**** WARNING ** WARNING ** WARNING ** WARNING ****
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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.

Seismic Retrofit Project

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS

AND

SPECIAL PROVISIONS

FOR CONSTRUCTION ON

STATE HIGHWAY

IN

CONTRA COSTA AND MARIN COUNTIES IN AND NEAR RICHMOND AND SAN RAFAEL FROM 1.7 MILES EAST TO 2.6 MILES WEST OF CONTRA COSTA/MARIN COUNTY LINE

DISTRICT 04, ROUTE 580

For use in Connection with Standard Specifications **DATED JULY, 1992**, Standard Plans **DATED JULY, 1992**, and Labor Surcharge And Equipment Rental Rates.

CONTRACT NO. 04-0438U4

INFORMAL BIDS CONTRACT

04-CC,Mrn-580-6.1/7.8,0.0/2.6

Bids Open: December 8, 1999

Dated: August 16, 1999

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IMPORTANT SPECIAL NOTICES

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- Attention is directed to Section 5-1.14, "Year 2000 Compliance," of the Special Provisions.

- 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.

- Attention is directed to Section 2, Section 3, Sections entitled "DVBE Records," "Performance of DVBE Subcontractors and Suppliers," and "DVBE Goal for this Project," of the Special Provisions. Attention is also directed to the Caltrans Bidder - DVBE - Information form and Good Faith Efforts forms in the Proposal and Contract book for this project.

- The bidder's attention is directed to the following special requirements for this project concerning submission of DVBE information, award and execution of contract, and beginning of work:

  First-tier subcontractors that will be used for meeting DVBE goals must be listed in the "List of Subcontractors" form regardless of dollar amount of work to be performed. Second- and lower-tier subcontractors need not be listed on the "List of Subcontractors" form. Other, non-DVBE subcontractors are to be listed on the "List of Subcontractors" form in accordance with the requirements in Section 2-1.054 of the Standard Specifications and the Special Provisions.

  Identify second- and lower-tier DVBE subcontractors on the "Caltrans Bidder DVBE Information" form.

  DVBE information shall be submitted **with the bid proposal**. (See **Section 2-1.04** of the special provisions.) The evaluation of the effort to meet the DVBE goal will be based on the information provided with the bid proposal. If the goal was not met, Caltrans' determination of good faith effort will be based on the information provided with the bid, and the decision will be final. Bidders and all subcontractors listed in the DVBE Information shall be available, by phone, on the day following the bid opening.

  The DVBE information shall include all DVBE partners.

  It is anticipated that this contract will be awarded within **10 days after bid opening**.

  If the Bidder submits cash or a cashier's check or a certified check as the form of bidder's security (see Section 2-1.07 of the Standard Specifications), the Bidder shall also include with the bid submittal a signed and notarized affidavit from an admitted surety insurer that contract bonds, as required by Section 3-1.02, "Contract Bonds," of the Standard Specifications, will be provided within the specified time for executing and returning the contract for approval.

  If the bidder claims a mistake was made in his bid, the bidder shall give the Department written notice within 48-hours, not including Saturdays, Sundays and legal holidays, after the opening of bids of the alleged mistake in lieu of the 5 days specified in Section 2-1.095, "Relief of Bidders," in the Standard Specifications. (See Section 2-1.01 of the special provisions.) Caltrans' FAX number for submitting this information is (916) 227-6282. Such information shall be submitted "Attention Office Engineer."

The contract shall be signed by the successful bidder and shall be received with contract bonds by the Office of Office Engineer within **4 days**, including Saturdays, Sundays and legal holidays, after the bidder has received notice that the contract has been awarded. (See Section 3 of the special provisions.)

If properly executed by the bidder, it is anticipated the contract will be approved within 24 hours of when the executed contract and contract bonds are received by the Department.
The Contractor shall begin work within 5 calendar days after receiving notice that the contract has been approved. The contract work shall be completed before the expiration of **1170 WORKING DAYS** beginning at **12:01 a.m. on the DAY AFTER THE DAY OF CONTRACT AWARD.** The definition of a working day has been re-defined for this project. (See Section 4 of the special provisions.)

The time limit specified in the Special Provisions for the completion of work contemplated herein is considered insufficient to permit completion of the work by the Contractor working a normal number of hours per day or week on a single shift basis. It is expected that additional shifts will be required throughout the life of the contract to the extent deemed necessary to ensure that the work will be completed within the time limit specified. (See Section 4 of the Special Provisions).

The following forms have been included at the end of the Proposal and Contract book to assist the successful bidder in early execution of the contract documents: Payment Bond, Performance Bond, Insurance, Vendor Data Record.

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PRE-AWARD MEETING
SPECIAL NOTICE

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The bidder's attention is directed to Section 2-1.07, "Bridge Seismic Retrofit Information/Questionnaire," and Section 3, "Pre-Award Meeting and Award and Execution of Contract," in the Special Provisions.

Responses to the **"Bridge Seismic Retrofit Information/Questionnaire"** included in the Proposal must be **submitted with the bid**

A pre-award **qualifications review meeting** will be conducted with the apparent low bidder on **December 10, 1999 at 10:00 a.m. in the third floor conference room, 1727 - 30th Street, Sacramento, CA 95816.** The purpose of the meeting will be to determine the bidder's qualifications and ability to complete the seismic retrofit work on this project. The second and third apparent low bidders may also be requested to participate in pre-award qualifications review meetings.

Establishing to the satisfaction of the Department the bidder's qualifications and ability to complete the bridge seismic retrofit work in a safe and timely manner is a condition for being eligible for award of the contract.

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ADVERTISEMENT
SPECIAL NOTICE

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This contract is the result of the combination of the two previously advertised contracts 04-043824 and 04-043844.

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DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS

THIS IS AN INFORMAL BIDS CONTRACT

CONTRACT NO. 04-0438U4

04-CC,Mrn-580-6.1/7.8,0.0/2.6

Sealed proposals for the work shown on the plans entitled:

STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROJECT PLANS FOR CONSTRUCTION ON STATE HIGHWAY IN CONTRA COSTA AND MARIN COUNTIES IN AND NEAR RICHMOND AND SAN RAFAEL FROM 1.7 MILES EAST TO 2.6 MILES WEST OF CONTRA COSTA-MARIN COUNTY LINE

will be received at the Department of Transportation, 1120 N Street, Room 0200, MS #26, Sacramento, California 95814, until 2 o'clock p.m. on December 8, 1999, at which time they will be publicly opened and read in Room 0100 at the same address.

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

STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROPOSAL AND CONTRACT FOR CONSTRUCTION ON STATE HIGHWAY IN CONTRA COSTA AND MARIN COUNTIES IN AND NEAR RICHMOND AND SAN RAFAEL FROM 1.7 MILES EAST TO 2.6 MILES WEST OF CONTRA COSTA-MARIN COUNTY LINE

General work description: Toll Bridge Seismic Retrofit of the Richmond - San Rafael Bridge

This project has a goal of 3 percent disabled veteran business enterprise (DVBE) participation.
No pre-bid meeting is scheduled for this project.
Bidder inquiries may be made as follows:

For all inquiries: Toll Bridge Retrofit Program Duty Senior at District 04 Office, 111 Grand Avenue, Oakland, California 94612; Fax Number (510) 286-4563; E-mail address, duty_senior_tollbridge_district04@dot.ca.gov; Telephone Number (510) 286-5549.

Bidders will be requested to submit their inquiries in writing to the Oakland address, accompanied by an electronic copy where feasible, in order to avoid any misunderstandings. Written inquiries shall include the bidder's name, address and phone number. Written inquiries will be investigated and an addendum to the contract will be issued to the extent feasible and at the discretion of the Department. A copy of each addendum will also be posted on the Internet at "http://tresc.dot.ca.gov/sfobb/rsru4inquiry.html".

The time limit specified for the completion of the work contemplated herein is considered insufficient to permit completion of the work by the Contractor working a normal number of hours per day or week on a single shift basis. Should the Contractor fail to maintain the progress of the work in accordance with the "Progress Schedule" required in these special provisions, additional shifts will be required to the extent necessary to ensure that the progress conforms to the abovementioned schedule and that the work will be completed within the time limit specified.

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.

The Contractor must also be properly licensed at the time the bid is submitted, except that on a joint venture bid a joint venture license may be obtained by a combination of licenses after bid opening but before award in accordance with Business and Professions Code, Section 7029.1.

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

Preference will be granted to bidders properly certified as a "Small Business" as determined by the Department of General Services, Office of Small and Minority Business at the time of bid opening in accordance with the provisions in Section 2-1.04, "Small Business Preference," of the special provisions, and Section 1896 et seq, Title 2, California Code of Regulations. A form for requesting a "Small Business" preference is included with the bid documents. Applications for status as a "Small Business" must be submitted to the Department of General Services, Office of Small and Minority Business, 1531 "I" Street, Second Floor, Sacramento, CA 95814, Telephone No. (916) 322-5060.

A reciprocal preference will be granted to "California company" bidders in accordance with Section 6107 of the Public Contract Code. (See Sections 2 and 3 of the special provisions.) A form for indicating whether bidders are or are not a "California company" is included in the bid documents and is to be filled in and signed by all bidders.

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, Transportation Building, 1120 N Street, MS #26, 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 Santa Ana, Oakland, and the district in which the work is situated. Standard Specifications and Standard Plans are available through the State of California, Department of Transportation, Publications Unit, 1900 Royal Oaks Drive, Sacramento, CA 95815, Telephone No. (916) 445-3520.

Cross sections for this project are not available.

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

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. Future effective general prevailing wage rates which have been predetermined and are on file with the Department of Industrial Relations are referenced but not printed in the general prevailing wage rates.

DEPARTMENT OF TRANSPORTATION

Deputy Director Transportation Engineering

Dated: August 16, 1999

LM

COPY OF ENGINEER'S ESTIMATE

(NOT TO BE USED FOR BIDDING PURPOSES)

04-0438U4

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
1	047865	TIME RELATED OVERHEAD	WDAY	1,170		

2	047866	ESTABLISH MARINE ACCESS	LS	LUMP SUM	LUMP SUM	
3	016600	ELECTRONIC MOBILE DAILY DIARY COMPUTER SYSTEM DATA DELIVERY	LS	LUMP SUM	LUMP SUM	
4	016601	TEMPORARY STOCKPILE COVER	SQYD	2,000		
5	016602	STABILIZED CONSTRUCTION ENTRANCE	EA	2		
6	016603	TEMPORARY CONSTRUCTION ROAD	SQYD	1,700		
7	016604	TEMPORARY STRAW BALE BARRIER	LF	3,500		
8	016605	TEMPORARY CONCRETE WASHOUT FACILITIES	LS	LUMP SUM	LUMP SUM	
9	016606	TRANSPORTATION FOR THE ENGINEER	LS	LUMP SUM	LUMP SUM	
10	016607	INFORMATIONAL SIGN BOARD	EA	2		
11	070010	PROGRESS SCHEDULE (CRITICAL PATH)	LS	LUMP SUM	LUMP SUM	
12	074019	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	LUMP SUM	LUMP SUM	
13	074020	WATER POLLUTION CONTROL	LS	LUMP SUM	LUMP SUM	
14	074029	TEMPORARY SILT FENCE	LF	6,000		
15 (S)	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM	LUMP SUM	
16 (S)	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM	LUMP SUM	
17 (S)	120151	TEMPORARY TRAFFIC STRIPE (TAPE)	LF	70,800		
18 (S)	120152	TEMPORARY PAVEMENT MARKING (TAPE)	SQFT	540		
19 (S)	120300	TEMPORARY PAVEMENT MARKER	EA	4,750		
20 (S)	128650	PORTABLE CHANGEABLE MESSAGE SIGN	EA	14		

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
21	129000	TEMPORARY RAILING (TYPE K)	LF	52,440		
22	016608	TEMPORARY TRAFFIC SCREEN	LF	52,440		
23	129100	TEMPORARY CRASH CUSHION MODULE	EA	244		
24	016609	TEMPORARY SINGLE LINE CRASH CUSHION/END TREATMENT	EA	3		
25	016610	REMOVE WOOD PILES	EA	30		
26	016611	REMOVE METAL PONTOON	LS	LUMP SUM	LUMP SUM	
27	016612	REMOVE STEEL PIPES	LF	200		
28	150662	REMOVE METAL BEAM GUARD RAILING	LF	25		
29	150715	REMOVE PAINTED TRAFFIC STRIPE AND PAVEMENT MARKING	LF	86,900		
30	150718	REMOVE THERMOPLASTIC TRAFFIC STRIPE AND PAVEMENT MARKING	LF	37,800		
31	150722	REMOVE PAVEMENT MARKER	EA	6,670		
32	016613	REMOVE ASPHALT CONCRETE, CONCRETE, AND SLOPE PROTECTION MATERIAL	CY	3,900		
33	150860	REMOVE BASE AND SURFACING	CY	850		
34 (S)	151568	RECONSTRUCT THRIE BEAM BARRIER	LF	200		
35 (S)	151572	RECONSTRUCT METAL BEAM GUARD RAILING	LF	125		
36	152320	RESET ROADSIDE SIGN	EA	30		
37 (S)	153101	PLANE ASPHALT CONCRETE PAVEMENT	SQYD	1,140		
38	016614	REMOVE WATER LINES AND AIR LINES	LS	LUMP SUM	LUMP SUM	
39	016615	RELOCATE AND RECONSTRUCT WATER LINES AND AIR LINES	LS	LUMP SUM	LUMP SUM	
40	160101	CLEARING AND GRUBBING	LS	LUMP SUM	LUMP SUM	

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
41 (S)	203016	EROSION CONTROL (TYPE D)	SQYD	15,000		
42	390102	ASPHALT CONCRETE (TYPE A)	TON	1,920		
43	720104	ROCK SLOPE PROTECTION (1 TON, METHOD A)	CY	5,200		
44	721010	ROCK SLOPE PROTECTION (BACKING NO. 1, METHOD B)	CY	1,700		
45	729010	ROCK SLOPE PROTECTION FABRIC	SQYD	2,500		
46	810110	SURVEY MONUMENT	EA	195		
47 (S)	832003	METAL BEAM GUARD RAILING (WOOD POST)	LF	25		
48	839481	CONCRETE BARRIER (TYPE 50)	LF	140		
49 (S)	839532	CABLE ANCHOR ASSEMBLY (BREAKAWAY, TYPE B)	EA	1		
50 (S)	839551	TERMINAL SECTION (TYPE B)	EA	1		
51 (S)	840504	4" THERMOPLASTIC TRAFFIC STRIPE	LF	87,000		
52 (S)	840506	8" THERMOPLASTIC TRAFFIC STRIPE	LF	560		
53 (S)	840515	THERMOPLASTIC PAVEMENT MARKING	SQFT	12,100		
54 (S)	840526	4" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 17-7)	LF	180		
55 (S)	850101	PAVEMENT MARKER (NON-REFLECTIVE)	EA	3,590		
56 (S)	850102	PAVEMENT MARKER (REFLECTIVE)	EA	1,850		
57	994429	PREFABRICATED BENCH	EA	1		
58 (S)	869072	SEISMIC MONITORING SYSTEM	LS	LUMP SUM	LUMP SUM	
59 (S)	016616	MODIFY SEISMIC RETROFIT ELECTRICAL SYSTEM	LS	LUMP SUM	LUMP SUM	
60 (S)	860401	LIGHTING	LS	LUMP SUM	LUMP SUM	

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
61 (S)	016617	MODIFY ELECTRICAL SYSTEM CABLE	LS	LUMP SUM	LUMP SUM	
62 (S)	860415	LIGHTING (STAGE CONSTRUCTION)	LS	LUMP SUM	LUMP SUM	
63 (S)	016618	COMMUNICATION CONDUIT SYSTEM	LS	LUMP SUM	LUMP SUM	
64 (S)	016619	ELECTRICAL SERVICE (BACK UP POWER SYSTEM)	LS	LUMP SUM	LUMP SUM	
65 (S)	991065	MECHANICAL WORK	LS	LUMP SUM	LUMP SUM	
66 (S)	994650	BUILDING WORK	LS	LUMP SUM	LUMP SUM	
67	047867	REMOVE UNSOUND CONCRETE AND APPLY PORTLAND CEMENT CONCRETE PATCH (4" DEPTH)	SQFT	6,370		
68	047868	BRIDGE REMOVAL (PORTION) (SUBSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
69	047869	BRIDGE REMOVAL (PORTION) (FENDER) (SUBSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
70	047870	TEMPORARY BRACING SYSTEM (SUBSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
71	047871	TEMPORARY FENDERING (SUBSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
72 (F)	047872	STRUCTURE EXCAVATION (TYPE D) (SUBSTRUCTURE)	CY	19,630		
73 (F)	047873	PIER BACKFILL (SUBSTRUCTURE)	CY	2,490		
74 (F)	047874	ARMOR ROCK (SUBSTRUCTURE)	CY	6,270		
75 (S)	047875	TEST BORINGS (SUBSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
76	047876	FURNISH 12" XS STEEL PIPE PILING (SUBSTRUCTURE)	LF	22,215		
77 (S)	047877	DRIVE 12" XS STEEL PIPE PILE (SUBSTRUCTURE)	EA	144		
78 (S)	047878	INSTALL 12" XS STEEL PILE EXTENSION (SUBSTRUCTURE)	EA	16		
79 (S)	047879	INSTALL 12" XS STEEL SENSOR PILE EXTENSION (SUBSTRUCTURE)	EA	1		
80	047880	FURNISH 14" STEEL PIPE PILING (SUBSTRUCTURE)	LF	9,480		

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
81 (S)	047881	DRIVE 14" STEEL PIPE PILE (SUBSTRUCTURE)	EA	122		
82	047882	FURNISH 14" STEEL PIPE PILING (FENDER) (SUBSTRUCTURE)	LF	23,895		
83 (S)	047883	DRIVE 14" STEEL PIPE PILE (FENDER) (SUBSTRUCTURE)	EA	140		
84	047884	FURNISH 16" STEEL PIPE PILING (SUBSTRUCTURE)	LF	6,864		
85 (S)	047885	INSTALL 16" STEEL PILE EXTENSION (SUBSTRUCTURE)	EA	96		
86 (S)	047886	150" CAST-IN-DRILLED HOLE CONCRETE PILING (SUBSTRUCTURE)	LF	1,708		
87	047887	FURNISH 126" CAST-IN-STEEL SHELL CONCRETE PILING (SUBSTRUCTURE)	LF	584		
88 (S)	047888	DRIVE 126" CAST-IN-STEEL SHELL CONCRETE PILE (SUBSTRUCTURE)	EA	4		
89	047889	FURNISH 150" CAST-IN-STEEL SHELL CONCRETE PILING (SUBSTRUCTURE)	LF	914		
90 (S)	047890	DRIVE 150" CAST-IN-STEEL SHELL CONCRETE PILE (SUBSTRUCTURE)	EA	6		
91	047891	FURNISH 162" CAST-IN-STEEL SHELL CONCRETE PILING (SUBSTRUCTURE)	LF	642		
92 (S)	047892	DRIVE 162" CAST-IN-STEEL SHELL CONCRETE PILE (SUBSTRUCTURE)	EA	4		
93 (S)	047893	MICROPILE (SUBSTRUCTURE)	EA	481		
94 (S)	047894	PRESTRESSING (SUBSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
95 (F)	047895	STRUCTURAL CONCRETE, BRIDGE (SUBSTRUCTURE)	CY	6,170		
96 (F)	047896	STRUCTURAL CONCRETE, FENDER (SUBSTRUCTURE)	CY	3,310		
97	047897	DRILL AND BOND DOWEL (SUBSTRUCTURE)	LF	13,490		
98	047898	DRILL AND BOND DOWEL (EPOXY CARTRIDGE) (SUBSTRUCTURE)	EA	1,220		
99	047899	DRILL AND BOND DOWEL (FENDER) (SUBSTRUCTURE)	LF	192		
100 (S)	047900	FURNISH PRECAST CONCRETE BRACKET AND WALER UNIT (SUBSTRUCTURE)	EA	88		

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
101 (S)	047901	ERECT PRECAST CONCRETE BRACKET AND WALER UNIT (SUBSTRUCTURE)	EA	88		
102	047902	FURNISH PRECAST CONCRETE SEAT (SUBSTRUCTURE)	EA	96		
103 (S)	047903	ERECT PRECAST CONCRETE SEAT (SUBSTRUCTURE)	EA	96		
104	047904	FURNISH PRECAST CONCRETE PILE CAP ASSEMBLY (TYPE A) (SUBSTRUCTURE)	EA	9		
105 (S)	047905	ERECT PRECAST CONCRETE PILE CAP ASSEMBLY (TYPE A) (SUBSTRUCTURE)	EA	9		
106	047906	FURNISH PRECAST CONCRETE PILE CAP ASSEMBLY (TYPE C) (SUBSTRUCTURE)	EA	2		
107 (S)	047907	ERECT PRECAST CONCRETE PILE CAP ASSEMBLY (TYPE C) (SUBSTRUCTURE)	EA	2		
108	047908	FURNISH PRECAST CONCRETE JACKET ASSEMBLY (TYPE A) (SUBSTRUCTURE)	EA	21		
109 (S)	047909	ERECT PRECAST CONCRETE JACKET ASSEMBLY (TYPE A) (SUBSTRUCTURE)	EA	21		
110	047910	FURNISH PRECAST CONCRETE JACKET ASSEMBLY (TYPE B) (SUBSTRUCTURE)	EA	4		
111 (S)	047911	ERECT PRECAST CONCRETE JACKET ASSEMBLY (TYPE B) (SUBSTRUCTURE)	EA	4		
112	047912	FURNISH PRECAST CONCRETE JACKET ASSEMBLY (TYPE C) (SUBSTRUCTURE)	EA	4		
113 (S)	047913	ERECT PRECAST CONCRETE JACKET ASSEMBLY (TYPE C) (SUBSTRUCTURE)	EA	4		
114	047914	FURNISH PRECAST CONCRETE JACKET ASSEMBLY (TYPE D) (SUBSTRUCTURE)	EA	3		
115 (S)	047915	ERECT PRECAST CONCRETE JACKET ASSEMBLY (TYPE D) (SUBSTRUCTURE)	EA	3		
116	047916	FURNISH PRECAST CONCRETE JACKET ASSEMBLY (TYPE E) (SUBSTRUCTURE)	EA	2		
117 (S)	047917	ERECT PRECAST CONCRETE JACKET ASSEMBLY (TYPE E) (SUBSTRUCTURE)	EA	2		
118 (S)	047918	CORE CONCRETE (3") (SUBSTRUCTURE)	LF	154,900		
119 (S)	047919	CORE CONCRETE (4") (SUBSTRUCTURE)	LF	13,370		
120 (S)	047920	CORE CONCRETE (14") (SUBSTRUCTURE)	LF	6,188		

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
121 (S)	047921	CORE CONCRETE (2 1/2") (SUBSTRUCTURE)	LF	13,180		
122 (S)	047922	CORE CONCRETE (1 1/2", FENDER) (SUBSTRUCTURE)	LF	512		
123 (S-F)	047923	BAR REINFORCING STEEL (BRIDGE) (SUBSTRUCTURE)	LB	900,000		
124 (S-F)	047924	BAR REINFORCING STEEL (EPOXY COATED) (SUBSTRUCTURE)	LB	1,332,000		
125 (S-F)	047925	BAR REINFORCING STEEL (EPOXY COATED) (FENDER) (SUBSTRUCTURE)	LB	828,000		
126 (S-F)	047926	STEEL CASING (SUBSTRUCTURE)	LB	3,718,000		
127 (S)	047927	COLUMN RESTRAINER BRACKET (SUBSTRUCTURE)	EA	60		
128 (F)	047928	FURNISH STRUCTURAL STEEL (BRIDGE) (SUBSTRUCTURE)	LB	20,600,000		
129 (S-F)	047929	ERECT STRUCTURAL STEEL (BRIDGE) (SUBSTRUCTURE)	LB	20,600,000		
130 (S)	047930	RIVET REMOVAL AND HOLE REAMING (SUBSTRUCTURE)	EA	61,980		
131 (S-F)	047931	RRP AND CP LUMBER (SUBSTRUCTURE)	MFBM	179		
132 (S)	047932	CLEAN AND PAINT STRUCTURAL STEEL (SUBSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
133 (S-F)	047933	SPOT BLAST CLEAN AND PAINT UNDERCOAT (SUBSTRUCTURE)	SQFT	16,660		
134 (S)	047934	WORK AREA MONITORING (SUBSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
135 (S-F)	047935	MISCELLANEOUS METAL (BRIDGE) (SUBSTRUCTURE)	LB	432,000		
136 (S-F)	047936	MISCELLANEOUS METAL (BRIDGE)(FENDER) (SUBSTRUCTURE)	LB	190,700		
137	047937	BRIDGE REMOVAL (PORTION), LOCATION A (SUPERSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
138	047938	BRIDGE REMOVAL (PORTION), LOCATION B (SUPERSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
139	047938	BRIDGE REMOVAL (PORTION), LOCATION C (SUPERSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
140	047940	BRIDGE REMOVAL (PORTION), LOCATION D (SUPERSTRUCTURE)	LS	LUMP SUM	LUMP SUM	

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
141	047941	BRIDGE REMOVAL (PORTION), LOCATION E (SUPERSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
142	047942	RECONSTRUCT STEEL BRIDGE RAILING (SUPERSTRUCTURE)	LF	269		
143	047943	TEMPORARY STRUCTURE (SUPERSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
144	047944	TEMPORARY SUPPORT, LOCATION A (SUPERSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
145	047945	TEMPORARY SUPPORT, LOCATION B (SUPERSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
146	047946	TEMPORARY SUPPORT, LOCATION C (SUPERSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
147	047947	TEMPORARY SUPPORT, LOCATION D (SUPERSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
148 (F)	047948	STRUCTURE EXCAVATION (TYPE A) (SUPERSTRUCTURE)	CY	1,810		
149 (F)	047949	STRUCTURE EXCAVATION (TYPE AH) (SUPERSTRUCTURE)	CY	4,420		
150 (F)	047950	STRUCTURE EXCAVATION (TYPE DH) (SUPERSTRUCTURE)	CY	2,140		
151 (F)	047951	STRUCTURE BACKFILL (BRIDGE) (SUPERSTRUCTURE)	CY	1,210		
152 (S)	047952	66" CAST-IN-DRILLED-HOLE CONCRETE PILING (SUPERSTRUCTURE)	LF	13,427		
153 (S)	047953	MICROPILE (SUPERSTRUCTURE)	EA	282		
154 (S)	047954	TEST BORINGS (SUPERSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
155 (S)	047955	PRESTRESSING CAST-IN-PLACE CONCRETE (SUPERSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
156 (S)	047956	PRESTRESSING VISCOUS DAMPING DEVICE BRACKETS (SUPERSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
157	047957	SEAL COURSE CONCRETE (SUPERSTRUCTURE)	CY	170		
158 (F)	047958	STRUCTURAL CONCRETE, BRIDGE FOOTING (SUPERSTRUCTURE)	CY	2,880		
159 (F)	047959	STRUCTURAL CONCRETE, BRIDGE (SUPERSTRUCTURE)	CY	6,000		
160 (F)	047960	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE R) (SUPERSTRUCTURE)	CY	80		

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
161	047961	DRILL AND BOND DOWEL (SUPERSTRUCTURE)	LF	23,000		
162	047962	DRILL AND BOND DOWEL (EPOXY CARTRIDGE) (SUPERSTRUCTURE)	EA	1,800		
163	047963	FURNISH PRECAST PRESTRESSED CONCRETE GIRDER (90'-100') (SUPERSTRUCTURE)	EA	64		
164	047964	FURNISH PRECAST CONCRETE DECK (SUPERSTRUCTURE)	SQFT	3,602		
165	047965	FURNISH PRECAST CONCRETE PANEL (SUPERSTRUCTURE)	EA	464		
166	047966	FURNISH PRECAST BENT CAP SHELL (SUPERSTRUCTURE)	EA	66		
167 (S)	047967	ERECT PRECAST PRESTRESSED CONCRETE GIRDER (SUPERSTRUCTURE)	EA	64		
168 (S)	047968	ERECT PRECAST CONCRETE DECK (SUPERSTRUCTURE)	EA	4		
169 (S)	047969	ERECT PRECAST CONCRETE PANEL (SUPERSTRUCTURE)	EA	464		
170 (S)	047970	ERECT PRECAST BENT CAP SHELL (SUPERSTRUCTURE)	EA	66		
171 (S)	047971	CORE CONCRETE (2") (SUPERSTRUCTURE)	LF	1,620		
172 (S)	047972	CORE CONCRETE (5") (SUPERSTRUCTURE)	LF	270		
173 (S)	047973	CORE AND PRESSURE GROUT CONCRETE (1 1/2") (SUPERSTRUCTURE)	LF	1,680		
174 (S)	047974	CORE AND PRESSURE GROUT CONCRETE (2") (SUPERSTRUCTURE)	LF	10,630		
175 (S)	047975	CORE AND PRESSURE GROUT CONCRETE (3") (SUPERSTRUCTURE)	LF	940		
176 (S)	047976	CORE AND PRESSURE GROUT CONCRETE (4") (SUPERSTRUCTURE)	LF	310		
177 (S)	047977	SEISMIC ISOLATION BEARING (SUPERSTRUCTURE)	EA	16		
178 (S)	047978	JOINT SEAL (MR 1/2") (SUPERSTRUCTURE)	LF	170		
179 (S)	047979	JOINT SEAL (TYPE B-MR 2") (SUPERSTRUCTURE)	LF	170		
180 (S)	047980	JOINT SEAL ASSEMBLY (MR 4") (SUPERSTRUCTURE)	LF	520		

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
181 (S)	047981	EXPANSION JOINT ASSEMBLY (SUPERSTRUCTURE)	LF	360		
182 (S-F)	047982	SEISMIC ISOLATION JOINT ASSEMBLY (SUPERSTRUCTURE)	LF	144		
183 (S-F)	047983	BAR REINFORCING STEEL (BRIDGE) (SUPERSTRUCTURE)	LB	3,023,000		
184 (S-F)	047984	BAR REINFORCING STEEL (EPOXY COATED) (BRIDGE) (SUPERSTRUCTURE)	LB	3,494,000		
185 (S-F)	047985	ASPHALT MEMBRANE WATERPROOFING (SUPERSTRUCTURE)	SQFT	1,600		
186 (S-F)	047986	COLUMN CASING (SUPERSTRUCTURE)	LB	784,000		
187 (S-F)	047987	SHAFT CASING (SUPERSTRUCTURE)	LB	177,400		
188 (F)	047988	FURNISH STRUCTURAL STEEL (BRIDGE) (SUPERSTRUCTURE)	LB	10,831,000		
189 (S-F)	047989	ERECT STRUCTURAL STEEL (BRIDGE) (SUPERSTRUCTURE)	LB	10,831,000		
190 (S)	047990	RIVET REMOVAL AND HOLE REAMING (SUPERSTRUCTURE)	EA	243,600		
191	047991	TRAVELING MAINTENANCE SCAFFOLD (SUPERSTRUCTURE)	EA	7		
192 (F)	047992	FURNISH STRUCTURAL STEEL (RAIL LOWERING) (SUPERSTRUCTURE)	LB	20,600		
193 (S-F)	047993	ERECT STRUCTURAL STEEL (RAIL LOWERING) (SUPERSTRUCTURE)	LB	20,600		
194	047994	REMOVE EXISTING TRUSS SHOE PIN (SUPERSTRUCTURE)	EA	122		
195 (S-F)	047995	INSTALL STUD CONNECTORS (SUPERSTRUCTURE)	EA	1,256		
196 (S)	047996	VISCOUS DAMPING DEVICE (225 KIPS) (SUPERSTRUCTURE)	EA	20		
197 (S)	047997	VISCOUS DAMPING DEVICE (PIER 19) (SUPERSTRUCTURE)	EA	8		
198 (S)	047998	CLEAN AND PAINT STRUCTURAL STEEL (SUPERSTRUCTURE)	LS	LUMP SUM	LUMP SUM	
199 (S-F)	047999	SPOT BLAST CLEAN AND PAINT UNDERCOAT (SUPERSTRUCTURE)	SQFT	282,600		
200	048000	WORK AREA MONITORING (SUPERSTRUCTURE)	LS	LUMP SUM	LUMP SUM	

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
201 (S-F)	048001	MISCELLANEOUS METAL (RESTRAINER-CABLE TYPE) (SUPERSTRUCTURE)	LB	70,900		
202 (S-F)	048002	MISCELLANEOUS METAL (RESTRAINER - ROD TYPE) (SUPERSTRUCTURE)	LB	108,000		
203 (S-F)	048003	MISCELLANEOUS METAL (BRIDGE) (SUPERSTRUCTURE)	LB	487,000		
204 (F)	048004	CONCRETE BARRIER (TYPE 27 MODIFIED) (SUPERSTRUCTURE)	LF	12,958		
205	999990	MOBILIZATION	LS	LUMP SUM	LUMP SUM	

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISIONS

Annexed to Contract No. 04-043844

SECTION 1. SPECIFICATIONS AND PLANS

The work embraced herein shall be done in accordance with the Standard Specifications dated July, 1992, and the Standard Plans dated July, 1992, of the Department of Transportation insofar as the same may apply and in accordance with the following special provisions.

