of the various modules of the video multiplexer and video demultiplexer. The rack frame and power supply shall provide power to all of the modules contained therein and shall operate from input power supply of 120 VAC ±15 percent, 60 Hz ±5 percent. The rack frame and power supply shall be suitable for installation in an EIA standard 19-inch equipment rack.

Modules not designed to be contained in the rack frame and power supply shall be suitable for installation directly into an EIA standard 19-inch equipment rack and shall be powered directly from a power supply of 120 VAC ±15 percent, 60 Hz ±5 percent.

FIBER OPTIC ATTENUATOR

The fiber optic attenuator shall be suitable for installation at the receiver end of the optical signal path. The value of each fiber optic attenuator shall be such that, for each optical signal path into which a fiber optic attenuator is inserted, the optical power level delivered to the respective fiber optic receiver is at least 3 dBm above the minimum level required, and does not exceed the maximum level acceptable by the fiber optic receiver. Fiber optic attenuators shall be provided if the saturation level of the receiver minus the received signal level is greater than one dB.

INSTALLATION

All components of the video multiplexer shall be installed at the locations and in the quantities as shown in the plans. Installation shall include all required interface cable types as specified in these special provisions. All blank module slots in rack frame and power supply assemblies shall be filled with a plate of construction and finish consistent with those of the modules. The filler plate shall be field removable without a requirement for special tooling or any disassembly of the system. The system shall provide the ability to remove and replace any module in the system without requiring that the power supply be turned off and without disturbing the operation of any other modules in the same rack frame and power supply assembly. All modules shall be labeled on the front panel to identify the video signal or fiber passing through the module. The labeling technique shall be such that all labels are neat and legible and shall be removable and replaceable to allow for substitution of modules in the event of failure.

TESTING

The Contractor shall test all modules and components prior to installation in accordance with the manufacturer's test procedures in the presence of the Engineer and shall furnish documentation demonstrating the compliance of all modules of these special provisions.

10-6.05 D-4 CHANNEL BANK

The D-4 channel bank equipment shall include a DS-1 optical modem. This equipment will be used to digitize the narrow bandwidth analog and quasi-analog signals and to time-division multiplex them into a 1.544 Mbps composite data signal. The D-4 channel bank shall satisfy the following requirements:

Physical:

Operating temperature	32°F to 122°F
Relative humidity	95 percent non-condensing

Dimensions:

Height	less than 18-inch
Width	19-inch
Depth	less than 20-inch

Electrical:

Line rate	1.544 Mbps ± bps (stratum 4)
Line code	AMI or B8ZS (user selectable)
Sampling format	D4
Framing format	ESF
Line impedance	100 Ω ±10 Ω
Power input	120 VAC ±10 % at 60 Hz ±3 Hz, 3 A minimum

The D4 channel bank shall be fully configured to house up to 24 DS-O channel cards at 64 kbps framing with 8 kbps overhead and shall multiplex up to 24 voice or data channels for transmission over a DS-1 data channel. The channel bank shall be type-accepted in accordance with the FCC Regulations, Part 68. The common card units shall provide the transmit, receive, power distribution, timing, and alarm functions.

The D4 channel bank shall be installed in the equipment racks shown on the plans. . Each slot within the D4 channel bank shall be individual tested by moving cards from slot-to-slot.

The D4 channel bank shall mount in a standard EIA 19-inch rack. The power supply shall convert 120 VAC to 48 VDC with a 2 A output.

The D4 channel bank shall include the following channel cards, cables and power supply.

D4 Channel Cards.--The D4 channel bank shall include the following channel cards:

4-wire analog with E&M signaling - (4WE&M)
4-wire transmit only (4 WTO)
2-wire Foreign Exchange - Subscriber (FXS)

The Contractor shall supply the quantities of each card identified on the plans and elsewhere in these special provisions. The D4 channel bank shall be installed in accordance with the manufacturer's installation instructions. The Contractor shall measure end-to-end performance of the analog and digital parameters under full operation.

The D4 channel cards shall be designed to physically plug into any of the available channel card slots of the D4 multiplex unit with electrical power on. Each D4 channel card shall use no more than 5 W maximum power supplied by the D4 multiplex unit. The A/D and D/A channel conversion frequency for all channel cards shall be 8000 ±2 Hz.

The D4 channel cards shall meet all required operating specifications over a temperature range from 32°F to 122°F. and with maximum relative humidity of 95 percent, noncondensing.

All channel cards shall satisfy the following requirements:

Return loss:	(per AT&T Pub. 43801):
ERL:	≥ 28 dB
SRL:	≥ 20 dB
Idle noise, single ended:	≤ 19 dBrnC0
Idle noise, end-to-end:	≤ 22 dBrnC0
Crosstalk coupling loss:	≥ 65 dB, 200 to 3400 Hz
C-message weighted.	

Four-Wire Analog With E&M Signaling - (4WE&M).--The 4-wire analog with E&M signaling channel card shall meet the following requirements:

Channel coding resolution	8 voice bits per channel
Normal transmission level point (TLP)	transmit: -17.5 dBm to +8.0 dBm receive: -16.9 dBm to +8.5 dBm
TLP range	-24 to +8 dBm transmit and receive
Drop impedance	600 Ω

Frequency Response (1004 Hz reference):		
Frequency (Hz)	Transmit Level (dB)	Receive Level (dB)
60	< -14 max.	< -14 max.
200	-2.0 to +0.15	-1.0 to +0.15
300-3000	±0.15	±0.15
3200	-0.75 to +0.15	-0.75 to +0.15
3400	-1.5 to +0.15	-1.5 to +0.15
4000	-14 max.	-14 max.

Four-Wire Transmit Only - (4WTO).--The 4-wire transmit only channel card shall meet the following requirements:

Channel coding resolution:	8 voice bits per channel
Normal transmission level point (TLP):	transmit: -16 dBm receive: +7dBm
TLP range:	-24 to +8 dBm transmit and receive
Drop impedance:	600 Ω

Frequency Response (1004 Hz reference):		
Frequency (Hz)	Transmit Level (dB)	Receive Level (dB)
60	< -14 max.	< -14 max.
200	-2.0 to +0.15	-1.0 to +0.15
300-3000	±0.15	±0.15
3200	-0.75 to +0.15	-0.75 to +0.15
3400	-1.5 to +0.15	-1.5 to +0.15
4000	-14 max.	-14 max.

Two-Wire Foreign Exchange - (2WFXS).--The 2-wire foreign exchange channel card shall meet the following requirements:

Channel coding resolution	8 voice bits per channel, 5 of 6 frames, 7 voice bits per channel, 1 of 6 frames, 1 signaling bit per channel, 1 of 6 frames
Normal transmission level point (TLP)	transmit: -16 dBm receive: +7 dBm
TLP range	-22 to +8 dBm transmit and receive
Drop impedance	600 or 900 Ω and 2.15 µF

Frequency Response (1004 Hz reference):		
Frequency (Hz)	Transmit Level (dB)	Receive Level (dB)
60	< -14 max.	< -14 max.
200	-3.0 to +0	-2.0 to +0
300-3000	-0.5 to +0.25	-0.5 to +0.25
3200	-0.75 to +0.25	-0.75 to +0.25
3400	-1.5 to +0.25	-1.5 to +0.25

Signaling:

Dial pulse distortion	-5% to +3%, at 12 pps, 60% break.
Pulse rate range	8 to 14 pps.
Loop length limit	< 2000 Ω without buildout resistors. < 1000 Ω with buildout resistors
Ring trip time	≤ 250 ms
Ring ground detect range	≤ 1500 Ω without buildout resistors. ≤ 1000 Ω with buildout resistors.
Interrupted ringing (PLAR)	2 s on and 4 s off

10-6.06 DS-1 OPTICAL MODEM

The DS-1 optical modem converts the electrical signals of the TDM's aggregate interface and the optical signals used on the singlemode optical fiber facilityThe electrical DS-1 interface of the optical modem shall comply with the ANSI T1.102-1987 standard. The physical interface shall be either a 15 pin, Type D connector or a 4 position terminal strip with provision for grounding the cables shield. The optical connectors shall be of the ST type. The DS-1 optical modem shall be transparent to any zero-code suppression used by the terminal equipment. If necessary, the output power of each modem shall be externally attenuated to be compatible with the optical loss of the fiber being used.

The optical interface shall be designed for singlemode operation using an optical wavelength of between 1250 and 1350 nm. The optical launch power of the transmitter shall be at least 20 dB greater than the sensitivity of the receiver. Sensitivity is defined as the minimum optical receive power required to maintain the specified error rate. The saturation level is the maximum optical received power that the receiver can tolerate before the error rate is exceeded. At no time shall the received optical power exceed the receiver's saturation level. Fixed optical attenuators with a return loss of greater than 15 dB shall be provided. A bit error rate of less than or equal to one in 1×10^9 shall be certified over the specified operating ranges.

As shown on the plans for field locations, the optical modems shall be installed as stand-alone units on a shelf. The DS-1 cables shall be connectorized as appropriate. The DS-1 modem shall be available in a stand-alone and rack-mount versions. The rack-mount card cage shall be capable of housing a minimum of seven modems in no more than 21 inches of vertical rack space. All hardware necessary for mounting both versions of the modem in a standard 19 inch rack shall be provided. The DS-1 optical modems shall operate from standard 60 Hz, 120 VAC power and operate as specified over the temperature range of 32°F to 122°F.

The optical receive power at each modem shall be measured and recorded before connection of the receive optical pigtail. The optical fibers shall be attached as required. Fibers shall be tested as follows:

Each optical modem shall be functionally tested by looping back the optical transmit connector to the optical receive connector using a variable optical attenuator with measured optical loss of 10 dB at 1300 nm. A DS-1 test set shall be connected to the modem and set for ESF framing, B8ZS coding, internal timing, and a QRS pattern. The test set shall also be set for the standard DSX-1 output level and terminated input. A fifteen minute test after burn-in shall be error free.

After performing the fifteen minute bit error rate (BER) test, at least two modems shall be tested for receiver dynamic range. To do this the optical attenuation shall be increased to the point at which the data test just begins to register bit errors. The optical receive power into the modem shall be measured and recorded. The optical attenuation shall be then decreased until the data test once again registers errors. At no time shall the optical power into the receiver

exceed the manufacturer's specified saturation level. The optical receive level shall once again be measured and recorded. These minimum and maximum receive levels define the modem receiver's dynamic range.

One pair of modems shall be interconnected using optical patchcords and attenuators with a loss of 10 dB in each direction. The DS-1 interface shall be looped back on one modem and a DS-1 test set connected to the DS-1 interface of the other modem. A bit error rate of less than one in 1 x 10^{10} shall be demonstrated.

10-6.07 TELEPHONE BRIDGE

GENERAL DESCRIPTION.--The dual 5-way active data bridge shall provide a 4-wire transmission interconnection between a dedicated common port and a number of multiple ports. The bridge shall provide four multiple ports. The bridge shall incorporate a splitter channel and a combiner channel. Multiple inputs shall be connected to a common output in the combiner channel and, in the splitter channel, a common input shall be connected to multiple outputs. Splitter and combiner shall be separate and independent, allowing operation in full-duplex data transmission applications.

The active bridge shall provide front-panel-accessible potentiometers with continuous adjustment of cross-bridge gain or loss within two switch-selectable loss and gain ranges suitable for most data applications: -30 to -10dB and -10 to +10dB. Either range shall be independently selectable for each channel. The level to which each channel is adjusted shall be common to all cross-bridge port combinations in that channel (for example if the splitter-channel potentiometer is set for +3dB gain, all common-to-multiple-port paths in the splitter channel shall receive a +3dB level increase).

All ports of the bridge, both common and multiple, shall be characterized by a balanced 600 ohm terminating impedance. The modules active circuit shall allow unused multiple ports to be left unterminated without affecting the transmission response of the ports in use.

Input, output and line monitor jacks on the front panel of the bridge shall allow isolated-module, isolated-facility, and cross-bridge measurement of transmission parameters in both the splitter and combiner channels.

The bridge shall be powered from input voltage of -22 to -56 volts DC at a maximum current of 60 milliamperes.

Each dual 5-way active bridge unit shall be individually packaged in a housing. All circuitry shall be solid state, constructed on removable industry standard circuit boards with plug in edge connectors. All test jacks, edge connectors and external plug connectors shall be of a type and material suitable for use in the above stated environment without deterioration of electrical connection for the useful life of the equipment. The physical size of the case shall not exceed 224 cubic inches (approximately 7" x 8" x 4") and shall be suitable for mounting to the frame of a field cabinet. Mounting holes shall be provided for attaching the unit to one side of the frame of a relay rack.

Input and output ports shall be provided for five full duplex telephone circuits with input and output ports labeled as to function. Level control, or switches and level adjustment potentiometers, along with the input and output level test jacks shall provide external adjustments without removal of the housing.

APPLICATION.--The dual 5-way active data bridge shall be used to interconnect several 4-wire data modems to a common data channel or data link. The common data link is terminated at the distant end into a central processor unit (CPU) or computer that may time-sequentially poll various outlying or remote data terminals. A bridge shall be used to provide the central transmission arrangement, or "hubbing" network, that extends data transmission to the outlying terminals.

Tandem bridge arrangements to expand the number of multiple ports of a 4-wire data hubbing network shall be effected by direct connection of one multiple port in each channel of the first bridge to the common port of the same channel of a second bridge to provide a 4-wire data bridge with one common and 7 multiple ports.

CIRCUIT DESCRIPTION.--The combiner channel of the dual 5-way active data bridge shall consist of a variable-gain integrated-circuit operational amplifier with an input summing circuit. The summing circuit shall add the transmission energy from all multiple input ports at a low-impedance summing point to provide input port isolation. The output of the amplifier shall be connected to a transformer for balanced connection to the facility.

The splitter channel shall consist of a transformer-input, variable-gain, integrated-circuit operational amplifier and a power amplifier. The output of the power transformer shall be a very low impedance and shall drive eight 300 ohm resistors to derive proper impedance at the multiple output circuits and provide isolation between output circuits.

The multiple ports in the splitter and combiner channels of the bridge shall be isolated and balanced via an output transformer and matched precision resistors in each channel.

ELECTRICAL REQUIREMENTS.--Electrical requirements are as follows:

Splitter channel loss/gain:

-30 to +10dB usable range.

Combiner channel loss/gain:

-30 to +10dB usable range.

Maximum output level (overload point):

Splitter: +5dBm.
Combiner: +12dBm.

Level change with loading:

1 dB maximum, one port to all ports loaded.

Input port impedance:

Splitter (multiple ports): 600 ohms balanced.
Combiner (common port): 600 ohms balanced.

Output port impedance:

Splitter (multiple ports): 600 ohms balanced.
Combiner (common port): 600 ohms balanced.

Harmonic distortion:

Splitter: less than one percent at +3dBm.
Combiner: less than one percent at +8dBm.

Noise:

20dBm maximum.

Frequency response:

±1dB re 1000 Hz level, 300 to 5000 Hz.

Delay distortion:

Less than 75 microseconds, 400 to 3000 Hz.

Cross-port coupling loss (crosstalk):

Greater than 55dB.

Input power:

-22 to -56 volts DC, 60 milliamperes maximum.

Operating environment:

20° to 130° F (-7° to 54° C), humidity to 95 percent (no condensation).

Mounting:

One position.

TESTING AND TROUBLESHOOTING.--Complete testing and troubleshooting instructions, circuit diagrams, and pictorial component location and identification guides shall be provided with each unit.

10-6.08 PAYMENT

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

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

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

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

The contract unit price paid for telephone bridges (existing controllers) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing telephone bridges and connecting the communication distribution cables in existing cabinets, complete in place, including cables, wiring and terminal blocks to make the telephone bridges fully functional, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for telephone bridges installed in new cabinets shall be considered as included in the contract lump sum price paid for the various new cabinet locations involved and no separate payment will be made therefor.

Full compensation for the technician from the manufacturer shall be considered as included in the contract price paid for the items involved and no additional compensation will be allowed therefor.

SECTION 10-7. SYSTEM TESTING AND DOCUMENTATION

10-7.01 DESCRIPTION

The system testing and documentation shall cover pre-installation testing, subsystem testing, fiber optic cable testing, twisted pair cable testing, video link testing, video multiplex testing, channel card testing, data link testing, acceptance testing, physical inspection, functional testing. performance testing, final acceptance and system documentation that is required to validate the operational performance of the communications system and described elsewhere in these special provisions.

10-7.02 TEST PLAN

The Contractor shall develop and submit within 60 working days to the Engineer an installation and test plan for approval, which details the method of installation and all testing for all material, equipment, and cable and the associated schedule of activities, based on these special provisions, plans, the manufacturer's recommended test procedures, and industry standard practices. Five copies of the test plan shall be submitted to the Engineer for approval. The Engineer will review then approve or disapprove the plan within four weeks. If the Engineer rejects the test plan the Contractor shall submit a revised test plan within 20 working days for review and approval by the Engineer. No testing shall be performed until the Contractor’s test plan has been approved by the Engineer. The tests shall demonstrate that the design and production of material and equipment meet the requirements of these special provisions and plans. All test results, including results of failed test or re-tests, shall be submitted and delivered to the Engineer and a copy placed with the equipment at the site. All test equipment shall be supplied by the Contractor.

The Contractor shall notify the Engineer of his intent to proceed with functional and subsystem testing 48 hours prior to commencement of each test. Full environmental conditions shall be tested as part of the functional tests for field equipment. Subsystem testing and inspections shall include visual inspection for damaged in correct installation, adjustments and alignment, and measurement of parameters and operating conditions.

10-7.03 PRE-INSTALLATION TESTING

Pre-inspection testing shall include testing of all material, equipment and cable in a laboratory environment prior to delivery to the site. Use of laboratory facilities, including an environmental simulation chamber, shall be arranged by the Contractor. The tests shall either be conducted at the equipment manufacturer's premises or at a laboratory arranged by the Contractor.

All material, except test equipment and special tools, shall be bench tested in accordance with the following paragraphs, which include those items described elsewhere requiring pre-installation testing for each individual item where applicable.

All active equipment shall be connected to normal operating power, energized and subjected to normal operating conditions for a continuous period of time in the laboratory of not less than 48 hours.

Functional testing shall be performed by the manufacturer on all material prior to delivery to the site. The functional tests shall be performed in accordance with an approved test plan. Any material or equipment which fails to meet the requirements of the contract shall be repaired or replaced and the test shall be repeated until satisfactory. All functional test results, including results of failed tests or re-tests, shall be submitted and delivered with all material and equipment delivered to the site.

Full performance test shall be performed by the manufacturer or by the Contractor on not less than 5 percent or at least one unit of material selected at random from the normal production run. The full performance test shall be performed in accordance with a test plan developed by the Contractor and approved by the Engineer.

10-7.04 SUBSYSTEM TESTING

Subsystem testing shall encompass the testing of all material, equipment and cable after installation, but prior to acceptance tests. These tests shall be done in accordance with the performance testing called under each individual item in these special provisions.

Equipment and hardware shall be installed in accordance with the plans and special provisions. All material, equipment and cable shall be tested after installation at the site. Subsystem testing and inspections shall include visual inspection for damaged or incorrect installation, adjustments and alignment, and measurement of parameters and operating conditions. The Contractor shall notify the Engineer of his intent to proceed with subsystem testing 48 hours prior to commencement of each test.

Installation documentation and test results shall be provided for all material, equipment and cable prior to commencement of acceptance tests. Installation documentation shall be in accordance with these special provisions and shall include the following as appropriate:

Model, part number and serial number for all material and equipment.
Test equipment model number, serial number, settings, and date of last calibration.
All strap and switch settings.
Record of all adjustments and levels.
Alignment measurements.
Identification of interconnections.
All factory, laboratory and site test results.

10-7.05 FIBER OPTIC CABLE TESTING

Attention is directed to "Fiber Optic Testing" elsewhere in these special provisions.

10-7.06 TWISTED PAIR CABLE TESTING

The twisted-pair cable testing consists of testing the trunk cable and drop cable. Contractor shall test the continuity of the cable, looking for grounds, opens, shorts, and splits. Any anomalies shall be corrected.

The Contractor shall measure and record the loop resistance and insulation integrity of all twister-pair between terminations. The measured value shall not deviate from the calculated loop resistance of the cable by more than 10 percent.

10-7.07 VIDEO LINK TESTING

The video link testing shall be conducted after the Contractor submits a test plan and receives approval from the Engineer, based on these special provisions, plans and the manufacture's recommended test procedures for the equipment involved. Measurements shall be made from the baseband-in to baseband-out connections. A video communications link shall include a video transmitter, video receiver, interconnecting optical fiber, connectors and power supplies. The video link is to provide point-to-point transmission and reception of a full motion NTSC baseband video signal using an optical fiber as the transmission medium. Video system performance tests for any particular video link shall be performed after the associated camera has been installed and tested.

Each video link in the communications system shall be tested with a video test signal at the transmitter input. The Contractor shall perform all level adjustments and alignments required on the video link in order for it to operate in accordance with these special provisions. If any video link fails to meet the performance requirements, the Contractor shall take all steps necessary to restore the failed link to the required performance.

Each video link in the communications system shall be tested for qualitative performance with its associated camera turned on and connected to the BNC connector of the video link transmitter. The Contractor shall measure and record the received optical power at the optical connector of the video receiver from the video transmitter under test using a 90 percent APL (average picture level) flat field input to the transmitter. The Contractor shall measure, record and tabulate a receiver's dynamic range at the optical connector of the video receiver from the video transmitter under test using a 90 percent APL (average picture level) flat field input to the transmitter. To do this the measured optical attenuation of the fiber being used shall be increased to the point at which the video test set just begins to show a 3 dB degradation of the video signal to noise ratio in accordance with EIA 250 video test procedures. The optical receive power into the video receiver shall be measured and recorded. Then the optical attenuation shall be decreased until the video test set once again shows degradation of the video and registers errors. At no time shall the optical power into the receiver exceed the manufacturer's specified saturation level. The optical receive level shall once again be measured and recorded. These minimum and maximum receive levels define the video receiver's dynamic range and shall meet or exceed the specifications as specified elsewhere under these special provisions. This measurement shall be repeated for each video link. The video test set shall be approved by the Engineer. The Contractor shall measure and record the baseband video output level from the video receiver under test. This measurement shall be repeated for each video link.

The output video signal shall be connected to a video display monitor. The observed picture on the video display monitor shall be assessed for qualitative performance. All qualitative comments shall be recorded for each camera. The Contractor shall measure, record and tabulate the receiver's dynamic range at the optical connector of the video demultiplexer's receiver from the video multiplexer's transmitter under test. To do this the measured optical attenuation of the fiber being used shall be increased to the point at which the video test set just begins to show a 3 dB degradation of the video signal to noise ratio in accordance with EIA 250 video test procedures. The optical receive power into the video receiver shall be measured and record. Then the optical attenuation shall be decreased until the video test set once again shows degradation of the video and registers errors. At no time shall the optical power into the receiver exceed the manufacturer's specified saturation level. The optical receive level shall once again be measured and recorded. These minimum and maximum receive level define the video receiver's dynamic range and shall meet or exceed the specifications as specified elsewhere under these special provisions. This measurement shall be repeated for each video link. The video test set shall be approved by the Engineer. The Contractor shall measure, record and demonstrate that the performance meets or exceed the specified EIA RS-250 requirements listed below:

Differential gain.
Differential phase.
Chrominance to luminance delay inequality.
Amplitude vs. frequency characteristics.
Frequency response characteristic.
Signal to noise ratio.
Signal to low frequency noise.
Signal to periodic noise.
Output signal level.

10-7.08 VIDEO MULTIPLEX TESTING

The video multiplex testing shall be conducted after the Contractor submits a test plan and receives approval from the Engineer, based on these special provisions, plans and the manufacture's recommended test procedures for the equipment involved. Measurements shall be made from the baseband-in to baseband-out connections of the video multiplexer. A video communications link shall include a video multiplexer, video demultiplexer, interconnecting optical fiber, connectors and power supplies. Each video channel of each multiplexer in the communications system shall be tested with a video test signal at the multiplexer input. Measurements shall be made from the baseband-in to baseband-out connections of the video multiplexThe Contractor shall perform all level adjustments and alignments required on the video link in order for it to operate in accordance with these special provisions. If any video channel fails to meet the performance requirements, the Contractor shall take all steps necessary to restore the failed link to the required performance.

The Contractor shall measure and record the baseband video output level for each video channel of the video demultiplexer under test. The output video signal shall be connected to a video display monitor. The observed picture on the video display monitor shall be assessed for qualitative performance. All qualitative comments shall be recorded for each video channel.

Each video channel shall be tested for the following performance characteristics. The Contractor shall measure, record and demonstrate that the performance meets or exceed the demonstrate that the performance meets or exceeds the specified requirements.

Differential gain.
Differential phase.
Chrominance to luminance delay inequality.
Amplitude vs. frequency characteristics.
Frequency response characteristic.
Signal to noise ratio.
Signal to low frequency noise.
Signal to periodic noise.
Output signal level.

10-7.09 CHANNEL CARD TESTING

The channel card testing shall be conducted after the Contractor submits a test plan and receives approval from the Engineer, based on these special provisions, plans and the manufacture's recommended test procedures for the equipment involved. The Contractor shall test all channel cards and record the results in accordance with the approved installation and test plan. The Contractor shall test all DS1 optical modem and D4 channel as specified elsewhere in these special provisions.

Channel card testing shall consist of functional and performance tests conducted between the D4 channel multiplex in the field and DS1 optical modems . The audio channel shall be verified in both directions using telephone instruments. The signaling system shall be verified in both directions. Circuits shall be fully tested to the channel card manufacturer's specification using a transmission impairment measuring set (TIMS).

10-7.10 DATA LINK TESTING

This data link testing shall be conducted after the Contractor submits a test plan and receives approval from the Engineer, based on these special provisions, plans and the manufacture's recommended test procedures for the equipment involved. The Contractor shall test all channel cards and record the results in accordance with the approved installation and test plan. Data link testing is for the alignment and testing of the data system. The activities shall include verification of all data circuits in the low speed data links, high speed data ring network and in the integrated data system. The Contractor shall adjust levels required for the data system to operate.

Data link performance tests shall be conducted between the D4 channel multiplex at the nodes and each system element as shown in the plans . Records of all tests shall be delivered to the Engineer. Circuits shall be fully tested to the channel card manufacturer's specifications using a transmission impairment measuring set (TIMS). In addition, complete bit error rate tests shall be conducted on all circuits using 4 WTO channel cards. Bit error rate tests shall be conducted using Type 400 modems (or equivalent) at 9600 bps configured in a loop back path, from the nodes to the circuit terminus, looped back into the circuit back to the data nodes. A BERTS shall be used in a 3 hour test of each circuit. All circuits shall provide an error rate less than $l \times 10^{-6}$.