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 accordance with Section 2-1.054, "Required Listing of Proposed Subcontractors," of the Standard Specifications, each proposal shall have listed therein the name and address of each DVBE subcontractor to be used for credit in meeting the goal, and to whom the bidder proposes to directly subcontract portions of the work. The list of subcontractors shall also set forth the portion of work that will be done by each subcontractor listed. A sheet for listing the subcontractors is included in the Proposal.

If the Bidder submits cash or a cashier's check or a certified check as the form of bidder's security (See said Section 2-1.07 of the Standard Specifications), the Bidder shall also include with the bid submittal a signed and notarized affidavit from an admitted surety insurer that contract bonds, as required by Section 3-1.02, "Contract Bonds," of the Standard Specifications, will be provided within the time specified elsewhere in these special provisions for executing and returning the contract for approval.

The form of Bidder's Bond 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.

In accordance 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.

If the bidder claims a mistake was made in his bid, the bidder shall give the Department written notice within 48 hours, not including Saturdays, Sundays and legal holidays, after the opening of bids of the alleged mistake, in lieu of the 5 days specified in Section 2-1.095, "Relief of Bidders," in the Standard Specifications. The notice of alleged mistake shall specify in detail how the mistake occurred.

2-1.02 DISABLED VETERAN BUSINESS ENTERPRISE (DVBE)

Section 10115 of the Public Contract Code requires the Department to implement provisions to establish a goal for Disabled Veterans Business Enterprise (DVBE) in contracts.

It is the policy of the Department that Disabled Veteran Business Enterprise (DVBE) shall have the maximum opportunity to participate in the performance of contracts financed solely with state funds. The Contractor shall ensure that DVBEs have the maximum opportunity to participate in the performance of this contract and shall take all necessary and reasonable steps for this assurance. The Contractor shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of subcontracts. Failure to carry out the requirements of this paragraph shall constitute a breach of contract and may result in termination of this contract or other remedy the Department may deem appropriate.

Bidder's attention is directed to the following:

(a) "Disabled Veteran Business Enterprise" (DVBE) means a business concern certified as a DVBE by the Office of Small and Minority Business, Department of General Services.

(b) A DVBE may participate as a prime contractor, subcontractor, joint venture partner with a prime or subcontractor, or vendor of material or supplies;

(c) Credit for DVBE prime contractors will be 100 percent.

(d) A DVBE 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 DVBE joint venture partner must share in the ownership, control, management responsibilities, risks and profits of the joint venture. The DVBE joint venturer must submit the joint venture agreement with the Caltrans Bidder DVBE Information form required in Section 21.04, "Submission of DVBE Information," elsewhere in these special provisions;

(e) A DVBE 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) Credit for DVBE vendors of materials or supplies is limited to 60 percent of the amount to be paid to the vendor for the material unless the vendor manufactures or substantially alters the goods;

(g) Credit for trucking by DVBEs will be as follows:

(1) One hundred percent of the amount to be paid when a DVBE trucker will perform the trucking with his/her own trucks, tractors and employees;

(2) Twenty percent of the amount to be paid to DVBE trucking brokers who do not have a "certified roster";

(3) One hundred percent of the amount to be paid to DVBE trucking brokers who have:

a. signed agreements that all trucking will be performed by DVBE truckers if credit is toward the DVBE goal;

b. a "certified roster" showing that all trucks are owned by DVBEs; and

c. a signed statement on the "certified roster" that indicates that 100 percent of revenue paid by the broker will be paid to the DVBEs listed on the "certified roster".

(4) Twenty percent of the amount to be paid to trucking brokers who are not a DVBE but who have:

a. signed agreements with DVBE truckers assuring that at least 20 percent of the trucking will be performed by DVBE truckers if credit is toward the DVBE goal;

b. a "certified roster" showing that at least 20 percent of the number of trucks are owned by DVBE truckers; and

c. a signed statement on the "certified roster" that indicates that at least 20 percent of the revenue paid by the broker will be paid to the DVBEs listed on the "certified roster".

The "certified roster" referred to herein shall conform to the requirements in Section 3-1.01A, "DVBE Information," elsewhere in these special provisions;

(h) DVBEs and DVBE joint venture partners must be certified DVBEs as determined by the Department of General Services, Office of Small and Minority Business, 1531 "I" Street, Second Floor, Sacramento, CA 95814, on the date bids for the project are opened before credit may be allowed toward the DVBE goal.

It is the Contractor's responsibility to verify that DVBEs are certified;

(i) Noncompliance by the Contractor with these requirements constitutes a breach of this contract and may result in termination of the contract or other appropriate remedy for a breach of this contract.

2-1.03 DVBE GOAL FOR THIS PROJECT

The Department has established the following goal for Disabled Veteran Business Enterprise (DVBE) participation for this project:

Disabled Veteran Business Enterprise (DVBE), 3 percent.

It is the bidder's responsibility to make a sufficient portion of the work available to subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DVBE subcontractors and suppliers, so as to assure meeting the goal for DVBE participation.

The Office of Small and Minority Business, Department of General Services, may be contacted at (916) 322-5060 or visit their internet web site at www.dgs.ca.gov/osmb for program information and certification status. The Department's Business Enterprise Program may also be contacted at (916) 227-9599 or the internet web site at http://www.dot.ca.gov/hq/bep/.

2-1.04 SUBMISSION OF DVBE INFORMATION

The required DVBE information shall be submitted **WITH THE BID** on the following "CALTRANS BIDDER - DVBE - INFORMATION" and "TELEPHONE LOG AND LIST OF REJECTED DVBEs."

It is the bidder's responsibility to meet the goal for DVBE participation or to establish that, prior to bidding, the bidder made good faith efforts to do so based on the information in the "CALTRANS BIDDER - DVBE - INFORMATION" and "TELEPHONE LOG AND LIST OF REJECTED DVBEs."

The information to show that the DVBE goal will be met on the "CALTRANS BIDDER - DVBE - INFORMATION" form shall include the names of DVBEs and DVBE joint venture partners to be used, with a complete description of work or supplies to be provided by each and the dollar value of each such DVBE transaction. When 100 percent of a contract item of work is not to be performed or furnished by a DVBE, a description of the exact portion of said work to be performed or furnished by that DVBE shall be included in the DVBE information, including the planned location of said work. DVBE prime contractors shall enter their Office of Small and Minority Business (OSMB) - DVBE reference number and/or DBA name, as listed with OSMB, on the line provided. (Note: DVBE subcontractors to whom the bidder proposes to directly subcontract portions of the work are to be named in the bid. - See Section 2-1.054, "Required Listing of Proposed Subcontractors," of the Standard Specifications and Section 2-1.01, "General," of these special provisions, regarding listing of proposed subcontractors).

If credit for trucking by a DVBE trucking broker is shown on the bidder's information as 100 percent of the revenue to be paid by the broker is to be paid to DVBE truckers, a "certified roster" of the broker's trucks to be used must be included with the bid. The "certified roster" must indicate that all the trucks are owned by certified DVBEs and must show the DVBE truck numbers, owner's name, Public Utilities Commission Cal-T numbers, and the DVBE certification numbers. The roster must indicate that all revenue paid by the broker will be paid to DVBEs listed on the "certified roster".

If credit for trucking by a trucking broker who is not a DVBE is shown in the bidder's information, a "certified roster" of the broker's trucks to be used must be included with the bid. The "certified roster" must indicate that at least 20 percent of the broker's trucks are owned by DVBEs and must show the DVBE truck numbers, owner's name, Public Utilities Commission Cal-T numbers, and the DVBE certification numbers. The roster must indicate that at least 20 percent of the revenue paid by the broker will be paid to DVBEs listed on the "certified roster".

Information necessary to establish the bidder's good faith efforts to meet the DVBE goals shall be included in the "TELEPHONE LOG AND LIST OF REJECTED DVBEs" form located in the Proposal and shall include:

1. The names, dates and times of notices of all certified DVBEs solicited by telephone for this project and the dates, times and methods used for following up initial solicitations to determine with certainty whether the DVBEs were interested.
2. The names of DVBEs who submitted bids which were not accepted and the reason for rejection of the DVBEs bid.

Bidders are cautioned that even though their submittal indicates they will meet the stated DVBE goal, their submittal should also include the telephone log and rejected DVBE 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.

It is the bidders responsibility to be available, by phone, both the day of and the day after the bid opening to answer questions and provide good faith effort clarification. The bidder shall also assure that listed DVBEs are available, by phone, on both days.

If it is found that the goal has not been met, the Department will review the information submitted with the bid to determine the bidder’s good faith effort. In the event that the Department determines that a bidder has not made a good faith effort based on the information submitted with the bid and its independent investigation, the Department’s decision will be final.

2-1.05 SMALL BUSINESS PREFERENCE

Attention is directed to "Award and Execution of Contract" elsewhere in these special provisions.

Attention is also directed to the Small Business Procurement and Contract Act, Government Code Section 14835, et seq and Title 2, California Code of Regulations, Section 1896, et seq.

Bidders who wish to be classified as a Small Business under the provisions of those laws and regulations, shall be certified as Small Business by the Department of General Services, Office of Small and Minority Business, 1531 "I" Street, Second Floor, Sacramento, CA 95814.

To request Small Business Preference, bidders shall fill out and sign the Request for Small Business Preference form in the Proposal and shall attach a copy of their Office of Small and Minority Business (OSMB) small business certification letter to the form. The bidder's signature on the Request for Small Business Preference certifies, under penalty of perjury, that the bidder is certified as Small Business at the time of bid opening and further certifies, under penalty of perjury, that under the following conditions, at least 50 percent of the subcontractors to be utilized on the project are either certified

Small Business or have applied for Small Business certification by bid opening date and are subsequently granted Small Business certification.

The conditions requiring the aforementioned 50 percent level of subcontracting by Small Business subcontractors apply if:

1. The lowest responsible bid for the project exceeds $100 000; and
2. The project work to be performed requires a Class A or a Class B contractor's license; and
3. Two or more subcontractors will be used.

If the above conditions apply and Small Business Preference is granted in the award of the contract, the 50 percent Small Business subcontractor utilization level shall be maintained throughout the life of the contract.

2-1.06 CALIFORNIA COMPANY PREFERENCE

Attention is directed to "Award and Execution of Contract" of these special provisions.

In accordance with the requirements of Section 6107 of the Public Contract Code, a "California company" will be granted a reciprocal preference for bid comparison purposes as against a nonresident contractor from any state that gives or requires a preference to be given contractors from that state on its public entity construction contracts.

A "California company" means a sole proprietorship, partnership, joint venture, corporation, or other business entity that was a licensed California contractor on the date when bids for the public contract were opened and meets one of the following:

(1) Has its principal place of business in California.

(2) Has its principal place of business in a state in which there is no local contractor preference on construction contracts.

(3) Has its principal place of business in a state in which there is a local contractor construction preference and the contractor has paid not less than $5000 in sales or use taxes to California for construction related activity for each of the five years immediately preceding the submission of the bid.

To carry out the "California company" reciprocal preference requirements of Section 6107 of the Public Contract Code, all bidders shall fill out and sign the California Company Preference form in the Proposal. The bidder's signature on the California Company Preference form certifies, under penalty of perjury, that the bidder is or is not a "California company" and if not, the amount of the preference applied by the state of the nonresident Contractor.

A nonresident Contractor shall disclose any and all bid preferences provided to the nonresident Contractor by the state or country in which the nonresident Contractor has its principal place of business.

Proposals without the California Company Preference form filled out and signed may be rejected.

2-1.07 BRIDGE SEISMIC RETROFIT INFORMATION/QUESTIONNAIRE

The Department has established the need to obtain information regarding each bidder's qualifications for performing bridge seismic retrofit work contracts.

Bidders shall submit responses to the "Bridge Seismic Retrofit Information/Questionnaire" included in the Proposal. The responses to the Questionnaire shall be submitted with the bid.

In signing the signature page of the Proposal, the bidder certifies that the information and answers on the "Bridge Seismic Retrofit Information/Questionnaire" are complete and accurate.

2-1.08 ESCROW OF BID DOCUMENTATION

Bid documentation shall consist of all documentary and calculated information generated by the Contractor in preparation of the bid. The bid documentation shall conform to the requirements in these special provisions, and shall be submitted to the Department and held in escrow for the duration of the contract.

In the resolution of disputes involving the project, the escrowed bid documents will be the only documents accepted from the Contractor regarding preparation of the bid.

In signing the proposal, the bidder certifies that the material submitted for escrow constitutes all the documentary information used in preparation of the bid and that he has personally examined the contents of the container and that they are complete.

The bidder shall include with the proposal, the identification of the bidder's representative authorized to present the bid documentation and the persons responsible for preparing the bidder's estimate.

Nothing in the bid documentation shall be construed to change or modify the terms or conditions of the contract.

Escrowed bid documentation will not be used for pre-award evaluation of the Contractor's anticipated methods of construction, nor to assess the Contractor's qualifications for performing the work.

Bid documentation shall clearly itemize the Contractor's estimated costs of performing the work. The documentation submitted shall be complete and so detailed as to allow for an in-depth analysis of the Contractor's estimate.

The bid documentation shall include, but not be limited to: quantity takeoffs; rate schedules for the direct costs and the time- and nontime-related indirect costs for labor (by craft), plant and equipment ownership and operation, permanent and expendable materials, insurance and subcontracted work; estimated construction schedules, including sequence and duration and development of production rates; quotations from subcontractors and suppliers; estimates of field and home office overhead; contingency and margin for each contract item of work; and other reports, calculations and information used by the bidder to arrive at the estimate submitted with the proposal.

The Contractor shall also submit bid documentation for each subcontractor whose total subcontract exceeds $250,000. Subcontractor bid documentation shall be enclosed with the Contractor's submittal. The examination of subcontractors' bid documentation will be accomplished in the same manner as for the Contractor's bid documentation. If a subcontractor is replaced, bid documentation for the new subcontractor shall be submitted for review and escrow before authorization for the substitution will be granted. Upon request of a subcontractor, the bid documentation from that subcontractor shall be reviewed only by the subcontractor and the Department.

If the bidder is a joint venture, the bid documentation shall include the joint venture agreement, the joint venture estimate comparison and final reconciliation of the joint venture estimate.

Copies of the proposals submitted by the first, second and third low bidders will be provided to the respective bidders for inclusion in the bid documentation to be escrowed.

The first, second, and third apparent low bidders shall present the bid documentation for escrow at the District 04 Office, 111 Grand Avenue, Room 12-816, Oakland, CA, on the first Monday, at 1:00 p.m., following the time indicated in the "Notice to Contractors" for the opening of bids.

Bid documentation shall be submitted in a sealed container, clearly marked with the bidder's name, date of submittal, project contract number and the words, "Bid Documentation for Escrow."

Failure to submit the actual and complete bid documentation as specified herein within the time specified shall be cause for rejection of the proposal.

Upon submittal, the bid documentation of the apparent low bidder will be examined and inventoried by the duly designated representatives of the Contractor and the Department to ensure that the bid documentation is authentic, legible, and in accordance with the terms of this section "Escrow of Bid Documentation." The examination will not include review of, nor will it constitute approval of, proposed construction methods, estimating assumptions or interpretation of the contract. The examination will not alter any conditions or terms of the contract. The acceptance or rejection by the Department that the submitted bid documents are in compliance with this section "Escrow of Bid Documentation" shall be completed within 48 hours of the time the bid documentation is submitted by the Contractor.

At the completion of the examination, the bid documents will be sealed and jointly deposited at an agreed commercial bank.

Bid documentation submitted by the second and third apparent low bidders will be jointly deposited at agreed commercial banks. If the apparent low bid is withdrawn or rejected, the bid documentation of the second low bidder will be examined and inventoried in the manner specified above, then sealed and deposited again in escrow. If the second low bid is withdrawn or rejected, the bid documentation of the third low bidder will be examined and inventoried in the manner specified above, then sealed and deposited again in escrow. Upon execution and final approval of the contract or rejection of all bids, the bid documentation will be returned to any remaining unsuccessful bidders.

The escrowed bid documentation may be examined by the designated representatives of both the Department and the Contractor, at any time deemed necessary by either the Department or the Contractor to assist in the negotiation of price adjustments and change orders, or in the settlement of claims or disputes.

If requested by a Disputes Review Board, the escrowed bid documentation may be utilized to assist the Board in its recommendations.

The bid documentation submitted by the Contractor will be held in escrow until the contract has been completed, the ultimate resolution of all disputes and claims has been achieved and receipt of final payment has been accepted by the Contractor. The escrowed bid documentation will then be released from escrow to the Contractor.

The bid documentation submitted by the bidder is, and shall remain, the property of the bidder, and is subject to only joint review by the Department and the bidder. The Department stipulates and expressly acknowledges that the submitted bid documentation constitutes trade secrets and will not be deemed public records. This acknowledgment is based on the Department's express understanding that the information contained in the bid documentation is not known outside the bidder's business, is known only to a limited extent and only by a limited number of employees of the bidder, is safeguarded while in the bidder's possession, is extremely valuable to the bidder and could be extremely valuable to the bidder's competitors by virtue of it reflecting the bidder's contemplated techniques of construction. The Department acknowledges that the bid documentation includes a compilation of information used in the bidder's business, intended to give the bidder an opportunity to obtain an advantage over competitors who do not know of or use the contents of the documentation. The Department agrees to safeguard the bid documentation, and all information contained therein, against disclosure, including disclosure of subcontractor bid documentation to the Contractor and other subcontractors to the fullest extent permitted by law. However, in the event of arbitration or litigation, the bid documentation shall be

subject to discovery, and the Department assumes no responsibility for safeguarding the bid documentation unless the Contractor has obtained an appropriate protective order issued by the arbitrator or the court.

Full compensation for preparing the bid documentation, presenting it for escrow and reviewing it for escrow and upon request of the Engineer shall be considered as included in the contract prices paid for the various items of work, and no additional compensation will be allowed therefor.

The direct cost of depositing the bid documentation in escrow at the agreed commercial bank will be paid by the State.

SECTION 3. PRE-AWARD MEETING AND AWARD AND EXECUTION OF CONTRACT

3-1.01 GENERAL

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.

3-1.01A PRE-AWARD MEETING.--Bidders are advised that on December 10, 1999 at 10:00 a.m., in the third floor conference room, 1727 - 30th Street, Sacramento, CA 95816, the apparent low bidder shall participate in a pre-award qualifications review meeting conducted by an agent of the Director. Non-attendance to the qualifications review meeting by the apparent low bidder shall be just cause for rejection of the bid and forfeiture of the proposal guaranty. At the qualifications review meeting, the low bidder shall be prepared to discuss and answer questions relative to the responses to the "Bridge Seismic Retrofit Information/Questionnaire" submitted with the bid. The Director's agent will prepare written findings and recommendations to the Engineer regarding award of the contract to the apparent low bidder based on the bridge seismic retrofit information and responses submitted with the bid, and on the information provided at the qualifications review meeting. The Engineer's determination on the bidder's qualifications for performing bridge seismic retrofit work, in a manner that is safe for the workers and the public, will be based on the bidder's experience, qualifications of on-site supervisory personnel, equipment, conceptual approach to the bridge seismic retrofit work and safety history of the bidder and its supervisory personnel. The decision of the Engineer regarding the bidder's qualifications shall be final.

The second and third apparent low bidders shall participate in pre-award qualifications review meetings if requested to do so by the Department. Notification by the Department will be within 7 days after the bid opening, and will be provided at least 12 hours prior to the qualifications review meeting. Non-attendance by the second or third apparent low bidder at any such requested meeting shall be just cause for rejection of bid and forfeiture of the proposal guaranty.

3-1.01B AWARD AND EXECUTION OF CONTRACT.-- The award of 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 goals for DVBE participation or has demonstrated, to the satisfaction of the Department, good faith effort to do so. Meeting the goals for DVBE participation or demonstrating, to the satisfaction of the Department, good faith efforts to do so is a condition for being eligible for award of contract.

It is anticipated that this contract will be awarded within 10 days after the bid opening.

Each of the two bonds required in Section 3-1.02, "Contract Bonds," of the Standard Specifications shall be in a sum equal to 100 percent of the contract price.

The contract shall be signed by the successful bidder and shall be received with contract bonds by the Department within **4 days**, including Saturdays, Sundays and legal holidays, after the bidder has received notice that the contract has been awarded. Failure to do so shall be just cause for forfeiture of the proposal guaranty. The executed contract documents shall be delivered to the following address: Department of Transportation, P.O. Box 942874, Sacramento, CA 94274-0001, Attn: Office Engineer (MS 43)- Contracts.

Within 2 days, not including Saturdays, Sundays and legal holidays, of return of the executed contract and bonds, the Department will notify the successful bidder of either approval of the contract by the Attorney General or the attorney appointed and authorized to represent the Department of Transportation, or disapproval of the submittal. Should the Department fail to provide notification within said 2 days, 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.

A "Vendor 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, vendor 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 "Vendor Data Record" form to the Department as provided herein will result in the retention of 20 percent of payments due the contractor and penalties of up to

$20,000. This retention of payments for failure to complete the "Vendor Data Record" form is in addition to any other retention of payments due the Contractor.

Attention is also directed to "Small Business Preference" of these special provisions. Any bidder who is certified as a Small Business by the Department of General Services, Office of Small and Minority Business will be allowed a preference in the award of this contract, if it be awarded, under the following conditions:

(1) The apparent low bidder is not certified as a Small Business, or has not filled out and signed the Request for Small Business Preference included with the bid documents and attached a copy of their Office of Small and Minority Business (OSMB) small business certification letter to the form; and

(2) The bidder filled out and signed the Request for Small Business Preference form included with the bid documents and attached a copy of their Office of Small and Minority Business (OSMB) small business certification letter to the form.

The small business preference will be a reduction in the bid submitted by the small business contractor, for bid comparison purposes, by an amount equal to 5 percent of the amount bid by the apparent low bidder, said amount not to exceed $50,000. If such reduction results in the small business contractor becoming the low bidder, then the contract will be awarded to said small business contractor on the basis of the actual bid of the small business contractor notwithstanding the reduced bid price used for bid comparison purposes.

Attention is also directed to "California Company Preference" of these special provisions.

The amount of the California company reciprocal preference shall be equal to the amount of the preference applied by the state of the nonresident contractor with the lowest responsive bid, except where the "California company" is eligible for a California Small Business Preference, in which case the preference applied shall be the greater of the two, but not both.

If the bidder submitting the lowest responsive bid is not a "California company" and with the benefit of the reciprocal preference, a "California company's" responsive bid is equal to or less than the original lowest responsive bid, the "California company" will be awarded the contract at its submitted bid price except as provided below.

Small business bidders shall have precedence over nonsmall business bidders in that the application of the "California company" preference for which nonsmall business bidders may be eligible shall not result in the denial of the award to a small business bidder.

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

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

The Contractor shall begin work within 5 calendar days after the contract has been approved by the Attorney General or the attorney appointed and authorized to represent the Department of Transportation.

This work shall be diligently prosecuted to completion before the expiration of

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beginning at 12:01 a.m. on the **FIRST WORKING DAY AFTER CONTRACT AWARD.**

The Contractor shall pay to the State of California the sum of $25,000 per day, for each and every calendar day's delay in finishing the work in excess of the number of working days prescribed above. The 72 hours advance notice before beginning work as referred to in said Section 8-1.03 is changed to 24 hours advance notice for this project.

A working day as defined in said Section 8-1.06 is re-defined for this project. Subparagraph (a) in said Section 8-1.06 shall not apply. Saturdays, Sundays and legal holidays, except days of inclement weather, will be counted as working days.

The time limit specified for the completion of the work contemplated herein is considered insufficient to permit completion of the work by the Contractor working a normal number of hours per day or week on a single shift basis. Should the Contractor fail to maintain the progress of the work in accordance with the "Progress Schedule" required in these special provisions, additional shifts will be required to the extent necessary to ensure that the progress conforms to the abovementioned schedule and that the work will be completed within the time limit specified.

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

SECTION 5. GENERAL

SECTION 5-1. MISCELLANEOUS

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 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.

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 said regulations. A Complaint in Arbitration by the Contractor shall be made not later than 180 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 41.03, "Changes," or Section 81.06, "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, except temporary railing (Type K) fabricated prior to January 1, 1993, with one longitudinal No. 5 reinforcing steel bar near the top in lieu of the 2 longitudinal No. 5 reinforcing steel bars near the top, as shown on the plans, may be used.

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, excluding serpentine material that may be encountered in piling operations, 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 such 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 such 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.

5-1.15 DVBE RECORDS

The Contractor shall maintain records of all subcontracts entered into with certified DVBE subcontractors and records of materials purchased from certified DVBE suppliers. Such records shall show the name and business address of each DVBE subcontractor or vendor and the total dollar amount actually paid each DVBE subcontractor or vendor.

Upon completion of the contract, a summary of these records shall be prepared on Form CEM-2402 and certified correct by the Contractor or his authorized representative, and shall be furnished to the Engineer.

5-1.155 PERFORMANCE OF DVBE SUBCONTRACTORS AND SUPPLIERS

The DVBEs listed by the Contractor in response to the requirements in Section 2-1.04, "Submission of DVBE Information," in these special provisions, which are determined by the Department to be certified DVBEs, 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 utilize other forces or sources of materials may be requested for the following reasons:

(1) The listed DVBE, 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.

(2) The listed DVBE becomes bankrupt or insolvent.

(3) The listed DVBE fails or refuses to perform his subcontract or furnish the listed materials.

(4) The Contractor stipulated that a bond was a condition of executing a subcontract and the listed DVBE subcontractor fails or refuses to meet the bond requirements of the Contractor.

(5) The work performed by the listed subcontractor is substantially unsatisfactory and is not in substantial accordance with the plans and specifications, or the subcontractor is substantially delaying or disrupting the progress of the work.

(6) The listed DVBE subcontractor is not licensed pursuant to the Contractors License Law.

(7) 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 DVBE 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, Section 2, "Proposal Requirements and Conditions," Section 2-1.04, "Submission of DVBE Information," and Section 3, "Award and Execution of Contract," elsewhere in these special provisions and these special provisions.

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

The Contractor shall perform with his own organization contract work amounting to not less than 30 percent of the original total contract price, except that any designated "Specialty Items" may be performed by subcontract and the amount of such "Specialty Items" so performed may be deducted from the original total contract price before computing the amount of work required to be performed by the Contractor with his own organization.

The second sentence in the third paragraph of 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."

The DVBE information furnished under Section 2-1.04, "Submission of DVBE Information," of these special provisions is in addition to the subcontractor information required to be furnished under said Section 8-1.01, "Subcontracting," and Section 2-1.054, "Required Listing of Proposed Subcontractors," of the Standard Specifications.

Section 10115 of the Public Contract Code requires the Department to implement provisions to establish a goal for Disabled Veteran Business Enterprise (DVBE) participation in highway contracts that are state funded. As a part of this requirement:

1. No substitution of a DVBE subcontractor shall be made at any time without the written consent of the Department, and

2. If a DVBE subcontractor is unable to perform successfully and is to be replaced, the Contractor will be required to make good faith efforts to replace the original DVBE subcontractor with another DVBE subcontractor.

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

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.

A one-day “Training in Partnering Concepts” forum will be conducted regardless of whether the Contractor requests the formation of a “Partnering” relationship. The forum will be conducted locally for the Contractor and the Engineer’s project representatives. The Contractor shall be represented by a minimum of two representatives, one being the Contractor’s authorized representative pursuant to Section 5-1.06, “Superintendence,” of the Standard Specifications. If, upon the Contractor’s request, “Partnering” is approved by the Engineer, “Training in Partnering Concepts” shall be conducted prior to the “Partnering” workshop. Scheduling of “Training in Partnering Concepts,” selection of the Engineer’s representatives to participate in “Training of Partnering Concepts,” and selection of the partnering concepts trainer and site shall be as determined by the Engineer.

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

The costs involved in providing a trainer and site for the "Training in Partnering Concepts" forum will be borne by the State. 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 will reimburse the Contractor for these costs as extra work in conformance with the provisions in Section 4-1.03D of the Standard Specifications. Full compensation for the wages and expenses of the Contractor's representatives, including travel costs, shall be considered as included in the contract prices paid for the various items of work and no additional compensation will be allowed therefor.

The costs involved in providing a “Partnering” 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 to the costs of “Training in Partnering Concepts” or the costs of providing a “Partnering” facilitator and workshop site. 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, as amended elsewhere in these special provisions. 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, as amended elsewhere in these special provisions. The State will review those claims in accordance with Section 9-1.07B, of the Standard Specifications, as amended. 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, as amended elsewhere in these special provisions, 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 TIDAL CONDITIONS AND ELEVATION DATUM

Attention is directed to Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work."

Tidal conditions may present significant problems in constructing the work as depicted in the contract plans. Tidal fluctuations may be severe and different from those shown in published tidal and current data due to differences in datum, winter runoff and other causes. Strong currents exist over portions of the project site. Limited time periods of slack water may restrict diving and other underwater activities.

The Contractor is responsible for being knowledgeable of such tidal difficulties, and no payment will be made by the State for any costs incurred by the Contractor in connection with the variations in actual tidal or current conditions during the course of this contract. Any reference to Mean Higher High and Mean Lower Low tides shall be understood to be an estimate used for permit purposes, actual mean tide data shall be determined by the Contractor.

All vertical control data are based on the National Geodetic Vertical Datum of 1929.

5-1.20 COST REDUCTION INCENTIVE

Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications is amended by adding the following paragraph:

> Prior to preparing a cost reduction proposal, the Contractor shall request a meeting with the Engineer to discuss the proposal in concept and determine whether the cost reduction proposal will be considered by the Department. Items of discussion will also include permit issues, impact on other projects, impact on the project schedule, traffic considerations, safety and health issues, design criteria, and review times required by the Department and other agencies. Determination by the Engineer that a cost reduction proposal will not be considered further will be deemed rejection of the proposal.

5-1.21 USE OF DREDGED MATERIALS

If sand, gravel, aggregates, imported borrow or other minerals are dredged from San Francisco Bay (outside the required contract limits under this contract), the Contractor shall provide documentation to the Engineer that authorizations from the Bay Conservation and Development Commission, Army Corp of Engineers, Dredged Material Management Office, and Regional Water Quality Control Board have been obtained. The documentation shall include the permit number, parcel number and specific location of the source of the material. The Contractor must also include this information on the HC-30 "Notice of Materials to be Used".

5-1.22 FORCE ACCOUNT PAYMENT

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

To the total of the direct costs 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 a markup of 25 percent to the cost of labor, 10 percent to the cost of materials, and 10 percent to the equipment rental.

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 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," shall be deemed to be the actual cost of the work performed on a force account basis, and shall constitute full compensation therefor.

When extra work to be paid for on a force account basis is performed by a subcontractor, approved in accordance with the provisions in Section 8-1.01, “Subcontracting,” of the Standard Specifications, an additional markup of 5 percent will be added to the total cost of said extra work including all markups specified in this section "Force Account Payment". Said additional 5 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.

5-1.23 OVERHEAD

The Contractor will be compensated for overhead in accordance with these special provisions.

Attention is directed to "Force Account Payment" and "Progress Schedule (Critical Path)" of these special provisions.

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.

The quantity of time related overhead to be measured for payment will be the number of working days specified in "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions, 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 accordance with Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications, except:

   a) 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; and
   b) suspensions ordered due to unsuitable weather conditions;

2) extensions of time granted by the State in accordance with the provisions of the fifth paragraph of Section 8-1.07, "Liquidated Damages," of the Standard Specifications; or
3) reductions in contract time set forth in approved contract change orders, in accordance with Section 4-1.03, "Changes," of the Standard Specifications.