10-7.11 ACCEPTANCE TESTING

The acceptance testing shall be conducted in accordance with the approved test plan. The acceptance testing shall include conducting acceptance tests and subsequent retests, and documentation of the test results.

Final acceptance tests shall be conducted after the site and subsystem test results have been reviewed and accepted by the Engineer. These tests include the complete system in normal operations. The test plan shall address the full testing requirements of the specifications. The test plan shall detail all tests to be performed, the test results which are expected and the test schedule. The acceptance test plan shall include the following major test and acceptance categories:

Physical inspection.
Functional tests.
Performance tests.

The Contractor shall test the communications system according to the approved acceptance test plan and shall provide all test equipment, labor and ancillary items required to perform the testing. The test equipment shall be certified to be calibrated to the manufacturer's specifications. The model and part numbers and date of last calibration of all test equipment shall be included with the test results.

Acceptance testing shall not commence until all material required by these special provisions and plans are delivered, installed, and aligned and all production test and site test documentation and results have been approved by the Engineer.

All acceptance test results shall be fully documented and such documentation provided as a condition of acceptance.

10-7.12 PHYSICAL INSPECTION

The Contractor shall provide documentation to prove delivery of all material, equipment, cable and documentation. If any material or documentation is outstanding or have been replaced under pre-acceptance warranty a physical inspection and documentation shall be provided for this material. The physical inspection shall consist of inspecting all installed material to ensure workmanship satisfies the specified requirements.

10-7.13 FUNCTIONAL TESTS

The Contractor shall test all system functions to demonstrate that all circuits (video, data, and voice), and all equipment satisfies the functional requirements of the specifications.

This testing shall include subjective testing of each camera image and verification of camera control from the camera control unit. The connectivity of each data channel shall be demonstrated. The Contractor shall document all functional test results. In the event that any aspect of the functional tests are determined by the Engineer to have failed, the Contractor all cease all acceptance testing and determine the cause of the failure and make repairs to the satisfaction of the Engineer. Acceptance testing shall, at the discretion of the Engineer, be repeated beginning from the start of functional tests.

10-7.14 PERFORMANCE TESTS

The Contractor shall conduct operational performance tests on the following:

All video links from the camera to the video nodes.

All data circuits operational from the data nodes to the system element located in the field.

Video tests shall satisfy the end-to-end performance requirements under normal operating conditions. Video tests shall be measured with the camera video output transmitting a video signal at the input of the video display monitors. The Contractor shall test the video subsystem and record the results.

The video signal to noise shall be measured according to EIA-250. The video signal to noise ratio shall be measured and recorded with both the camera providing the video input reference and with suitable video test equipment providing the video reference signal. When the source is the test equipment, the video signal to noise ratio shall be greater than 47 dB.

Adjustments shall be calculated to account for any deviation in output level of the camera resulting from the variable light conditions, the automatic iris and associated automatic gain control. The resulting video signal to noise ratio shall be recorded.

The video signal to low frequency noise ratio shall be measured according to EIA-250. The resulting video signal to low frequency noise ratio shall be greater than 39 dB. If an AGC circuit does not allow measurement as per EIA-250, the Contractor shall submit an alternative test plan for approval.

The video signal to periodic noise ratio shall be measured according to EIA-250. The resulting video signal to periodic noise ratio shall be greater than 52 dB.

Data tests shall be performed on all operational and voice data circuits using appropriate test equipment for the measurement of the following parameters:

End-to-end bit error rate tests shall be run from the data nodes to each remote drop of each data Circuit A data test set shall be used at both the data nodes and the remote modems to insert an asynchronous pseudo-random pattern using 8 data bits, 1 start bit, I stop bit and even parity. The data test set at the remote modem must hold RTS high for the duration of the data test. The data rate of the test sets shall be set to rate as employed in the system.

A 15 minute test on each drop of each multipoint circuit shall be error free in both directions. One drop of each circuit as chosen by the Engineer shall be tested for 72 hours. The average bit error rate in both directions shall be less than 1×10^{-6} at 9600 bps.

The round-trip propagation delay for each new 170 controller circuit shall be measured by using a loop back connector on the slave modem furthest from the master. The loop back connector shall connect pin 2 to 3, 8 to 4, and 6 to 20 of the DB-25 connector. A data test set capable of measuring delay shall be used at the data node. The test shall be repeated 3 times and the average value calculated.

Distortion shall be tested between the data node and the selected field modem for each data circuit. The signal shall not have a gross span-stop distortion greater than 20 percent at any data interface measured as per EIA-404-A.

If any circuit or element fails to satisfy the specified performance requirements the Contractor shall determine the cause and correct the failure to the satisfaction of the Engineer. The full performance tests shall be repeated under operating conditions as determined by the Engineer.

10-7.15 SYSTEM DOCUMENTATION

The Contractor shall submit a draft copy of all documentation for review and approval prior to production of documentation. The Engineer will review and approve or reject the draft documentation within four weeks of receipt.

The Contractor shall modify the documentation if required and submit provisional documentation. The Engineer will approve or reject the provisional documentation within three weeks of receipt. The Contractor shall arrange for re-submission in a timely manner to meet the schedule in the case that the documents are rejected.

Draft documentation shall be submitted eight weeks prior to the start of installation. The draft documentation shall show the general approach in preparing the final manuals.

Upon approval of he draft documentation provisional documentation shall be supplied 3 weeks prior to the start of site testing. The provisional documentation shall be of the same format as the final manuals but with temporary insertion for items which cannot be finalized until the system is completed tested and accepted. Final documentation shall be submitted no later than 4 weeks after completion of the acceptance tests and shall incorporate all comments made during the approval stages. The Contractor shall be responsible for all delay caused by non-compliance to the specified requirements.

Final documentation shall be approved prior to its production. Twelve copies of all final documents shall be delivered. The copies shall be 8.5 x 11 inch paper and bound in three-ring hard-covered binders complete with dividers. System documentation shall be arranged in an operation and maintenance (O & M) manual format providing all the information necessary to operate, maintain and repair the equipment and cable to the lowest module or component level. The operation and maintenance manual shall as a minimum consist of the following sub-section as described below:

Master Items Index.--This shall be the first section of the O & M manual. The section shall describe the purpose of each manual and brief description to the directory of the manual. It shall also reference equipment manuals as required for additional and support material.

System Description and Technical Data.--This section shall contain an overall description of the system and associated equipment and cables with illustrative block diagrams. This section shall identify all equipment and cables in the system stating the exact module and option number that are employed in the system. Technical data specification and settings for every type of equipment or cable shall be provided. Any modification that has been done on the equipment shall be clearly described.

Theory of Operation.--The manual shall contain a functional description of each element of the system, explaining how each function is being achieved separately and how each element works together to form the complete system.

Software Documentation.--Proper documentation for all software shall be provided. The software documentation shall include a clear description of the system's functionalities and specifications. Description on each software modules and programs shall be provided. The Contractor shall supply related programming and system user manuals, application and utilities software use manual and all associated proprietary software manuals. Software listing of all custom programs shall also be provided , as well as a copy of any software source code.

Operations.--The manual shall describe how to operate the system and each particular type of equipment and software. Equipment layout, layout of controls, displays, software operating procedures and all other information required to correctly operate the system and each functional unit shall be provided. Procedures shall also be provided for initial tune-up of the system and adjustment and checkout required to ensure that the system is functioning within the performance requirements. Warning of special procedures shall be given. The functions and setting of all parameters shall be explained.

Corrective Maintenance.--The manual shall include fault diagnostic and repair procedures to permit the location and correction of faults to the level of each replaceable module. Procedures shall include alignment and testing of the equipment following repair, the test equipment, tools, diagnostic software required and the test set up.

Preventative Maintenance.--The manual shall include procedures for preventative maintenance in order to maintain the performance parameters of the system, equipment and cables within the requirements of the specifications.

Parts List.--The manual shall include a list of all replaceable parts with exact parts description and number and a directory of recommended suppliers with correspondence address, telephone and fax numbers.

Test Results.--This section shall include a copy of the results for all the tests that have been conducted for the contract.

System schematic drawings shall be provided to identify the type of equipment at each location and the function of all equipment. The drawings shall also show how the system is interconnected. A comprehensive list of cabling and wiring shall be provided to clearly identify the interconnection and labeling of all equipment in the field and at the

10-7.16 FINAL ACCEPTANCE

The final acceptance of the system will not occur until all of the following conditions have been met as follows:

Physical, functional, and full performance acceptance tests have been completed and the results are approved by the Engineer.

All documentation has been completed and submitted to the Engineer.

All connections that were changed to perform acceptance tests are restored and tested.

10-7.17 PAYMENT

The contract lump sum price paid for system testing and documentation shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in system testing and documentation, 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 11-1. QUALITY CONTROL / QUALITY ASSURANCE

Asphalt concrete for this project 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 for Type A and Type B asphalt concrete for this project.

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, spreading and compacting the mixture, and furnishing and placing pavement reinforcing fabric, all as specified in this specification and the section entitled "Asphalt Concrete" in Section 10-1, "General," elsewhere in these special provisions.

The Contractor shall be responsible for controlling the quality of the asphalt concrete product entering the work, including mix design, mixing, spreading, and compacting asphalt concrete for the work performed, and for developing, implementing and maintaining a quality control program. The Contractor shall also be responsible for the inspection, sampling and testing required to control the quality of the asphalt concrete and the work performed, and for the inspection, sampling, and testing required to provide the Engineer with the information and test data necessary for acceptance of the asphalt concrete, complete in place.

The inspection, sampling and testing required by the Contractor to control the quality of the workmanship and the asphalt concrete product shall conform to the provisions specified herein, and the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete," dated April 1996.

Asphalt concrete is designated as Type A or Type B. The type of asphalt concrete will be shown on the plans or shall be in conformance with the provisions in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

Asphalt concrete shall be produced in a batch mixing plant, a continuous pugmill mixing plant, or a drier-drum mixing plant. Proportioning shall be either by hot-feed control or cold-feed control.

39-2 MATERIALS

39-2.01 Mix Design

The Contractor shall submit a proposed mix design and the material proposed for each asphalt concrete mixture to be used to the Engineer, at least 2 weeks prior to production of that asphalt concrete mixture. The proposed mix designs shall conform to the asphalt concrete mixture quality provisions in Section 39-2.03, "Aggregate," of this Section 11-1. Aggregate shall conform to the quality and gradation requirements specified in Section 39-2.03, "Aggregate," of this Section 11-1, for the asphalt concrete types and sizes conforming to the provisions in "Asphalt Concrete," in Section 10-1, "General," elsewhere of these special provisions.

The Contractor shall furnish test data in support of each proposed mix design. The test data furnished shall be for an asphalt concrete mixture that conforms to the proposed target values. In addition, the Contractor shall also furnish samples of the aggregate, asphalt binder and the additives proposed for use in each asphalt concrete mixture. The Contractor shall submit the following for each asphalt concrete mixture proposed for use under the contract:

A. Aggregate and mineral filler:

1. Target values for percent passing each sieve size for the aggregate blend. The proposed target values, for the specified type and aggregate size, shall conform to the aggregate gradation limits specified in Section 39-2.03, "Aggregate," of this Section 11-1;
2. Results of tests for aggregate quality conforming to the provisions in Section 39-2.03, "Aggregate," of this Section 11-1;
3. Source of each aggregateto be used;
4. Percentage of each aggregate stockpile or hot bin to be used;
5. Gradation of each aggregate stockpile or hot bin to be used; and
6. Samples from each aggregate stockpile or hot bin to be used. These samples shall be representative of the material to be used and shall have been processed in a manner representative of the material to be used in the work.

    a. 125 pounds of each coarse aggregate;
    b. 75 pounds of each intermediate and fine aggregate; and
    c. 10 pounds of each mineral filler.

B. Asphalt binder:

1. Target value for asphalt binder content for each proposed asphalt concrete mixture;
2. Four individual one-quart samples of the asphalt binder to be used in each proposed asphalt concrete mixture;
3. Results of the asphalt binder quality tests as specified in Section 92, "Asphalts," of the Standard Specifications; and
4. Material Safety Data Sheets.

C. Antistrip additives**,** when applicable:

1. A 10-pound sample of dry additive or a one-quart sample of liquid antistrip additive, including name of product, manufacturer, manufacturer's numerical designation (if any) and proposed rate, location and method of addition; and
2. Material Safety Data Sheets.

The Engineer will test the Contractor's proposed asphalt concrete mix design for verification using the proposed aggregate gradation and asphalt binder content target values, and the quality and asphalt concrete mixture provisions specified in Section 39-2.03, "Aggregate," of this Section 11-1. Asphalt concrete production for this project shall not begin until the Contractor has received written notification that the proposed mix design to be used has been verified by the Engineer.

Changes from one mix design to another shall not be made during the progress of the work, unless permitted in writing by the Engineer. The Contractor shall submit to the Engineer a proposed mix design for each new asphalt concrete mixture to be used at least 2 weeks prior to production of that mixture. Asphalt concrete mix designs not verified by the Engineer shall not be used. Changes in stockpile or hot bin proportions to conform to aggregate grading requirements will not be considered changes in the mix design. Changes in asphalt binder content or aggregate grading target values will not be applied retroactively for acceptance or payment.