The contract price paid for time related overhead shall include full compensation for time related overhead measured for payment as specified above, incurred by the Contractor and by any joint venture partner, subcontractor, supplier or other party associated with the Contractor.

No adjustment in compensation will be made for any increase or decrease in the quantities of time related overhead required, regardless of the reason for the increase or decrease. The provisions in Sections 4-1.03B, "Increased or Decreased Quantities" and 4-1.03C, "Changes in Character of the Work," of the Standard Specifications, shall not apply to time related overhead.

For progress payment purposes, the number of working days to be paid for time related overhead in each monthly estimate will be the number of working days specified above to be measured for payment that the Contractor performed work on the current controlling operation or operations as specified in Section 8-1.06, "Time of Completion," of the Standard Specifications. Working days specified above to be measured for payment, on which the Contractor did not perform work on the controlling operation or operations will be measured and included for payment in the first estimate made in accordance with Section 9-1.07, "Payment After Acceptance," of the Standard Specifications.

Full compensation for overhead other than time related overhead measured and paid for as specified above, and other than overhead costs for extra work performed pursuant to Section 4-1.03D of the Standard Specifications, shall be considered as included in the various items of work and no additional compensation will be allowed therefor.

5-1.24 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	$ 25,000
Electronic Mobile Daily Diary Computer System Data Delivery	$ 40,000

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 said 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 said payment as materials furnished but not incorporated in the work:

Signal and lighting standards, luminaires, signal heads and mounting brackets, electrical equipment, conduits, cables and fixtures
Electrical wires and cables
Mechanical piping and equipment
Piling
Precast concrete and precast prestressed concrete member
Precast concrete assemblies
Precast concrete panel
Prestressing ducts and anchorages

Prestressing steel in sealed containers
High strength steel bars for prestressing
Seismic isolation bearings
Viscous damping devices
Joint seal assemblies
Expansion joint assemblies
Seismic isolation joint assemblies
Bar reinforcing steel
Column restrainer bracket
Steel casing
Structural steel
Column and shaft casing
Miscellaneous metals
Metal doors and frames

Partial payment will not be made for seismic isolation bearings and viscous damping devices until the individual item has met the acceptance criteria for proof testing as determined by the Engineer.

Plate steel for fabrication of pipe piling and structural steel, stored within the State of California, and fabricated elements for pipe piling and structural steel, fabricated and stored within the United States will be eligible for partial payment if the Contractor furnishes evidence satisfactory to the Engineer that its storage is subject to or under the control of the Department and that it has been designated or fabricated specifically for this project.

5-1.25 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.

Between the hours of 7:00 a.m. and 9:00 p.m. there are no sound control restrictions. Attention is directed to Section "Environmental Work Restrictions" elsewhere in these special provisions.

Between the hours of 9:00 p.m. and 7:00 a.m. piles shall not be driven and the noise level from all of the Contractor's operations shall not exceed 86 dbA at a distance of 50 feet.

Said noise level requirement shall apply to all equipment on the job or related to the job. 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.

5-1.26 SUNKEN DEBRIS REMOVAL

Should the Contractor during the progress of the work, sink, lose, or throw overboard any material, plant or machinery into the waters of the Bay, he shall recover or remove such debris within 90 days.

The Contractor shall give immediate notice to proper authorities and shall mark the location of the fallen debris with U.S. Coast Guard-approved lighted buoys until such debris are removed. Attention is directed to Section "Relations with the U.S. Coast Guard" of these special provisions regarding specific conditions in connection with obstructions to navigation

5-1.27 RELATIONS WITH CALIFORNIA DEPARTMENT OF FISH AND GAME

This project is located within the jurisdiction of the California Department of Fish and Game. The Department of Fish and Game has concurred with protection measures developed by the Department of Transportation regarding the double-crested cormorants colony that nests on the Richmond-San Rafael Bridge during their breeding season and to protect the Pacific herring fisheries if a spawn occurs in the vicinity of the Bridge. The Contractor shall fully inform himself of the requirements associated with these measures as well as all rules regulations, and conditions that may govern his operations in said area and shall conduct his operations accordingly.

Copies of the agreement are available for inspection at the office of the Toll Bridge Program Duty Senior at District 04 Office, 111 Grand Avenue, Oakland, California 94612; telephone number (510) 286-5549.

Attention is directed to "Environmental Work Restrictions" of these special provisions relating to specific protection measures required under this contract.

Any modifications to the agreement 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. No additional time or compensation will be allowed for delays caused by the Contractor's proposed modifications to the agreement between the Department of Transportation and the Department of Fish and Game.

Any modifications to any agreement between the Department of Transportation and the California Department of Fish and Game shall 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.

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

5-1.28 RELATIONS WITH UNITED STATES FISH AND WILDLIFE SERVICE

This project is located within the jurisdiction of the U.S. Fish and Wildlife Service. The Fish and Wildlife Service has issued a Biological Opinion regarding the peregrine falcon, a federal and state endangered species protected under both the federal Endangered Species Act and the California Endangered Species Act. The Contractor shall fully inform himself of the requirements of the Biological Opinion as well as of all rules, regulations, and conditions that may govern his operations in said area and shall conduct hisoperations accordingly.

Copies of the Biological Opinion are available for inspection at the office of the Toll Bridge Program Duty Senior at District 04 Office, 111 Grand Avenue, Oakland, California 94612; telephone number (510) 286-5549.

Attention is directed to "Environmental Work Restrictions" of these special provisions relating to specific measures required under this contract.

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

5-1.29 RELATIONS WITH NATIONAL MARINE FISHERIES SERVICE

This project is located within the jurisdiction of the National Marine Fisheries Service. The National Marine Fisheries Service has concurred with measures developed by the Department of Transportation regarding the protection of the winter-run Chinook Salmon, a federal and state endangered species protected under both the federal Endangered Species Act and the California Endangered Species Act. The Contractor shall fully inform himself of the requirements associated with these measures as well as of all rules, regulations, and conditions that may govern his operations in said area and shall conduct his operations accordingly.

Attention is directed to "Environmental Work Restrictions" of these special provisions relating to specific measures required under this contract.

The National Marine Fisheries Service has issued an Incidental Harassment Authorization under the Marine Mammal Protection Act for protection of the California sea lions and harbor seals. The Contractor shall fully inform himself of the requirements of this authorization as well as of all rules, regulations, and conditions that may govern his operations in said area and shall conduct hisoperations accordingly.

Copies of the Incidental Harassment Authorization for sea lions and harbor seals and the Department of Transportation measures for the protection of Chinook Salmon are available for inspection at the office of the Toll Bridge Program Duty Senior at District 04 Office, 111 Grand Avenue, Oakland, California 94612; telephone number (510) 286-5549.

Any modifications to the Incidental Harassment Authorization and the Department's measures to protect the Chinook Salmon which are proposed by the Contractor shall be submitted in writing to the Engineer for transmittal to the National Marine Fisheries Service for their consideration. No additional time or compensation will be allowed for delays caused by the Contractor's proposed modifications to the agreement between the Department of Transportation and the National Marine Fisheries Service.

Any modifications to any agreement between the Departments of Transportation and the National Marine Fisheries Service shall 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.

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

5-1.30 RELATIONS WITH CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

The location of the Richmond-San Rafael Bridge is within an area controlled by the Regional Water Quality Control Board. SFBRWQCB Resolution No. 97-053 has been issued covering work to be performed under this contract. The Contractor shall fully inform himself of all rules, regulations and conditions that may govern hisoperations in said area and shall conduct his work accordingly.

Copies of the resolution are available for inspection at the office of the Toll Bridge Program Duty Senior at District 04 Office, 111 Grand Avenue, Oakland California 94612; telephone number (510) 286-5549.

Attention is directed to Sections 7-1.11, "Preservation of Property," and 7-1.12, "Responsibility for Damage," of the Standard Specifications.

Any modifications to the resolution which are proposed by the Contractor shall be submitted in writing to the Engineer for transmittal to the Regional Water Quality Control Board for their consideration. No additional time or compensation will be allowed for delays caused by the Contractor's proposed modifications to the agreement between the Department of Transportation and the Regional Water Quality Control Board.

When the Contractor is notified by the Engineer that a modification to the resolution is under consideration, no work will be allowed on the proposed modification until the Department takes action on the proposed modification.

Any modifications to the resolution between the Department of Transportation and the Regional Water Quality Control Board shall 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.

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

5-1.31 RELATIONS WITH US ARMY CORPS OF ENGINEERS

The location of the Richmond-San Rafael Bridge is within an area controlled by the US Army Corps of Engineers. Permit has been issued covering work to be performed under this contract. The Contractor shall be fully informed of all rules, regulations and conditions of the permit that may govern its operations in said area and shall conduct its work accordingly. Said document shall be considered a part of, and shall become, an integral part of the special provisions and contract for this project.

Copies of the Permit are available for inspection at the Toll Bridge Program Duty Senior at District 04 Office, 111 Grand Avenue, Oakland, California 94623-0660, telephone number (510) 286-5549.

Any modifications to the permit which are proposed by the Contractor shall be submitted in writing to the Engineer for transmittal to the Army Corps of Engineers for their consideration. No additional time or compensation will be allowed for delays caused by the Contractor's proposed modifications to the agreement between the Department of Transportation and the Army Corps of Engineers.

When the Contractor is notified by the Engineer that a modification to the permit is under consideration, no work will be allowed on the proposed modification until the Department takes action on the proposed modification. Any modifications to any agreement between the Department of Transportation and the Army Corps of Engineers shall 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.

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

5-1.32 RELATIONS WITH SAN FRANCISCO BAY CONSERVATION DEVELOPMENT COMMISSION (BCDC)

The location of the Richmond-San Rafael Bridge is within an area controlled by the BCDC. Permit has been issued covering work to be performed under this contract. The Contractor shall be fully informed of all rules, regulations and conditions of the permit that may govern its operations in said area and shall conduct its work accordingly. Said document shall be considered a part of, and shall become, an integral part of the special provisions and contract for this project.

Copies of the Permit are available for inspection at the Toll Bridge Program Duty Senior at District 04 Office, 111 Grand Avenue, Oakland, California 94623-0660, telephone number (510) 286-5549.

Any modifications to the permit which are proposed by the Contractor shall be submitted in writing to the Engineer for transmittal to the BCDC for their consideration. No additional time or compensation will be allowed for delays caused by the Contractor's proposed modifications to the agreement between the Department of Transportation and BCDC.

When the Contractor is notified by the Engineer that a modification to the permit is under consideration, no work will be allowed on the proposed modification until the Department takes action on the proposed modification. Any modifications to any agreement between the Department of Transportation and BCDC shall 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.

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

5-1.33 RELATIONS WITH U.S. COAST GUARD

The location of the Richmond/San Rafael Bridge is within an area controlled by the U.S. Coast Guard. The U.S. Coast Guard has authorized the seismic retrofit as repairs in kind in accordance with 33CFR 115.40. The Contractor shall fully inform himself of all rules, regulations and conditions that may govern his operations in said area and shall conduct his work accordingly.

An informational handout entitled, "Preconstruction Checklist for the Richmond-San Rafael Bridge Seismic Retrofit Project," dated June 26, 1997 is available to the Contractor.

Copies of the checklist are available for inspection at the Toll Bridge Program Duty Senior at District 04 Office, 111 Grand Avenue, Oakland, California 94623-0660, telephone number (510) 286-5549.

Attention is directed to Sections 7-1.11, "Preservation of Property," and 7-1.12, "Responsibility for Damage," of the Standard Specifications.

Attention is directed to "Sunken Debris Removal" elsewhere in these special provisions.

The following conditions are among those established by the U.S. Coast Guard in the Preconstruction Checklist and their work authorization for this project:

Navigation.--The Contractor's operations shall conform to the U.S. Coast Guard Commandant Instruction M16672.2C.

Aids to Navigation.--The Contractor, acting on behalf of the Department, shall coordinate with the U.S. Coast Guard Commander (POW), Telephone (510) 437-2983 for written authorization at least 60 days prior to any relocation or temporary removal of any aids to navigation within or near any areas involved with dredging or construction. In addition, the Contractor shall not obstruct, willfully damage, make fast to, or interfere with any aid to navigation.

Ferry Operations.--The Contractor's operations shall not obstruct, detour, delay or hazard Ferry operations. The Contractor shall be responsible in contacting the following Ferry Operators for current and updated routes and schedules:

Ferry Operator	Address/Contact
Blue and Gold Fleet (Vallejo Ferry)	Pier 39 P.O. Box Z2 San Francisco, CA 94133 Contacts: Chief Operating Officer, Telephone (415) 705-5580 or Port Captain Telephone (415) 705-5424

Attention is directed to Section 8-1.06, "Time of Completion," of the Standard Specifications. Days during which the Contractor will not be permitted to perform the work from waterborne equipment in the navigation channel when the visibility at the work site is less than 1,000 yards, shall be considered to be nonworking days if, in the opinion of the Engineer, these restrictions cause a delay in the current controlling operation or operations.

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

5-1.34 ENVIRONMENTAL WORK RESTRICTIONS

The project is located within the jurisdiction of the U.S. Army Corps of Engineers, the San Francisco Bay Conservation and Development Commission, the California Department of Fish and Game (CDFG), the U.S. Fish and Wildlife Service (U.S. FWS) and the National Marine Fisheries Service. An agreement regarding mitigation of the potential impact that this project may cause have been entered into by the Department of Transportation and the Department of Fish and Game, U.S. Fish and Wildlife Service, and the National Marine Fisheries Service.

The Contractor shall notify the Engineer immediately if any dead or injured species of concern listed below are encountered.

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

The Contractor shall fully inform himself of the requirements of these agreements as well as all rules, regulations, and conditions that may govern his operation in the following environmentally sensitive areas:

SPECIES OF CONCERN

WINTER-RUN CHINOOK SALMON AND STEELHEAD TROUT.--Open water hydraulic dredging in areas 20 feet below Mean Lower Low Water (NGVD 1929) or shallower will not be allowed between January 1 through May 31 of any year, except in areas confined within cofferdams or pile casings. At the Contractor's option, dredging by clam shell method may be used to perform the work without any time restriction.

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

HARBOR SEAL.—No activity shall occur between Piers 52 through 57 (inclusive) during the "Closure Period" defined as February 15 to July 31 of any year. In addition, the Contractor shall furnish and install buoys delineating an exclusion zone at the location shown on the plans. Buoys shall be in accordance with the requirements of the U.S. Coast Guard. The Contractor shall obtain a Private Aids to Navigation Permit from the U.S. Coast Guard prior to

installing the buoys. Outside of the "Closure Period", water crafts can enter the exclusion zone only when construction equipment is required in this area for work conducted specifically at Piers 52 through 57.

Harbor Seal movements and behavior will be monitored throughout the construction period. Monitoring will be performed at various times throughout the day and night. The Contractor shall provide access to monitoring personnel to and from the observation area on the bridge near Pier 55. Contractor shall not disturb video cameras for seal monitoring located near Pier 55 on the lower deck unless authorized by the Engineer.

Existing temporary concrete barriers utilized as protective device for the closed roadway shoulder at and within the vicinity of Pier 55, shall remain in-place until such time that the Contractor's operation or traffic handling system will require the removal of said barriers. When the temporary concrete barriers are removed, the Contractor shall provide temporary traffic control and safety devices, when directed by the Engineer, to provide safety to all personnel doing the harbor seal monitoring work.

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

PEREGRINE FALCON.--Peregrine falcon movements and behavior will be monitored by the U.S. Fish and Wildlife Service authorized personnel during construction between February 1st and July 31st of each year of construction.

If peregrine falcon nesting occurs, the Contractor shall provide access to the nesting site as directed by the authorized peregrine falcon expert to allow for the removal of eggs.

Full compensation for providing access to U.S. Fish and Wildlife Service authorized personnel shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefore.

PACIFIC HERRING.— Open water hydraulic dredging in areas 20 feet below Mean Lower Low Water (NGVD 1929) or shallower will not be allowed between January 1 through May 31 of any year, except in areas confined within cofferdams or pile casings. At the Contractor's option, dredging by clam shell method may be used to perform the work without any time restriction.

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

Contractor’s operations within cofferdams or during pile installations which will not place debris into the water or increase water turbidity will not be restricted. In-water construction or other operations that can generate debris into the water or increase water turbidity during spawn will not be allowed.

Surveys and monitoring of Pacific herring spawning locations will be conducted by the State. The Engineer will notify the Contractor whenever a spawning event is observed. If construction operations within the open water is within 650 feet of a spawn, the Contractor shall cease the portion of the contract work in this area within 8 hours of notification by the Engineer. Work shall not resume until notified by the Engineer which is expected to be approximately 14 days from the time of spawning.

It is anticipated that Pacific herring spawning could occur from November 15 through March 31 of any year.

DOUBLE-CRESTED CORMORANT AND OTHER BIRD SPECIES.--The majority of the Double-Crested Cormorant colony nest on the bridge between Piers 52 through 57 (inclusive). This “Cormorant Zone” is defined as the area from Piers 52 through 57 (inclusive) with vertical limits from the lower bridge deck to 20 feet below the lower bridge deck bottom chord. Per section, “Harbor Seal” of this special provision, no activity shall occur between Piers 52 through 57 (inclusive) during the “Closure Period”. Additionally, no activity shall be performed in the “Cormorant Zone” from August 1 to August 31 of any year.

Where Double-Crested Cormorant or other bird species nests are present outside of the “Cormorant Zone”, the Contractor shall not perform any activity within the nesting area during the breeding season defined as March 15 to August 31 of any year unless the Contractor implements the following:

a. Remove existing nests from the work areas prior to the breeding season.
b. Prevent the birds from constructing nests in the work area by installing temporary nettings and wood sheetings or by continually washing off nest material beginning March 1 through July 1.

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

Richmond-San Rafael Bridge Seismic Retrofit
ENVIRONMENTAL WORK RESTRICTIONS

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
No Activity Between Piers 52 Through 57 (Inclusive)												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
No activity within “Cormorant Zone”												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Anticipated Double-Crested Cormorant Breeding Season – For Work Outside “Cormorant Zone”												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
No Suction Dredging Allowed in Water Shallower than 20 Feet												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Anticipated Historical Pacific Herring Spawn												

Note:

For information only. See special provisions text for specific requirements.

5-1.35 UTILITIES

The Contractor shall make its own arrangements to obtain electrical power, water, or compressed air or other utilities required for its operations and shall make and maintain the necessary service connections at its own expense. The Contractor will not be allowed the use of any existing utilities on the bridge and/or highway facilities within the contract limits, unless approved in writing by the Engineer.

5-1.36 USE OF EXISTING TRAVELER RAILS AND SCAFFOLDS

Existing State-owned traveler scaffolds and other scaffolding facilities on the Richmond-San Rafael Bridge will not be available for use by the Contractor.

Contractor's scaffolds, platforms, or other access devices may be placed on the existing traveler rails, provided they carry only personnel and hand tools. The traveler rails shall not be used to support the Contractor's formwork, to support the protective cover where required, nor to hoist or transport structural steel or other materials. The design loading for the traveler rails and their supports shall not be exceeded.

The Contractor shall submit to the Engineer working drawings and design calculations of the Contractor's scaffold, platforms, or other access devices to be supported on the existing traveler rails. Such drawings and design calculation s shall be signed by an engineer who is registered as a Civil Engineer in the State of California. The working drawings and design calculations shall conform to the requirements of Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The number of sets of drawings and design calculations and times for review shall be the same as specified for falsework working drawings in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications.

Working drawings for any part of the supports shall include stress sheets, anchor bolt layouts, shop details, erection and removal plans.

The Contractor shall make his own determination of allowable loads that the existing traveler rails are capable of safely supporting based on anticipated loads.

Attention is directed to Section 7-1.11, "Preservation of Property," and to Section 7-1.14, "Cooperation," of the Standard Specifications.

5-1.37 AREAS FOR CONTRACTOR'S USE

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 all 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 any damage to or loss of materials or equipment located within such areas.

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

The Contractor shall secure at its own expense any area required for storage of plant, equipment and materials, or for other purposes if sufficient area is not available within the contract limits.

5-1.38 SANITARY PROVISIONS

State sanitary facilities will not be available for use by the Contractor's employees.

5-1.39 BRIDGE TOLLS

Toll-free passage on the Richmond-San Rafael Bridge will be granted only for cars, trucks and special construction equipment which are clearly marked on the exterior with the Contractor's identification and which are being operated by the Contractor exclusively for the project and for the purpose of transporting materials and personnel directly to and from the jobsite.

The Contractor shall make application to the Engineer in advance for toll-free passage. The Contractor will be held accountable for the proper use of all passes issued, and upon completion of the work, shall return all unused passes.

Attention is directed to Section 23302, "Evasion of Toll," of the Vehicle Code.

5-1.40 ACCESS TO JOBSITE

Prospective bidders may make arrangements to visit the jobsite by contacting the Toll BridgeProgram Duty Senior at District 04 Office, 111 Grand Avenue, Oakland, California 94623-0660, telephone number (510) 286-5549.

5-1.41 DRAWINGS

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

When working drawings are required by these special provisions, the drawings shall be submitted in accordance with the provisions in Section 55-1.02, "Drawings," of the Standard Specifications and the following:

1. Working drawings shall be submitted to the Engineer.
2. Working drawings shall not exceed 22" x 34" in size.
3. Microfilms are required of all approved shop drawings and shall be only a 24x reduction.

Working drawings will be required for the following items:

Bridge removal plans
Protection shields plans
Debris containment and collection program
Temporary bracing system
Fendering
Temporary supports
Prestressing existing steel truss members for temporary supports
Temporary structure
Falsework
Steel railing reconstruction
Excavation, pile and cofferdam discharge plans
Test borings
Test boring and drilling fluids working schematic diagrams
Micropiling
Micropiling test frame assemblies and access platform
Cast-in-drilled hole concrete pile placing plan
Precast concrete assemblies
Precast assembly erection frames
Precast concrete girders
Precast concrete decks
Precast bent cap shells
Precast concrete panel
Precast concrete panel erection frames and temporary support bracing.
Prestressing and anchorage assemblies
Prestressing cast-in-place concrete
Prestressing at pier 19 for the viscous damping devices
Expansion joint assemblies
Seismic isolation joint assemblies
Joint seal assembly (MR=4”)
Seismic isolation bearings
Viscous damping devices
Bar reinforcing steel
Column restrainer brackets
Steel casings
Structural steel
Miscellaneous metal
Paint residue containment and collection program

At the completion of the contract, one set of all approved final working drawings in electronic form, including any revisions required after approval, shall be furnished to the Engineer.

Electronic files of working drawings shall be Microstation Version 95 or a more current design file format and shall be submitted on compact disk media.

An index prepared specifically for the working drawings for each portion of the work which requires working drawings, containing sheet numbers and titles shall be included on the compact disk media. Electronic files for working drawings shall be arranged in the order of drawing numbers shown in the index.

The Contractor shall submit to the Engineer 3 copies of manufacturer's catalog sheets, maintenance and operation booklets or instructions for joint seal assembly (MR=4”), seismic isolation bearings, viscous damping devices, anti-washout admixtures, concrete coatings, and T-headed reinforcement.

5-1.42 PERMITS AND LICENSES

Attention is directed to Section 7-1.04, "Permits and Licenses," of the Standard Specifications and these special provisions.

The Department has obtained the following permits for this project:

San Francisco Bay Conservation Development Commission (BCDC)
US Army Corps of Engineers (ACOE)
San Francisco Bay (Region 2) Water Quality Control Board

Copies of these permits can be seen at the office of the Toll Bridge Program Duty Senior at 111 Grand Avenue, Oakland California 94612, telephone number (510) 286-5549.

The Contractor shall become fully informed of the conditions of the Permits that govern the Contractor's operations and shall conduct the construction operations accordingly.

The Contractor shall comply with all applicable provisions of the Permits. The Contractor shall be responsible for all fines, damages and job delays incurred due to failure to implement the requirements of the Permits.

The Contractor shall maintain a copy of the Permits at the construction site and shall make the Permits available to operating personnel during construction activities.

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

5-1.43 AERIALLY DEPOSITED LEAD, GENERAL

Aerially Deposited Lead is defined as lead deposited within the Department of Transportation (Caltrans) Right of Way primarily due to vehicle emissions. Aerially deposited lead contamination has been discovered through testing of materials from within the project limits.

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

Portions of the Site Investigation Report are included in the "Materials Information." The report entitled "Upland Soil Characterization and Disposal Option Evaluation - Richmond-San Rafael Bridge Retrofitting" is available for inspection at the Department of Transportation, 111 Grand Avenue, Oakland, from the Toll Bridge Duty Senior at (510) 286-5549. Materials with total levels of lead greater than the Total Threshold Limit Concentration (TTLC) of 1000 milligrams per kilogram (mg/kg) or solubility levels, as established by the California Waste Extraction Test (WET), greater than the Solubility Threshold Limit Concentration (STLC) of 5 milligrams per liter (mg/l) shall be considered hazardous pursuant to California Code of Regulations, Title 22. The materials with 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.

Excavation, transportation, and handling of soils 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 grubbing activities in work areas containing aerially deposited lead at hazardous levels.

Excavation and disposal of material with 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 2
Integrated Waste Management Board
Regional Water Quality Control Board (RWQCB), Region 2
State Air Resources Control Board
Bay Area Air Quality Management District (BAAQMD)
California Division of Occupational Safety and Health Administration (CAL-OSHA)

The Contractor shall prepare a project specific Health and Safety Plan to prevent or minimize exposure to potentially hazardous levels of lead. The Contractor's attention is directed to Title 8, California Code of Regulations, Section 5192 (b) (4) (B) and the Occupational Safety and Health Guidance Manual published by National Institute of Occupational Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA), and USEPA for elements of the site safety plan. The Health and Safety Plan shall contain as a minimum but not be limited to: identification of key personnel for the project, job hazard analysis for work assignments, summary of risk assessment, air monitoring plan, personal protective equipment, delineation of 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 of Title 8, California Code of Regulations Section 1532.1 and as a minimum shall contain a description of activities, specific means employed to achieve compliance, report of the technology considered, air monitoring, schedule for implementation of the program, a work practice program, administrative control schedule, description of arrangements for information transfer between 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 be 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 aerially deposited lead. The Health and Safety plan shall be approved by the Contractor's Certified

Industrial Hygienist before submission to the Engineer. The plan shall be submitted to the Engineer for review and acceptance at least 15 days prior to beginning any work in areas containing aerially deposited lead.

Prior to performing any work in areas containing 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, which meets the requirements of Title 8, California Code of Regulations, 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 10.

If lead levels are not known, the Contractor shall conduct initial sampling in the area to determine lead levels. The Contractor shall prepare a work plan for the handling, temporary stockpiling anddisposal of materials containing lead. The sampling 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 development of the sampling plan, statistical analysis, and reporting of the test results and shall be submitted to the Engineer for review and approval at least 15 days prior to beginning work in any areas containing lead.

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.

5-1.44 CONTAMINATED AND HAZARDOUS MATERIAL, GENERAL

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

Contaminated and hazardous material have been discovered through testing within the project limits. Portions of the test results are included in the "Materials Information Handout". The complete report entitled "Upland Soil and Ground Water Characterization, Richmond-San Rafael Bridge Seismic Retrofit Project" is available for inspection at the Department of Transportation, Toll Bridge Duty Senior, 111 Grand Avenue, Oakland, California, (510) 286-5549. The levels of some material designated as hazardous at the locations shown in the Richmond-San Rafael Bridge, Soil Classification Table enclosed in the Section "Earthwork" of these special provisions are regulated under the Resource Conservation and Recovery Act (RCRA). The levels of hydrocarbon contamination are considered to be designated waste as defined by State of California regulations.

No contaminated material or hazardous material shall be deposited on public roads. The Contractor shall indemnify the State from any costs due to spillage during the transport of the contaminated or hazardous material to the disposal facility.

All contaminated material and hazardous material on exteriors of transport vehicles shall be removed and placed either into the current transport vehicle or the excavation prior to the vehicle leaving the exclusion zone.

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

Excavation operations outside structure excavation pay limits will be at the Contractor's expense. This resultant material shall be treated as either contaminated material or hazardous material if the test results for the location indicate that the material being excavated is contaminated or hazardous.

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

United States Department of Transportation (USDOT)
United States Environmental Protection Agency (USEPA)
California Environmental Protection Agency (CAL-EPA)

1. Department of Toxic Substance Control (DTSC)
2. Integrated Waste Management Board
3. Regional Water Quality Control Board, Region 2 (RWQCB)
4. State Air Resources Board

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

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

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

HEALTH, SAFETY AND WORK PLAN.--The Contractor shall prepare a detailed Health, Safety and Work Plan for all site personnel in accordance with the DTSC and CAL-OSHA regulations. The Health, Safety and Work Plan shall include a plot plan indicating the exclusion zones, contaminant reduction (decontamination zones) and support zones in accordance with California Code of Regulations (CCR), Title 8, an air monitoring plan, site clean up procedures, and physical barrier; and shall be submitted at least 15 working days prior to beginning any work for review and acceptance by the Engineer. Prior to submittal, the Contractor shall have the Health, Safety and Work Plan approved by a Civil Engineer, registered in the State of California and by a Certified Industrial Hygienist.

SAFETY.--Prior to performing any work at the locations containing material classified as hazardous, all personnel, including State Personnel, shall complete a 40 hour safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified. The training shall be provided by the Contractor. The Contractor shall provide a certification of completion of the Safety Training Program to all personnel. Any personal protective equipment required by the Contractor's Health, Safety and Work Plan for personnel working within the exclusion zone will be supplied to State personnel by the Contractor. The number of State personnel requiring the above mentioned safety training program and personal protective equipment will be 10.

The decontamination area shall be located outside of the exclusion zone. Water from decontamination procedures shall be collected and disposed of at an appropriate disposal site by the Contractor. Non-reusable protective equipment, once used by any personnel, including State personnel, shall be collected and disposed of at an appropriate disposal site by the Contractor. Temporary 6-foot chain link security fence shall be installed to surround and secure the exclusion zone.

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

The Contractor may perform additional tests on the material to be excavated at his option and expense for confirmation of the material classification as contaminated or hazardous. Sampling and analysis shall be the same or equivalent tests specified in the Materials Information Handout. The Contractor shall submit for approval by the Engineer, his sampling and analysis procedure and the name and address of the laboratory to be used fifteen working days prior to beginning any sampling or analysis. The laboratory used shall be certified by the California Department of Health Services. The Contractor shall submit a copy of the test results to the Engineer prior to the disposal of the material.

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

5-1.45 ESTABLISH MARINE ACCESS

This work shall consist of furnishing, erecting, maintaining and removing barges, trestles and other facilities to provide marine access to the job site. This work shall be separate from and in addition to the work specified in Section 11, "Mobilization," of the Standard Specifications.

The Contractor shall submit, for approval by the Engineer, a schedule of values detailing the cost breakdown of the contract lump sum item for establish marine access. The schedule of values shall reflect the items, work, quantities and costs required to establish marine access to the job site, including as a minimum: initial mobilization of marine access facilities, monthly facility and equipment rental, monthly maintenance, and demobilization. The Contractor shall be responsible for the accuracy of the quantities and costs used in the schedule of values submitted for approval.

The sum of the amounts for the items and work listed in the schedule of values shall be equal to the contract lump sum price for establish marine access.

The schedule of values for establish marine access shall be submitted to the Engineer within the time required for submittal of the Interim Baseline Schedule, as specified in "Progress Schedule (Critical Path)" of these special provisions.

When approved in writing by the Engineer, the schedule of values will be used to determine progress payments for establish marine access during the progress of the work. No partial payment for establish marine access will be made until the schedule of values is approved in writing by the Engineer.

The contract lump sum price paid for establish marine access shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in establishing marine access to the job site, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

When other contract items are adjusted as provided in Section 4-1.03, "Changes," of the Standard Specifications, the costs of establishing marine access to the job site will be deemed to have been recovered by the Contractor through the

payments made for establish marine access, and will be excluded from consideration in determining compensation for the adjustments.