The Engineer will determine asphalt concrete mix design evaluation costs incurred as a result of Contractor requested verification of additional asphalt concrete mix design proposals. The mix design evaluation costs, as determined by the Engineer, will be deducted from moneys due or to become due the Contractor.

39-2.02 Asphalts

Asphalt binder to be mixed with aggregate shall be a steam-refined paving asphalt conforming to the provisions in Section 92, "Asphalts," of the Standard Specifications, and shall be the grade designated in "Asphalt Concrete," in Section 10-1, "General," of these special provisions or as determined by the Engineer. The amount of asphalt binder to be mixed with the aggregate will be determined by the Contractor and verified by the Engineer, in conformance with the provisions in Section 39-2.01, "Mix Design," of this Section 11-1. In support of the material certification provisions in Section 92, "Asphalts," of the Standard Specifications, the Contractor shall obtain 2 individual one-quart samples of the asphalt binder for each day of asphalt concrete production. The sample containers shall be labeled with the date and time of sampling and shall be submitted to the Engineer on a weekly basis.

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 conforming 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 designated 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 designated by the Engineer.

39-2.03 Aggregate

All aggregates shall be clean and free from decomposed or organic materials and other deleterious substances. Coarse aggregate is material retained on the No. 4 sieve, fine aggregate is material passing the No. 4 sieve, and supplemental fine aggregate is added fine material passing the No. 30 sieve, including, but not limited to, cement and stored fines from dust collectors.

The combined aggregate shall conform to the provisions of this section.

The target value for the percent passing each designated sieve size for the aggregate blend used in the proposed asphalt concrete mixture shall fall within the "Target Value Limits" of the following table:

AGGREGATE GRADATION
Type A and Type B Asphalt Concrete
Percentage Passing

3/4" Maximum, Coarse		3/4" Maximum, Medium	
Sieve Sizes	Target Value Limits	Sieve Sizes	Target Value Limits
1"	100	1"	100
3/4"	90-100	3/4"	90-100
3/8"	60-75	3/8"	65-80
No. 4	45-50	No. 4	49-54
No. 8	32-36	No. 8	36-40
No. 30	15-18	No. 30	18-21
No. 200	3-7	No. 200	3-8

1/2" Maximum, Coarse		1/2" Maximum, Medium	
Sieve Sizes	Target Value Limits	Sieve Sizes	Target Value Limits
3/4"	100	3/4"	100
1/2"	95-100	1/2"	95-100
3/8"	75-90	3/8"	80-95
No. 4	55-61	No. 4	59-66
No. 8	40-45	No. 8	43-49
No. 30	20-25	No. 30	22-27
No. 200	3-7	No. 200	3-8

During asphalt concrete production, aggregate gradation shall be within the limits specified in Table 39-3, "Minimum Quality Control Required for Acceptance," 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 combined aggregate shall conform to the following quality requirements prior to the addition of the asphalt binder:

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 No. 4, Retained on No. 8) (Min.)		70%	20%
Los Angeles Rattler	211		
Loss at 100 Rev. (Max.)		12%	
Loss at 500 Rev. (Max.)		45%	50%
Sand Equivalent (Min.)	217	47	42
K_cFactor (Max.)	303	1.7	1.7
K_fFactor (Max.)	303	1.7	1.7

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:

Asphalt Concrete Mixture Requirements

Design Parameters	California Test	Asphalt Concrete	
		Type A	Type B
Hveem Stabilometer Value (Min.)	366	37	35
Percent air voids	367	3-5	3-5
Swell Max. (in.)	305	0.030	0.030

39-2.04 Pavement Reinforcing Fabric

Pavement reinforcing fabric shall conform to the provisions in Section 88, "Engineering Fabrics," of the Standard Specifications.

39-3 CONTRACTOR QUALITY CONTROL

39-3.01 General

The Contractor shall establish, provide and maintain a quality control system which will provide assurance to the Engineer that all materials and completed –construction, submitted for acceptance, conform to the contract requirements specified herein. The Contractor shall also be responsible for the quality of all component materials contained within the asphalt concrete product, complete in place, procured from subcontractors or vendors.

At least 14 days prior to the start of production of asphalt concrete, the Contractor shall submit a written Quality Control Plan for approval which shall be used to ensure the quality of the product and the work. The production of asphalt concrete shall not begin until the Quality Control Plan is approved by the Engineer.

39-3.02 Quality Control Plan

The Contractor shall provide a Quality Control Plan which shall describe the organization and procedures which the Contractor shall use to administer the quality control system including the procedures used to control the production process, 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," dated April 1996.

Approval of the Quality Control Plan will be based on the inclusion of all of the required information. 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 these specifications. It shall remain the responsibility of the Contractor to demonstrate such compliance. The Contractor may propose in writing a supplement to the Quality Control Plan as work progresses and must propose a supplement whenever there are changes in production or placement of asphalt concrete or to quality control procedures or personnel. Asphalt concrete production and placement shall not resume or continue until the revisions to the Quality Control Plan or quality control personnel have been approved in writing by the Engineer.

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 directly responsible to the Contractor and shall have the authority to make decisions where quality of the work or product are concerned. Sampling, inspection, and test reports shall be reviewed and signed by the Quality Control Manager prior to submittal to the Engineer.

The Quality Control Plan shall include the name and qualifications of an independent testing laboratory mutually agreed to by the Contractor and the Engineer to serve as the Third Party Laboratory in any dispute resolution. Attention is directed to Section 39-4.05, "Dispute Resolution," of this Section 11-1.

39-3.03 Quality Control Inspection, Sampling and Testing

The Contractor shall perform quality control sampling and testing, provide inspection, and exercise management control to ensure that asphalt concrete production and placement conforms to the requirements specified herein.

The Contractor shall provide the required sampling, testing, and inspection during each phase of the 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 specified herein. Sampling, testing, and inspection to be used by the Engineer for acceptance and determination of payment shall be performed at the minimum frequency specified in Table 39-3, "Minimum Quality Control Required for Acceptance," of this Section 11-1, and as outlined in the approved Quality Control Plan. The Contractor shall provide quality control inspection on the project when asphalt concrete paving operations are in progress.

Sampling locations for quality control tests, as specified herein, shall be determined by the Contractor using a random sampling plan approved by the Engineer. The Contractor shall establish a statistically based procedure of random sampling.

The Contractor shall obtain and split into representative portions samples in conformance with California Test 125. One representative split portion of each sample shall be reserved for possible retest during dispute resolution, conforming to the provisions in Section 39-4.05, "Dispute Resolution," of this Section 11-1.

The Contractor shall provide a testing laboratory with adequate equipment and personnel for the performance of the quality control tests. Laboratory facilities shall be clean and all sampling and testing equipment shall be maintained in proper working condition. The Engineer shall have unrestricted access to the laboratory for inspection and to witness the Contractor's quality control activities during working hours.

Testing laboratories and inspection, sampling and testing personnel shall conform to the minimum requirements as set forth in the Department's "Manual for Quality Control and Quality Assurance for Asphalt Concrete," dated April 1996.

39-3.04 Control Charts and Records

The Contractor shall record sampling, testing and inspection data on forms approved by the Engineer. The Contractor shall maintain complete testing and inspection records and post test data in the laboratory.

Upon written request by the Contractor, the Engineer will provide the test data of testing done by the State.

39-3.04A Control Charts

The Contractor shall develop and maintain linear control charts. The control charts shall identify the project, test number, test parameter, applicable upper and lower specification limits, and test data. The control charts shall be used as part of the quality control system to document variability of the asphalt concrete production process, identify construction and equipment problems, and identify potential pay factor adjustments.

When test data for any quality characteristic deviates beyond the specification limits specified in Table 39-3, "Minimum Quality Control Required for Acceptance," of this Section 11-1, the Contractor shall take the necessary corrective action to bring the production within the specification limits, and shall document the corrective action taken in the records of inspection and testing in conformance with the provisions in Section 39-3.04B, "Records of Inspection and Testing," of this Section 11-1. When 3 consecutive sets of test data for a quality characteristic deviate beyond the limits designated in Table 39-3, "Minimum Quality Control Required for Acceptance," of this Section 11-1, the Contractor shall cease production of asphalt concrete and shall propose corrective measures to the Engineer. Production of asphalt concrete may continue when the corrective measures have been approved by the Engineer and implemented by the Contractor.

Control charts shall be kept current and shall be posted in a location accessible to the Engineer. Control charts shall be updated each day of asphalt concrete production, and up-to-date copies shall be posted prior to the beginning of the next day's production of asphalt concrete.

39-3.04B 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 a form approved by the Engineer. The inspection record shall state

> "It is hereby certified that the information contained in this record is accurate, and that the work documented herein complies with the requirements of the contract. Exceptions to this certification are documented as a part of this record."

For each day of asphalt concrete production,, the Contractor shall prepare an "Asphalt Concrete Testing Record" on a form approved by the Engineer. The testing record shall includea certification signed by the Quality Control Manager. The certification shall state

"It is hereby certified that the information contained in this record is accurate, and that tests and 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."

The Contractor shall submit sampling, testing, and inspection records and certifications to the Engineer within 24 hours or by noon of the next day's asphalt concrete production, whichever period is agreed to by the Engineer at the beginning of the asphalt concrete production. If the record is incomplete or in error, a copy of the record will be returned to the Contractor with the deficiencies noted by the Engineer. The Contractor shall correct the deficiencies and return the updated record to the Engineer by the start of the following working day. When errors or omissions in sampling, inspection or testing records repeatedly occur, the Contractor shall correct the procedures by which the records are produced.

If control charts, sampling, testing and inspection records and certifications are not posted or provided as required within the time specified herein, the Engineer may require work to be suspended until the missing control charts, sampling, testing and inspection records, and certifications have been provided.

39-4 ENGINEER QUALITY ASSURANCE

39-4.01 General

The Engineer will verify conformance to contract specifications by inspection of the Contractor's procedures, evaluation of the Contractor's quality control records, and independent sampling and testing of the materials. The Engineer will obtain random samples and perform tests to verify the test data of the quality control testing performed by the Contractor.

In addition to the minimum sampling and testing requirements specified in this specification, the Contractor shall, when directed by the Engineer, obtain representative samples of an asphalt concrete mixture or material component that appears defective or inconsistent. These samples will be obtained and split into representative portions in conformance with California Test 125. The Contractor shall provide the Engineer with one representative split portion of each sample taken and shall reserve one representative split portion of each sample for possible retest during dispute resolution, conforming to the provisions in Section 39-4.05, "Dispute Resolution," of this Section 11-1. The material need not be sampled if the Contractor elects to remove and replace the material, at the Contractor's expense, or if the Contractor uses a method of correcting the situation which has been approved by the Engineer. Test data from these additional material samples shall not be used as a basis for a calculated pay factor.

39-4.02 Engineer Sampling for Verification

The Engineer will obtain random samples of aggregate, asphalt binder, and asphalt concrete mixture, and test for in-place density independent of the Contractor’s quality control testing. These samples may be obtained during asphalt concrete production and placement operations, and will be obtained and split into representative portions in conformance with California Test 125. One of the representative split portions will be provided to the Contractor, one of the representative split portions will be tested by the Engineer and used to verify quality control test data furnished by the Contractor that has not yet been verified, and 2 representative split portions will be reserved by the Engineer for third party testing in conformance with the provisions in Section 39-4.05, "Dispute Resolution," of this Section 11-1.

The Engineer will permit the Contractor to witness verification sampling. However, the Engineer will not be required to notify the Contractor of anticipated sampling schedules or locations. The Engineer will not delay sampling for the Contractor to witness the sampling.

39-4.03 Engineer Testing for Verification

Test data from the samples taken by the Engineer will be used to verify the Contractor’s quality control test data.

The Engineer will sample and test for all material quality characteristics specified for statistical acceptance of the work. The Engineer's verification tests will be at a frequency of not less than 10 percent of the minimum quality control sampling and testing frequency required of the Contractor, and will be in conformance with Table 39-3, "Minimum Quality Control Required for Acceptance," of this Section 11-1. The Engineer's verification tests will be performed using the same test methods used by the Contractor.

A standard statistical test, the *t*-test for sample means, conforming in Section 39-4.04, "Statistical Verification Tests," of this Section 11-1, will be used by the Engineer to verify the Contractor’s quality control sampling and testing for acceptance of the material. All quality control test data reported by the Contractor since the last completed verification by the Engineer, for each indexed quality characteristic, will be used in the comparison. If the *t*-test does not indicate that the difference between the Contractor’s test data and the corresponding Engineer's verification test data is significant ($t \leq t_{crit}$), the Contractor’s test data will be deemed verified and used by the Engineer to accept the material. If the *t*-test indicates that the difference between the Contractor’s test data and the corresponding Engineer's verification test data is significant ($t > t_{crit}$), the Contractor's test data will be deemed unverified.

When the Contractor's test data are not verified by the Engineer, the Contractor will be notified in writing of the difference, and the Engineer and Contractor will cooperate to determine the source of the discrepancy. In addition, the Engineer will continue to sample asphalt concrete production, and will compare the cumulative verification test data to the cumulative unverified test data reported by the Contractor for the indexed quality characteristic in question.

If, after 5 consecutive verification tests by the Engineer, the Contractor's quality control test data is not verified ($t > t_{crit}$), acceptance and payment determination for the indexed quality characteristic in question on the asphalt concrete represented by the unverified test data will be made on the basis of the Engineer's verification test data only. The unverified test data will not be considered for acceptance purposes by the Engineer, nor will the test data be included in subsequent *t*-test verification by the Engineer, pending the findings of the dispute resolution process in conformance with the provisions in Section 39-4.05, "Dispute Resolution," of this Section 11-1. In addition, the Contractor's sampling and testing program shall be deemed unacceptable and shall be disqualified from further sampling and testing. Before proceeding with asphalt concrete production, the Contractor shall propose, in writing, remedial measures which will be taken to provide an acceptable sampling and testing program. Asphalt concrete production shall not resume until the Contractor has received written notification that the revised sampling and testing program has been approved by the Engineer.

The Contractor shall not use a representative split portion of the samples taken by the Engineer for verification tests for determination of quality control test data.

Test data from the reserved representative split portions of verification samples will be used in the dispute resolution process in conformance with the provisions in Section 39-4.05, "Dispute Resolution," of this Section 11-1.

39-4.04 Statistical Verification Tests

The Engineer shall determine the acceptability of the Contractor's quality control test data for material acceptance purposes using the *t*-test for sample means.

The Contractor's quality control test data will be considered verified at a level of significance, $\alpha = 0.01$.

The *t*-value of the group of test data to be verified (t) 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 (min. 2 required)

n_v = Number of Verification tests (min. 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 $n_v > 1$)

(Use the standard deviation of the Contractor's quality control tests when $n_v = 1$)

Compute t using the equation above and compare to the critical *t*-value, t_{crit} , from the following table:

Critical t-value for Verification Testing

degrees of freedom (nc+nv-2)	tcrit for a = 0.01	degrees of freedom (nc+nv-2)	tcrit for a = 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

When the *t*-value of the test data from the Engineer's verification tests and the Contractor's quality control tests is compared to t_{crit} from the previous table, if t is less than or equal to t_{crit} ($t \leq t_{crit}$), the difference between the Contractor's quality control test data and the corresponding Engineer's verification test data is not significant, and the Contractor's test data are verified. When t is greater than t_{crit} ($t > t_{crit}$), the difference between the Contractor's quality control test data and the corresponding Engineer's verification test data is significant, and the Contractor's test data are not verified.

39-4.05 Dispute Resolution

The Contractor and Engineer still work in partnership to avoid potential conflicts and to resolve any differences that may arise from unverified test data. As soon as an unsuccessful verification attempt is reported by the Engineer, both parties will review their sampling and testing procedures and share their findings. If an error in the Contractor's testing is detected during this review, the Contractor will either recalculate, if appropriate, or retest using the reserved representative split portions of quality control samples. This new test data shall be resubmitted to the Engineer for verification purposes. If an error in the Engineer's testing is detected, the Engineer will recalculate, if appropriate, or retest using a reserved representative split portion of the verification samples. Using the new test data, the Engineer will repeat the verification calculation of the Contractor's resubmitted test data using the statistical *t*-test conforming to the provisions in Section 39-4.04, "Statistical Verification Tests," of this Section 11-1.

If the initial review does not reveal the source of the discrepancy, the Contractor may test the split verification samples and submit this test data to the Engineer for verification conforming to the provisions in Section 39-4.04, "Statistical Verification Tests," of this Section 11-1.

If the Contractor's quality control test data remain unverified after 5 consecutive verification samples have been obtained and tested, the Engineer will use the statistical *t*-test conforming to the provisions in Section 39-4.03, "Statistical Verification Tests," of this Section 11-1, to verify the Contractor's test data on the 5 representative split portions of the verification samples. If the Contractor's test data for the 5 representative split portions of the verification samples are verified by the Engineer, then for purposes of acceptance and payment determination, the Contractor's unverified quality control test data will be replaced by the paired averages of the Engineer's and Contractor's test data for the 5 verification samples. If the Contractor's test data for the 5 representative split portions of the verification samples are not verified, the asphalt concrete represented by the unverified quality control tests will be accepted and paid for solely on the basis of the Engineer's verification test data. In either case, the Contractor's sampling and testing program will remain disqualified.

If neither the Contractor's quality control test data nor the test data of the representative split portions of the verification samples are verified by the Engineer, the Contractor may retain the services of the Third Party Laboratory designated in the Contractor's approved Quality Control Plan to resolve the difference. The Third Party Laboratory will perform the test method in question using the reserved representative split portions of the 5 verification samples. This test data will be submitted to the Engineer for verification . The Engineer will use the statistical *t*-test conforming to the provisions in Section 39-4.04, "Statistical Verification Tests," of this Section 11-1, to compare the Third Party Laboratory test data to the Engineer's verification test data. Both the Contractor and Engineer may witness the Third Party Laboratory testing.

If the Third Party Laboratory test data verifies the Engineer's verification test data, the asphalt concrete represented by the unverified quality control test data will be accepted and paid for using the paired averages of the Third Party Laboratory

test data and the Engineer's verification test data. Costs related to the Third Party Laboratory testing shall be responsibility of the Contractor, and no additional compensation will be allowed. The Contractor's sampling and testing program shall remain disqualified.

If the Third Party Laboratory test data does not verify the Engineer's verification test data, the Engineer will use the statistical *t*-test to compare the Third Party Laboratory test data to the Contractor's unverified quality control test data. If the Contractor's quality control test data are verified by the Third Party Laboratory test data, acceptance and payment determination by the Engineer will be based on the Contractor's quality control test data. Costs of the Third Party Laboratory testing will be the Engineer's responsibility. The Contractor's quality control sampling and testing program shall be considered qualified, and the Engineer's verification sampling and testing program will be modified as necessary.

If the Third Party Laboratory test data fails to verify either the Engineer's verification test data or the Contractor's quality control test data, acceptance and payment determination will be based on the Third Party Laboratory test data. Costs for the Third Party Laboratory testing shall be split equally by the Engineer and the Contractor. The Contractor's sampling and testing program shall remain disqualified. The Engineer's verification sampling and testing program will be modified as necessary.

When the dispute is over relative compaction, the Third Party Laboratory will obtain test maximum densities using the reserved representative split portions of the verification samples. The Third Party Laboratory will re-calibrate the Engineer's nuclear density gage with cores obtained from the most recent 500 feet of complete in place asphalt concrete surfacing not yet opened to public traffic. If no 500-foot section of asphalt concrete surfacing not yet opened to public traffic is available, the Contractor shall construct a 500-foot test strip, to the thickness to be placed, at a location on the project approved by the Engineer. The Third Party Laboratory will use the new calibration to re-calculate the nuclear density gage readings for determination of the Engineer's verification test data and will use the new calibration to determine relative compaction. If the re-calculated relative compaction test data verifies the Engineer's verification test data, subsequent testing by the Engineer will use the re-calibrated nuclear density gage. If the re-calculated relative compaction test data verifies the Engineer's verification test data, costs related to the Third Party Laboratory testing shall be the responsibility of the Contractor, and no additional compensation will be allowed. The Contractor's sampling and testing program shall remain disqualified. If the re-calculated relative compaction test data do not verify the Engineer's verification test data, the Engineer may choose to re-calibrate the Engineer's nuclear density gage or may use the Third Party Laboratory calibration and all costs for the re-calibration shall be the responsibility of the Engineer. The Contractor's sampling and testing program shall remain disqualified.

If the Contractor's sampling and testing program is disqualified, the Contractor shall submit a plan for improving the Contractor's sampling and testing program which satisfies the requirements of the Quality Control Plan, in conformance with the provisions in Section 39-3, "Contractor Quality Control," of this Section 11-1. The Contractor shall not continue to use the disqualified sampling and testing program for quality control sampling and testing to be considered for acceptance and payment determination during the dispute resolution process as specified herein.

Should the Third Party Laboratory test data obtained during the process of dispute resolution, as specified herein, verify the Contractor's quality control test data and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay caused by the dispute resolution process, the delay will be considered a right of way delayin conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

39-5 STORING, PROPORTIONING AND MIXING MATERIALS

39-5.01 Storage

The Contractor shall store 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 which has been intermingled with another size of aggregate shall be removedr and replaced with aggregate of specified grading. "Hot-feed control" and "cold-feed control," indicates the location of measuring devices or controls.

When the Contractor adds supplemental fine aggregate, each such supplemental fine aggregate used shall be stored separately and kept thoroughly dry.

The measurement and storage requirements of this Section 39-5, "Storing, Proportioning and Mixing Materials," 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 these special provisions.

39-5.01A Aggregate Cold Storage

The Contractor shall feed the material from storage with a mechanical feeder. Before being fed to the drier, aggregate shall be separated into 3 or more sizes and stored separately.

39-5.0lB Aggregate Hot Storage

The Contractor shall store aggregate for asphalt concrete to be mixed in batch mixing plants, after being dried, in accordance with the following requirements:

Aggregates for asphalt concrete shall be separated into 3 or more sizes.

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 39-5.03, "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.

39-5.01C Asphalt Binder Storage

Asphalt to be used as a binder for asphalt concrete shall be stored in tanks accurately calibrated in uniform intervals of 100-gallon intervals and maintained to this accuracy. The tanks shall be made accessible for measuring the volume of asphalt at any time.

The Contractor shall provide a suitable sampling device 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 1/2 inch and 3/4 inch, constructed in such a manner that a one-quart sample may be withdrawn slowly at any time during plant operations. The Contractor shall maintain the valve in good condition and, if the valve fails to function properly, replace the valve. The sampling device shall be readily accessible and in an area free of dangerous obstructions and shall be between 24 and 30 inches above the platform. A drainage receptacle shall be provided by the Contractor for flushing the device prior to sampling.

The Contractor shall maintain the discharge end of the asphalt binder circulating pipe below the surface of the asphalt binder in the storage tank to prevent discharging hot asphalt binder into open air.

The Contractor shall install a temperature sensing device in the asphalt feed line. The device shall measure the temperature of the asphalt and shall be accurate to 10° F. increments. An automatic, continuous recording device shall be provided and used to maintain accurate records of the asphalt temperature during production.

39-5.02 Drying

Aggregate shall be fed directly to a drier-drum mixer or to a drier at a uniform rate.

Drying shall continue for a sufficient period of time and at a sufficiently high temperature so 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 by California Test 310 or 370.

The drier or drier-drum mixer shall be provided with a device which senses the temperature of the material leaving the drier or the drier-drum mixer. The temperature-sensing device shall be accurate to the nearest 10° F. The device shall be located so that changes of 10° F. in temperature of the material will be indicated within one minute. An automatic continuous recording device shall be provided and used to maintain accurate records of the temperatures during production.

The burner used for heating the aggregate shall achieve complete combustion of the fuel.

39-5.03 Proportioning for Batch Mixing

When the Contractor elects to use batch mixing equipment, each aggregate storage bin shall be equipped with a suitable, safe sampling device which will provide a sample, representative of actual production, of the aggregate discharged into the weigh hopper or volumetric proportioning bin. When such samples are taken from a location above ground level, a means shall be provided for lowering the aggregate samples to the ground.

Fine material collected in all dust control systems, other than centrifugal collectors or knock-out boxes, is considered to be supplemental fine aggregate. When supplemental fine aggregate is used, it shall be proportioned by weight as provided in39-5.03A(1), "Weight Proportioning," of this Section 11-1 . A suitable, safe sampling device shall be installed in each feed line or surge tank preceding the weigh hopper.

Aggregate and asphalt shall be proportioned by weight or by volume as follows:

39-5.03A Manual Proportioning

An automatic plant shall not be operated manually unless the automatic circuitry is disconnected to the extent that it cannot be activated by the mere operation of a switch, circuit breaker, or some other similar routine procedure.

When manual proportioning is used in the production of asphalt concrete, proportioning shall conform to the following:

1. Weight Proportioning.—The zero tolerance for aggregate scales shall be 0.5-percent of the total batch weight 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 weight of the aggregate.

The indicated weight of material drawn from storage for a draft of material shall not vary from the preselected scale setting by more than the following percentages of the total batch weight of the aggregate:

a. 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.
b. Supplemental fine aggregate shall be within 0.5-percent.
c. Asphalt binder shall be within 0.1-percent.

The asphalt binder shall be measured by a tank scale.

2. Volumetric Proportioning.—Each size of aggregate, except supplemental fine aggregate, shall be proportioned in a separate bin that is adjustable in size. Each bin shall have a gate or other device designed so that the bin shall be completely filled and struck off in measuring the volume of aggregate to be used in the mix. Means shall be provided for calibrating the weight of material in each measuring bin at any time. The plant shall be operated so that the material in each aggregate bin is within 2 percent of the weight pre-selected for the type of mixture being produced.

   Asphalt binder shall be proportioned by a meter or an adjustable calibrated tank. When meters are used, the asphalt lines leading to the asphalt meters shall be full-circulating or shall be regulated so that during plant stoppages, the temperature of the asphalt does not change more than 15° F. from the temperature maintained while the plant is in full operation. Asphalt binder shall be proportioned to within 2 percent of the weight preselected for the asphalt concrete mixture being produced.

39-5.03B Automatic Proportioning

When automatic batch mixing is in conformance with the provisions in "Asphalt Concrete," in Section 10-1, "General," of these special provisions, or when the Contractor elects to use an automatic batching system, 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.

When automatic proportioning is used in the production of asphalt concrete, proportioning shall conform to the following:

1. Weight Proportioning.—Automatic 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 all 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 any given scale at one time, and 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 fromstorage varies from the preselected amount by more than the tolerances conforming to the provisions in Section 39-5.03A, "Manual Proportioning," of 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 weight of the batch. When partial batches are batched automatically, the interlock tolerances, except the zero tolerance, shall apply to the total weight of aggregate in the partial batch.