5-1.46 RELATIONS WITH BAY AREA AIR QUALITY MANAGEMENT DISTRICT (ASBESTOS DEMOLITION/RENOVATION)

Portions of the work being performed under this contract are subject to the provisions of Regulation 11, Rule 2, "Asbestos Demolition, Renovation, and Manufacturing," of the Bay Area Air Quality Management District. Copies of the Regulation, Rule 2 are available for inspection at the Toll Bridge Program Duty Senior at District 04 Office, 111 Grand Avenue, Oakland, California 94623-0660, telephone number (510) 286-5549. The Contractor shall be fully informed of the provisions of Regulation 11, Rule 2 and shall conduct the work accordingly.

The Contractor shall submit the required notification of intent to demolish or renovate to the Bay Area Air Quality Management District at least 10 working days, as defined in Rule 2, prior to beginning any demolition, even where no regulated asbestos-containing material (RACM) is present; any renovation operation where the amount of RACM is at least 30.8 linear meters, 9.4 square meters, or 1 cubic meter; and for all dry removals. The Contractor shall pay all fees for conducting the asbestos operations.

An asbestos survey has been completed covering the work areas of this contract. Copies of the report are available for inspection at the office of the Toll Bridge Program Duty Senior at 111 Grand Avenue, Oakland, CA 94612, telephone no. (510) 286-5549. Notify the Duty Senior at least 24 hours in advance to reserve a copy for review.

Attention is directed to Sections 7-1.01, "Laws to be Observed," 7-1.04, "Permits and Licenses," and 7-1.09, "Public Safety, " of the Standard Specifications.

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

SECTION 6. (BLANK)

SECTION 7. (BLANK)

SECTION 8. MATERIALS

SECTION 8-1. MISCELLANEOUS

8-1.01 PREQUALIFIED AND TESTED SIGNING AND DELINEATION MATERIALS

The Department maintains a trade name list of approved prequalified and tested signing and delineation materials and products. Approval of prequalified and tested products and materials shall not preclude the Engineer from sampling and testing any of the signing and delineation materials or products at any time.

Said listing of approved prequalified and tested signing and delineation materials and products cover the following:

MATERIALS and PRODUCTS

Temporary pavement markers
Striping and pavement marking tape
Pavement markers, reflective and non-reflective
Flexible Class 1 delineators and channelizers
Railing and barrier delineators
Sign sheeting and base materials
Reflective sheeting for barricades
Reflective sheeting for channelizers
Reflective sheeting for markers and delineators
Reflective sheeting for traffic cone sleeves
Reflective sheeting for barrels and drums

None of the above listed signing and delineation materials and products shall be used in the work unless such material or product is listed on the Department's List of Approved Traffic Products. A Certificate of Compliance shall be furnished as specified in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for signing and delineation materials and products. Said certificate shall also certify that the signing and delineation material or product conforms to the prequalified testing and approval of the Department of Transportation, Division of Traffic Operations and was manufactured in accordance with the approved quality control program.

Materials and products will be considered for addition to said approved prequalified and tested list if the manufacturer of the material or product submits to the Division of Traffic Operations a sample of the material or product. The sample shall be sufficient to permit performance of all required tests. Approval of such materials or products will be dependent upon a determination as to compliance with the specifications and any test the Department may elect to perform.

The following is a listing of approved prequalified and tested signing and delineation materials and products:

PAVEMENT MARKERS, PERMANENT TYPE

REFLECTIVE

Adelite (4"x4")
Apex (4"x4")
Pavement Markers, Inc., "Hye-Lite" (4"x4")
Ray-O-Lite, Models SS, RS, and AA (4"x4")
Ray-O-Lite, Models 2002 (2.4"x4.7")
Stimsonite, Model 88 (4" x4")

REFLECTIVE WITH ABRASION RESISTANT SURFACE

Ray-O-Lite "AA" ARS (4" x4")(Not for use in recessed applications)
Ray-O-Lite Mod. 2002 ARS (2.2"x4.7")
Stimsonite, Model 911 (4"x4")(Not for use in recessed applications)
Stimsonite, Model 944 SB (2"x4")
Stimsonite, Model 948 (2.3"x4.7")
Stimsonite, Model 953 (2.75"x4.5")(Not for use in recessed applications)

NON-REFLECTIVE FOR USE WITH EPOXY OR BITUMEN ADHESIVE

Apex Universal (Ceramic)
Highway Ceramics Inc. (Ceramic)
Zumar, TM40W/Y (Polyester)

NON-REFLECTIVE FOR USE WITH BITUMEN ADHESIVE ONLY

Apex Universal, Model 929 (ABS)
Elgin Molded Plastics, "Empco-Lite" Model 900 (ABS)
Hi-Way Safety Inc., Models P20-2000W and 2001Y (ABS)
Interstate Sales, "Diamond Back" (ABS)
Loomis Plastics, D-Dot (ABS)
Pavement Markers Inc., (Marker Supply) - Models A1107 and AY1108 (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")
Elgin Molded Plastics, "Empco-Lite" Model 901 (4" Round)
Highway Technologies, Megalites (4"x4")
Road Creations, Model R41C (4"x4")

TEMPORARY MARKERS FOR SHORT TERM DAY/NIGHT USE (14 days or less)

Apex Universal, Model 932
Davidson Plastics, Models TOM (Standard) with Reflexite PC-1000, or (WZ) with Reflexite AC-1000 Sheeting
Hi-Way Safety Inc., Model 1280/1281 with Reflexite PC-1000
Stimsonite, Model 300 "Temporary Overlay Marker"

TEMPORARY MARKERS FOR SHORT TERM DAY/NIGHT USE (14 days or less at seal coat locations)

Apex Universal, Model 932
Davidson Plastics, Models TRPM (Standard) with Reflexite PC-1000, or (WZ) with Reflexite AC-1000 Sheeting
Davidson Plastics, Models "HH" (High Heat) TRPM (Standard) with Reflexite PC-1000, or (WZ) with Reflexite AC-1000 Sheeting
Hi-Way Safety Inc., Model 1280/1281 with Reflexite PC-1000
Stimsonite, Model 301 Chip Seal Marker

STRIPING AND PAVEMENT MARKING MATERIAL

PERMANENT TRAFFIC STRIPING AND PAVEMENT MARKING TAPE

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

TEMPORARY REMOVABLE STRIPING AND PAVEMENT MARKING TAPE

Advanced Traffic Marking, ATM Series 200
Brite-Line, Series 100
P.B. Laminations, Aztec, Grade 102
Swarco Industries, "Director-2"
3M, "Stamark" Brand, Detour Grade, Series 5710 and A620

PREFORMED THERMOPLASTIC

Flint Trading, "Premark""
Pavemark, "Hotape"

REMOVABLE TRAFFIC PAINT

Belpro, Series 250/252 and No. 93 Remover

CLASS 1 DELINEATORS

ONE-PIECE DRIVEABLE FLEXIBLE TYPE, 1200 mm (48")

Carsonite, Curve-Flex CFRM-400
Carsonite, Roadmarker CRM-375
Davidson Plastics, "Flexi-Guide 400 and 566"
GreenLine Model HWDI-66
GreenLine Model CGDI-66

SPECIAL USE FLEXIBLE TYPE, 1200 mm (48")

Carsonite, "Survivor" with 18" U-Channel anchor
FlexStake, H-D
GreenLine HWD with 18" soil anchor
GreenLine CGD with 18" soil anchor
Safe-Hit with 8" pavement anchor (SH248-GPR and SHAI-08-PI)
Safe-Hit, with 15" soil anchor (SHA5-15C-GL)
Safe-Hit, with 18" soil anchor (SH248-GPR and SHAI-18C-PL)

SURFACE MOUNT FLEXIBLE TYPE, 1200 mm (48")

Bent Manufacturing Co., "Masterflex" Model MF-180EX-48"
Carsonite, "Super Duck II"
FlexStake, Surface Mount H-D

CHANNELIZERS

SURFACE MOUNT TYPE 900 mm (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 "The Channelizer"
FlexStake, Surface Mount H-D
GreenLine SMD-36
Repo, Models 300 and 400
Safe-Hit, Guide Post, Model SH236SMA, with glue down base
The Line Connection, "Dura-Post" Model DP36-3C

TYPE "K" OBJECT MARKERS 450 mm (18")

Carsonite, Model SMD-615
Repo, Models 300 and 400
Safe-Hit, Model SH718SMA
The Line Connection, Model DP21-4K (Vertical configuration only)

TYPE "Q" OBJECT MARKERS, 450-600 mm (18-24")

Carsonite, Super Duck II
Repo, Models 300 and 400
Safe-Hit, Models SH824SMA--WA and SH824GP3--WA
The Line Connection, Model "DP21-4Q"

CONCRETE BARRIER MARKERS (For use to the left of traffic.**)**

IMPACTABLE TYPE

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

NON-IMPACTABLE TYPE

Astro-Optics, 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 400 mm (16"). **(**For use to the right of traffic. When mounted on top of barrier, places top of reflective element at 48" [1200 mm]**)**

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

SOUND WALL DELINEATOR (On vertical surface, places top of reflective element at 48" [1200 mm]**.)**

Davidson Plastics, PCBM S-36

GUARD RAILING DELINEATOR 685 mm (27") Wood Post Type. (For use to the right or left of traffic. Places reflective element at 48" [1200 mm].**)**

Carsonite, Model 427
Davidson Plastics FG 427 and FG-527
GreenLine GRD 27-inch
Safe-Hit, Model SH227GRD

GUARD RAILING DELINEATOR 685 mm (27") Steel Post Type. (For use to the right or left of traffic. Places reflective element at 48" [1200 mm].**)**

Carsonite, Model CFGR-327 with CFGRBK300 Mounting Bracket

REFLECTIVE SHEETING FOR:

CHANNELIZERS, BARRIER MARKERS AND DELINEATORS

3M, High Intensity (Long Term)
Reflexite, PC-1000, Metalized Polycarbonate (Long Term)
Reflexite, AC-1000, Acrylic (Long Term)
Reflexite, AP-1000, Metalized Polyester (Short Term)
Stimsonite, Series 4500 (For Carsonite CurveFlex and Roadmarker delineators only)

TRAFFIC CONES

330 mm (13") Sleeves
Reflexite SB (Polyester), Vinyl or "TR" (Semi-transparent)

100 and 150 mm (4" and 6") Sleeves
3M Series 3840
Reflexite Vinyl

BARRELS AND DRUMS

Reflexite, "Super High Intensity"
3M Series 3810

BARRICADES

Type I, Engineer Grade
American Decal, Adcolite
Avery Dennison, 1500/1600
Nikkalite, 8100 Series
3M, Scotchlite, Series CW

SIGNS

Type II, Super Engineer Grade (State-Furnished Signs Only)
Avery Dennison, "Fasign" 2500 Series
Kiwalite, Type II
Nikkalite 1800 Series

Type III, High Performance
3M, High Intensity, Series 3870

Type IV, High Performance
Stimsonite, Series 4200

Type VI, Roll-Up Signs
Reflexite, Vinyl

Note: Sheeting Types conforming to the requirements of ASTM Designation: D 4956-93B

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:

Disks for survey monuments.

Equipments for pile load testing including load cells for the primary measurement of load, and displacement transducers.

Attention is directed to "Seismic Monitoring System Work," of these special provisions for State-furnished materials associated with the seismic monitoring system.

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.

Wherever the word "cement" is used in the Standard Specifications or the special provisions, and its use conforms to one of the following criteria, it shall be understood to mean "cementitious material":

A. When the cement content of portland cement concrete is specified and Section 90, "Portland Cement Concrete," of the Standard Specifications is referenced.
B. When the pounds of cement per cubic yard for portland cement concrete is specified and Section 90, "Portland Cement Concrete," of the Standard Specifications is referenced.

The above criteria shall not apply when the use of mineral admixture is not allowed.

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 of 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 of California Test 109 within one year prior to producing concrete for the project. The delivery weight certificate accompanying each load to be tested shall meet the requirements of these special provisions and shall include the specific gravity of the coarse aggregate used in the load.

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. All 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 any concrete on the project, the Contractor shall supply a list of all 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 per project. The truck mixers selected for testing shall be representative of the different mixer brands, ages, and conditions of the mixers on the list. 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 Contractor shall provide an adequate number of testers to successfully perform the testing with a minimum amount of impact to the Contractor's operations. All testers used shall meet the requirements of the Department's Quality Assurance Program. The Quality Assurance Program Manual is available from the Department's Central Publications Unit, 1900 Royal Oaks Drive, Sacramento, CA 95815-3800 or orders may be placed by phone at (916) 445-3520, by FAX at (916) 324-8997, or on the internet at "http://www.ns.net/caltrans/publicat.htm."

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 will be considered as included in the contract price paid for the concrete work involved and no additional compensation will be allowed therefor.

Unless otherwise specified, Type C accelerating chemical admixture conforming to the requirements of ASTM Designation: C 494, may be used in portland cement concrete for precast steam cured concrete members.

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 a combination of "Type II Modified" portland cement and mineral admixture.

Concrete for each portion of the work shall comply with the requirements 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.

Whenever the 28-day compressive strength shown on the plans is 3,500 pounds per square inch or greater, 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 less than 3,500 pounds per square inch, 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 any monies 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.

All 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 "Type II Modified" portland cement.

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

In addition, "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 of 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 deleted.

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 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 ASTM Designation: C109, when compared to the results obtained with distilled water, tested in conformance with 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 of the ASTM Designations shown below:

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, except that the loss on ignition shall not exceed 4 percent, or, silica fume as specified in ASTM Designation: C 1240, 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 be as specified 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 any 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 measured in conformance with the requirements of ASTM Designation: C 618.

Unless specified otherwise, 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 not be less than 25 percent by weight of the total amount of cementious 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, mineral admixture or a combination of both; however, the maximum 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 Admixture," 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.—All weighing, measuring or metering devices used for proportioning materials shall conform to the requirements in Section 9-1.01, "Measurement of Quantities," and this Section 90-5.02. In addition, any automatic weighing systems used shall comply with the requirements 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," 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, all 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 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 all other weigh systems. Each weigh system shall be equipped with a hopper, a lever system, and an indicator to constitute an individual and independent material weighing device. The cement, and the mineral admixture shall be discharged into the mixer simultaneously with the aggregate.

The 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 any 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 any 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 all 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 dial or beam scale and indicator for weighing each size of aggregate.
B. Single box and dial or multiple beam type 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 requirements specified 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:

All concrete shall be homogeneous and thoroughly mixed, and there shall be no lumps or evidence of undispersed cement, mineral admixture, or cement plus mineral admixture.

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 and eighth 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.

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

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 or the calculated portland cement concrete volume (cubic yards) calculated from actual scale weights. Theoretical or target batch weights shall not be used as a substitute for actual scale weights. When showing a calculated portland cement concrete volume on the delivery weight certificate, the Contractor shall maintain and have available a record of the following information for each batched load:

1. Mix identification number, specific to the contract.
2. Load number shall match the load number on the delivery weight certificate.
3. Date and time the load was batched.
4. Actual batch weight (pounds) for each ingredient.
5. Any water (gallons) added at the plant, in addition to the water proportioned for the batch.

When requested, the Contractor shall submit the recorded information for calculated portland cement concrete volumes to the Engineer. The information shall be provided in printed form, or if acceptable to the Engineer, 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) delevered to the jobsite with the load.

All wight certificates furnished by the Contractor shall conform to the requirements of Section 9-1.01, "Measurement of Quantities."

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 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 elsewhere 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 of 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. All 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 specifications of 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.

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

Certified test data, in order to be acceptable, 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.

All tests shall be performed in conformance with either the appropriate California Test methods or the comparable ASTM test methods. All 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 all ingredients used.
D. Penetration of the concrete.
E. The air content of the concrete if an air-entraining admixture is used.
F. The age at time of testing and strength of all concrete cylinders tested.

All 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 any 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 and the Contractor shall be responsible for production of trial batches at a sufficiently early date so that the progress of the work is not delayed.

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

Section 90-10.02A, "Portland Cement," of the Standard Specifications is renamed "Cementitious Material" and 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 elsewhere 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, that is suitable for the use intended, and which conforms to requirements specified herein. "Recognized standards of good practice" are outlined in various industry publications such as are issued by American Concrete Institute, AASHTO, or 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 weight certificate shall be clearly marked with the date and time of day when the load left the batching plant and, if hauled in truck mixers or agitators, the time the mixing cycle started.

A Certificate of Compliance in conformance with 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 all 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 any admixtures in the concrete when their use is not required by these specifications or the special provisions, furnishing the admixtures and adding them to the concrete will be paid for as extra work as provided in Section 4-1.03D.

Should the Contractor use admixtures as permitted under Sections 90-4.05, "Optional Use of Chemical Admixtures;" or 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 ROADWAY DECK SLAB REQUIREMENTS

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

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 welding for this project.

8-3.02 WELDING QUALITY CONTROL

Welding quality control shall apply to the items of work described herein and shall conform to the requirements in the AWS welding codes, the Standard Specifications and these special provisions.

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	1996
D1.4	1992
D1.5	1995
D1.5 (metric only)	1996

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.

Except for steel piling, welding performed anywhere other than at a permanent fabrication facility that is certified under the AISC Quality Certification Program, Category III, Major Steel Bridges, shall conform to the provisions for welding quality control as specified herein. Welding of steel piling shall conform to the provisions in "Piling" elsewhere in these special provisions and to the provisions for welding quality control specified herein.

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

Unless otherwise specified, when any type of welding is performed on items of work including 1) steel piles, 2) bar reinforcement, 3) steel structures, 4) column casings and 5) miscellaneous metal, 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 all welding, including materials and workmanship, performed by the Contractor and all subcontractors.

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.

No welding inspection personnel or nondestructive testing (NDT) firms to be used in the work shall 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 shall be the sole individual responsible to the Contractor for submitting and receiving all correspondence and required submittals and reports regarding welding to and from the Engineer.

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

Prior to performing any welding, the Contractor shall submit to the Engineer, in accordance with the provisions of Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, 3 copies of a separate QCP for each item of work for which welding is to be performed. As a minimum, each QCP 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 and 2) placing all identification and tracking information on each radiograph;
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.

The Engineer shall have 10 working days to review the QCP submittal after a complete plan has been received. No welding shall be performed until the QCP 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 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.

An amended QCP or addendum shall be submitted to, and approved in writing by the Engineer, for any proposed revisions to the approved QCP. An amended QCP or addendum will be required for any revisions to the QCP, 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 QCP or addendum. Work that is affected by any of the proposed revisions shall not be performed until the amended QCP 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 QCP or addendum, 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.

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

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.

It is expressly understood that the Engineer's approval of the Contractor's QCP 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 QCP.

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 reports regarding NDT, including radiographs, shall be signed by both 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 shall review the Welding Report to determine if the Contractor is in conformance with the QCP. 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" elsewhere in these special provisions. Prior to receiving notification from the Engineer of the Contractor's conformance with the QCP, 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 as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Sections 6.1.1 through 6.1.3.3 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 accordance with the provisions of 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 accordance with the provisions of 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 6.14.7, "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 amended to read:

Personnel performing NDT shall be qualified in accordance with 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. 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 amended to read:

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 amended to read:

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 QCP, 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 as specified 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 or an independent third party acceptable to 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 in accordance with Section 4-1.03D, "Extra Work," of the Standard Specifications. Should any welding deficiencies be discovered by this additional NDT, the cost of the testing will not be paid for as extra work, 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 accordance with 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 accordance with the details shown on the plans and the provisions of the Standard Specifications and these special provisions.

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

SECTION 9. DESCRIPTION OF BRIDGE WORK

The bridge work to be done consists, in general of, the replacement of the concrete trestle portion and constructing seismic retrofit on the rest of the structure in accordance with the details shown on the plans and briefly described as:

Richmond-San Rafael Bridge
(Br. No. 28-0100)

The bridge includes two single deck reinforced concrete approach trestle, two steel plate girder approach structures which convert from single-deck to double deck at each end of the bridge, two variable-depth, double-deck, cantilever-truss-type structures and 38 constant-depth 289 foot span, double-deck trusses which span between the two cantilever spans and between the cantilever spans and the approach structures. The structure has a combined length of approximately 21,335 feet.

The replacement of the concrete trestle portion shall be constructed by one of the alternative types of construction methods as shown on plans and as specified in these special provisions.

Additional bridge work to be done consists of earthquake retrofitting fenders in accordance with the details and at the locations shown on the plans.

SECTION 10. CONSTRUCTION DETAILS

SECTION 10-1. GENERAL

10-1.01 ELECTRONIC MOBILE DAILY DIARY SYSTEM DATA DELIVERY

Attention is directed to Sections 5-1.10, "Equipment and Plants," and 7-1.01A(3), "Payroll Records," of the Standard Specifications, and these special provisions.

The Contractor shall submit to the Engineer a list of each piece of equipment and its identifying number, type, make, model and rate code in accordance with the Department of Transportation publication entitled “Labor Surcharge and Equipment Rental Rate” which is in effect on the date upon the work is performed, and the names, labor rates and work classifications for all field personnel employed by the Contractor and all subcontractors in connection with the public work, together with such additional information as is identified below. This information shall be updated and submitted to the Engineer weekly through the life of the project.

This personnel information will only be used for this mobile daily diary computer system and it will not relieve the Contractor and subcontractors from all the payroll records requirements as required by Section 7-1.01A(3), "Payroll Records," of the Standard Specifications.

The Contractor shall provide the personnel and equipment information not later than 11 days after the contract award for its own personnel and equipment, and not later than 5 days before start of work by any subcontractor for the labor and equipment data of that subcontractor.

The minimum data to be furnished shall comply with the following specifications:

Data Content Requirements.--

1. The Contractor shall provide the following basic information for itself and for each subcontractor that will be used on the contract:

Company name.	Alphanumeric; up to 30 characters.
Federal tax ID	Alphanumeric; up to 10 characters.
State contractor license	Alphanumeric; up to 20 characters.
Company type (prime or sub)	Alphanumeric; up to 10 characters.
Address (line 1).	Alphanumeric; up to 30 characters.
Address (line 2).	Alphanumeric; up to 30 characters.
Address (city).	Alphanumeric; up to 30 chars.
Address (2-letter state code).	Alphanumeric; up to 2 characters.
Address (zip code)	Alphanumeric; up to 14 characters.
Contact name.	Alphanumeric; up to 30 characters
Telephone number (with area code).	Alphanumeric; up to 20 characters.
Company code: short company name.	Alphanumeric; up to 10 characters.
Type of work (Department-supplied codes)	Alphanumeric; up to 30 characters
DBE status (Department-	Alphanumeric; up to 20 characters.

supplied codes)	
Ethnicity for DBE status (Department-supplied codes).	Alphanumeric; up to 20 characters.
List of laborers to be used on this contract (detail specified below).	
List of equipment to be used on this contract (detail specified below).	

For example, one such set of information for a company might be:

XYZ CONSTRUCTION, INC.
94-2991040
AL1649T
SUB
1240 9TH STREET
SUITE 600
OAKLAND
CA
94612
JOHN SMITH
(510) 834-9999
XYZ
PAVING
MBE
BLACK

2. The Contractor shall provide the following information for each laborer who will be used on the contract:

Company code (as defined above).	Alphanumeric; up to 10 characters.
Employee ID	Alphanumeric; up to 10 characters.
Last name.	Alphanumeric; up to 20 characters.
First name.	Alphanumeric; up to 15 characters.
Middle name.	Alphanumeric; up to 15 characters.
Suffix	Alphanumeric; up to 15 characters
Labor trade (Department-provided codes).	Alphanumeric; up to 10 characters.
Labor classification (Department-provided codes).	Alphanumeric; up to 10 characters.
Regular hourly rate.	Alphanumeric; up to (6,2)
Overtime hourly rate.	Alphanumeric; up to (6,2)
Doubletime hourly rate	Alphanumeric; up to (6,2)
Standby hourly rate.	Alphanumeric; up to (6,2)
Ethnicity (Department-provided codes).	Alphanumeric; up to 20 characters.

Gender.	Alphanumeric; up to 1 characters.

For example, one such set of information might be:

XYZ
1249
GONZALEZ
HECTOR
VINCENT
JR.
OPR
JNY
22.75
30.25
37.75
0.00
HISPANIC
M

3. The Contractor shall provide the following information for each piece of equipment that will be used on the contract:

Company code (as defined above).	Alphanumeric; up to 10 characters.
Company's equipment ID number.	Alphanumeric; up to 10 characters.
Company's equipment description.	Alphanumeric; up to 60 characters.
Equipment type (from Department ratebook).	Alphanumeric; up to 60 characters.
Equipment make (from Department ratebook).	Alphanumeric; up to 60 characters.
Equipment model (from Department ratebook).	Alphanumeric; up to 60 characters.
Equipment rate code (from Department ratebook).	Alphanumeric; up to 10 characters
Regular hourly rate.	Alphanumeric; up to (6,2)
Overtime hourly rate.	Alphanumeric; up to (6,2)
Standby hourly rate	Alphanumeric; up to (6,2)
Idle hourly rate.	Alphanumeric; up to (6,2)
Rental flag.	Alphanumeric; up to 1 character.

For example, one such set of information might be:

XYZ
B043
CAT TRACTOR D-6C
TRACC
CAT
D-6C
3645
28.08
25.27
14.04
0.00
N

Data Delivery Requirements.--

1. All data described in "Data Requirements" of this section shall be delivered to the Department electronically, on 3 1/4" floppy disks compatible with the Microsoft Windows operating system. The Contractor shall provide a weekly disk and hard copy of the required correct updated personnel and equipment information for the Contractor and all the subcontractors and verified correct by the Engineer.
2. Data of each type described in the previous section (contractor, labor, and equipment information) will be delivered separately, each type in one or more files on floppy disk. Any given file may contain information from one contractor or from multiple contractors, but only one type of data (contractor, labor, or equipment information).
3. The file format for all files delivered to Caltrans shall be standard comma-delimited, plain text files. This type of file (often called "CSV") is the most standard type for interchange of formatted data; it can be created and read by all desktop spreadsheet and desktop database applications. Characteristics of this type of file are:

   - All data is in the form of plain ASCII characters.
   - Each row of data (company, person, equipment) is delimited by a carriage return character.
   - Within rows, each column (field) of data is delimited by a comma character.

4. The files shall have the following columns (i.e., each row shall have the following fields):

   - Contractor info: 15 columns (fields) as specified in "Data Requirements #1", above.
   - Labor info: 14 columns (fields) as specified in "Data Requirements #2", above.
   - Equipment info: 12 columns (fields) as specified in "Data Requirements #3", above.

   For each type of file, columns (fields) must be in the order specified under "Data Requirements", above. All columns (fields) described under "Data Requirements" must be present for all rows, even if some column (field) values are empty. The first row of each file may contain column headers (in plain text) rather than data, if desired.

5. Column (field) contents must conform to the data type and length requirements described in the "Data Requirement" section, above. In addition, column (field) data must conform to the following restrictions:

   - All data shall be uppercase.
   - Company type shall be either "PRIME" or "SUB".
   - Labor trade and classification codes must conform to a list of standard codes that will be supplied by Department.
   - Contractor type of work codes and DBE status codes must conform to a list of standard codes that will be supplied by Department.
   - Ethnicity codes must conform to standard codes that will be supplied by Department.
   - Data in the "gender" column must be either "M" or "F".
   - Data in the "rental equipment" column must be either "Y" or "N".
   - Equipment owner's description may not be omitted. (The description, together with the equipment number, is how the equipment will be identified in the field.) Include manufacturer, rated capacity & trade description
   - Equipment type, make, model, and ratebook code shall conform to the Department of Transportation Publication entitled "Labor Surcharge and Equipment Rental Rate", which is in effect on the date upon the work is performed. If the equipment in question does not have an entry in the book then alternate, descriptive entries may be made in these fields as directed by the Engineer.

6. The name of each file must indicate its contents, e.g., "XYZlab.csv" for laborers from XYZ Company, Inc. Each floppy disk supplied to Caltrans must be accompanied by a printed list of the files it contains with a brief description of the contents of each file.

PAYMENT.-- Payment for providing electronic mobile daily diary computer system data delivery will be made on a lump sum basis. The lump sum bid price for electronic mobile daily diary computer system data delivery will be made according to the following schedule:

The Contractor will receive not more than 2.5 percent per month of the total bid price for electronic mobile daily diary computer system data delivery.

After the completion of the work, 100 per cent payment will be made for electronic mobile daily diary computer system data delivery less the permanent deduction, if any, for failure to deliver complete weekly electronic mobile daily diary computer system data in each month.

The contract lump sum price paid for electronic mobile daily diary computer system data delivery shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in electronic mobile daily diary computer system data delivery as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

After the completion of the work, 100 per cent payment will be made for electronic mobile daily diary computer system data delivery less the permanent deduction, if any, for failure to deliver complete weekly electronic mobile daily diary computer system data in each month.

The Department will retain an amount equal to 25 percent of the estimated value of the work performed during the first estimate period in which the Contractor fails to submit electronic mobile daily diary computer system data delivery conforming to the requirements of this section, as determined by the Engineer. Thereafter, on subsequent successive estimate periods the percentage the Department will retain will be increased at the rate of 25 percent per estimate period in which acceptable electronic mobile daily diary computer system data have not been submitted to the Engineer. Retentions for failure to submit acceptable electronic mobile daily diary computer system data shall be additional to all other retentions provided for in the contract. The retention for failure to submit acceptable electronic mobile daily diary computer system data will be released for payment on the next monthly estimate for partial payment following the date that acceptable electronic mobile daily diary computer system data is submitted to the Engineer.

The adjustment provisions in Section 4-1.03, "Changes," of the Standard Specifications, shall not apply to the item of electronic mobile daily diary computer system data delivery. Adjustments in compensation for electronic mobile daily diary computer system data delivery will not be made for any increased or decreased work ordered by the Engineer in furnishing electronic mobile daily diary computer system data.

10-1.02 ORDER OF WORK

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

Attention is directed to Sections entitled "Environmental Work Restrictions" and "Relations With U.S. Coast Guard" of these special provisions concerning various types of work restrictions related to environmental issues and aid to navigation and waterways on this project.

Attention is directed to the section entitled "Cooperation" of these special provisions. The Contractor shall cooperate and coordinate his operation with State maintenance forces, other agency forces and other contractors that may be performing work within these construction limits.

The Contractor shall notify the Engineer, and submit a schedule of work, not less than 90 days prior to performing any portion of work that will cause an obstruction of the operation of the existing State-owned traveling maintenance scaffolds and platforms. Other State contractors will be installing alternative temporary or permanent traveling maintenance scaffolds and platforms to clear the area affecting the operation of the existing maintenance traveler facility.

Prior to removing portions of the Trestle bridge structure, the Contractor shall remove the steel covers of the northerly existing utility tray on the eastbound trestle to allow temporary relocation of existing telephone conduits and fiber optics cable by PacBell forces.

Attention is directed to "Maintaining Traffic" and "Temporary Pavement Delineation" of these special provisions and to the traffic handling and detour sheets of the plans.

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 said 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, such 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 also include the limits or changes in striping pattern, including one- and two-way barrier lines, 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.

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

Attention is directed to the sections entitled "Temporary Supports," "Falsework," and "Bridge Removal (Portion)," of these special provisions. Temporary supports shall be in place prior to beginning bridge removal (portion) operation at those locations requiring temporary supports.

Attention is directed to the section entitled "Protection Shields," of these special provisions. Protection shields shall be in place prior to beginning any retrofit works requiring protection shields.

Temporary railing (Type K) shall be in place prior to any partial deck removal at the reconstruction of the concrete trestle and prior to performing other work at locations where temporary railing (Type K) is required as shown on the plans.

Attention is directed to the sections entitled "Seismic Isolation Bearings," and "Viscous Damping Devices," of these special provisions. Ordering seismic isolation bearings and viscous damping devices shall be a first order of work.

Attention is directed to the section entitled "Miscellaneous Metal (Restrainer-Cable Type)," of these special provisions. Cable yield indicators shall be furnished to the Engineer for testing and approval 6 weeks prior to the beginning of restrainer work.

Attention is directed to "Test Borings" of these special provisions regarding test borings to be performed by the Contractor.

Performing the test boring program as directed elsewhere in these special provisions shall be a first order of work. The Contractor shall complete the test bore holes and deliver the results to the Engineer. The Engineer will review the samples and results from the test bore holes at each location to verify bottom of steel shell elevations prior to the Contractor fabricating the steel shells to length at that location.

The Contractor shall submit estimated lengths of bedrock embedment for micropiling to the Engineer in writing prior to starting test borings at micropile locations.

The Contractor shall incorporate the results of the test boring program in the working drawing details for micropiling prior to submitting the micropile working drawings for approval. Attention is directed to “Micropiling” of these special provisions for working drawing requirements.