   Automatic proportioning devices shall be operated so that all weight increments required for a batch are preset on the controls 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.

   Automatic proportioning controls shall be equipped with means for inspection of the interlock tolerance settings, and instructions for doing so shall be immediately available at the point of operation.

   The Contractor shall provide the necessary means to check the weights of various proportioned amounts on a separate scale located at the plant.

2. Volumetric Proportioning.—Asphalt binder shall be proportioned by an adjustable calibrated tank.

   Automatic volumetric proportioning devices shall be of a type which will not allow the bins to discharge into the mixer unless the mixer is empty and the mixer discharge gate is closed and will not operate unless the aggregate bins and asphalt binder tank are full. The automatic proportioning device shall operate in such a manner that the material in each aggregate bin and the asphalt binder tank is within 2 percent of the preselected weights.

   The Contractor shall provide the necessary means to check the weights of various proportioned amounts on a separate scale located at the plant.

39-5.03C 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 asphalt temperature, unless the meter is of 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 any day's run, the temperature of asphalt binder shall not vary more than 50° F. 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 weight 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 at between 30 percent and 100 percent of maximum operating capacity, the average difference between the indicated weight of material delivered and the actual weight delivered shall not exceed one percent of the actual weight for three, 15-minute runs. For any of the 3, individual 15-minute runs, the indicated weight of material delivered shall not vary from the actual weight delivered by more than 2 percent of the actual weight.

The fine material collected in all 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. Return rates 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 weight of material delivered and the actual weight delivered shall not exceed one percent of the actual weight for three, 3-minute runs. For any of the 3 individual 3-minute runs, the indicated weight of material delivered shall not vary from the actual weight delivered by more than 2 percent of the actual weight.

The actual weight of material delivered for proportioning device calibrations shall be determined by a vehicle scale conforming to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications. The vehicle scale shall be located at the plant and shall be sealed 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 any other time as directed 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 (pounds of asphalt per 100 pounds of dry aggregate including supplemental fine aggregate, if used) designated in the verified mix design provided by the Contractor in conformance with the provisions in Section 39-2.01, "Mix Design," 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 which will prevent any 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 which will provide a 60 to 80-pound 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 which will provide a 60 to 80-pound 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 the samples are taken from a location above ground level, the Contractor shall provide a means for safely lowering the aggregate samples to the ground.

When supplemental fine aggregate is used, a suitable, safe sampling device shall be installed in each feed line or surge tank preceding the proportioning device for the supplemental fine aggregate.

39-5.04 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 all 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 250° F. nor more than 375° F. when added to the aggregate.

The temperature of the aggregate before adding the binder shall be not more than 325° F.

Mixing shall conform to the following requirements:

39-5.04A 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 which 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.

When automatic proportioning or automatic batch mixing is specified in "Asphalt Concrete," in Section 10-1, "General," of these special provisions, or when the Contractor elects to use an automatic batching system, an interval timer shall control the time of mixing. The interval timer shall be interlocked so that the mixer cannot be discharged until all of the materials have been mixed for the full amount of time specified.

39-5.04B 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 325° F. upon discharge from the mixer.

The mixer shall discharge into a storage silo with a capacity of not less than that conforming to the provisions in Section 39-5.05, "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.

39-5.05 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 any one silo during mixing shall be 20 tons except for the period immediately following a shutdown of the plant of 2 hours or more. A means shall be provided to indicate that storage in each silo is being maintained as required.

Storage silos shall be equipped with a surge-batcher sized to hold a minimum of 4,000 pounds of material. A surge-batcher consists of equipment placed at the top of the storage silo which 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 thermally insulated or heated 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 4,000 pounds 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 which contained the material with the hardened lumps shall not be used for further storage until the cause of the lumps is corrected.

39-5.06 Asphalt Concrete Plants

Plants, including commercial plants, that produce asphalt concrete that is subject to these special provisions 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 which will reduce the dust emission to the degree that adjacent property is not damaged. The washer and other equipment shall function efficiently at all times when the plant is in operation.

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.

39-6 SUBGRADE, PRIME COAT, PAINT BINDER (TACK COAT), AND PAVEMENT REINFORCING FABRIC

39-6.01 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 which 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 all other extraneous material immediately before applying the prime coat or paint binder (tack coat).

39-6.02 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 conformance with the provisions 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 0.25-gallon per square yard 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 conforming to the provisions 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 0.02 to 0.10-gallon per square yard 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 285° F., nor more than 350° F.

Prime coat or paint binder (tack coat) shall be applied only so far in advance of placing the surfacing as may be permitted 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, and loose or extraneous material shall be removed, and no additional compensation will be allowed therefor.

39-6.03 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 in confomance with the provisions in "Asphalt Concrete," in Section 10-1, "General," of these special provisions or when determined by the Engineer.

Before placing the pavement reinforcing fabric, a binder of paving asphalt shall be applied to the surface to receive the pavement reinforcing fabric at an approximate rate of 0.25-gallon per square yard 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 3 inches on each side.

Before applying binder, large cracks, spalls, and depressions in existing pavement shall be repaired as directed by the Engineer, and the repair work will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

The fabric shall be aligned and placed with no wrinkles that lap. The test for lapping shall be made by gathering together the fabric in a wrinkle. If the height of the doubled portion of extra fabric is 1/2-inch or more, the fabric shall be cut to remove the wrinkle, then lapped in the direction of paving. Lap in excess of 2 inches shall be removed. Pavement reinforcing fabric shall not be placed in areas of conform tapers where the thickness of the overlying asphalt concrete is 0.10-foot or less.

If manual laydown methods are used, the fabric shall be unrolled, aligned, and placed in increments of approximately 30 feet.

Adjacent borders of the fabric shall be lapped 2 to 4 inches. The preceding roll shall be lapped 2 to 4 inches over the following roll in the direction of paving at ends of rolls or at any break. At fabric overlays, both the binder and the fabric shall overlap previously placed fabric by the same amount.

Seating of the fabric with rolling equipment after placing will be permitted. Turning of the paving machine and other vehicles shall be gradual and kept to a minimum to avoid damage to the fabric.

A small quantity of asphalt concrete, to be determined by the Engineer, may be spread over the fabric immediately in advance of placing asphalt concrete surfacing in order to prevent fabric from being damaged by construction equipment.

Public traffic shall not be allowed on the bare reinforcing fabric, except that public cross traffic may be allowed to cross the fabric under traffic control after the Contractor has placed a small quantity of asphalt concrete over the fabric.

Care shall be taken to avoid tracking binder material onto the pavement reinforcing fabric or distorting the fabric during seating of the fabric with rolling equipment. If necessary to protect the pavement reinforcing fabric, exposed binder material may be covered lightly with sand.

39-7 SPREADING AND COMPACTING EQUIPMENT

39-7.01 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. Screed action shall include any cutting, crowding, or other practical action which is effective on the asphalt concrete mixture without tearing, shoving, or gouging, and which 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.

The asphalt paver shall operate independently of the vehicle being unloaded or shall be capable of propelling the vehicle being unloaded in a satisfactory manner. 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 at all times, 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 weight of hauling or loading equipment, other than the connection, shall be supported by the asphalt paver, and no vibrations or other motions of the loader, which 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 with a paver equipped with tracks unless the layer being placed is 0.15-foot or less in compacted thickness.

39-7.02 Compacting Equipment

The Contractor shall furnish a sufficient number of rollers to obtain the specified compaction and surface finish required by these specifications. One roller each shall be provided for breakdown, intermediate, and finish rolling. The Contractor shall size the rollers to achieve the required results.

Rollers shall be equipped with pads and water systems which prevent sticking of asphalt concrete mixtures to the pneumatic or steel-tired wheels. A parting agent which will not damage the asphalt concrete mixture, as approved by the Engineer, may be used to aid in preventing the sticking of the asphalt concrete mixture to the wheels.

39-8 SPREADING AND COMPACTING

39-8.01 General Requirements

Asphalt concrete shall be handled, spread and compacted in a manner which is in conformance with this specification.

Asphalt concrete shall be placed in a manner so that cracking, shoving and displacement will be avoided.

Type A and Type B asphalt concrete shall be placed only when the atmospheric temperature is above 50° F.

Asphalt concrete shall not be placed when the underlying layer or surface is frozen or when weather conditions will prevent proper handling, finishing, or compaction of the mixture.

Asphalt concrete shall be spread and compacted in the number of layers of the thicknesses indicated in the following table:

All thicknesses shown are in hundredths of a foot							
Total Thickness Shown on the Plans*	Number of Layers	Top Layer Thickness		Next Lower Layer Thickness		All Other Lower Layers Thickness	
		Min.	Max.	Min.	Max.	Min.	Max.
25 or less	one	—	—	—	—	—	—
25 through 30	2***	11	20	11	25	—	—
30 through 44	2	15	20	20	25		
44 or more	***	15	20	15	25	20	40

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 the Contractor's option, 0.25-foot layer may be placed in one layer.

** *At least 3 layers if total thickness is 0.44-foot or more and less than 0.90-foot. At least 4 layers if total thickness is 0.90-foot or more.

A layer shall not be placed over a layer which exceeds 0.25-foot in compacted thickness until the temperature of the layer being covered is less than 160° F. at mid depth.

Asphalt concrete to be placed on shoulders, and on other areas off the traveled way having a width of 0.5 feet or more, shall be spread in the same manner as above.

The completed mixture shall be deposited on the roadbed at a uniform quantity per linear foot, as necessary to provide the required compacted thickness without resorting to spotting, picking-up or otherwise shifting the mixture.

Segregation shall be avoided, and the 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 shall correspond with the edges of proposed traffic lanes. Longitudinal joints in all other layers shall be offset not less than 0.5-foot alternately each side of the edges of traffic lanes.

Unless otherwise provided herein or permitted 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 such 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 0.25-foot or less, shoulders or other adjoining areas may be spread simultaneously with the through lane provided the completed surfacing conforms to the requirement of this specification. Tracks or wheels of spreading equipment shall not be operated on the top layer of asphalt concrete in an area until final compaction has been completed.

At location shown on the plans, specified in "Asphalt Concrete," in Section 10-1, "General," elsewhere in 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 any means practicable so as 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.

39-8.02 Test Strip Start Up Procedures

On the first day of asphalt concrete production of each asphalt concrete mixture, the Contractor shall produce an initial quantity of asphalt concrete mixture sufficient to construct a test strip of asphalt concrete surfacing to the thickness representative of the operations for each asphalt concrete mixture. The test strip shall contain a minimum of 100 tons, and a maximum of 500 tons, of complete in place asphalt concrete. The amount of asphalt concrete to be initially produced for the construction of the test strip shall be proposed to the Engineer by the Contractor, and shall be approved by the Engineer. The Contractor shall construct the test strip on the project at a location approved by the Engineer. The purpose of the test strip is to establish a rolling pattern which will produce the specified asphalt concrete density, to develop a correlation between cores taken from the test strip and the Contractor's and Engineer's nuclear density gage readings taken at the core locations on the test strip, and to verify the Contractor's mix design and asphalt concrete mixture quality characteristics which shall be produced for the contract.

The Contractor shall construct the test strip using asphalt concrete mix production, lay-down and compaction procedures, and equipment intended for the entire project. The Contractor shall stop production of asphalt concrete after construction of the test strip until the specified quality characteristics of the asphalt concrete mixture and the density values of the test strip have been tested, verified, and accepted by the Engineer in conformance with the provisions in Section 39-4.03, "Engineer Testing for Verification," of this Section 11-1.

Attention is directed to longitudinal and transverse construction joint requirements conforming to the provisions in "Asphalt Concrete" in Section 10-1, "General," of these special provisions.

The following sampling and testing requirements shall apply to the test strip:

The Contractor shall obtain 3 representative asphalt concrete mixture samples from the test strip and shall evaluate the material for conformance to the asphalt concrete mixture conforming to the provisions in Section 39-2.03, "Aggregate," of this Section 11-1. The Engineer will also obtain 3 representative asphalt concrete mixture samples from the test strip at the same location for purposes of verification of the Contractor's test data. The Contractor's test data will be considered verified if the asphalt concrete mixture design parameters conform to the requirements specified herein for minimum and maximum values and the design parameter of asphalt concrete mixture percent air voids is within ± 1.0 percent of the percent air voids designated in the Contractor's verified mix design submitted in conformance with the provisions in Section 39-2.01, "Mix Design," of this Section 11-1. The asphalt concrete mixture is acceptable if the verified test data for the design parameters from the 3 asphalt concrete mixture samples are within the specified limits.

The Contractor shall obtain 5 representative samples and shall evaluate the material quality characteristics for conformance with the provisions specified in Table 39-3, "Minimum Quality Control Required for Acceptance," of this Section 11-1. If the test data from one or more samples are outside the specified limits, but the average of the test data from all samples is within the specification limits, the Engineer may tentatively accept the test strip with the Contractor’s assurance that adjustments to the process will be made to correct the indicated quality characteristic deficiencies in the asphalt concrete mixture.