Ordering permanent steel casings for cast-in-drilled-hole concrete piles, steel shells for cast-in steel-shell concrete piles, pipe reinforcement for micropiling, and precast concrete assemblies which include panels, bent cap shells, girders, jackets and pile caps, and decks shall be a first order of work. Fabrication of precast concrete panels for a given pier shall not proceed until all controlling foundation dimensions have been verified by the Contractor and any required adjustment approved by the Engineer and indicated on the precast concrete panel shop drawings, unless otherwise approved by the Engineer.

The existing knee brace and maintenance rail at the upper and lower level end diaphragms shall be removed, at the locations shown on the plans. After removal of the knee brace and maintenance rail, adjacent steel structural member connections shall be replaced immediately. One knee brace shall be removed at a time in each span. During the removal period of the existing rails as shown on the plans, the shut down period for the maintenance vehicle shall not exceed 30 days.

When removing and replacing restrainers, not more than 50 percent of the existing restrainers shall be removed at any time at any joint without being replaced with an equal proportion of new restrainers which are anchored in accordance with the details shown on the plans. All removal and replacement shall be done symmetrically about the center line of the existing bridge.

Prior to coring vertical holes for the installation of shaft high-strength bars at Piers 20 through 29, 31 through 33, 36 through 43, 45, 46, 50 through 54, and 56 through 60 the Contractor shall completely install precast jacket panels A through D, and S, including the grouting of annular spaces, and the stressing and grouting vertical and horizontal high-strength bars.

CONSTRUCTION PROCEDURE DEMONSTRATION.--Time is of essence for the completion of the segmental removal and deck replacement operations of the concrete trestle portion of the bridge structure each time one direction of the trestle section is closed to public traffic.

Prior to performing any work on the trestle section bridge deck removal and replacement, the Contractor shall perform actual demonstration of his planned construction operations. The purpose of this demonstration is for the Engineer to conduct an actual on-site verification and assessment, whether the Contractor's planned construction activities such as; methods, procedures, equipment and personnel, can be successfully executed to complete the segmental deck replacement within the specified time limit of deck closure.

Thirty days in advance of starting the trestle section deck replacement work, the Contractor shall submit complete information on methods, procedure, number and types of equipment and personnel that will be used to carry-out the operations.

Construction procedure demonstration shall be performed for a minimum of 4 nights on 2 separate occasions. Each occasion shall take place on 2 consecutive nights and only during Friday and Saturday nights. The scheduling of these operations shall be in consideration of the bridge deck closure requirements specified in "Maintaining Traffic" of these special provisions.

When the construction demonstration has been determined by the Engineer to be ineffective after the initial work occasion, the Contractor shall make corrective measures on his operations and submit such revisions to the Engineer for

review before proceeding with the second construction demonstration occasion. Upon the Engineer's review of the revised plan of operations, the Contractor shall repeat the construction demonstration in accordance with the requirements specified above until a satisfactory operation will be finally proven effective.

In the event that the construction demonstration is determined satisfactory by the Engineer, the construction procedure shall then be the standard of construction operation for the deck removal and replacement of the bridge trestle section.

Full compensation for all additional costs occasioned by compliance with the requirements of this section "Construction Procedure Demonstration" shall be considered as included in the contract prices paid for various contract items of work and no additional compensation will be allowed therefor.

10-1.03 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 Permit No.CAS029998 issued by the San Francisco Bay Regional Water Quality Control Board. This 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. In addition, a Conceptual Storm Water Pollution Prevention Plan, hereafter reffered to as the “CSWPPP,” has been prepared for this project by the Department. The CSWPPP shall be used as a reference for determining and preparing the minimum work required under the Permit and this Special Provision.

Copies of the Handbook, CSWPPP, and the Permit are also available for review at 111 Grand Avenue Oakland, California 94601. To reserve a copy of the documents, the Toll Bridge Duty Senior shall be contacted at (510) 286-5549 at least 24 hours in advance.

The Contractor shall become fully informed of and 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 activities.

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 to the Contractor or property owner whatsoever 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 any liability imposed by law as a result of the Contractor’s failure to comply with the requirements 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 to any remedy authorized by law, so much of the money due the Contractor under the contract that shall be considered necessary 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 of its intention to retain funds from any partial payment which may become due to the Contractor prior to acceptance of the contract. Retention of funds from any payment 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 requirements of this section "Water Pollution Control" shall not relieve the Contractor from the Contractor's responsibilities, as provided in Section 7-1.11, "Preservation of Property," and Section 7-1.12, "Responsibility for Damage," of the Standard Specifications.

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, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the construction site and the Contractor's facilities pertinent to the work;
2. Have access to and copy any 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 requirements 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 requirements of Section 7-1.01G, "Water Pollution," of the Standard Specifications for development and submittal of a Water Pollution Control Program.

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

Within 20 days after the approval of the contract, the Contractor shall submit 3 copies of the SWPPP to the Engineer. The Contractor shall allow 10 days for the Engineer to review the SWPPP. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the SWPPP within 5 days of receipt of the Engineer’s comments and shall allow 5 days for the Engineer 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 objectives of the SWPPP shall be to identify pollution sources that may adversely affect the quality of storm water discharges associated with the project and to identify, construct, implement and maintain water pollution control measures, hereafter referred to as control measures, 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. The special minimum requirements listed below supersede the minimum requirements listed in the Handbook for the same category. 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 accordance with the procedure specified in the Handbook. The following special minimum requirements are established:

Category:	Minimum Requirements:
Non-Storm Water and Waste Management Controls	CD7(2) Dewatering (Excavation), CD7(2) Dewatering (Cofferdam), CD7(2) Dewatering, (Stockpile), CD8(2) Paving Operations, CD10(2) Material Delivery and Storage, CD11(2) Material Use, CD12(2) Spill Prevention and Control, CD13(2) Solid Waste Management, CD14(2) Hazardous Waste Management, CD16(2) Concrete Waste Management, CD17(2) Sanitary/Septic Waste Management, CD18(2) Vehicle and Equipment Cleaning, CD19(2) Vehicle and Equipment Fueling, CD20(2) Vehicle and Equipment Maintenance, CD22(2) Scheduling, CD44(2) Illicit Discharge/Illegal Dumping Reporting
Erosion & Sediment Source Controls	CD22(2) Scheduling, CD23(2) Preservation of Existing Vegetation, CD25(25(2) Mulching, CD26B(2) Geotextiles, Mats/Plastic Covers & Erosion Control Blankets,
Wind Erosion Controls	CD22(2) Scheduling, CD26A(2) Soil Stabilizers, CD26B(2) Geotextiles, Mats/Plastic Covers & Erosion Control Blankets
Sediment Treatment Controls	CD22(2) Scheduling, CD39(2) Brush or Rock Filter CD43(2) Fiber Rolls

The following contract items of work, as shown on the project plans, shall be incorporated into the SWPPP as critical temporary control measures: Stabilized Construction Entrance, Temporary Construction Road, Temporary Concrete Washout Facilities, Temporary Silt Fence, Temporary Stockpile Cover, and Temporary Straw Bale Barrier. The Contractor shall consider other control measures to supplement the critical temporary control measures when necessary to meet the pollution control objectives of the SWPPP.

The following contract items of work, as shown on the project plans, shall be incorporated into the SWPPP as permanent post-construction control measures: Erosion Control (Type D), Rock Slope Protection (1 Ton, Method A) and Rock Slope Protection (Backing No. 1, Method B). These control measures shall be utilized as construction period control measures. Attention is directed to "Order of Work" of these special provisions. The Contractor shall consider other control measures to supplement these permanent, post-construction control measures when necessary to meet the pollution control objectives of the SWPPP. The Contractor shall maintain and protect the permanent control measures throughout the duration of the project and shall restore these controls to the lines and grades shown on the plans prior to acceptance of the project.

The SWPPP shall include, but not be 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. Copy of the local permit;
11. BMP Consideration Checklist;
12. SWPPP Checklist;
13. Schedule of Values; and
14. 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 it 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 compliance 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 48 hours 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 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, and 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 accordance with 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 October 1 and May 1.

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, no 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 no more than 2 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. The Contractor shall maintain a quantity of soil stabilization and sediment control materials on site equal to 125 percent of that sufficient to protect unprotected, soil-disturbed areas on the project site and shall maintain a detailed plan for the mobilization of sufficient labor and equipment to fully deploy control measures required to protect unprotected, soil-disturbed areas on the project site prior to the onset of precipitation. The Contractor shall include a current inventory of control measure materials and the detailed mobilization plan 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 10 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 used, or an 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 the Contractor shall deploy functioning control measures 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 requirements 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 frames to address any damaged measures or reinitiate any measures that have been discontinued.

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

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 each storm event;
3. At 24 hour intervals during extended precipitation events; and
4. Routinely, on a weekly basis.

If the Contractor or the Engineer identifies a deficiency in the deployment or functioning of an identified control measure, the deficiency shall be corrected by the Contractor immediately, or by 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 events. 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 accordance with 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 project 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, in accordance with 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 any item 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," 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 requirements of this section "Water Pollution Control" as determined by the Engineer.

Retentions for failure to conform to the requirements 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 requirements of 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.

WATER POLLUTION CONTROL SCHEDULE OF VALUES

Contract No. 04-0438U4

UNIT DESCRIPTION	UNIT	APPROXIMATE QUANTITY	VALUE	AMOUNT
NON-STORM AND WASTE MANAGEMENT CONTROLS				
DEWATERING (EXCAVATION)	LS	LUMP SUM		
DEWATERING (COFFERDAM)	LS	LUMP SUM		
DEWATERING (STOCKPILE)	LS	LUMP SUM		
DEWATERING (PILE)	LS	LUMP SUM		
MATERIAL USE	LS	LUMP SUM		
SPILL PREVENTION AND CONTROL	LS	LUMP SUM		
SOLID WASTE MANAGEMENT	LS	LUMP SUM		
HAZARDOUS WASTE MANAGEMENT	LS	LUMP SUM		
CONCRETE WASTE MANAGEMENT	LS	LUMP SUM		
SANITARY/SEPTIC WASTE MANAGEMENT	LS	LUMP SUM		
VEHICLE AND EQUIPMENT CLEANING	LS	LUMP SUM		
VEHICLE AND EQUIPMENT FUELING	LS	LUMP SUM		
VEHICLE AND EQUIPMENT MAINTENANCE	LS	LUMP SUM		
SCHEDULING	LS	LUMP SUM		
ILLICIT DISCHARGE/ILLEGAL DUMPING REPORTING				

WATER POLLUTION CONTROL SCHEDULE OF VALUES

Contract No. 04-0438U4

UNIT DESCRIPTION	UNIT	APPROXIMATE QUANTITY	VALUE	AMOUNT
EROSION AND SEDIMENT SOURCE CONTROLS				

SCHEDULING	LS	LUMP SUM		
PRESERVATION OF EXISTING VEGETATION	LS	LUMP SUM		
MULCHING	SQYD			
GEOTEXTILES, MATS/PLASTIC COVERS AND EROSION CONTROL BLANKETS	SQYD			
WIND EROSION CONTROLS				
SCHEDULING	LS	LUMP SUM		
SOIL STABILIZERS	SQYD			
GEOTEXTILES, MATS/PLASTIC COVERS AND EROSION CONTROL BLANKETS	SQYD			
SEDIMENT TREATMENT CONTROLS				
SCHEDULING	LS	LUMP SUM		
BRUSH OR ROCK FILTER	EACH			
FIBER ROLLS	EACH			

TOTAL _____

10-1.04 TEMPORARY CONSTRUCTION ROAD

Temporary construction road shall conform to the details shown on the plans and these special provisions.

The Conceptual Storm Water Pollution Prevention Plan (CSWPPP), developed for this project, graphically shows the location of temporary construction road for reference only. The quantity of temporary construction road for this project is derived from the location of temporary construction road shown in the CSWPPP.

Preparation shall conform to the requirements in Section 20-3.02, "Preparation," of the Standard Specifications.

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

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

MATERIALS.—Materials shall conform to Section 20-2, "Materials," of the Standard Specifications and the following:

Subgrade Enhancement Fabric.--Subgrade enhancement fabric shall be placed where shown on the plans and locations designated by the Engineer in accordance with this special provision.

Subgrade enhancement fabric shall be manufactured from one or more of the following materials: polyester, nylon or polypropylene.

Subgrade enhancement fabric shall conform to the following:

	Woven	Non-Woven
Weight, ounces per Square Yard, Min. ASTM Designation: D3776	8.65	8.65
Grab Tensile Strength, Pounds, Min. ASTM Designation: D4632	200	180
Tensile Strength at 10% Elongation, Pounds, Min. ASTM Designation: D4632	110	--
Elongation at Break, Percent, Max. ASTM Designation: D4632	35 Max.	50 Min.

Subgrade enhancement fabric shall be furnished in an appropriate protective cover which shall protect it from ultraviolet radiation and from abrasion due to shipping and handling, and shall remain in said cover until installation.

Subgrade enhancement fabric shall be accompanied by a Certificate of Compliance conforming to the provision in Section 6-L07, “Certificate of Compliance” of the Standard Specifications.

The subgrade to receive the fabric, immediately prior to placing, shall conform to the compaction and elevation tolerance specified in Section 25-1.03, “Subgrade”, of the Standard Specifications and these special provisions and shall be free of loose or extraneous material and sharp objects that may damage the fabric during the installation.

Subgrade enhancement fabric shall be handled and placed in accordance with the manufacturer’s recommendation and shall be positioned longitudinally along the alignment, pulled taut to form a tight wrinkle-free mat.

Adjacent borders of the fabric shall be overlapped a minimum of 18 inches.

The amount of subgrade enhancement fabric placed shall be limited to that which can be covered with aggregate base material within 72 hours.

Aggregate base material to be placed directly over the subgrade enhancement fabric shall be spread in the direction of fabric overlaps. Stockpiling of materials directly on the subgrade enhancement fabric is not allowed. Once a sufficient working platform has been constructed, all remaining materials shall be placed in accordance with the applicable sections of the special provisions and the Standard Specifications.

Should the fabric be damaged during placing, the damaged section shall be repaired by placing a new piece of fabric over the damaged area. Said piece of fabric shall be large enough to cover the damaged area and provide a minimum 3 feet overlay on all edges.

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

During spreading of the aggregate base material. vehicles or equipment shall not be driven directly on the fabric. A sufficient thickness of material shall be maintained between the fabric and the equipment to prevent damage to the fabric.

Aggregate Base.--Aggregate base shall be Class 3 and shall conform to the provisions in Section 26, "Aggregate Base, " of the Standard Specifications and these special provisions.

The first paragraph of Section 26-1.02B, "Class 3 Aggregate Base, " of the Standard Specifications is amended by adding the following sentences:

Aggregate may include or consist of material processed from reclaimed asphalt concrete, portland cement concrete base, cement treated base, glass or a combination of any of these materials. Aggregate base incorporating reclaimed glass shall not be placed at locations where surfacing will not be placed over the aggregate base.

Aggregate for Class 3 aggregate base shall conform to the following requirements:

Percentage Passing		
1 1/2" Maximum		
Sieve Size	Operating Range	Contract Compliance
2"	100	100
1 1/2"	90-100	87-100
1"	--	--
3/4"	50-85	45-90
No. 4	25-45	20-50
No. 30	10-25	6-29
No. 200	2-11	0-14

The aggregate shall not be treated with lime, cement or other chemical material before the Durability Index test is performed. Untreated reclaimed asphalt concrete and portland cement concrete will not be considered to be treated with, cement or other chemical material for purposes of performing the Durability Index test.

INSTALLATION.—Temporary construction road shall be installed as shown in the CSWPP, in accordance with the details shown on the plans, and as follows:

Prior to placing the aggregate base on areas to receive temporary construction road, the areas shall be cleared of all trash and debris. Weeds shall be removed to the ground level. Cleared trash, debris, and removed weeds shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

Any depressions in the areas designated as part of the temporary construction road as shown on the plans shall be graded to a uniform surface.

Following grading, a subgrade enhancement fabric shall be placed prior to spreadingaggregate base. Aggregate base shall be uniformly placed and spread with 1:4 (V:H) tapers at the perimeter edges of the temporary construction road where it conforms to existing roadway.

The Contractor shall maintain the temporary construction road throughout the contract period and shall prevent displacement or migration of the aggregate base. Any significant depressions, as determined by the Engineer, which form due to settling or heavy traffic shall be repaired by the Contractor.

Once the temporary construction road is no longer needed, the aggregate base and subgrade enhancement fabric shall be removed and disposed of as provided for in Section 7-1.13 'Disposal of Material Outside of the Highway Right of Way' of the Standard Specifications. Following removal of the temporary construction road, the areas shall be graded smooth and compacted to conform with adjacent areas.

MEASUREMENT AND PAYMENT.—Temporary construction road will be measured by the square yard in accordance with the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications.

The contract price paid per square yard for temporary construction road shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing temporary construction road, complete in place, including maintaining, removing, transporting and disposing of temporary construction road and any incidental grading required to grade and compact areas within the limits of temporary construction road, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

No adjustment of compensation will be made for any increase or decrease in the quantity of temporary construction road required, regardless of the reason for the increase or decrease. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," shall not apply to temporary construction road.

10-1.05 STABILIZED CONSTRUCTION ENTRANCE

Stabilizing construction entrance shall consist of furnishing, placing, maintaining and later removing and disposing of construction entrance stabilization for vehicular ingresses and egresses at the job site in accordance with these special provisions and the details shown on plans, and as directed by the Engineer.

MATERIALS.--At the Contractor's option, stabilization of construction entrance shall consist of either gravel surfacing over a geotextile reinforcing fabric, or an asphalt or portland cement concrete surfacing. The Contractor shall be responsible in determining the type and thickness of construction entrance stabilization material based on longevity, required performance and site conditions.

The aggregate for gravel surfacing construction entrance stabilization 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.

Asphalt concrete material for stabilizing construction entrances 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.

Portland cement concrete for stabilizing construction entrances shall be constructed of minor concrete conforming to the provisions in Section 73-1.06, "Sidewalk, Gutter Depression, Island Paving, Ramp (Wheelchair Ramp), and Driveway Construction," and Section 90-10, "Minor Concrete," of the Standard Specifications.

EXECUTION.--Prior to placing the surfacing selected for stabilizing construction entrances, areas to receive temporary surfacing shall be cleared of all trash and debris. Weeds shall be removed to the ground level. Cleared trash, debris, and removed weeds shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

Construction entrance stabilization material shall be uniformly placed and spread so the finished grade of the temporary surfacing shall not vary more than 0.10-foot above or below the required grade.

The Contractor shall maintain the construction entrance stabilization throughout the contract period and shall prevent displacement of the temporary surfacing to maintain the stabilized entrance bed. Once the stabilized construction entrance is no longer needed, the temporary surfacing and base material shall be removed and disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications. Once the temporary surfacing and base have been removed, the resulting depression in areas used as construction entrance shall be backfilled with material equivalent to the surrounding material, graded smooth and compacted to conform with adjacent areas.

MEASUREMENT AND PAYMENT.--Stabilized construction entrance will be paid for by the unit, regardless of the area required for each construction entrance.

The contract unit price paid for stabilized construction entrance shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing stabilized construction entrance, complete in place, including maintenance, removal and disposal when no longer required, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.06 TEMPORARY CONCRETE WASHOUT FACILITIES

Temporary concrete washout facilities shall be installed, maintained, and later removed as shown on the plans, in accordance with the details shown on the plans and these special provisions, and as directed by the Engineer. The concrete washout shall be above grade, and used for collecting excess concrete slurry and concrete equipment wash water resulting from the cleaning of concrete trucks and pumping equipment. Concrete waste shall not come into contact with soil, vegetation, or water bodies. The Conceptual Storm Water Pollution Prevention Plan (CSWPPP), developed for this project, graphically shows the location of temporary concrete washouts for reference only. The quantity of temporary concrete washout for this project is derived from the location of temporary concrete washout shown in the CSWPPP.

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

The Contractor shall have a concrete washout facility within 150 feet of any concrete operation, unless otherwise directed by the Engineer. The location of any concrete washout facility, except those facilities on water borne vessels and the bridge deck, shall not be allowed within 150 feet of drainage inlets and 200 feet of defined water bodies.

Concrete washout facilities shall be installed prior to beginning any placement operation of concrete. The washout facilities shall be maintained so that the volume of waste within the device is less than 75% of the capacity. The washout facilities shall be removed and disposed of at the completion of concrete operations, or as directed by the Engineer. The Contractor shall be responsible for all costs associated with replacing any displaced soil or vegetation.

At the Contractor's option, concrete washout facilities may be installed below grade according to the plans. When concrete washout facilities are installed below grade, removal of the washout shall consist of removing all concrete wastes and disposing of the waste in accordance with Section 7-1.13 'Disposal of Material Outside of the Highway Right of Way' of the Standard Specifications. At the discretion of the Engineer, disposal of concrete wastes within the Right of Way may be allowed. Approval to dispose of concrete wastes within the Right of Way will only be allowed by written authority from the Engineer. Upon disposal of concrete wastes, all below grade pits shall be backfilled, graded and compacted to conform to the surrounding area. Native material excavated to construct the washout shall be used as backfill material. Additional fill material may be used if native material is insufficient to allow the level of the excavated area to conform with the surrounding grade after compaction, with written approval by the Engineer.

MEASUREMENT AND PAYMENT.--Payment for installing, maintaining, removing, and disposing of temporary concrete washout facilities will be by lump sum. If the Contractor removes the concrete washout in order to facilitate any other work the concrete washout shall be replaced by the Contractor at no additional cost to the State.

The contract lump sum price paid for temporary concrete washout facilities shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in temporary concrete washout facilities, complete in place, including maintaining, removing and disposing of temporary concrete washout facilities, including installing, maintaining, removing and disposing of concrete washout sign, as shown on the plans, as specified in Section 15-3.02, "Removal Methods," of the Standard Specifications and these special provisions, and as directed by the Engineer.

No adjustment of compensation will be made for any increase or decrease in the quantities of temporary concrete washouts required, regardless of the reason for the increase or decrease. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," shall not apply to temporary concrete washout.

10-1.07 TEMPORARY SILT FENCE

Temporary silt fence shall be furnished and constructed, maintained and later removed, as specified in these special provisions, in accordance with the details shown on the plans, and as directed by the Engineer.

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

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

SEDIMENTATION CONTROL FABRIC.--Sedimentation control fabric shall be a woven fabric made of polypropylene. The fabric shall be non biodegradable, resistant to sunlight deterioration, inert to most soil chemicals and shall be furnished with sealed edges on all sides to prevent unraveling. The fabric shall also conform to the following minimum requirements:

Grab tensile strength, ASTM D-4632	100-120 lbs.
Trapezoid tear strength, ASTM D-4533	48-50 lbs.
Mullen burst strength, ASTM D3786	250 psi
UV stability	80%
Fabric width	3 feet

Used materials shall not be used.

EXECUTION.--Wood posts shall be an integral part of the silt fence and shall be packaged with the silt fence fabric. Wood posts shall be a minimum of 4 feet in length.

Concrete footings for wood posts will not be required.

Temporary silt fences shall be maintained to preserve at least a minimum of 70% of the sediment holding capacity. The Contractor shall remove built-up sediments when necessary and as directed by the Engineer. All removed sediments shall be disposed of and protected from further erosion.

Temporary silt fences that are damaged as a result of the Contractors operation shall be repaired or replaced by the Contractor at his expense. The Contractor shall repair any damaged temporary silt fences as directed by the Engineer.

When no longer required for the purpose as determined by the Engineer, temporary silt fence shall be removed. Removed facilities shall become the property of the Contractor and shall be removed from the site of the work.

Holes, depressions or any other ground disturbance caused by the removal of the silt fence shall be backfilled and repaired in accordance with the provisions in the second paragraph of Section 15-1.02, "Preservation of Property," of the Standard Specifications.

MEASUREMENT AND PAYMENT.--The quantity of silt fence to be paid for shall be determined by the linear foot of temporary silt fence installed as measured along the base of the ground at the base of the fence. If the Contractor removes temporary silt fence in order to facilitate any other work, the silt fence shall be replaced by the Contractor at no additional cost to the State.

Temporary silt fence maintenance shall be shared, and the cost divided, by the Contractor and the State as provided for in section 12-2.02 “Flagging” of the Standard Specifications and these special provisions. Necessary vehicles, equipment, other incidentals and removal and disposal of materials shall be considered in the cost for performing maintenance work.

The contract price paid per linear foot for temporary silt fence shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in temporary silt fence, complete in place, including removing and disposing of temporary silt fence, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.08 TEMPORARY STOCKPILE COVER

Temporary stockpile cover material shall be either plastic sheeting or fabric. If fabric is used, the material shall conform to the provisions in the Standard Specifications and these special provisions.

The temporary stockpile cover shall not be used for stockpiles containing contaminated or hazardous material. Attention is directed to Sections "Contaminated and Hazardous Materials, General" and "Earthwork" elsewhere in these special provisions.

The Conceptual Storm Water Pollution Prevention Plan (CSWPPP), developed for this project, graphically shows the location of temporary stockpile cover for reference only. The quantity of temporary stockpile cover for this project is derived from the location of temporary cover shown in the CSWPPP.

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

If fabric is used, the fabric shall be a minimum 4 to 6 oz.slit film woven fabric made of monofilaments of polypropylene. The fabric shall be non biodegradable, resistant to sunlight deterioration, inert to most soil chemicals and furnished with sealed edges on all sides to prevent unraveling. The fabric shall also conform to the following:

Properties

Grab tensile strength (minimum)	200 - 302 lbs
Elongation at break (minimum)	40%

If plastic sheeting is used, the sheeting shall be new and a minimum of 12 mil in thickness.

Fabric or plastic sheeting shall be placed over the critical slope with a 2 feet overlap. Weights such as rock bags (25 pounds each minimum) shall be placed on the overlap area at a maximum spacing of 8 feet. Edges shall be embedded a minimum of 6" in native soil.

Temporary stockpile cover damaged as a result of the Contractors operations shall be replaced by the Contractor at his expense.

MEASUREMENT AND PAYMENT.--The quantity of temporary stockpile cover to be paid for shall be determined by the square yard of sheeting cover installed. If the Contractor removes the sheeting cover in order to facilitate any other work, the cover shall be replaced and secured by the contractor at no additional cost to the State.

The contract price paid per square yard for temporary stockpile cover shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in temporary stockpile cover complete in place, including removing, maintaining and disposing of the temporary stockpile cover as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Temporary stockpile cover placed at locations other than as shown on the project plans or directed by the Engineer, in accordance with the Contractor's Storm Water Pollution Prevention Plan, will not be measured and will be paid for as specified in "Water Pollution Control" elsewhere in these special provisions.

No adjustment of compensation will be made for any increase or decrease in the quantities of temporary stockpile cover required, regardless of the reason for the increase or decrease. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," shall not apply to temporary stockpile cover.

10-1.09 TEMPORARY STRAW BALE BARRIER

Temporary straw bale barrier shall conform to the details shown on the plans, and these special provisions.

Temporary straw bale barrier work shall consist of furnishing, installing, constructing, anchoring, staking, maintaining and removing bales.

The Conceptual Storm Water Pollution Prevention Plan (CSWPPP), developed for this project, graphically shows the location of temporary straw bale barrier for reference only. The quantity of temporary straw bale barrier for this project is derived from the location of temporary straw bale barrier shown in the CSWPPP.

Preparation shall conform to the requirements in Section 20-3.02, "Preparation," of the Standard Specifications.

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

MATERIALS.—Materials shall conform to the provisions in Section 20-2.06, "Straw," of the Standard Specifications and the following:

Each straw bale shall be a minimum of 14" wide, 18" in height, 3 feet in length and shall have a minimum mass of 50 pounds. The straw bale shall be composed entirely of vegetative matter, except for binding material.

Stakes shall be 2" x 2" wood posts. Each stake shall have a minimum length of 3 feet.

Bales shall be bound by either wire, nylon or polypropylene string. Jute and cotton binding shall not be used. Wire shall be a minimum of 16-gage baling wire. Nylon or polypropylene string shall be approximately 0.08" in diameter with 80 pounds of breaking strength.

INSTALLATION.—Temporary straw bale barriers shall be installed as shown on the plans and in accordance with Detail Sheet 1 in Appendix C, CD37(2) in the Construction Contractors Guide and Specifications of the Caltrans Storm Water Quality Handbooks and the following:

Bales shall be securely anchored in place by 2 stakes driven through the bales. The first stake in each bale shall be driven toward the previously laid bale to force the bales together.

Temporary straw bale barriers shall be maintained to provide for adequate sediment holding capacity. Sediment deposits shall be removed when the sediment deposit reaches one-third of the straw bale barrier height. Removed sediment shall be deposited within the project in such a way that it is not subject to erosion by wind or water, or as directed by the Engineer. Installed bales shall be removed and replaced as required to adapt to changing conditions.

When no longer required for the intended purpose, as determined by the Engineer, temporary straw bale barrier shall be removed from the site of the work. As an option, the Contractor may spread the straw bales on slopes or other areas approved by the Engineer.

Holes, depressions or any other ground disturbance caused by the removal of the temporary straw bale barrier shall be backfilled and repaired in accordance with the provisions in the second paragraph of Section 15-1.02, "Preservation of Property," of the Standard Specifications.

MEASUREMENT AND PAYMENT.—The quantity of temporary straw bale barrier to be measured and paid for will be determined by the linear foot from the actual completed length of the temporary straw bale barrier. This length will be measured parallel to the slope of the ground excluding the width of the openings.

The contract price paid per linear foot for temporary straw bale barrier shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing temporary straw bale barriers complete in place, including maintenance and removal of materials, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Temporary straw bale barriers placed at locations other than as shown on the project plans or directed by the Engineer, in accordance with the Contractor's Storm Water Pollution Control Plan, will not be measured and will be paid for as specified in "Water Pollution Control" elsewhere in these special provisions.

No adjustment of compensation will be made for any increase or decrease in the quantities of temporary straw bale required, regardless of the reason for the increase or decrease. The provisions in Section 41.03B, "Increased or Decreased Quantities," shall not apply to temporary straw bale.

10-1.10 NON-STORM WATER DISCHARGES

This work shall consist of performing, installing, monitoring, maintaining, and removing when no longer required, non-storm water discharge facilities and waste management devices in accordance to the provisions in Section 7-1.01G, "Water Pollution Control," of the Standard Specifications and these special provisions and as directed by the Engineer.

Conformance with the requirements of this section shall not relieve the Contractor's from his responsibilities, as provided in Sections 7-1.11, "Preservation of Property," and 7-1.12, "Responsibility for Damage," of the Standard Specifications.

Attention is directed to Section "Dredging" of these specifications for handling of dredged material.

The special minimum measures required under this contract for non-storm water discharges are as follows:

EXCAVATION DEWATERING.--The Contractor shall prevent surface runoff from entering the excavations. Continuous pumping of groundwater from the excavations may be required. A meter that has been approved by the Engineer shall be used to measure all excavation discharges. Dewatering at multiple locations within the project limits may be required in order to perform contract work. Effluent treatment systems may require multiple operations to mobilize, assemble and disassemble various components adjacent to work areas. Groundwater levels adjacent to work areas may require dewatering in order to perform contract work. This dewatering may be necessary in addition to the dewatering of individual work locations. Discharging effluent from various work locations to the approved discharge area may require additional piping or hauling of the treated effluent to the discharge location.

The Contractor shall submit a plan to the Engineer, as provided in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, which details the methods and measures that will be used to seal the sides of the excavations, prevent the flow of water into excavations, and remove known groundwater contaminants. The plan shall, at a minimum, contain a graphic for the dewatering operation showing both a sectional and plan view that details the removal techniques for suspended solids and other constituents of concern. The graphic shall define the flow path and placement of pipes, hoses, pumps, and other equipment used to convey the discharge. In addition, the Contractor shall provide a drawing that depicts the general position of the dewatering measures relative to the excavations undergoing dewatering and the point of effluent discharge. The written descriptions of the dewatering operation shall include, but are not limited to, an estimate of the discharge volume, flow rate, and frequency; location of discharge; performance capabilities of treatment measures; and the inspection and monitoring procedures related to the discharge.

The plan shall be submitted at least 2 weeks prior to beginning excavation operations. The Contractor shall allow 5 days for the Engineer to review and approve the plan. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the plan within 3 days of receipt of the Engineer's comments and shall allow 3 days for the Engineer to review the revisions. Excavation operations shall not be allowed until the Engineer has approved the plan.

The maximum rate for dewatering of the excavation shall be 120,000 gallons per day

Suspended solids shall be removed during the dewatering operation in conformance with these special provisions and the discharge permit for contaminated groundwater.

Suspended solids shall be removed to the extent that visible, floating products are not apparent within the discharge. Furthermore, suspended solids shall be removed to the extent that the activated carbon treatment system does not become damaged, clogged, or create a significant pressure drop, such that the removal effectiveness of petroleum hydrocarbons is diminished. The discharge shall be of a purity such that turbidity and apparent color beyond the present natural background levels are not apparent within the receiving water body. The turbidity, measured in Nephelometric Turbidity Units (NTU), of the discharge shall not be greater than a 10 percent increase of the background turbidity. The point of effluent discharge shall not cause bottom sediments, aquatic vegetation or surface soils to become dislodged or disturbed.

Petroleum hydrocarbons shall be removed during the dewatering operation in conformance with these special provisions and the discharge permit for contaminated groundwater.

The discharge into the receiving water body shall not contain total petroleum hydrocarbons beyond a maximum allowable concentration of 3.1×10^{-5} pounds per cubic feet. Samples obtained from the discharge shall be analyzed in accordance with EPA method 8015M. The detection limit for the analysis shall be equal to or less than the allowable discharge concentration.

Monitoring requirements for the purposes of determining contaminant removal effectiveness and contaminant breakthrough of the effluent treatment system shall be handled as provided in 'Monitoring' elsewhere in this specification and in accordance with the discharge permit for contaminated groundwater.

The Contractor shall conduct a daily inspection of the dewatering equipment, when in use, to ensure that all components are functional and routinely maintained to prevent leakage prior to removal of suspended solids and petroleum hydrocarbons. Should any component of the dewatering equipment or treatment systems be damaged or affect the performance of the treatment system, the dewatering operation shall be discontinued and the component shall be repaired or replaced with substitute equipment.

The Contractor shall monitor both the discharge and the receiving water body. The observations or measurements made during monitoring shall include the color, size of affected area, presence of suspended material, presence of water fowl or aquatic wildlife, wind direction and velocity, atmospheric condition, time, date, pH, and a turbidity measurement in NTU. The Contractor shall supplement the observations with photographs. The Contractor shall conduct monitoring, at a minimum of 1 hour prior to discharge, during the first 10 minutes of initiating discharge, every 4 hours during discharge, and upon cessation of the discharge. The observations shall be recorded on the inspection forms to be provided by the Engineer. Completed inspection forms, including photographs, shall be provided to the Engineer, on a weekly basis or as directed by the Engineer.

Observations which indicate that the discharge is of a visible purity such that turbidity and apparent color are beyond the present natural background levels shall be immediately reported to the Engineer. The discharge activity shall cease so that corrective actions are undertaken to repair, modify or replace the equipment. The commencement of discharge activities shall be upon approval by the Engineer.

All water removed from excavations and dewatering operations shall be handled as provided in 'Effluent Treatment System' elsewhere in this specification and in accordance with the discharge permit for contaminated groundwater issued by the San Francisco Bay Regional Water Board. Copies of the permit are available for inspection and purchase at the Department of Transportation, Toll Bridge Duty Senior's Desk, 111 Grand Avenue, Oakland, California, telephone (510) 286-5549. Penalties assessed against the State for permit non-compliance by the Contractor shall be borne by the Contractor. The Department will deduct those penalty amounts from any monies due, or that may become due, the Contractor under the contract.

EFFLUENT TREATMENT SYSTEM.--An effluent treatment system shall be provided to treat all groundwater discharged from excavations or dewatering operations as shown on the plans and in accordance with these special provisions. Effluent shall be considered as the water and any other material discharged from the pumping operations.

The Contractor shall use the effluent treatment system to treat all groundwater prior to discharging into the approved dedicated discharge site (San Francisco Bay). Protection shall be provided at the outlet of treated effluent into the receiving water body to ensure that bottom sediments, aquatic vegetation, or surface soils do not become dislodged or disturbed.

Materials.--Materials for the effluent treatment system shall conform to the provisions in Section 6, "Control of Materials," Section 7-1.16, "Contractor's Responsibility for the Work and Materials," and Section 74-2, "Drainage Pump Equipment," of the Standard Specifications and these special provisions.

Holding tanks shall be transportable, totally enclosed, with a minimum holding capacity of 10,000 gallons per individual tank and capable of connecting multiple tanks in series. Holding tanks shall have an inlet and outlet capable of receiving and discharging minimum flows at a rate of 85 gpm. Holding tanks shall be able to accommodate temporary installation of submersible pumps of such capability to discharge water at a rate of 85 gpm. A minimum of 4 tanks shall be provided for use on this project. All tanks shall be of the same make and manufacturer and shall remain on the jobsite until dewatering operations are no longer necessary as determined by the Engineer.

A granulated activated carbon (GAC) system shall be used to treat groundwater contaminated with petroleum hydrocarbons. The GAC treatment system shall consist of at least 2 vessels having an inlet and outlet capable of receiving and discharging water at a flow rate of 85 gpm. The GAC treatment system shall be capable of treating total petroleum hydrocarbons at an inflow concentration of 6.2×10^{-4} pounds per cubic feet, such that the outflow concentration is less than or equal to an allowable concentration of 3.1×10^{-5} pounds per cubic feet. GAC treatment vessels shall be readily capable of removal and replacement or interchange when required. The GAC treatment system shall have appropriate fittings for pipe connections designed to accommodate the flow rate. The Contractor shall throughout the operation have 1 additional GAC vessel available for transport and use at the site within 24 hours after being directed by the Engineer.

Sampling ports shall be spigots attached to the piping system and capable of obtaining a representative sample of water at each location of the GAC treatment system, as shown on the plans. The GAC treatment system shall be capable of sustaining temporary fluctuations in water pressure due to monitoring activities.

Pumps shall be capable of being submerged in water and discharging water. Submersible pumps will be required for this project and shall be capable, at all times, of discharging at a flow rate of 85 gpm.

Plastic piping may be approved for use as determined by the Engineer in writing. If plastic piping is used, it shall conform to the provisions in Section 20-5.03E, "Pipe" of the Standard Specifications. The Contractor shall be responsible for providing all piping required to circulate the effluent through the treatment system and all piping required to convey the treated effluent from the temporary holding container to the point of release at the dedicated discharge location.

A temporary holding container shall be provided with a minimum holding capacity of 500 gallons. The holding container shall have an inlet and outlet capable of receiving and discharging minimum flows of 85 gpm. The holding container shall be open to the air and sealed on all sides and the bottom to prevent any leakage.

The Contractor shall be responsible for maintaining all of the equipment and materials outlined in this special provision to operational levels necessary to comply with provisions outlined in these special provisions and permits issued for this project. If the Contractor or the Engineer identifies a deficiency in the functioning of any equipment or material, the deficiency shall be immediately corrected by the Contractor.

MONITORING.--Monitoring shall be conducted in accordance with these special provisions and the discharge permit. Monitoring shall occur daily for the first 7 days of operating the GAC treatment system, and then be reduced to a frequency of once every 7 days thereafter. Upon relocation, replacement, interchange, or maintenance of the GAC vessels the Contractor shall conduct daily monitoring for the first 7 days of resuming treatment operations, and then reduce the monitoring frequency to once every 7 days thereafter. The Contractor shall collect water samples from each sampling port of the GAC treatment system, as depicted in the plans. A total of 3 samples shall be obtained from each sampling port during each monitoring event. The first of the 3 samples shall be analyzed for total suspended solids (TSS) in accordance with EPA method 160.1. The detection limit for the TSS analysis shall be at a maximum of 6.2×10^{-5} pounds per cubic feet. The second sample shall be analyzed for total metals in accordance with EPA method 6010, and the third sample shall be analyzed for total petroleum hydrocarbons in accordance with EPA method 8015M. The detection limits for total metals and total petroleum hydrocarbons shall be consistent with those used for the site investigation described in "Contraminated and Harzardous Material, General" elsewhere in these special provisions. Furthermore, the quality assurance and quality control measures employed by the laboratory and personnel conducting sampling shall be consistent with those used for the site investigation described "Contraminated and Harzardous Material, General" elsewhere in these special provisions. Analytical results for all samples shall be available to the Engineer within 24 hours of delivering the samples to the laboratory. The Contractor shall ensure that the laboratory responsible for the analysis of the samples has been properly certified by the California Department of Health Services for conducting the analyses described under these special provisions and the discharge permit.

PILE AND COFFERDAM DEWATER.-- Suspended solids shall be removed during the dewatering operation for piles and cofferdams, as specified in these special provisions.

Suspended solids shall be removed to the extent that visible, floating products are not apparent within the discharge. Also, the discharge shall be of a purity such that turbidity and apparent color beyond present natural background levels are not apparent within the receiving water body of San Francisco Bay. The turbidity, measured in Nephelometric Turbidity Units (NTU), of the discharge shall not be greater than a 10 percent increase of the background turbidity for San Francisco Bay upgradient of the piles and cofferdams at a distance of at least 60 feet, but not greater than 150 feet. The point of effluent discharge shall not cause bottom sediments, aquatic vegetation, or surface soils to become dislodged or disturbed.

The Contractor shall graphically depict the dewatering process within the Storm Water Pollution Prevention Plan (SWPPP), as specified in “Water Pollution Control” of these special provisions. The graphic shall show both a sectional and plan view that details the removal techniques for suspended solids. The graphic shall define the flow path and placement of pipes, hoses, pumps, and other equipment used to convey the discharge. In addition, the contractor shall provide a sketch that depicts the general position of the apparatus relative to the pile(s) or cofferdam(s) undergoing dewatering and the point of effluent discharge.

The Contractor shall describe the dewatering apparatus within the appropriate sections of the SWPPP. The description shall include, but not be limited to, an estimate of the discharge volume, flow rate, and frequency; location of discharge; and the inspection and monitoring procedures related to the discharge.

The Contractor shall conduct a daily inspection of the dewatering equipment, when in use, to ensure that all components are functional and routinely maintained to prevent leakage prior to removal of suspended solids. Any component of the apparatus that is found to be damaged or to affect the performance of the apparatus shall be either immediately repaired or replaced.

The Contractor shall monitor and observe both the discharge and the receiving water body. The observations made during monitoring shall include the color, size of affected area, presence of suspended material, presence of water fowl or aquatic wildlife, wind direction and velocity, tidal condition, atmospheric condition, time, and date. In addition, the Contractor shall supplement the observations with photographs. Monitoring the discharge shall include collection of a turbidity measurement of the discharge and background turbidity of San Francisco Bay. Turbidity shall be reported in NTU. The contractor shall conduct monitoring, at a minimum, one hour prior to discharge, during the first ten minutes of initiating discharge, every four hours during discharge, and upon cessation of discharge. The observations and monitoring data shall be recorded daily in a tabular format known as the monitoring report provided within the Conceptual Storm Water Pollution Prevention Plan, as described within “Water Pollution Control” of these special provisions. The monitoring report, including photographs, shall be provided weekly to the Engineer, or as directed by the Engineer.

Observations which indicate that the discharge is of a visible purity such that turbidity and apparent color are beyond the present natural background levels shall be immediately reported to the Engineer. The discharge activity

shall immediately cease, so that corrective actions are undertaken to repair, modify, or replace the equipment. The commencement of discharge activities shall be allowed upon approval by the Engineer.

STOCKPILE DEWATER.-- The Contractor shall prevent the flow of water, including ground water, surface runoff and tidal flow from entering any temporary stockpiles on land.

The Contractor shall depict and describe within an amendment to the Storm Water Pollution Prevention Plan (SWPPP), as specified in "Water Pollution Control" of these special provisions, the methods and measures that will be used to dewater the temporary stockpiles, to seal the sides and bottom of the temporary stockpiles, and to prevent the flow of water into the stockpiles. The time to be provided for the Engineer's review and approval of the amendment shall be 10 working days prior to beginning temporary stockpile operations. Operations producing water will not be permitted until the plan has been approved by the Engineer.

All water removal from temporary stockpiles shall be handled in accordance with National Pollutant Discharge Elimination System (NPDES) Permit CAS029998, issued by the San Francisco Bay Regional Water Quality Control Board. Copies of the permit and its amendments will be available for inspection and purchase at the Department of Transportation, District 04 Toll Bridge Duty Senior's desk at 111 Grand Avenue, Oakland, California, telephone number (510) 286-5549. In addition, materials information entitled "San Mateo-Hayward Bridge Site Water" will be available for review at the same location.

The Contractor is responsible for all work, records, reports, and costs involved in handling the water in accordance with the NPDES permit. The Contractor shall supply all analytical data, dewatering volume records, and written requests for discharge to the Engineer for approval prior to discharging any water. The Engineer shall have up to 7 calendar days for review and approval of discharge. Water that does not meet discharge permit requirements shall not be discharged on the site or to the storm drainage or to the sanitary sewer systems. The Contractor is responsible for either treating such water to meet the permit requirements for discharge or hauling such water off site to an appropriately licensed liquid disposal facility. Penalties assessed against the State for permit non-compliance by the Contractor will be borne by the Contractor. Such penalties will be deducted from the monthly progress payment.

However, nothing in this section, "Non-Storm Water Discharge," will be construed as relieving the Contractor of full responsibility of complying with Section 7-1.16 "Contractor's Responsibility for the Work and Materials" of the Standard Specifications.

FLUIDS FROM TEST BORING AND PILE INSTALLATION.--Fluids from test boring and pile installation shall be contained during and after the test boring or piling operations.

The Contractor shall submit to the Engineer schematic diagrams showing the process in conveying and containing fluids including any fluid recirculation system intended to be used during test boring or piling operations. In addition, the Contractor shall supplement the schematic diagrams with contingency plans in event of spills. Schematic diagrams shall conform to the requirements in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. For initial review, 4 sets of schematic diagrams for review shall be submitted. After review, between 5 and 10 sets, as requested by the Engineer, shall be submitted to the Engineer for final approval and for use during construction.

Test boring or piling operations shall not be performed until the Contractor receives written approval from the Engineer.

Attention is directed to the requirements in "Spill Contingencies" of this section in the event of spill.

Disposal of fluids from test boring and pile installation not using cofferdams shall conform to Section "Dredging" of these special provisions and shall be fully described in the Storm Water Pollution Prevention Plan (SWPPP).

Disposal of fluids from pile installation within cofferdams shall conform to the requirements under "Pile and Cofferdam Dewater" of these special provisions and shall be fully described in the Storm Water Pollution Prevention Plan (SWPPP).

All water removed from piles shall be handled in accordance with National Pollution Discharge Elimination System (NPDES) Permit CAS029998 issued by the San Francisco Bay Regional Water Quality Control Board. Copies of the permit and its amendments are available for inspection and purchase at the Department of Transportation, Toll Bridge Duty Senior's Desk, 111 Grand Avenue, Oakland, CA, (510) 286-5549. Penalties assessed against the State for permit non-compliance by the Contractor will be borne by the Contractor. Such penalties will be deducted from the monthly progress payment.

SPILL CONTINGENCY.--The Contractor shall prepare and submit to the Engineer a contingency plan for the management of spills or leaks of any materials or wastes that may impact the water quality of the San Francisco Bay.

The spill contingency plan shall be incorporated within the Storm Water Pollution Prevention Plan (SWPPP), as specified in "Water Pollution Control" of these special provisions.

The contingency plan shall include instructions and procedures for reporting spills, and a list of spill containment and collection materials and equipment to be maintained onsite. The contingency plan shall be reviewed and updated at least every 90 calendar days.

LIQUIDS, RESIDUES AND DEBRIS.--Attention is directed to "Existing Highway Facilities", "Bridge Removal (Portion)," and "Falsework" of these special provisions.

The control and disposal of liquids, residues, and debris associated with "Existing Highway Facilities," "Bridge Removal (Portion)," and "Falsework" shall be described within the SWPPP, as specified in "Water Pollution Control" of these special provisions. The SWPPP shall, at a minimum, depict and describe the procedural and structural methods of detaining, collecting, and disposing of all slurries, liquids, residues, and debris associated with the operations. Sufficient redundancy shall be incorporated into the procedural and structural methods such that the liquids, residues, and debris are not conveyed into or become present in drainage systems, San Francisco Bay, or other water bodies.

PAYMENT.--Full compensation for conforming to the requirements of this section shall be considered as included in the lump sum price paid for water pollution control no additional compensation will be allowed therefor.

10-1.11 COOPERATION

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

Bridge maintenance work by State forces will be underway within or adjacent to the project limits during the progress of work under this contract.

The Contractor shall attend joint weekly meetings to be organized by the Engineer with the State Maintenance forces in order to minimize conflicts.

The Contractor's operation shall be subject to coordination with the work conducted by the State's contractor for the San Francisco-Oakland Bay Bridge project starting in the year 2000 regarding the anticipated upper bridge deck closure on Sunday mornings, from 1:00 a.m. to 5:00 a.m. Attention is directed to Section "Maintaining Traffic" in these special provisions.

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

10-1.12 PHOTOGRAPHY

The Contractor shall provide time-lapse video and still photography to document pre-construction conditions, and progress and completion of the work, as directed by the Engineer. Photography will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications, and will not be considered a special service as specified in Section 9-1.03B of the Standard Specifications.

10-1.13 PROGRESS SCHEDULE (CRITICAL PATH)

Progress schedules will be required for this contract. Progress schedules shall utilize the Critical Path Method (CPM).

Definitions - The following definitions apply to this section "Progress Schedule (Critical Path)":

1) Activity: Any task, or portion of a project which takes time to complete.
2) Baseline Schedule: The initial CPM schedule representing the Contractor's original work plan, as accepted by the Engineer.
3) Critical Path Method: A mathematical calculation to determine the longest path of work and relative float represented by a graphic representation of the sequence of activities that shows the interrelationships and interdependencies of the elements composing a project.
4) Current Contract Completion Date: The extended date for completion of the contract shown on the weekly statement of working days furnished by the Engineer in accordance with Section 8-1.06, "Time of Completion," of the Standard Specifications.
5) Early Completion Time: The difference in time between the current contract completion date and the Contractor's scheduled early completion date as shown on the accepted baseline schedule, or schedule updates and revisions.
6) 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.
7) Fragnet: A section or fragment of the network diagram comprised of a group of activities.
8) Free Float: The amount of time an activity can be delayed before affecting a subsequent activity.

9) Hammock Activity: An activity added to the network to span an existing group of activities for summarizing purposes.
10) 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, but will otherwise function in the network as if it were an activity.
11) Revision: A change in the future portion of the schedule that modifies logic, adds or deletes activities, or alters activities, sequences, or durations.
12) Tabular Listing: A report showing schedule activities, their relationships, durations, scheduled and actual dates, and float.
13) Total Float: The amount of time that an activity may be delayed without affecting the total project duration of the critical path.
14) Update: The modification of the CPM progress schedule through a regular review to incorporate actual progress to date by activity, approved time adjustments, and projected completion dates.

Preconstruction Scheduling Conference - The Engineer will schedule and conduct a Preconstruction Scheduling Conference with the Contractor's Project Manager and Construction Scheduler within seven days after the bidder has received the contract for execution. At this meeting, the requirements of this section of the special provisions will be reviewed with the Contractor. The Contractor shall be prepared to discuss its schedule methodology, proposed sequence of operations, and any deviations it proposes to make from the Stage Construction Plans. At this meeting, the Contractor shall submit its proposed work breakdown structure, the associated alpha-numeric coding structure to implement the work breakdown structure and the activity identification system for labeling all work activities. The Engineer shall review and comment on the work breakdown structure, the coding structure and activity identification system within seven days after submission by the Contractor. The Contractor shall make all modifications to the proposed work breakdown structure, the coding structure and activity identification system that are requested by the Engineer, and shall employ that coding, structure and system in its baseline schedule submission.

Interim Baseline Schedule - Within 10 days after approval of the contract, the Contractor shall submit to the Engineer an interim baseline project schedule which will serve as the progress schedule for the first 120 days of the project, or until the baseline schedule is accepted, whichever is sooner. The interim baseline schedule shall utilize the critical path method. The interim baseline schedule shall depict how the Contractor plans to perform the work for the first 120 days of the contract. Additionally, the interim baseline schedule shall show all submittals required early in the project, and shall provide for all permits, and other non-work activities necessary to begin the work. The interim baseline schedule submittal shall include a 3 l/2 inch floppy diskette which contains the data files used to generate the schedule.

The Engineer shall be allowed 15 calendar days to review and accept or reject the interim baseline schedule submitted. Rejected schedules shall be resubmitted to the Engineer within 5 calendar days of receipt by the Contractor of the Engineer's comments, at which time a new 15-calendar day review period by the Engineer will begin.

Baseline Schedule - Within 30 days after approval of the contract, the Contractor shall submit to the Engineer a baseline project schedule. The baseline schedule shall include the activities shown on the interim baseline schedule in the same order and logical relationship as shown in the interim baseline schedule. The baseline project schedule shall have a data date of the day prior to the first working day of the contract and shall not include any completed work to-date. The baseline progress schedule shall meet interim target dates, milestones, stage construction requirements, internal time constraints, show logical sequence of activities, and must not extend beyond the number of days originally provided for in the contract.

The baseline CPM schedule submitted by the Contractor shall have a sufficient number of activities to assure adequate planning of the project and 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 all activities that define the critical path.

The baseline progress schedule shall be supplemented with resource allocations for every activity, to a level of detail that facilitates report generation based on labor craft and equipment class for the Contractor and subcontractors. The Contractor shall use average composite crews to display the labor loading of on-site construction activities. The Contractor shall optimize and level labor to reflect a reasonable plan for accomplishing the work of the contract and to assure that resources are not duplicated in concurrent activities. The Contractor shall require each subcontractor to submit in writing a statement certifying that the subcontractor has concurred with the Contractor's CPM, including major updates, and that the subcontractor's related schedule has been incorporated accurately, including the duration of activities and labor and equipment loading. Along with the baseline progress schedule, the Contractor shall also submit to the Engineer time-scaled resource histograms of the labor crafts and equipment classes to be utilized on the contract. The baseline schedule submittal shall include a 3 l/2 inch floppy diskette which contains the data files used to generate the schedule.

The Engineer shall be allowed 15 calendar days to review and accept or reject the baseline project schedule submitted. Rejected schedules shall be resubmitted to the Engineer within 5 calendar days, at which time a new 15-calendar day review period by the Engineer will begin.

Project Schedule Reports - Schedules submitted to the Engineer including baseline and interim baseline schedules shall include time scaled network diagrams. 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 computer-generated mathematical analysis tabular reports for each activity included in the project schedule. Three different report sorts shall be provided: Early Start, Free Float, Total Float, and Activity Number, which shall show all predecessors and successors for each activity. The mathematical analysis tabular reports (8 1/2" x 11" size) shall be submitted to the Engineer and shall include, at a minimum, the following for each activity:

1) Data date
2) Predecessor and successor activity numbers and descriptions;
3) Activity number and description;
4) Activity codes;
5) Schedule, and actual and remaining duration for each activity;
6) Earliest start date (by calendar date);
7) Earliest finish date (by calendar date);
8) Actual start date (by calendar date);
9) Actual finish date (by calendar date);
10) Latest start date (by calendar date);
11) Latest finish date (by calendar date);
12) Identify actual non-working days
13) Identify activity calendar type
14) Total Float and Free Float, in work days;
15) Percentage of activity complete and remaining duration for incomplete activities; and
16) Imposed constraints.

Networks shall be drafted time scaled to show a continuous flow of information from left to right. The primary paths of criticality shall be clearly and graphically identified on the networks. The network diagram shall be prepared on E-size sheets (36" x 48"), 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 approval of the Engineer.

Schedule network diagrams and computer tabulations shall be submitted to the Engineer for acceptance in the following quantities:

a) 2 sets of the Network Diagrams;
b) 2 copies of the computer tabulation reports (8 1/2" x 11" size); and
c) 3 computer diskettes.

Should the baseline schedule or schedule update, submitted for acceptance, show variances from the requirements of the contract, the Contractor shall make specific mention of the variations in the letter of transmittal, in order that, if accepted, proper adjustments to the project schedule can be made. The Contractor will not be relieved of the responsibility for executing the work in strict accordance with the requirements of the contract documents. In the event of a conflict between the requirements of the contract documents and the information provided or shown on an accepted schedule, the requirements of the contract documents shall take precedence.

Each schedule submitted to the Engineer shall comply with all limits imposed by the contract, with all specified intermediate milestone and completion dates, and with all constraints, restraints or sequences included in the contract. The degree of detail shall include factors including, but not limited to:

1) Physical breakdown of the project;
2) Contract milestones and completion dates, substantial completion dates, constraints, restraints, sequences of work shown in the contract, the planned substantial completion date, and the final completion date;
3) Type of work to be performed, the sequences, and the major subcontractors involved;
4) All purchase, submittals, submittal reviews, manufacture, tests, deliver, and installation activities for all major materials and equipment.
5) Preparation, submittal and approval of shop and working drawings and material samples, showing time, as specified elsewhere, for the Engineer's review. The same time frame shall be allowed for at least one resubmittal on all major submittals so identified in the contract documents;

6) Identification of interfaces and dependencies with preceding, concurrent and follow-on contractors, railroads, and utilities as shown on the plans or specified in the specifications;
7) Identification of each and every utility relocation and interface as a separate activity, including activity description and responsibility coding that identifies the type of utility and the name of the utility company involved.
8) Actual tests, submission of test reports, and approval of test results;
9) All start-up, testing, training, and assistance required under the Contract;
10) Punchlist and final clean-up;
11) Identification of any manpower, material, or equipment restrictions, as well as any activity requiring unusual shift work, such as double shifts, 6-day weeks, specified overtime, or work at times other than regular days or hours; and
12) Identification of each and every ramp closing and opening event as a separate one-day activity, including designation by activity coding and description that it is a north-bound, south-bound, east-bound, west-bound, and entry or exit ramp activity.

Each construction activity shall have a duration of not more than 20 working days, and not less than one working day unless permitted otherwise by the Engineer. All activities in the 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 to any activity. Float shall not be considered as time for the exclusive use of or benefit of either the State or the Contractor but shall be considered as a jointly owned, expiring resource available to the project and shall not be used to the financial detriment of either party. Any accepted schedule, revision or update having an early completion date shall show the time between the early completion date and the current Contract Completion Date as "project float".

The Contractor shall be responsible for assuring that all work sequences are logical and the network shows a coordinated plan for complete performance of the work. Failure of the Contractor to include any element of work required for the performance of the contract in the network shall not relieve the Contractor from completing all work within the time limit specified for completion of the contract. If the Contractor fails to define any element of work, activity or logic, and the omission or error is discovered by either the Contractor or the Engineer, it shall be corrected by the Contractor at the next monthly update or revision of the schedule.

Monthly Update Schedules - The Contractor shall submit a Monthly Update Schedule to the Engineer once in each month. The proposed update schedule prepared by the Contractor shall include all information available as of the 20th calendar day of the month, or other date as established by the Engineer. A detailed list of all proposed schedule changes such as logic, duration, lead/lag, additions and deletions shall be submitted with the update.

The monthly update schedule submitted to the Engineer shall be accompanied by a Schedule Narrative Report. The Schedule Narrative Report shall describe the physical progress during the report period, plans for continuing the work during the forthcoming report period, actions planned to correct any negative float predictions, and an explanation of potential delays or problems and their estimated impact on performance, milestone completion dates and the overall project completion date. In addition, alternatives for possible schedule recovery to mitigate any potential delay or cost increases shall be included for consideration by the Engineer. The report shall follow the outline set forth below:

Contractor's Schedule Narrative Report Outline:

1) Contractor's Transmittal Letter
2) Work completed during the period
3) Description of the current critical path
4) Description of problem areas
5) Current and anticipated delays
   a) Cause of the delay
   b) Corrective action and schedule adjustments to correct the delay
   c) Impact of the delay on other activities, milestones, and completion dates
6) Changes in construction sequences
7) Pending items and status thereof
   a) Permits
   b) Change Orders
   c) Time Extensions
   d) Non-Compliance Notices
8) Contract completion date(s) status
   a) Ahead of schedule and number of days
   b) Behind schedule and number of days

9) Include updated Network Diagram and Reports

The Contractor shall provide to the Engineer a 31/2” electronic disk of the schedule, together with printed copies of the network diagrams and tabular reports described under "Project Schedule Reports", and the Schedule Narrative Report.

The monthly update of the schedule shall be for the period from the last update to the current cut-off date, and for the remainder of the project. The current period's activities shall be reported as they actually took place and designated as actually complete, if actually completed, in the schedule updates.

Portions of the network diagram on which all activities are complete need not be reprinted and submitted in subsequent updates. However, the electronic disk file of the submitted schedule and the related reports shall constitute a clear record of progress of the work from award of contract to final completion.

The Contractor will be permitted to show early or late completion on schedule updates and revisions. The Engineer may use the updates and revisions, and other information available, in evaluating the effect of changes, delays, or time savings on the critical path and the accepted schedule current at the time to determine if there is an applicable adjustment of time, if any, to any target date or completion date due to the changes, delays, or time savings.

On a date determined by the Engineer, the Contractor shall meet with the Engineer to review the monthly schedule update. At the monthly progress meeting, the Contractor and the Engineer will review the updated schedule and will discuss the content of the Narrative Report. The Engineer shall be allowed 15 days after the meeting to review and accept or reject the update schedule submitted. Rejected schedules shall be resubmitted to the Engineer within 15 calendar days, at which time a new 15-calendar day review period by the Engineer will begin.

Schedule Revisions - If the Contractor desires to make a change to the accepted schedule, the Contractor shall request permission from the Engineer in writing, stating the reasons for the change, and proposed revisions to activities, logic and duration. The Contractor shall submit for acceptance the affected portions of the project schedule and an analysis to show the effect on the entire project. The Engineer will provide a response within 10 days. No revision to the accepted baseline schedule or the schedule updates shall be made without the prior written approval of the Engineer.

The Engineer will request the Contractor to submit a proposed revised schedule within 15 days when:

a) there is a significant change in the Contractor's operations that will affect the critical path;
b) the current updated schedule indicates that the contract progress is 30 calendar days or more behind the planned schedule, as determined by the Engineer; or
c) the Engineer determines that an approved or anticipated change will impact the critical path, milestone or completion dates, contract progress, or work by other contractors.

The Engineer shall be allowed 15 days to review and accept or reject a schedule revision. Rejected schedule revisions shall be revised and resubmitted to the Engineer within 15 calendar days, at which time a new 15-calendar day review period by the Engineer will begin. Only upon approval of a change by the Engineer shall it be reflected in the next schedule update submitted by the Contractor.

Schedule Time Extension Requests - When the Contractor requests a time extension due to contract change orders or delays, the Contractor shall submit to the Engineer a written Time Impact Analysis illustrating the influence of each change or delay on the current contract completion date or milestone completion date, utilizing the current accepted schedule. Each Time Impact Analysis shall include a fragnet demonstrating how the Contractor proposes to incorporate the Change Order or delay into the current schedule. The fragnet shall include the sequence of new and existing activity revisions that are proposed to be added to the accepted baseline project schedule or current schedule in effect at the time the change or delay is encountered, to demonstrate the influence of the delay and the proposed method for incorporating the delay and its impact into the schedule.

Each Time Impact Analysis shall demonstrate the estimated time impact based on the events of delay, the anticipated or actual date of the contract change order work performance, the status of construction at that point in time, and the event time computation of all activities affected by the change or delay. The event times used in the analysis shall be those included in the latest update of the current schedule in effect at the time the change or delay was encountered.

Time extensions will be granted only to the extent that equitable time adjustments for the activity or activities affected exceed the total or remaining float along the critical path of activities at the time of actual delay, or at the time the contract change order work is performed. Float time is not for the exclusive use or benefit of the Engineer or the Contractor, but is an expiring resource available to all parties as needed to meet contract milestones and the contract completion date. Time extensions will not be granted nor will delay damages be paid unless:

a) the delay is beyond the control and without the fault or negligence of the Contractor and its subcontractors or suppliers, at any tier; and,

b) the delay extends the actual performance of the work beyond the applicable current contract completion date and the most recent date predicted for completion of the project on the accepted schedule update current as of the time of the delay or as of the time of issuance of the contract change order.