The Contractor shall obtain nuclear density gage readings for density and relative compaction determinations, and obtain 2 core samples each at a minimum of 10 locations selected at random within the test strip. The Engineer will obtain nuclear density gage readings at the same locations within the test strip as the Contractor. The Contractor shall perform the nuclear density gage tests according to California Test 375. The test data of each of the 2 cores shall be averaged to obtain one set of test data per location. The Contractor shall furnish the Engineer with the Contractor's calibration values for correlation of the nuclear density gage readings to the core densities. The test strip density will be acceptable if all core test data yield a pay factor of 0.90 or greater when determined in conformance with the provisions in Section 39-10.02B, "Statistical Evaluation," of this Section 11-1.

The Contractor shall repeat the test strip process until the material properties and mix design parameters produced conform to the requirements specified herein and the test strip is accepted by the Engineer. Test strips that are accepted by the Engineer may remain in place and payment for the test strips will be determined by the procedure conforming to the provisions in Section 39-10.02B, "Statistical Evaluation and Determination of Pay Factor," of this Section 11-1. Test data used to accept the test strips will not be included with the test data used for acceptance of the work according to the provisions in Section 39-10, "Acceptance," of this Section 11-1. Upon receipt of written approval from the Engineer that the test strip has been accepted, full production of asphalt concrete may commence. The Contractor may request that unacceptable test strips be left in place.

The Contractor shall use the test strip start-up procedures specified herein when resuming production of asphalt concrete after a termination of asphalt concrete production due to unsatisfactory material quality characteristics.

39-8.03 Spreading

Layers, except as otherwise specified, shall be spread with an asphalt paver, unless otherwise 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 to level irregularities, and to provide a smooth base in order that subsequent layers will be of uniform thickness. Section 39-10.02, "Statistical Evaluation and Determination of Pay Factor," of this Section 11-1, shall not apply to asphalt concrete (leveling).

When directed by the Engineer, paint binder (tack coat) shall be applied to a 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 and to a neat line. Transverse joints shall be tested with a 12-foot ± 0.20-foot straightedge and shall be cut back as required to conform to the provisions in Section 39-8.04, "Compacting," of this Section 11-1 for surface smoothness. Connections to existing surfacing shall be feathered to conform to the requirements for smoothness. Longitudinal joints shall be trimmed to a vertical face and to a neat line if the edges of the previously laid surfacing are, in the opinion of the Engineer, in such condition that the quality of the completed joint will be affected.

39-8.04 Compacting

Compacting equipment shall conform to the provisions of Section 39-7.03, "Compacting Equipment," of this Section 11-1.

Rolling shall commence at the lower edge and shall progress toward the highest portion, except that when compacting layers which exceed 0.25-foot in compacted thickness, and if approved by the Engineer, rolling shall commence at the center and shall progress outwards.

The Contractor shall monitor density during the compaction process with nuclear density gages calibrated to the control strip core density test data. 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.

Relative compaction shall be determined by California Test 375. Laboratory specimens shall be compacted in conformance with California Test 304. Test locations will be established for asphalt concrete areas to be tested, as specified in California Test 375.

Upon completion of rolling operations, if ordered be the Engineer, the asphalt concrete shall be cooled by applying water. Applying water shall conform to the provision 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 any equipment that leaves ridges, indentations, or other objectionable marks in the asphalt concrete shall be discontinued, and acceptable equipment shall be furnished by the Contractor.

When a straightedge 12 feet ± 0.20-foot long is laid on the finished surface and parallel with the center line, the surface shall not vary more than 0.01-foot 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 0.02-foot are present when tested with a straightedge 12 feet ± 0.20-foot long in a direction transverse to the center line and extending from edge to edge of a 12-foot traffic lane.

Pavement within 50 feet 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.

39-9 (BLANK)

39-10 ACCEPTANCE OF WORK

39-10.01 General

The Engineer will select the procedure used to determine the quantities of asphalts concrete for acceptance and payment determination in conformance with the requirements specified herein.

The Contractor's quality control test data which has been verified by the Engineer will form the basis for acceptance of the work. The quality requirements on which acceptance will be basedshall conform to the provisions in Table 39-3, "Minimum Quality Control Required for Acceptance," of this Section 11-1.

Work determined by the Engineer to conform to the requirements specified herein will be paid for at the contract price per ton for asphalt concrete and may be subject to compensation adjustment in conformance with the provisions in Section 39-10.02C, "Pay Factor Determination and Compensation Adjustment," of this Section 11-1.

Work that does not conform to the specified requirements may be rejected by the Engineer and shall be removed and replaced by the Contractor, at the Contractor's expense.

If a lot is concluded with fewer than 5 samples, the work will be accepted or rejected based on the quality requirements conforming to the provisions in Table 39-3, "Minimum Quality Control Required for Acceptance," of this Section 11-1. Section 39-10.02, "Statistical Evaluation and Pay Factor Determination," of this specification, shall not apply to the lot. The Engineer may reject any batch, load, or portion of roadway that appears to not be in compliance with these specifications.

Material that is determined to be defective may be rejected by the Engineer based on visual inspection or noncompliance with the specifications herein.

Rejected material shall not be incorporated into the roadway unless authorized in writing by the Engineer. The Contractor may request that work rejected by the Engineer on a visual basis be tested for conformance to the specifications.

If the Contractor elects to have material tested which was visually rejected by the Engineer, a minimum of 5 random samples of the material shall be obtained and split into representative portions and tested for compliance with the material quality requirements specified herein. Sampling of the material shall be witnessed by the Engineer. The Contractor shall provide the Engineer with one representative split portion of each sample obtained for verification testing purposes according to the requirements of Section 39-4.04 "Statistical Verification Tests," of this Section 11-1. If the Engineer cannot verify the Contractor's test data, no payment will be made and the material shall be removed at the Contractor's expense. In addition, the cost of the Engineer's verification testing will be deducted from any moneys due or to become due the Contractor. If the Engineer verifies the Contractor's test data, and the test data indicates that the material is in compliance with the material quality requirements specified herein, the cost of the Engineer's verification testing will be borne by the State. The test data obtained from testing this rejected material will be excluded from the payment determination of the lot .

39-10.02 Statistical Evaluation and Determination of Pay Factor

Statistical evaluation of the work shall be used to verify the Contractor's quality control test data to determine compliance with the specified requirements.

39-10.02A General

The quality characteristics to be evaluated, test methods, and specification limitsshall conform to the provisions in Table 39-3, "Minimum Quality Control Required for Acceptance," of this Section 11-1. Asphalt content, aggregate gradation (No. 30 and No. 200), and relative compaction are considered for purposes of this specification to be critical quality characteristics.

A lot is a discrete quantity of work to which the statistical acceptance procedure is applied. For this contract, 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 in writing and made in conformance with the requirements of this specification, or if production of asphalt concrete is terminated due to unsatisfactory material quality characteristics.

The frequency of sampling is specified in Table 39-3, "Minimum Quality Control Required for Acceptance," of this Section 11-1. Five samples is the minimum number of samples required to perform a statistical *t*-test evaluation. The maximum obtainable pay factor with 5 samples is 1.01. A minimum of 8 samples is required to obtain a 1.05 pay factor. 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 for a minimum of 8 samples. The Contractor shall provide the Engineer with the request to increase the sampling frequency at least 48 hours before the beginning of asphalt concrete production.

The point of sampling is indicated in Table 39-3, "Minimum Quality Control Required for Acceptance," of this Section 11-1. The location of sampling shall be determined by a random method approved by the Engineer. The Engineer will obtain random samples for verification testing independent of the Contractor.

The work in the lot will be accepted and a final pay factor determined when all sampling, inspection and test data are completed and have been submitted, evaluated and approved by the Engineer. Contractor quality control test data shall be verified by the Engineer using the *t*-test in conformance with the provisions in Section 39-4.04, "Statistical Verification Tests," of this Section 11-1, before the data will be accepted by the Engineer.

If the current composite pay factor of a lot is less than 1.00, the work represented by the lot will be accepted by the Engineer, provided the lowest single pay factor is not within the reject portion of Table 39-2, "Pay Factors," of this Section 11-1.

If the current composite pay factor of a lot is less than 1.00, and the lowest single pay factor is within the reject portion of Table 39-2, "Pay Factors," of this Section 11-1, the lot will be rejected. The Contractor shall remove all rejected material from the work, at the Contractor's expense.

If the current composite pay factor of a lot is less than 0.90, the Contractor shall terminate asphalt concrete production and the Engineer will terminate the lot. Production of asphalt concrete may resume after the Contractor takes necessary actions to improve the quality of the asphalt concrete product, and the proposed actions are approved in writing by the Engineer.

If a pay factor for a critical quality characteristic designated in Table 39-3, "Minimum Quality Control Required for Acceptance," of this Section 11-1, is less than 0.90 for the lot, or is within the rejection range for the last 5 tests, the Contractor shall terminate asphalt concrete production. Asphalt concrete production may resume after the Contractor takes necessary actions to improve the quality of the asphalt concrete product and the proposed actions are approved in writing by the Engineer. A new lot will be established when production resumes.

When approved in writing by the Engineer, the Contractor may voluntarily remove defective material and replace it with new material to avoid or minimize a pay factor of less than 1.00. New material will be sampled, tested, and evaluated for acceptance conforming with the requirements of this specification.

39-10.02B 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 in accordance 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: Σ = summation of
x = individual test value
n = total number of test values

(2) Calculate the standard deviation (s);

$$s = \sqrt{\frac{n\sum(x^2)-(\sum x)^2}{n(n-1)}}$$

where: $\Sigma(x^2)$ = summation of the squares of individual test values
$(\Sigma x)^2$ = summation of the individual test values squared

(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 contract specification limit or the target value plus the allowable deviation.)

(4) Calculate the lower quality index (Q_L);

$$Q_L = \frac{\overline{X} - LSL}{s}$$

where: LSL = lower specification limit
s = standard deviation
$\overline{X}$ = arithmetic mean

(Note: The LSL is equal to the contract specification limit or the target value minus the allowable deviation.)

(5) From Table 39-1, "Estimated Percent of Work Outside Specification Limits," of this specification, determine P_U ;

where: P_U = the estimated percentage of work outside the USL.
(P_U corresponds to a given Q_U; P_U = 0, when USL is not specified.)

(6) From Table 39-1, "Estimated Percent of Work Outside Specification Limits," of this specification, determine $P_{L;}$

where: P_L = the estimated percentage of work outside the LSL.
(P_L corresponds to a given Q_L ; 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 = $P_U + P_L$

(8) Repeat Steps 1 through 7 for each quality characteristic listed for acceptance.

39-10.02C Pay Factor Determination and Compensation Adjustment

The pay factor and compensation adjustment for a lot will be determined as follows:

1. From Table 39-2, "Pay Factors," of this specification, determine the pay factor for each quality characteristic, (PF_{QC}) using the total number of test data values and the total estimated percentage outside the specification limits ($P_U + P_L$) from Step 7 in Section 39-10.02B, "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 39-3, "Minimum Quality Control Required for Acceptance," of this Section 11-1. The following formula is used:

PF_C =

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 39-3, and
i = the quality characteristic index number.

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:

$CAF = PF_C - 1$

The amount of the compensation adjustment will be calculated as the product of: (1) the Compensation Adjustment Factor, (2) the total tons represented in the lot, and (3) the contract unit price per ton for the contract item of asphalt involved. If the compensation adjustment is a negative value, the compensation adjustment will be deducted from any moneys due, or that may become due, the Contractor under the contract. If the compensation adjustment is a positive value, it will be added to any moneys due, or that may become due, the Contractor under the contract.

Table 39-1.—Estimated Percent of Work Outside Specification Limits

Estimated Percent Outside Specification Limits (P_u and/or P_L)	Upper Quality Index Q_u or Lower Quality Index Q_L						
	n=5	n=6	n=7	n=8	n=9	n=10 to n=11	n=12 to n=14
0	1.72	1.88	1.99	2.07	2.13	2.20	2.28
1	1.64	1.75	1.82	1.88	1.91	1.96	2.01
2	1.58	1.66	1.72	1.75	1.78	1.81	1.84
3	1.52	1.59	1.63	1.66	1.68	1.71	1.73
4	1.47	1.52	1.56	1.58	1.60	1.62	1.64
5	1.42	1.47	1.49	1.51	1.52	1.54	1.55
6	1.38	1.41	1.43	1.45	1.46	1.47	1.48
7	1.33	1.36	1.38	1.39	1.40	1.41	1.41
8	1.29	1.31	1.33	1.33	1.34	1.35	1.35
9	1.25	1.27	1.28	1.28	1.29	1.29	1.30
10	1.21	1.23	1.23	1.24	1.24	1.24	1.25
11	1.18	1.18	1.19	1.19	1.19	1.19	1.20
12	1.14	1.14	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
14	1.07	1.07	1.07	1.06	1.06	1.06	1.06
15	1.03	1.03	1.03	1.03	1.02	1.02	1.02
16	1.00	0.99	0.99	0.99	0.99	0.98	0.98
17	0.97	0.96	0.95	0.95	0.95	0.95	0.94
18	0.93	0.92	0.92	0.92	0.91	0.91	0.91
19	0.90	0.89	0.88	0.88	0.88	0.87	0.87
20	0.87	0.86	0.85	0.85	0.84	0.84	0.84
21	0.84	0.82	0.82	0.81	0.81	0.81	0.80
22	0.81	0.79	0.79	0.78	0.78	0.77	0.77
23	0.77	0.76	0.75	0.75	0.74	0.74	0.74
24	0.74	0.73	0.72	0.72	0.71	0.71	0.70
25	0.71	0.70	0.69	0.69	0.68	0.68	0.67
26	0.68	0.67	0.67	0.65	0.65	0.65	0.64
27	0.65	0.64	0.63	0.62	0.62	0.62	0.61
28	0.62	0.61	0.60	0.59	0.59	0.59	0.58
29	0.59	0.58	0.57	0.57	0.56	0.56	0.55
30	0.56	0.55	0.54	0.54	0.53	0.53	0.52
31	0.53	0.52	0.51	0.51	0.50	0.50	0.50
32	0.50	0.49	0.48	0.48	0.48	0.47	0.47
33	0.47	0.48	0.45	0.45	0.45	0.44	0.44
34	0.45	0.43	0.43	0.42	0.42	0.42	0.41
35	0.42	0.40	0.40	0.39	0.39	0.39	0.38
36	0.39	0.38	0.37	0.37	0.36	0.36	0.36
37	0.36	0.35	0.34	0.34	0.34	0.33	0.33
38	0.33	0.32	0.32	0.31	0.31	0.31	0.30
39	0.30	0.30	0.29	0.28	0.28	0.28	0.28
40	0.28	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
42	0.23	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
44	0.16	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
46	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
48	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
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(Table continued next page)