Time Impact Analyses shall be submitted in triplicate within 15 days after the delay occurs or after issuance of the contract change order.

Approval or rejection of each Time Impact Analysis by the Engineer will be made within 15 days after receipt of the Time Impact Analysis, unless the review is delayed by subsequent meetings and negotiations. A copy of the Time Impact Analysis approved by the Engineer shall be returned to the Contractor and the accepted schedule revisions illustrating the influence of the contract change orders or delays shall be incorporated into the project schedule during the first update after approval.

Final Schedule Update - Within 15 days after the acceptance of the contract by the Director, the Contractor shall submit a final update of the schedule with actual start and actual finish dates for all activities. This schedule submission shall be accompanied by a certification, signed by an officer of the company and the Contractor's Project Manager stating "To the best of my knowledge, the enclosed final update of the project schedule reflects the actual start and completion dates of the activities contained herein."

Equipment and Software - The Contractor shall provide for the State's exclusive possession and use a complete computer system specifically capable of creating, storing, updating and producing CPM schedules. Before delivery and setup of the computer system, the Contractor shall submit to the Engineer for approval a detailed list of all computer hardware and software the Contractor proposes to furnish. The minimum computer system to be furnished shall include the following:

1) Complete computer system, including keyboard, mouse, 17 inch color SVGA monitor (1,024x768 pixels), Intel Pentium 300 MHZ micro processor chip, or equivalent, or better;

2) Computer operating system software, compatible with the selected processing unit, for Windows 98 or later, or equivalent;

3) Minimum sixty-four (64) megabytes of random access memory (RAM);

4) A 3.2 gigabyte minimum hard disk drive, a 1.44 megabyte 3 l/2 inch floppy disk drive, 32x speed minimum CD-ROM drive, ethernet card and 56.6 / 14.4 modem;

5) A color-ink-jet plotter with a minimum 8 megs RAM, capable of 600 dots per inch color, 600 dots per inch monochrome, or equivalent plotter capable of printing fully legible, timescaled charts, and network diagrams, in four colors, with a minimum size of 36 inches by 48 inches (E size) and is compatible with the selected system; and

6) CPM software shall be Primavera Project Planner, version 2.0 for Windows 95, or later.

The computer hardware and software furnished shall be compatible with that used by the Contractor for the production of the CPM progress schedule required by the Contract, and shall include original instruction manuals and other documentation normally provided with the software.

The Contractor shall furnish, install, set up, maintain and repair the computer hardware and software ready for use at a location determined by the Engineer. The hardware and software shall be installed and ready for use by the first submission of the baseline schedule. The Contractor shall provide 24 hours of formal training for the Engineer in the use of the hardware and software to include schedule analysis, reporting, resource and cost allocations.

All computer hardware and software furnished shall remain the property of the Contractor and shall be removed by the Contractor upon acceptance of the contract when no claims involving contract progress are pending. When claims involving contract progress are pending, computer hardware or software shall not be removed until the final estimate has been submitted to the Contractor.

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, materials (including computer hardware and software), tools, equipment, and incidentals; and for doing all the work involved in preparing, furnishing, updating and revising CPM progress schedules; maintaining and repairing the computer hardware; and training 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 progress schedule (critical path) will be made as follows:

Interim baseline schedule accepted, then 10 percent payment for progress schedule (critical path) will be made.
Baseline schedule accepted, then 10 percent payment for progress schedule (critical path) will be made.
Monthly update schedules accepted, then 75 percent payment for progress schedule (critical path) will be made equally for each update.
Final schedule update accepted, then 5 percent payment for progress schedule (critical path) will be made.

The Department will retain an amount equal to 25 percent of the estimated value of the work performed during the first estimate period in which the Contractor fails to submit an interim baseline, baseline, revised or updated CPM schedule conforming to the requirements of this section, as determined by the Engineer. Thereafter, on subsequent successive estimate periods the percentage the Department will retain will be increased at the rate of 25 percent per estimate period in which acceptable CPM progress schedules have not been submitted to the Engineer. Retentions for failure to submit acceptable CPM progress schedules shall be additional to all other retentions provided for in the contract. The retention for failure to submit acceptable CPM progress schedules will be released for payment on the next monthly estimate for partial payment following the date that acceptable CPM progress schedules are submitted to the Engineer.

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 the project schedule will not be made for any increased or decreased work ordered by the Engineer in furnishing project schedules.

10-1.14 TRANSPORTATION FOR THE ENGINEER

The Contractor shall provide transportation for the Engineer in accordance with Section 5-1.08, "Inspection," of the Standard Specifications and these special provisions.

The Contractor shall provide, operate, berth and maintain, throughout the life of the contract, one commercial grade work boat for the sole use of the Engineer and the Engineer's staff in performance of their work. In addition, the Engineer and all authorized representatives of the State, acting within the scope of their duties in connection with the work under this contract, shall be permitted to ride as passengers, without charge, on any boat operated by, or for, the Contractor for the transportation of personnel, equipment or materials. It is agreed that such transportation will be only on boats that are making trips in connection with the Contractor’s operation.

The commercial grade work boat shall be 40 foot launch adequate for open water operations, or equal, meeting or exceeding the following minimum requirements:

DRIVE POWER:

1) Engines - Diesel engines, 600 HP total, twin screw
2) Fuel Tank - 173 gal. tank

EQUIPMENT:

1) Stainless Steel Construction
2) Heavy Duty Bow- Eye Reinforcement
3) Stern Splashwell Bulk Head
4) High patterned side rails
5) Heavy Duty Lifting Eyes
6) 50 lb. anchor with chain and line (adequate for specific site condition)

ELECTRONICS:

1) VHF/FM Radio System
2) One (1) Com 58 or equal
3) Radar system Furuno 1731 or equal
4) Depth finder digital
5) Compass Richie navigator 2 each or equal

SAFETY AND EMERGENCY EQUIPMENT

1) United States Coast Guard required commercial grade safety and emergency equipment
2) Navigation lights, commercial U.S. Coast Guard approved

3) San Francisco Bay Navigation Charts appropriate for the project requirements
4) United States Coast Guard-approved life jackets for the Contractor's personnel.

United States Coast Guard-approved life jackets for the Contractor's personnel shall be provided and maintained on the boats at all times, as required by the United States Coast Guard. Life jackets for the Department's visitors and representatives will be provided by the Department at no cost to the Contractor.

The Contractor shall provide for the Department's visitors and representatives safe and protected permanent vertical access, as approved by the Engineer, to all marine construction equipment being utilized for construction of the project.

The Contractor shall provide safety training relative to marine transportation to the State's and the Contractor's personnel, prior to the commencement of work. Training shall include a review of the approved U.S. Coast Guard Safety Manual by all personnel prior to using the Contractor's provided marine transportation. The Contractor shall also conduct a quarterly Marine Safety Workshop for the Department's representatives.

The Contractor shall furnish a licensed boat operator and crew members, as required for the boat's operation and in accordance with all Maritime Agreements and Laws, including, but not limited to, the regulations contained in Title 46 Code of Federal Regulation Section 16 and Sections 24 through 26. The boat must have a valid U.S. Coast Guard Certificate of Inspection (COI), and must be manned and operated in accordance with the COI. The boat, boat operator and crew shall be furnished 90 days after the award of the contract for the duration of the contract. The boat, boat operator and crew shall be furnished for the complete duration of the work on the days when the Contractor's work is in progress and for 8 hours each day excluding Sundays and legal holidays on the days when the Contractor's work is not in progress.

The Contractor shall provide insurance coverage under the Federal Longshoremen's and Harbor Workers Compensation Act, the Jones Act and the Marine Act with respect to work performed from, or by use of, vehicles on any navigable water of the United States, including liability insurance for watercraft operations. At the option of the Contractor, liability insurance for watercraft operations may be covered under a separate Protection and Indemnity policy, provided the policy contains a combined single limit of at least $50,000,000 per occurrence and $50,000,000 aggregate.

The Contractor shall provide berthing facilities at the same location the Contractor utilizes for the departure of its construction crew, or at an alternate location approved by the Engineer.

The Contractor shall maintain the boat provided to the Engineer, including daily fueling, routine maintenance, equipment compliance, systems operations and the immediate repair of damage to the boat or its elements.

The boat shall remain the property of the Contractor. The boat shall not be removed from the site of the work until after acceptance of the contract.

The contract lump sum price paid for transportation for the engineer shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in providing transportation for the engineer as specified herein.

Payment for furnishing a boat, boat operator and crew within the first 90 days after the award of contract at the request of the Engineer and in excess of the complete duration of the work on the days when the Contractor's work is in progress and 8 hours per day excluding Sundays and legal holidays on the days when the Contractor's work is not in progress will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. No additional payment will be made for furnishing the boat, boat operator and the crew in excess of the time specified herein.

10-1.15 OBSTRUCTIONS

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

The Contractor's 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 workmen and of the public. Facilities requiring special precautions include, but are not limited to: conductors of petroleum products, oxygen, chlorine, and toxic or flammable gases; natural gas in pipelines greater than 150 mm (6 inches) in diameter or pipelines operating at pressures greater than 415 kPa (60 psi) gauge; underground electric supply system conductors or cables, with potential to ground of more than 300 volts, either directly buried or in duct or conduit which do not have concentric grounded conductors or other effectively grounded metal shields or sheaths.

The Contractor shall notify the Engineer and the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to performing any excavation or other work close to any underground pipeline, conduit, duct, wire or other structure. Regional notification centers include but are not limited to the following:

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

The following utility facilities will be relocated during the progress of the contract. The Contractor shall notify the Engineer in writing prior to doing any work in the vicinity of the facility. The utility facility will be relocated within the listed calendar days, as defined in Section 8-1.06, "Time of Completion," of the Standard Specifications, after said notification is received by the Engineer.

Utility	Location	Calendar Days
Pacific Bell (Temporary Relocation of Fiber Optics Cables)	Piers 19, and 61	10 (per Pier)
Pacific Bell (Fiber Optics Temporary Relocation) (Stage 1)	U Line Sta. 249+89 to 278+33 L Line Sta. 249+99 to 286+34	10
Pacific Bell (Fiber Optics Temporary Relocation) (Stage 2)	U Line Sta. 249+89 to 278+33 L Line Sta. 249+99 to 286+34	10
Pacific Bell (Fiber Optics Temporary Relocation) (Stage 3)	U Line Sta. 249+89 to 278+33 L Line Sta. 249+99 to 286+34	10
Pacific Bell (Fiber Optics Temporary Relocation) (Stage 4)	U Line Sta. 249+89 to 278+33 L Line Sta. 249+99 to 286+34	10

Installation of the following utility facilities will require coordination with the Contractor's operations. The Contractor shall make necessary arrangements with the utility company, through the Engineer, and shall submit a schedule of work, verified by a representative of the utility company, to the Engineer. The schedule of work shall provide not less than the following number of calendar 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	Calendar Days
Pacific Bell (Telephone-Interducts and Fiber Optics Cable Installation)	L Line Sta. 249+99 to 298+00	3
Pacific Bell (2 - 4” stainless steel Conduit Installation)	U Line Sta. 249+94 ±	10
Pacific Bell (Placement of previously relocated fiber optics cable back into Utility Tray)	Piers 19 and 61	10 per Pier
Pacific Bell (Modify interduct expansion joints)	Piers 19, 27, 33, 36, 46, 49, 58, and 61	10 per Pier
Pacific Bell (cable splicing)	Manhole at C Line Station 249+50 and splice location between Piers 14 and 19 (Exact location to be determined in the field)	18
Pacific Bell (cable removal)	L Line Station 249+99 to 298+00±	7

The Contractor shall notify the Engineer and Pacific Bell at least 72 hours in advance of the required relocation and installation of Pacific Bell facilities. In addition, the Contractor shall coordinate with the Engineer and Pacific Bell regarding the schedule of coring holes in the bridge deck for the temporary relocation of fiber optics cables to allow proper inspection by Pacific Bell representatives.

In the event that the utility facilities mentioned above are not removed or relocated by the times specified and, if in the opinion of the Engineer, the Contractor's operations are delayed or interfered with by reason of the utility facilities not being removed or relocated by said times, the State will compensate the Contractor for such 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.

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.

10-1.16 PROTECTION SHIELDS

This work consists of designing, constructing, maintaining, and removing temporary protection shields for the protection of the waterway and traffic traveling through the construction area.

Attention is directed to Section 7-1.09, "Public Safety" of the Standard Specifications.

Attention is directed to "Order of Work" elsewhere in these special provisions.

Protection shields shall be sized and located to protect roadways, waterways and other areas open to the public beneath the bridge from falling materials, debris, or other objects.

The traveled ways on the upper and lower decks and the waterway shall be protected with protection shields during the removing and installing of miscellaneous steel angles, steel plates, concrete, rivets and bolts for the upper and lower decks retrofitting works. In addition, the traveled ways and the waterways at the concrete trestles shall be protected with protection shields during the removal of the existing concrete trestles and the installation of the new concrete trestles.The protection shields shall be designed and constructed in conformance with the provisions for protective covers in "Bridge Removal (Portion)," elsewhere in these special provisions, and the following:

> The Contractor shall design the protection shields to withstand all loads to which it may be subjected during demolition, repair, and reconstruction of the bridge, and shall be designed to support a minimum uniform live load of 100 pounds per square foot, whichever is greater.

The Contractor shall submit to the Engineer working drawings, with design calculations, for the proposed protection shields plan. The protection shields plan shall be prepared by an engineer who is registered as a Civil Engineer in the State of California. The design calculations shall be adequate to demonstrate the stability of the protection shields during all stages of the retrofitting operations. Calculations shall be provided for each stage of retrofitting and shall include dead and live load values assumed in design of protection shields.

The protection shields plan shall conform to the requirements in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The number of sets of drawings and design calculations and times for review for the protection shields plan shall be the same as specified for falsework working drawings in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications.

The time to be provided for the Engineer's review of the working drawings for the protection shields shall be 4 weeks.

Approval by the Engineer of the protection shields plans or field inspection performed by the Engineer will in no way relieve the Contractor of full responsibility for the protection shields plan and procedure.

Prior to proceeding with bridge retrofitting where protection shields plan is required, an engineer for the Contractor who is registered as a Civil Engineer in the State of California shall inspect the protection shields, for conformity with the working drawings. The Contractor's registered engineer shall certify in writing that the protection shields, substantially conform to the details on the working drawings, and that the material and workmanship are satisfactory for the purpose intended. A copy of this certification shall be available at the site of the work at all times.

Full compensation for protection shields shall be considered as included in the contract prices paid for various items of work involved and no separate payment will be made therefor.

10-1.17 MOBILIZATION

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

10-1.18 INFORMATIONAL SIGN BOARDS

This work shall consist of furnishing, installing, and maintaining informational sign board units for posting any information necessary to notify the public of the temporary closure of bicycle and pedestrian pathways and other interpretive information on the seismic retrofitting of the bridge. Informational signs shall be constructed in accordance with the design requirements and layout shown on the plans and as provided in these special provisions, and as directed by the Engineer.

Informational sign boards shall be installed within 60 calendar days after the contract has been approved by the Attorney General or the appointed authority to represent the State.

Sign posts shall be commercial quality pressure treated timber.

Sign board housing frames, moldings, door, and door stops shall be finished (smooth 4 sides) redwood lumber. Sharp edges shall be rounded by light sanding.

Sign housing backing shall be commercial quality marine plywood.

Sign post foundation shall be of minor concrete conforming to the requirements in Section 90, "Portland Cement Concrete," of the Standard Specifications.

Plexiglas facing shall be of commercial quality meeting the minimum thickness shown on the plans. The edge all around the plexiglas sheet shall be caulked with a commercial quality silicone sealant.

Metal capping shall be commercial grade galvanized sheet metal.

All exposed wood surfaces shall be painted with 1 coat alkyd wood primer and 2 coats of alkyd semigloss enamel finish coats. Paint color on all wood surfaces inside the sign board housing, including the unattached plywood sheet, shall be white. Finish coat paint color on all exterior wood surfaces shall be dark brown. Painting galvanized metal capping shall conform to the provisions in Section 59-3, "Painting Galvanized Surfaces," of the Standard Specifications. Color shall match with the color specified for wood surfaces.

Lag screws and nails used shall be galvanized.

Door hardware shall conform to the requirements shown on the plans. Door handle shall be stainless steel.

Each sign board housing door shall be provided with a set of stainless steel hasp and a stainless steel 1 3/16" wide pad lock. Four sets of keys per pad lock shall be furnished to the Engineer upon completing the installation of the informational sign board units.

The Contractor shall maintain all informational sign board units in good condition at all times until acceptance of the contract. At the time of acceptance of the project, all informational sign board units shall be left in place.

Informational sign board will be paid for by the unit.

The contract unit price paid for informational sign board shall include full compensation for furnishing all labor, materials (including pad locks), tools, equipment, and incidentals, and for doing all the work involved in informational sign board, including maintenance, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.19 CONSTRUCTION AREA SIGNS

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

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 any 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

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

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

Type IV reflective sheeting for sign panels for portable construction area signs shall conform to the requirements specified under "Prequalified and Tested Signing and Delineation Materials" elsewhere in these special provisions.

10-1.20 MAINTAINING TRAFFIC

Attention is directed to Sections 7-1.08, "Public Convenience," 7-1.09, "Public Safety," and 12, "Construction Area Traffic Control Devices," of the Standard Specifications and to the Sections entitled "Public Safety" and "Cooperation" elsewhere in 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".

In the Standard Plans, Note 10 on Standard Plan T10, Note 9 on Standard Plan T10A, Note 5 on Standard Plan T11, Note 6 on Standard Plan T12, Note 5 on Standard Plan T13, and Note 4 on Standard Plan T14 are revised to read:

> All traffic cones used for night lane closures shall have reflective cone sleeves as specified in the specifications.

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.

The C16 and C17 designations of the signs shown on the detail "Entrance Ramp Without Turning Pockets" of Standard Plan T14 are amended to designate the signs as R16 and R17, respectively.

Lane closures shall conform to the provisions in the section of these special provisions entitled "Traffic Control System for Lane Closure."

Personal vehicles of the Contractor's employees shall not be parked on the traveled way or shoulders, including any section closed to public traffic.

Contractor’s vehicles and/or equipment, including personal vehicles of Contractor’s employees, shall not be parked in the parking lot adjacent to the Bridge Toll Plaza Administration Building or the widened area south side of the eastbound lanes on the east end of bridge.

The existing bike paths located between Piers 77 and 78 may be closed to bicycle and pedestrian traffic during the seismic retrofit work on Piers 77 and 78. The maximum closure of the bike paths shall not exceed 90 consecutive days at any time.

Whenever vehicles or equipment are parked on the shoulder within 6 feet of a traffic lane, the shoulder area shall be closed as shown on the plans.

Lanes shall be closed only during the hours shown on the charts included in this section "Maintaining Traffic." Except work required under 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.

One bridge deck may be closed to traffic during the hours indicated on the lane closure charts included in this section “Maintaining Traffic”. When one bridge deck is closed, the other bridge deck shall remain open for use as two-way public traffic, with one lane in each direction of travel. Attention is directed to Section "Cooperation" elsewhere in these special provisions regarding the closure of the upper deck of the San Francisco-Oakland Bay Bridge starting in the year 2000.

When two-way traffic is diverted to a single bridge deck, the Contractor shall utilize pilot cars. Pilot cars shall cycle in both directions, with one in front of a platoon of vehicles and the other at the rear. The leading pilot car shall stop the public traffic at the location shown on the plans or designated by the Engineer. As the traffic queue builds up, pilot cars shall move forward under the direction of traffic supervisors. Traffic supervisors shall position at flagger stations as designated on the plans or by the Engineer, with one traffic supervisor at each end of the bridge. At no time shall the traffic queue extend to the toll booths at the east end and extend beyond the one-lane segment in the eastbound direction at the west end as shown on the plans.

Traffic supervisors used to monitor and direct the two-way traffic control during a deck closure shall be certified by American Traffic Safety Services Association or have received certification of completion of at least 16 hours of traffic control training courses from a recognized training class within the past 3 years. They must have a minimum one year of related experience at a supervisory level or above within the past 3 years. All pilot cars and operators shall be provided by the Contractor. Contractor employees operating pilot cars or responsible for the operation of a traffic control station shall have the same training as required for the Traffic Operations Supervisor.

The Contractor shall, at his expense, provide a minimum of 16 hours training for up to 6 State personnel designated by the Engineer. The type of training for State personnel shall be the same as that provided to the Contractor's forces This training may be combined with the training required of Contractor’s employees.

The pilot cars to be utilized shall clearly display the Contractor’s name and logo. The pilot cars shall have communication means with traffic supervisors and toll plaza personnel in the work area, and the maximum speed of the pilot car through the traffic control zone shall not exceed 35 miles per hour. The pilot cars shall be equipped with a flashing sign displaying the message “PILOT CAR FOLLOW ME” mounted on the rear of the lead pilot car. The time between any two leading pilot cars in one direction shall not exceed 12 minutes. One California Highway Patrol (CHP) patrol vehicle shall also be positioned at each end of the bridge during all hours when two-way traffic is in operation. The Contractor shall coordinate with the Engineer to ensure the presence of CHP vehicles with officers at both ends of the bridge.

Full compensation for furnishing and placing traffic cones, flashing arrow signs, pilot cars and its operators, and traffic supervisors as shown on the traffic handling plans and as specified in this section shall be considered as included in the contract lump sum price paid for traffic control system and no additional compensation will be allowed therefor.

Designated legal holidays are: January 1st, the third Monday in February, the last Monday in May, July 4th, the first Monday in September, 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 and the pilot car operations 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. Such deviations shall not be adopted until the Engineer has indicated his written approval. All other modifications will be made by contract change order.

Precast concrete and structural steel members shall not be cast, assembled or stored within the right of way of Route 580. During work on said members, no workers, equipment or materials shall occupy any area within 4 feet of the edge of any existing pavement except as permitted during lane closures.

Erection of steel structural members and prcast conctete mermbers over Route 580 shall be undertaken during permitted hours of lane closures. During steel structural member erection, public traffic in the lanes over which steel structural member are being placed shall be routed around the work area by means of local detour as shown on the plans.

Regardless of the construction procedure, methods and equipment selected, the Contractor shall have all necessary materials and equipment on the site to erect or remove the precast concrete or steel structural member in any one location prior to any occupation of a traffic lane, and shall erect or remove the precast concrete or steel structural member in an expeditious manner in order that inconvenience to public traffic will be a minimum.

The Contractor may occupy one 12-foot width of the bridge roadway, adjacent to the curb, during the time cleaning and painting is being performed. Occupancy of the roadway shall be limited to one side of the bridge at a time and only during the hours when lane closures are allowed as shown on the lane closure charts in this section “Maintaining Traffic”.

The Contractor shall close the lane in accordance with the provisions in "Traffic Control System" of these special provisions before occupying such portion.

At the close of each day's work when operations are not in progress, all obstructions shall be removed and the roadway left clear and unobstructed for the free passage of traffic. All loose blasting material shall be removed from the traveled way before the area is opened to public traffic.

Supply lines may be laid along the top of curbs adjacent to railing posts, provided they do not interfere with public traffic. These lines shall be removed when work is not in progress.

TRAFFIC DELAY PENALTIES.--Should the Contractor fail to provide all lanes ready for use by public traffic at the times specified in the “Lane Closure Charts” included under “Maintaining Traffic” of these special provisions for either eastbound or westbound direction of the bridge, damages will be assessed by the Department. For each 10 minute period, or fraction thereof, damages in the amount of $7,600 will be assessed when all lanes are not available for use by public traffic. In no case will damages of more than $137,000, will be assessed for each and every calendar day’s delay in providing all lanes on the bridge to public traffic at the times specified in Section “Maintaining Traffic” of these special provisions. The Department will permanently reduce the amount of any contract moneys due to the contractors, or that may become due, by the amount of these damages. It is expressly agreed by the parties that the specific degree of damage suffered by the traveling public is uncertain and cannot be readily ascertained with a high degree of accuracy and that, therefor, liquidated damages are appropriately established at the time of entering into the contract.

The above damages are distinct and separate from other liquidated damages specified in Section “Beginning of Work, Time of Completion and Liquidated Damages” of these special provisions.

CONTINGENCY PLANS.--To minimize the impact when a catastrophic event should occur during the Contractor’s bridge removal or installation operations, within 30 calendar days after approval of the contract, the Contractor shall submit to the Engineer contingency plans to provide temporary bridge deck(s) that spans no less than 125 feet to allow 2 lanes of traffic in each direction of travel at the Trestle bridge section.

The contingency plans shall contain information on the fabrication and installation of a temporary bridge structure(s) within 72 hours after the time of a catastrophic event. This information shall indicate a step-by-step procedure describing all aspects of temporary bridge structure installation including personnel and equipment to assure the full width opening of the bridge decks to public traffic.

Working drawings for the contingency plans shall conform to the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. All drawings shall be 22" x 34" in size. For initial review, 10 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer shall be submitted for final approval and use during construction.

Approval and implementation of the contingency plans shall not relieve the Contractor from the penalties assessed specified under “Traffic Delay Penalties” of these special provisions.

Except as provided in Section 7-1.165, "Damage by Storm, Flood, Tidal Wave or Earthquake," of the Standard Specifications, full compensation for preparing contingency plans and fabrication, installation, removal and disposal of temporary bridge structures shall be considered as included in the contract prices paid for the various contract items of work and no additional compensation will be allowed therefor.

Chart No. 1
Multilane Lane Requirements

Location: EASTBOUND-ON ROUTE 580-AT THE RICHMOND/SAN RAFAEL BRIDGE (LOWER DECK)

	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	■	■	■	■	■	■															■	■	■	■	
Fridays	■	■	■	■	■	■															■	■	■	■	
Saturdays	■	■	■	■	■	■	■	■	■	■											■	■	■	■	
Sundays	■	■	■	■	■	■	■	■	■	■												■	■	■	
Day before designated legal holiday	■	■	■	■	■	■															■	■	■	■	
Designated legal holidays	■	■	■	■	■	■	■	■	■	■												■	■	■	

Legend:

■ One lane open in direction of travel

□ Two adjacent lanes open in direction of travel; Shoulder may be closed (See Remarks).

REMARKS: Shoulder can be utilized as travel lane when Lane No. 1 is closed to traffic.

Chart No. 2
Multilane Lane Requirements

Location: WESTBOUND-ON ROUTE 580-AT THE RICHMOND/SAN RAFAEL BRIDGE (UPPER DECK)

	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	■	■	■	■	■	■														■	■	■	■	■	
Fridays	■	■	■	■	■	■															■	■	■	■	
Saturdays	■	■	■	■	■	■	■	■												■	■	■	■	■	
Sundays	■	■	■	■	■	■	■	■	■											■	■	■	■	■	
Day before designated legal holiday	■	■	■	■	■	■															■	■	■	■	
Designated legal holidays	■	■	■	■	■	■	■	■	■	■										■	■	■	■	■	

Legend:

■ One lane open in direction of travel

□ Two adjacent lanes open in direction of travel; Shoulder may be closed (See Remarks).

REMARKS: Shoulder can be utilized as travel lane when Lane No. 1 is closed to traffic.

Chart No. 3
Multilane Lane Requirements

Location: ON ROUTE 580-AT THE RICHMOND/SAN RAFAEL BRIDGE (UPPER AND LOWER DECKS)

	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	■	■	■	■	■	■															■	■	■	■	
Fridays	■	■	■	■	■	■																	■	■	
Saturdays	■	■	■	■	■	■	■	■																■	
Sundays	■	■	■	■	■	■	■	■	■														■	■	
Day before designated legal holiday	■	■	■	■	■	■																	■	■	
Designated legal holidays	■	■	■	■	■	■	■	■	■														■	■	

Legend:

■ Single deck closure permitted. (See Remarks)

□ No deck closure allowed.

REMARKS: Lane Closure Chart No. 3 is applicable for single deck closure only. No deck closures will be allowed on the Richmond-San Rafael Bridge on Sunday mornings when the San Francisco-Oakland Bay Bridge deck is closed. Attention is directed to Section "Cooperation" in these special provisions.

LANE CLOSURE CHART NO. 4

Location: Route 580 Eastbound On-Ramp from Main Street (San Quentin) - Post Mile 2.540

DIRECTION: Eastbound

Lane Requirements and Hours of Work

	AM												PM												
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	■	■	■	■	■	■															■	■	■	■	
Fridays	■	■	■	■	■	■																	■	■	
Saturdays	■	■	■	■	■	■	■	■																■	
Sundays	■	■	■	■	■	■	■	■	■														■	■	
Day before Designated legal holiday	■	■	■	■	■	■																	■	■	
Designated Legal Holidays	■	■	■	■	■	■	■	■	■														■	■	

Legend:

■ Ramp may be closed.

□ Provide at least one lane open in direction of travel.

REMARKS: See Detour Plans for Eastbound on-ramp from Main Street to Route 580.

LANE CLOSURE CHART NO. 5

Location: Route 580 Westbound Off-Ramp from Main Street (San Quentin) - Post Mile 2.529

DIRECTION: Westbound

Lane Requirements and Hours of Work

	AM												PM												
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	■	■	■	■	■	■															■	■	■	■	
Fridays	■	■	■	■	■	■																	■	■	
Saturdays	■	■	■	■	■	■	■	■																■	
Sundays	■	■	■	■	■	■	■	■	■														■	■	
Day before Designated legal holiday	■	■	■	■	■	■																	■	■	
Designated Legal Holidays	■	■	■	■	■	■	■	■	■														■	■	

Legend:

■ Ramp may be completely closed. Detour traffic to Bellam Boulevard exit.

□ No ramp closure permitted.

REMARKS: See Detour Plans for Main Street westbound off-ramp from Route 580.

10-1.21 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE

A traffic control system shall consist of closing traffic lanes and ramps in accordance 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" elsewhere in 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.

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 all other operations traffic shall be controlled with stationary type lane closures. The Contractor's 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 component in the traffic control system is displaced, or ceases to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair the component to its original condition or replace the component and shall restore the component to its original location.

STATIONARY TYPE LANE CLOSURE.--When lane and ramp closures are made for work periods only, at the end of each work period, all 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, approved by the Engineer, within the limits of the highway right of way.

MOVING TYPE 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 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 crash cushions (TMCC) for use in moving lane closures shall be any of the following approved models, or equal:

(1)

Hexfoam TMA Series 3000 and
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 (800) 884-8274 FAX (916) 387-9734
	Distributor(Southern): Traffic Control Service, Inc. 1881 Betmor Lane Anaheim, CA 92805 Telephone (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 (800) 654-8182	Renco Inc. 1582 Pflugerville Loop Road P.O. Box 730 Pflugerville, TX 78660-0730 Telephone (800) 654-8182

Each TMCC shall be individually identified with the manufacturer's name, address, TMCC 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 TMCC shall have a message next to the name and model number in 1/2 inch high letters which states, "The bottom of this TMCC shall be _____ inches ±_____ inches above the ground at all points for proper impact performance." Any TMCC 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 TMCCs supplied under this contract need recertification. Each unit shall be certified by the manufacturer to meet the requirements for TMCCs in accordance with the standards established by the Transportation Laboratory Structures Research Section.

Approvals for new TMCC designs proposed as equal to the above approved models shall be in accordance with the procedures (including crash testing) established by the Transportation Laboratory Structures Research Section. For information regarding submittal of new designs for evaluation contact:

Transportation Laboratory
Structures Research Section
P.O. Box 19128
5900 Folsom Boulevard
Sacramento, CA 95819

New TMCCs proposed as equal to approved TMCCs or approved TMCCs determined by the Engineer to need recertification shall not be used until approved or recertified by the Transportation Laboratory Structures Research Section.

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.

10-1.22 TEMPORARY TWO-WAY TRAFFIC CHANNELIZATION DEVICES

Temporary two-way traffic channelization shall be furnished, placed, maintained and removed at the locations shown on the plans, and in accordance 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 to reduce 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.