Table 39-1 (continued).—Estimated Percent of Work Outside Specification Limits

Estimated Percent Outside Specification Limits (Pu and/or PL)	Upper Quality Index Qu or Lower Quality Index QL					
	n=15 to n=17	n=18 to n=22	n=23 to n=29	n=30 to n=42	n=43 to n=66	n=67 to ∞
0	2.34	2.39	2.44	2.48	2.51	2.56
1	2.04	2.07	2.09	2.12	2.14	2.16
2	1.87	1.89	1.91	1.93	1.94	1.95
3	1.75	1.76	1.78	1.79	1.80	1.81
4	1.65	1.66	1.67	1.68	1.69	1.70
5	1.56	1.57	1.58	1.59	1.59	1.60
6	1.49	1.50	1.50	1.51	1.51	1.52
7	1.42	1.43	1.43	1.44	1.44	1.44
8	1.36	1.36	1.37	1.37	1.37	1.38
9	1.30	1.30	1.31	1.31	1.31	1.31
10	1.25	1.25	1.25	1.25	1.26	1.26
11	1.20	1.20	1.20	1.20	1.20	1.20
12	1.15	1.15	1.15	1.15	1.15	1.15
13	1.11	1.11	1.11	1.11	1.11	1.11
14	1.06	1.06	1.06	1.06	1.06	1.06
15	1.02	1.02	1.02	1.02	1.02	1.02
16	0.98	0.98	0.98	0.98	0.98	0.98
17	0.94	0.94	0.94	0.94	0.94	0.94
18	0.91	0.90	0.90	0.90	0.90	0.90
19	0.87	0.87	0.87	0.87	0.87	0.87
20	0.83	0.83	0.83	0.83	0.83	0.83
21	0.80	0.80	0.80	0.80	0.80	0.79
22	0.77	0.76	0.76	0.76	0.76	0.76
23	0.73	0.73	0.73	0.73	0.73	0.73
24	0.70	0.70	0.70	0.70	0.70	0.70
25	0.67	0.67	0.67	0.67	0.67	0.66
26	0.64	0.64	0.64	0.64	0.64	0.63
27	0.61	0.61	0.61	0.61	0.61	0.60
28	0.58	0.58	0.58	0.58	0.58	0.57
29	0.55	0.55	0.55	0.55	0.55	0.54
30	0.52	0.52	0.52	0.52	0.52	0.52
31	0.49	0.49	0.49	0.49	0.49	0.49
32	0.47	0.46	0.46	0.46	0.46	0.46
33	0.44	0.44	0.43	0.43	0.43	0.43
34	0.41	0.41	0.41	0.41	0.41	0.40
35	0.38	0.38	0.38	0.38	0.38	0.38
36	0.36	0.36	0.36	0.36	0.36	0.36
37	0.33	0.33	0.33	0.33	0.33	0.32
38	0.30	0.30	0.30	0.30	0.30	0.30
39	0.28	0.28	0.28	0.28	0.28	0.28
40	0.25	0.25	0.25	0.25	0.25	0.25
41	0.23	0.23	0.23	0.23	0.23	0.23
42	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
44	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
46	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
48	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
50	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 39-2.—Pay Factors

PAY FACTOR	Sample Size												
	n=5	n=6	n=7	n=8	n=9	n=10 to n=11	n=12 to n=14	n=15 to n=17	n=18 to n=22	n=23 to n=29	n=30 to n=42	n=43 to n=66	n=67 to ∞
	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 39-1 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 39-3.—Minimum Quality Control Required for Acceptance

Index (i)	*Quality Characteristic*	*Specification Limits*	*Weighting Factor (w) for Pay*	*Test Method*	*Minimum Sampling and Testing Frequency*	*Point of Sampling*
1	Asphalt Content **	TV ± 0.5%	0.30	Extraction or calibrated nuclear asphalt content gage California Test 310, 379 (Or) Ignition Oven (Test Method under development)	One sample per 500 tons or portion thereof In all cases not less than one sample per day	Mat behind paver
	Gradation			Washed sieve analysis, California Test 202	One sample per 500 tons or portion thereof In all cases not less than one sample per day	Batch plant - from hot bins Drum Plant - from cold feed
2	3/4" or 1/2" *.	TV ± 5%	0.01			
3	3/8"	TV ± 6%	0.01			
4	No. 4	TV ± 7%	0.05			
5	No. 8	TV ± 5%	0.05			
6	No. 30**	TV ± 4%	0.08			
7	No. 200**	TV ± 2%	0.10			
8	Relative Compaction **	96%	0.40	California Test 375	Per Test Method. Test Lot 500 tons	Finished mat after final rolling
	Test Maximum Density			California Test 375	Per Test Method.	Mat behind the paver
	Mix Moisture Content	<1%		California Test 310 or 370	One sample per 500 tons or portion thereof In all cases not less than one sample per day	Mat behind the Paver
	Asphalt and Mix Temperature	250° to 350° F. (Asphalt) ≤325° F. (Mix)			Continuous using an automated recording device	Plant

Notes:

1.TV = Target Value from Contractor's proposed mix design

2 Production quantities which are less than the minimum specified in the Table shall be tested per the requirements of the Table.

3.* Depending on aggregate gradation specified.

**Quality characteristics 1, 6, 7 and 8 are defined as critical quality characteristics in the verification testing process.

39-11 MEASUREMENT AND PAYMENT

39-11.01 Measurement

Asphalt concrete will be measured by weight. The quantity to be paid for will be the combined weight of the mixture for the various types of asphalt concrete, as designated in the Engineer's Estimate.

The weight of the materials will be determined as provided 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 accordance with the methods provided in Sections 92, "Asphalts," 93, "Liquid Asphalts," or 94, "Asphaltic Emulsions," of the Standard Specifications, as the case may be.

When recorded batch weights are printed automatically, these weights may be used for determining pay quantities providing the following requirements are complied with:

A. Total aggregate and supplemental fine aggregate weight per batch shall be printed. When supplemental fine aggregate is weighed cumulatively with the aggregate, the total batch weight of aggregate shall include the supplemental fine aggregate.
B. The total bitumen weight per batch shall be printed.
C. Zero-tolerance weight 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 weights shall be certified by a licensed weighmaster and submitted to the Engineer.

Pavement reinforcing fabric will be measured and paid for by the square yard for the actual pavement area covered.

39-11.02 Payment

Asphalt concrete placed in the work, unless otherwise specified, will be paid for at the contract price per ton for asphalt concrete of the types designated in the Engineer's Estimate.

Compensation adjustment for asphalt concrete will be in conformance with the provisions in Section 39-10.02C, "Pay Factor Determination and Compensation Adjustment," of this Section 11-1.

When there is a contract item for asphalt concrete (leveling), quantities of asphalt concrete placed for leveling will be paid for at the contract price per ton for asphalt concrete (leveling). When there is no contract item for asphalt concrete (leveling), and leveling is ordered by the Engineer, asphalt concrete used for leveling will be paid for as extra work as provided in Section 4-1.03D, of the Standard Specifications.

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, as specified in this specification, shall be considered as included in the contract price paid per ton 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 data, all as specified in these specifications, shall be considered as included in the contract price paid per ton 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 yard for pavement reinforcing fabric and per ton 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 ton 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 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 ton as asphalt concrete.

When there is a contract item for liquid asphalt (prime coat), the quantity of prime coat will be paid for at the contract price per ton 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 prime coat, full compensation for furnishing and applying prime coat shall be considered as included in the contract price paid per ton for the asphalt concrete 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 ton 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 ton for the asphalt concrete 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 any 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 constructing asphalt concrete complete in place, as shown on the plans and as specified in these special provisions and 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.

FEDERAL REQUIREMENT TRAINING SPECIAL PROVISIONS

As part of the Contractor's equal employment opportunity affirmative action program, training shall be provided as follows:

The Contractor shall provide on-the-job training to develop full journeymen in the types of trades or job classification involved.

The goal for the number of trainees or apprentices to be trained under the requirements of this special provision will be 21.

In the event the Contractor subcontracts a portion of the contract work, he shall determine how many, if any, of the trainees or apprentices are to be trained by the subcontractor, provided however, that the Contractor shall retain the primary responsibility for meeting the training requirements imposed by this special provision. The Contractor shall also insure that this Training Special Provision is made applicable to such subcontract. Where feasible, 25 percent of trainees or apprentices in each occupation shall be in their first year of apprenticeship or training.

The number of trainees or apprentices shall be distributed among the work classifications on the basis of the Contractor's needs and the availability of journeymen in the various classifications within a reasonable area of recruitment. Prior to commencing work, the Contractor shall submit to the Department for approval the number of trainees or apprentices to be trained in each selected classification and training program to be used. Furthermore, the Contractor shall specify the starting time for training in each of the classifications. The Contractor will be credited for each trainee or apprentice employed by him on the contract work who is currently enrolled or becomes enrolled in an approved program and will be reimbursed for such trainees or apprentices as provided hereinafter.

Training and upgrading of minorities and women toward journeymen status is a primary objective of this Training Special Provision. Accordingly, the Contractor shall make every effort to enroll minority and women trainees or apprentices (e.g., by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees or apprentices) to the extent such persons are available within a reasonable area of recruitment. The Contractor will be responsible for demonstrating the steps that he has taken in pursuance thereof, prior to a determination as to whether the Contractor is in compliance with this Training Special Provision. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

No employee shall be employed as a trainee or apprentice in any classification in which he has successfully completed a training course leading to journeyman status or in which he has been employed as a journeyman. The Contractor should satisfy this requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used the Contractor's records should document the findings in each case.

The minimum length and type of training for each classification will be as established in the training program selected by the Contractor and approved by both the Department and the Federal Highway Administration. The Department and the Federal Highway Administration will approve a program if it is reasonably calculated to meet the equal employment opportunity obligations of the Contractor and to qualify the average trainee or apprentice for journeyman status in the classification concerned by the end of the training period. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with the State of California, Department of Industrial Relations, Division of Apprenticeship Standards recognized by the Bureau and training programs approved but not necessarily sponsored by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training shall also be considered acceptable provided it is being administered in a manner consistent with the equal employment obligations of Federal-aid highway construction contracts. Approval or acceptance of a training program shall be obtained from the State prior to commencing work on the classification covered by the program. It is the intention of these provisions that training is to be provided in the construction crafts rather than clerk-typists or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, estimators, timekeepers, etc., where the training is oriented toward construction applications. Training in the laborer classification may be permitted provided that significant and meaningful training is provided and approved by the division office. Some offsite training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training.

Except as otherwise noted below, the Contractor will be reimbursed 80 cents per hour of training given an employee on this contract in accordance with an approved training program. As approved by the Engineer, reimbursement will be made for training of persons in excess of the number specified herein. This reimbursement will be made even though the Contractor receives additional training program funds from other sources, provided such other source does not specifically prohibit the Contractor from receiving other reimbursement. Reimbursement for offsite training indicated above may only be made to the Contractor where he does one or more of the following and the trainees or apprentices are concurrently employed on a Federal-aid project; contributes to the cost of the training, provides the instruction to the trainee or apprentice or pays the trainee's or apprentice's wages during the offsite training period.

No payment shall be made to the Contractor if either the failure to provide the required training, or the failure to hire the trainee or apprentice as a journeyman, is caused by the Contractor and evidences a lack of good faith on the part of the Contractor in meeting the requirements of this Training Special Provision. It is normally expected that a trainee or apprentice will begin his training on the project as soon as feasible after start of work utilizing the skill involved and remain on the project as long as training opportunities exist in his work classification or until he has completed his training program. It is not required that all trainees or apprentices be on board for the entire length of the contract. A Contractor will have fulfilled his responsibilities under this Training Special Provision if he has provided acceptable training to the number of trainees or apprentices specified. The number trained shall be determined on the basis of the total number enrolled on the contract for a significant period.

Only trainees or apprentices registered in a program approved by the State of California's State Administrator of Apprenticeship may be employed on the project and said trainees or apprentices shall be paid the standard wage specified under the regulations of the craft or trade at which they are employed.

The Contractor shall furnish the trainee or apprentice a copy of the program he will follow in providing the training. The Contractor shall provide each trainee or apprentice with a certification showing the type and length of training satisfactorily completed.

The Contractor will provide for the maintenance of records and furnish periodic reports documenting his performance under this Training Special Provision.