Temporary two-way traffic channelization devices for use during bridge deck closures shall be the following approved models, or equal:

(1)

Opposing Traffic Lane Divider (OLTD)
with Portable Base
Product No. 270-P

Manufacturer:	Distributor
Impact Recovery Systems, Inc.	Impact Recovery Systems, Inc.
246 W. Josephine	246 W. Josephine
P.O. Box 12637	P.O. Box 12637
San Antonio, Texas 78212	San Antonio, Texas 78212
Telephone (210) 736-4477	Telephone (210) 736-4477
Telephone (210) 736-2084	Telephone (210) 736-2084

(2)

42” Tubular Marker
with Portable Base
Product No. T42-P

Manufacturer:	Distributor
Impact Recovery Systems, Inc.	Impact Recovery Systems, Inc.
246 W. Josephine	246 W. Josephine
P.O. Box 12637	P.O. Box 12637
San Antonio, Texas 78212	San Antonio, Texas 78212
Telephone (210) 736-4477	Telephone (210) 736-4477
Telephone (210) 736-2084	Telephone (210) 736-2084

Arrangements have been made to insure that any successful bidder can obtain the above two-way traffic channelization devices from the above source.

The price quoted by the manufacturer for the Opposing Traffic Lane Divider with Portable Base, Product No. 270-P. FOB San Antonio, Texas is $ 125.25 per unit, including sales tax.

The price quoted by the manufacturer for the 42” Tubular Marker with Portable Base, Product No. T42-P, FOB San Antonio, Texas is $ 79.00 per unit, including sales tax.

In addition, the manufacturer quoted the following prices for replacement parts of the above two-way channelization components:

Product Number	Description	Unit Price
270	Opposing Traffic Lane Divider without base	$ 79.00
146	Opposing Traffic Lane Divider Panel only (2 in set) with Hardware	$ 57.25
117	29” Orange Post for OLTD	$ 7.25
112	Blue Spring Assembly for OLTD	$ 21.50
827	2 - 3/4” Carriage Bolt for Panel Assembly for OLTD	$ 0.25
830	Orange Plastic Washer for Panel Assembly for OLTD	$ 0.25
831	Orange Plastic Washer with Tee Nut for Panel Assembly for OLTD	$ 0.45
180	2 - 3” x 8” Bands Sheeting for OLTD	$ 4.00
TP42	36” Replacement post with Hardware for Tubular Marker	$ 8.20
110	Red Spring Assembly for Tubular Marker	$ 20.50

(Above prices includes sales tax, FOB San Antonio, Texas)

The above prices will be firm for all orders placed on or before July 31, 2000, provided delivery is accepted within 90 days after the order is placed.

Assembly of two-way traffic channelization devices shall be in accordance with the manufacturer’s recommendation. All devices shall be assembled and installed with portable bases before placing on the roadway.

Full compensation for furnishing, placing, maintaining and removing temporary two-way traffic channelization devices shall be considered as included in the contract lump sum price paid for traffic control system and no separate payment will be made therefor.

10-1.23 TEMPORARY PAVEMENT DELINEATION

Temporary pavement delineation shall be furnished, placed, maintained and removed in accordance 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 to reduce 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, except where edgelines coincides with locations of temporary railing (Type K).

All work necessary, including any required lines or marks, to establish the alignment of temporary pavement delineation shall be performed by the Contractor. Surfaces to receive temporary pavement delineation shall be dry and free of dirt and loose material. Temporary pavement delineation shall not be applied over existing pavement delineation or other temporary pavement delineation. Temporary pavement delineation shall be maintained until superseded or replaced with a new pattern of temporary pavement delineation or permanent pavement delineation.

Temporary pavement markers and removable traffic tape which is 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 reflective pavement markers placed at longitudinal intervals of not more than 24 feet. The temporary reflective pavement markers shall be the same color as the laneline or centerline the pavement markers replace. Temporary reflective pavement markers shall be, at the option of the Contractor, one of the temporary pavement markers listed for short term day/night use (14 days or less) or long term day/night use (6 months or less) in "Prequalified and Tested Signing and Delineation Materials" elsewhere in these special provisions.

Temporary reflective pavement markers shall be placed in accordance with the manufacturer's instructions and shall be cemented to the surfacing with the adhesive recommended by the manufacturer, except epoxy adhesive shall not be used to place pavement markers in areas where removal of the pavement markers will be required.

Temporary laneline or centerline delineation consisting entirely of temporary reflective pavement markers placed on longitudinal intervals of not more than 24 feet, shall be used on lanes opened to public traffic for a maximum of 14 days. Prior to the end of the 14 days the permanent pavement delineation shall be placed. If the permanent pavement delineation is not placed within the 14 days, the Contractor shall provide additional temporary pavement delineation and the cost thereof shall be borne by the Contractor. 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 reflective pavement markers, 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:

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 25 feet.

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, or traffic cones, portable delineators or channelizers placed at longitudinal intervals not to exceed 25 feet; or temporary reflective 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 "Prequalified and Tested Signing and Delineation Materials" elsewhere in these special provisions.

Four-inch wide traffic stripe placed for temporary edgeline delineation which will require removal shall conform to the requirements of temporary traffic stripe (tape) specified herein. The quantity of temporary traffic stripe (tape) used for this temporary edgeline delineation will not be included in the quantities of tape 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 jobsite to maintain the cones or delineators during all hours of the day that they 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 the section of these special provisions entitled "Pavement Markers," 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 "Prequalified and Tested Signing and Delineation Materials" elsewhere in 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 paid for. Full compensation for furnishing, placing, maintaining and removing the 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 type traffic stripe tape listed in "Prequalified and Tested Signing and Delineation Materials" elsewhere in these special provisions.

Removable traffic stripe tape shall be applied in accordance 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 reflective pavement markers placed at longitudinal intervals of not more than 6 feet may be used in place of the temporary traffic stripe tape. Temporary reflective pavement markers shall be one of the types of temporary pavement markers listed for long term day/night use (6 months or less) in "Prequalified and Tested Signing and Delineation Materials" elsewhere in these special provisions. When temporary reflective pavement markers are used in place of tape, payment for those temporary pavement markers will be made on the basis of the theoretical quantity of temporary traffic stripe (tape), required for the left edgeline the temporary pavement markers replace.

TEMPORARY PAVEMENT MARKING (TAPE).--Temporary pavement marking consisting of removable pavement marking tape shall be applied at the locations shown on the plans. The temporary pavement marking tape shall be complete in place at the location shown, prior to opening the traveled way to public traffic.

Removable pavement marking tape shall be the temporary removable type pavement marking tape listed in "Prequalified and Tested Signing and Delineation Materials" elsewhere in these special provisions and shall be applied and removed in accordance with the provisions specified for applying and removing the temporary traffic stripe tape.

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 location 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 reflective pavement markers for long term day/night use (6 months or less) listed in "Prequalified and Tested Signing and Delineation Materials" elsewhere in these special provisions.

Temporary pavement markers shall be placed in accordance 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 reflective pavement markers for long term day/night use (6 months or less) listed in "Prequalified and Tested Signing and Delineation Materials" elsewhere in these special provisions, 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 temporary pavement markers used in place of temporary traffic stripe will be made on the basis of the theoretical quantities of temporary traffic stripe (tape), temporary traffic stripe (paint) and temporary pavement markers required for the pattern the pavement markers replace.

Reflective pavement markers conforming to the requirements of "Pavement Markers" of these special provisions may be used in place of temporary reflective pavement markers for long term day/night use (6 months or less) except at locations to simulate patterns of broken traffic stripe. Placement of the reflective pavement markers used for temporary pavement markers shall conform to said section "Pavement Markers" of these special provisions except; the waiting period requirements 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 linear foot, 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 pavement marking (tape) will be measured and paid for by the square foot for actual area of the pavement marking that receives tape.

Temporary pavement markers, shown on the plans, will be measured and paid for as units in the same manner specified for reflective pavement markers as provided 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 linear foot for temporary traffic stripe (tape) and per square foot for temporary pavement marking (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 the temporary traffic stripe tape and temporary pavement marking tape, complete in place, as shown on the plans, as specified in the Standard Specification and these special provisions, and as directed by the Engineer.

10-1.24 BARRICADES

Barricades shall be furnished, placed, and maintained at the locations designated by the Engineer, shown on the plans, or specified and shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Type II reflective sheeting for stripes on barricade rail faces shall conform to the requirements specified under "Prequalified and Tested Signing and Delineation Materials," elsewhere in these special provisions.

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," elsewhere in these special provisions, and will not be included in counts for payment for barricades.

Full compensation for barricades shown on the traffic handling plans shall be considered as included in the contract lump sum price paid for traffic control system and no separate payment will be made therefor.

10-1.25 PORTABLE CHANGEABLE MESSAGE SIGN

Portable changeable message signs shall be furnished, placed, operated, and maintained at 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.

The portable changeable signs shall be operated with complete remote control equipment from location(s) near the job site as designated by the Engineer. The remote control equipment shall comply with the following minimum functional specifications:

Baud Rate:	1200/2400
Protocol:	Error checking on all data.
Update of Message:	Immediate change to a new transmitted message.
Library Query:	Send message and sequence library data.
Library Update:	Load library with new message and sequence data.
Status Query:	Send complete sign status.

The operator shall be able to monitor and remotely control one or all changeable message signs as if they were being controlled locally. The changeable message signs shall have up to 200 of the most common construction messages which may be used for the project be pre-programmed. Any custom message can be added or substituted as necessary. The standard software provided with the Controller shall allow the operator to display pre-programmed messages; create, display and store custom messages; create and display sign sequences up to six frames long (i.e. six distinct message strung together to create a longer message), vary flash rates in 1 second intervals, plus other secondary editing functions. Messages to be displayed on the sign board shall be pre-programmed for automatic operation. In addition, sequences can be programmed for display on different days of the week at different hours of the day. All messages and sequences are independently programmable and have no limitations on nesting one within the other.

As a minimum, the following messages shall be pre-programmed:

TRAFFIC DETOUR AHEAD
35 ZONE AHEAD
2-WAY TRAFFIC AHEAD
PREPARE TO STOP
BRIDGE WORK AHEAD
WORK ZONE AHEAD

The use of specific sign messages during the night-time bridge deck closure shall be as shown on the plans.

Communication between the changeable message signs and the remote operating station can be hardwired or wireless. All of the modems in the entire changeable message sign system shall use MNP-10 protocol and be tested before being used in the field.

Full compensation for furnishing and operating remote control equipment for the portable changeable message signs shall be considered as included in the contract unit price paid for portable changeable message sign and no additional compensation will be made therefor.

10-1.26 TEMPORARY RAILING

Temporary railing (Type K) shall be placed at the locations shown on the plans, specified in these special provisions or in the Standard Specifications or 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.

Temporary railing (Type K) shall remain in place during all stages of construction until two-way traffic on a single bridge deck is no longer required.

Temporary railing (Type K) fabricated prior to January 1, 1993, with one longitudinal No. 5 reinforcing steel bar near the top in lieu of the 2 longitudinal No. 5 reinforcing steel bars near the top, as shown on the plans, may be used provided vertical holes are not drilled in the top of the temporary railing to secure temporary traffic screen to the temporary railing.

The Contractor's attention is directed to the provisions in "Public Safety" elsewhere in these special provisions.

Temporary railing (Type K) placed in accordance with the provisions in "Public Safety" elsewhere in these special provisions will not be measured nor paid for.

Temporary railing shall include a Type P marker at the angle point of the approach flare.

Where shoulders are less than 8 feet wide, approach end of temporary railing (Type K) shall be installed flush with existing bridge railing and a Type P marker shall be installed at the approach end of the temporary railing (Type K).

10-1.27 CHANNELIZERS

Channelizers shall be surface mounted type and shall be furnished, placed and maintained at the locations shown on the plans and 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 "Prequalified and Tested Signing and Delineation Materials," elsewhere in these special provisions.

Channelizer posts shall be orange in color.

At the option of the Contractor, channelizer bases may be cemented to the pavement using hot melt bitumen adhesive and in the same manner provided for cementing pavement markers to pavement in the section of these special provisions entitled "Pavement Markers."

Full compensation for channelizers shall be considered as included in the contract lump sum price paid for traffic control system and no separate payment will be made therefor.

10-1.28 TEMPORARY TRAFFIC SCREEN

Temporary traffic screen shall be furnished, placed and maintained on top of temporary railing (Type K) at the locations designated on the plans, specified or ordered 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.

Temporary traffic screen shall be, at the option of the Contractor, either the wood frame and metal post fabricated type shown on the plans, or shall be one of the commercially available types listed below or equal.

The wood frame metal post fabricated type temporary traffic screen shown on the plans, shall be fabricated from good commercial quality materials suitable for the purpose intended, mounted and anchored on temporary railing (Type K). The wood frame metal post fabricated type traffic screen need not be new provided the traffic screen is in good repair, sound, and suitable for the purpose intended.

The manufacturers of approved modular type temporary traffic screen are as follows:

Modular Guidance System Modules

Manufacturer:	Distributor:
Carsonite International 1301 Hot Springs Road Carson City, NV 89706 Telephone (800) 648-7974	Carsonite International 1301 Hot Springs Road Carson City, NV 89706 Telephone (800) 648-7974

Anti-Glare Shield System Modules

Manufacturer Distributor:

Safe-Hit Corporation	Safe-Hit Corporation
1930 W. Winton Avenue	1930 W. Winton Avenue
Building 11	Building 11
Hayward, CA 94545	Hayward, CA 94545
Telephone (800) 537-8958	Telephone (800) 537-8958

Syro Glare Foil System Modules

Manufacturer	Distributor:
Syro Steel	Syro Steel
P.O. Box 99	P.O. Box 99
Centerville, UT 84014	Centerville, UT 84014
Telephone (800) 772-7976	Telephone (800) 772-7976

Temporary modular traffic screen shall be either new or undamaged used modules mounted and anchored on temporary railing (Type K) using the mechanical anchoring system recommended by the manufacturer of the modules. Modular temporary traffic screen shall be installed in accordance with the manufacturer's instructions.

At the completion of the project, temporary traffic screen shall become the property of the Contractor and shall be removed from the site of the work.

Temporary traffic screen will be measured by the linear foot from actual measurements along the line of the completed temporary traffic screen, at each location designated on the plans, specified or ordered by the Engineer. If the Engineer orders a lateral move of temporary railing, with temporary traffic screen attached, moving the temporary traffic screen will be part of the extra work for moving the temporary railing as specified in Section 12-4.01, "Measurement and Payment," of the Standard Specifications. Temporary traffic screen placed in excess of the length shown, specified, or ordered will not be paid for.

The contract price paid per linear foot for temporary traffic screen shall include full compensation for furnishing all labor, materials (including anchoring systems), tools, equipment and incidentals, and for doing all work involved in installing, moving, maintaining and removing the temporary traffic screen, as shown on the plans, as specified in these special provisions and as directed by the Engineer.

10-1.29 TEMPORARY CRASH CUSHION MODULE

This work shall consist of furnishing, installing and maintaining sand filled temporary crash cushion modules in groupings or arrays at each location shown on the plans, specified in the special provisions or directed by the Engineer. The grouping or array of sand filled modules shall form a complete sand filled temporary crash cushion in accordance with the details shown on the plans and these special provisions.

Attention is directed to "Public Safety" and "Temporary Railing" 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 of the following types or equal:

Energite Inertial Modules

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 (800) 884-8274 FAX (916) 387-9734
	Distributor(Southern):
	Traffic Control Service, Inc. 1881 Betmor Lane Anaheim, CA 92805 Telephone (800) 222-8274

or Fitch Inertial Modules

National Distributor:	Distributor:
Roadway Safety Service, Inc. 700-3 Union Parkway Ronkonkoma, NY 11779	Singletree Sales Company 1533 Berger Drive San Jose, CA 95112 Telephone (800) 822-7735

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 above 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 accordance 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 his 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 his 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 approved 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 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 accordance with the provisions in "Public Safety" elsewhere in 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 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 such 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, markers, 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) the sand filled temporary crash cushion modules, complete in place, as shown on the plans, as specified in these special provisions and as directed by the Engineer.

10-1.30 TEMPORARY SINGLE LINE CRASH CUSHION/END TREATMENT

Temporary single line crash cushion/end treatment units shall be furnished and installed as shown on the plans, and as specified in the Standard Specifications and these special provisions.

Temporary crash cushion/end treatment units shall be installed at the locations shown on the plans. Nothing in these special provisions shall be construed as to reduce 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.

At the Contractor’s option, one of the following acceptable temporary single line crash cushion/end treatment units may be constructed:

PRODUCT	VENDOR
ADIEM II	SYRO, Inc. (A Trinity Industries Co.) 2525 N. Stemmons Freeway Dallas, TX 75207 Telephone (800) 644-7976 Fax: (214) 589-8423
QUADGUARD CZ	Energy Absorption System, Inc. One East Wacker Drive Chicago, IL 60601 Telephone (312) 467-6750 Fax: (312) 467-1356
REACT 350.9	Singletree Sales 1533 Berger Dr. San Jose, CA 95112 Telephone (408) 287-1943 Fax: (408) 287-1572

The temporary single line crash cushion/end treatment shall be installed in accordance with the manufacturer’s recommendations.

The Contractor shall furnish to the Engineer one copy of the manufacturer's plan and parts list of the selected temporary crash cushion/end treatment unit.

The Contractor shall provide the Engineer with the manufacturer's Certificate of Compliance in accordance with the provisions of Section 6-l.07, "Certificates of Compliance," of the Standard Specifications. Said certificate shall certify that the selected temporary single line crash cushion/end treatment units comply with the contract plans and specifications, conform to the prequalified design and material requirements, and were manufactured in accordance with the approved quality control program.

Upon completion of work and when no longer required, or at the time ordered by the Engineer, all temporary single line crash cushion/end treatment units shall remain the property of the State, and shall be salvaged, cleaned, packaged, bundled, tagged, hauled, to the District recycle center at San Francisco-Oakland Bay Bridge Warehouse Supply Area near Oakland and stockpiled.

The Contractor shall notify the Engineer and District Recycle Coordinator, telephone (415) 557-9229 a minimum of 48 hours prior to hauling salvaged temporary single line crash cushion/end treatment unit materials to the Recycle Center.

The District recycle center is open from 8:00 to noon and from 1:00 p.m. to 3:00 p.m. Mondays through Fridays, except designated legal holidays.

Temporary single line crash cushion/end treatment, regardless of length or modules required in each unit, will be measured and paid for by the unit as temporary single line crash cushion/end treatment. The quantity of units of temporary single line crash cushion/end treatment will be determined from actual count in place in the completed work.

The contract unit price paid for temporary single line crash cushion/end treatment, shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing and installing the temporary single line crash cushion, complete in place, including salvaging and hauling to the District recycle center, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.31 EXISTING HIGHWAY FACILITIES

The work performed in connection with various existing highway facilities shall conform to the provisions in Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

Except as otherwise provided for damaged materials in Section 15-2.04, "Salvage," of the Standard Specifications, the materials to be salvaged shall remain the property of the State, and shall be cleaned, packaged, bundled, tagged, and hauled to the District recycle center at the San Francisco-Oakland Bay Bridge Warehouse Supply Area adjacent to the San Francisco-Oakland Bay Bridge Toll Plaza and stockpiled.

Plans of the existing bridge are available for review at the Office of Structure Maintenance and Investigations, 1801 30th Street, Sacramento, California, Telephone (916) 227-8786.

Plans of the existing bridge 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 existing bridges, the Contractor shall verify field dimensions for all members prior to submitting working drawings and ordering, fabricating or installing material. The Contractor shall be responsible for adjusting dimensions of the work to fit existing conditions.

The Contractor shall certify in writing that field dimensions have been verified and shall include the certification with the working drawing submittal. Full compensation for conforming to the above requirements shall be considered as included in the contract prices paid for the various contract items of work and no additional compensation will be allowed therefor.

The following additional references are available for review at 111 Grand Avenue Oakland, California 94601:

Caltrans Report on Paint Thickness, dated 4-4-97
Caltrans Seismic Velocity Measurements, dated 10-31-95
Caltrans Soils Laboratory Test Data, dated 12-08-95
Caltrans Preliminary Seismic & Geologic Information, dated 02-20-96
Caltrans Liquefaction Hazard Evaluation, dated 12-04-95
Caltrans Revised Seismic Velocity Report and Laboratory Test Data, dated 11-21-95
Caltrans Preliminary Foundation Exploration for Contract 1002, dated 11-28-50
Caltrans Final Foundation Exploration for Contract 1002A, dated 04-29-52
Caltrans Final Substructure Construction Report (Main Spans) for Contract 1003, dated 12-22-55
Caltrans Final Construction Report (San Quentin Approach) for Contract 1017, dated 11-08-57
Caltrans Final Construction Report (Temporary Approach Trestle on San Quentin Side) for Contract 1007, dated 11-03-54
Caltrans Report of Tremie Concrete (Main Spans & East Approach) for Contract 1003, dated 06-11-54
Caltrans Diving Inspection Tracing (Main Spans), dated 04-03-55
Caltrans Telephone Cable Relocation Plan, dated 02-20-53
Earth Mechanics Inc. Pile Driveability Analysis for Pier 35, dated 02-25-97
Geomatrix Foundation Soils Information for Richmond-San Rafael Bridge Retrofit for Contract 59x475, dated 11-15-95
Caltrans Preliminary Report of Pile Tests at Pier No. 47, dated 05-01-54
Caltrans Preliminary Report of Pile Tests at Pier No. 34, dated 11-xx-54
Caltrans Soil Column Thickness Discrepancies Memo, dated 04-03-96
Caltrans Foundation Investigation Summary for West Trestle replacement, dated 02-14-97
Caltrans Supplemental Information - Preliminary Geologic Report for the West Trestle, dated 11-20-96
Caltrans Preliminary Geologic Report, dated 11-01-96
Existing shop drawings from the original 1950's bridge construction
Existing pile driving records from the original 1950's bridge construction
Existing Resident Engineer's Reports from the original 1950's bridge construction

The Contractor may call the Construction Toll Bridge Duty Senior, telephone number (510) 286-5549 to reserve a copy of the above references for review at least 24 hours in advance.

10-1.31A REMOVE GUARD RAILING

Existing guard railing, where shown on the plans to be removed, shall be removed and disposed of.

Existing concrete anchors shall be removed to a depth of not less than one foot below subgrade or one foot below finished grade, whichever is greater in depth. 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.

10-1.31B REMOVE PAVEMENT MARKERS

Existing pavement markers, when no longer required for traffic lane delineation as directed by the Engineer, shall be removed and disposed of.

10-1.31C REMOVE PAINTED AND THERMOPLASTIC TRAFFIC STRIPES AND PAVEMENT MARKINGS

Painted and thermoplastic traffic stripes and pavement markings to be removed will be designated by the Engineer.

Where grinding or any other method approved by the Engineer is used for the removal of painted or thermoplastic traffic stripes and pavement markings or for removal of objectionable material, and such removal operation is being performed within 10 feet of a lane occupied by public traffic, the residue including dust shall be removed immediately. Such removal shall be by a vacuum attachment operating concurrently with the such operation.

Yellow painted or thermoplastic traffic stripe and pavement markings contain lead and chromium. Removal of yellow thermoplastic may (1) produce debris containing heavy metals in concentrations that exceed hazardous waste thresholds established by the California Code of Regulations or (2) produce toxic fumes when heated.

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 Section 1532.1, "Lead," of Construction Safety Orders Title 8, of the California Code of Regulations.

The Contractor shall submit the written compliance programs required in subsection (e)(2), "Compliance Program," of Section 1532.1, "Lead," of the Construction Safety Orders to the Engineer 3 weeks before starting removal of yellow painted or thermoplastic traffic stripe and pavement markings on the project and at such times when revisions to the programs are required by Section 1532.1, "Lead." Approval of the programs by the Engineer will not be required. The compliance programs shall be prepared by an industrial hygienist certified by the American Board of Industrial Hygiene and monitored by a competent person capable of taking corrective action. Copies of all inspection reports made in accordance with Section 1532.1, "Lead," shall be furnished to the Engineer.

Where grinding or any other method approved by the Engineer is used for the removal of yellow painted or thermoplastic traffic stripes and pavement markings the residue including dust shall be contained and collected immediately. Such collection shall be by a vacuum attachment operating concurrently with the removal operation or by other methods approved in writing by the Engineer. The collected residue shall be stored in properly labeled containers approved for the transport of hazardous waste by the United States Department of Transportation while awaiting test results. The containers shall be handled in such a manner that no spillage will occur. The stored containers shall be enclosed by temporary fence at a location within the project limits approved by the Engineer. The Contractor shall begin disposing of the contained residue in accordance with these special provisions no more than 90 days after accumulating 200 pounds of residue.

All debris produced when yellow painted or thermoplastic traffic stripes and pavement markings are removed shall be disposed of by the Contractor at an approved Class 1 disposal facility in accordance with the requirements of the disposal facility operator. The yellow painted or thermoplastic debris shall be hauled by a transporter currently registered with the California Department of Toxic Substances Control using correct manifesting procedures. The Contractor shall make all arrangements with the operator of the disposal facility and perform any testing of the yellow painted or thermoplastic debris required by the operator. The Contractor shall submit the name and location of the disposal facility along with the testing requirements to the Engineer 3 weeks before starting removal of yellow painted or thermoplastic traffic stripe and pavement markings on the project. The Engineer will obtain the United States Environmental Protection Agency Identification Number and sign all manifests as the generator. The California Board of Equalization Number (State Generator's ID) for this project is HYHQ036020676.

The Contractor shall assume that the yellow painted or thermoplastic debris is not regulated under the federal Resource Conservation and Recovery Act (RCRA). Additional disposal costs for debris regulated under RCRA, as determined by test results, will be paid as extra work as provided in Section 4-1.03D of the Standard Specifications.

Full compensation for disposal of yellow painted or thermoplastic debris including testing, temporary storage, and hauling of the material and Compliance Plan preparation and implementation shall be considered as included in the contract price paid per linear foot for remove painted traffic stripe and pavement marking or remove thermoplastic traffic stripe and pavement marking 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.

10-1.31D RECONSTRUCT METAL BEAM GUARD RAILING AND THRIE BEAM BARRIER

Existing metal beam guard railing and thrie beam barrier, where shown on the plans to be reconstructed, shall be reconstructed as shown on the plans.

Attention is directed to "Order of Work" of these special provisions regarding the reconstruction of guard railing and thrie beam barrier at locations exposed to public traffic.

Existing metal beam guard railing and thrie beam barrier to be reconstructed shall be disassembled by removing the rail elements, end sections, terminal sections, and return sections from the posts and blocks. Posts and blocks shall be removed completely and concrete anchors shall be removed to a depth of not less than one foot below the adjacent finished grade.

New posts and blocks shall be furnished and used to reconstruct metal beam guard railing. Posts and blocks from the removed guard railing shall be disposed of. New posts and blocks shall conform to the requirements in Section 83-1.02B, "Metal Beam Guard Railing," for metal beam guard railing, and Section 83-2.02B, "Thrie Beam Barrier, " for thrie beam barrier, of the Standard Specifications.

Where field cutting or boring of wood posts and blocks is required after treatment, all cuts and holes shall be treated with copper naphthenate as specified in AWPA Standard M4. Application of preservative in the field shall conform to the requirements in the last paragraph in Section 58-1.04, "Wood Preservative for Manual Treatment," of the Standard Specifications.

New metal beam guard and thrie beam rail elements and required new backup plates, terminal sections, end sections, and return sections shall conform to the requirements of Type 2 W-Beam as shown in AASHTO Designation: M 180.

All metal components of the removed metal beam guard railing and thrie beam barrier that are not used in the reconstruction work shall be disposed of.

Full compensation for furnishing and installing additional new posts, blocks, and hardware, and for disposal of metal beam guard railing and thrie beam barrier components not used in the reconstruction work shall be considered as included in the contract price paid per linear foot for reconstruct metal beam guard railing or reconstruct thrie beam barrier and no separate payment will be made therefor.

Cable anchor assemblies (breakaway, Type B) for reconstructed metal beam guard railing will be measured and paid for separately and shall conform to the requirements specified under "Metal Beam Guard Railing" in these special provisions.

10-1.31E RESET ROADSIDE SIGNS

Existing roadside signs and mounting hardwares shall be removed, salvaged and temporarily stored at a location within the project limits, as determined by the Engineer, for later resetting at the locations shown on the plans.

Upon completion of the new bridge facilities or retrofitted bridge members where such signs are to be reset, the Contractor shall then haul said sign panels and hardwares from the temporary storage area and reset at its designated location.

10-1.31F REMOVE BASE AND SURFACING

Existing base and bituminous surfacing shown on the plans to be removed, shall be removed to the required depth shown on the plans.

The material removed shall be disposed of outside the highway right of way as provided in Section 15-2.03, "Disposal," of the Standard Specifications.

Removing base and surfacing will be measured by the cubic yard in the same manner specified for roadway excavation as provided in Section 19, "Earthwork," of the Standard Specifications and will be paid for at the contract price per cubic yard for remove base and surfacing.

10-1.31G PLANE ASPHALT CONCRETE PAVEMENT

Existing asphalt concrete pavement shall be planed at the locations and to the dimensions shown on the plans.

Except as provided herein, planing asphalt concrete pavement shall be performed, at the option of the Contractor, either by the cold planing or heater planing method. The use of the heater planing method shall be subject to approval of the local Air Pollution Control Officer.

Cold planing machines shall be equipped with a cutter head not less than 30 inches in width and shall be operated so as not to produce fumes or smoke. The cold planing machine shall be capable of planing the pavement without requiring the use of a heating device to soften the pavement during or prior to the planing operation.

Heater planing machines shall have, in combination or separately, a means for heating and cutting the asphalt concrete surface and blading the displaced material into windrows in one continuous forward motion. Heat shall be

applied uniformly to the area to be planed and shall be accurately controlled according to conditions and road surfacing being planed. The cutting width of the blade shall be not less than 3 feet.

Heater planing operations shall not be performed at any time where there is danger of igniting entrapped gases from sewers or gas mains, if an open flame is used in the heater. The heater planing method shall not be used in areas where the heat generated by the heater planing equipment may damage adjacent shrubs or the foliage on overhanging tree limbs.

The depth, width and shape of the cut shall be as indicated on the typical cross sections or as directed 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 at any time 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 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 all loose material from the underlying surface, before placing the permanent surfacing. Such removed material shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

Operations shall be scheduled such 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 such 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 accordance with the provisions in Section 7-1.13 of the Standard Specifications. Removal operations of planed material shall be concurrent with planing operations and follow within 50 feet of the planer, unless otherwise directed by the Engineer.

Planing asphalt concrete pavement will be measured by the square yard. The quantity to be paid for will be the actual area of surface planed irrespective of the number of passes required to obtain the depth shown on the plans.

The contract price paid per square yard for plane asphalt concrete pavement shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in 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 these special provisions and as directed by the Engineer.

10-1.31H REMOVE STEEL PIPES

Existing steel pipes, where shown on the plans to be removed, shall be removed and disposed of.

Removed steel pipes shall not be stored at the site.

Remove steel pipe will be measured and paid for by the linear foot.

The quantity of remove steel pipes will be determined from actual measurements of pipe removed.

10-1.31I REMOVE WOOD PILES

Existing wood piles, where shown on the plans to be removed, shall be removed and disposed of.

Existing wood piles shall be removed to a depth of not less than one foot below the bay mudline.

Removed wood piles shall not be stored at the site.

Existing wood piles contain creosote or pentachlorophenol wood preservatives. Remove wood piles shall be disposed of at an approved disposal facility.

The quantity of remove wood piles will be measured and paid for as units from actual count.

10-1.31J REMOVE METAL PONTOONS

Existing metal pontoons, where shown on the plans to be removed, shall be removed and disposed of.

Removed metal pontoons shall not be stored at the site.

Remove metal pontoons will be paid for on the basis of lump sum.

10-1.31K REMOVE ASPHALT CONCRETE, CONCRETE, AND SLOPE PROTECTION MATERIAL

Existing asphalt concrete, concrete, and material, including other objectionable waste materials, previously used as slope protection within the right of way of the project limits at the locations shown on the plans to be removed, shall be removed to the limits shown as directed by the Engineer.

Except where the character of the material removed is such that, as determined by the Engineer, irregularities are unavoidable, tolerance requirements of the finished slope shall not deviate more than one foot from the established plane. These tolerances shall be measured perpendicular to the plane of the slope.

Removed materials shall be disposed of outside the highway right of way as provided in Section 15-2.03, "Disposal," of the Standard Specifications. Disposal of removed materials shall be concurrent with the removal operations. Stockpiling of removed materials within the State right of way will not be allowed.

Removing asphalt concrete, concrete, and slope protection material will be measured by the cubic yard in the same manner specified for roadway excavation as provided in Section 19, "Earthwork," of the Standard Specifications.

10-1.31L RELOCATE AND RECONSTRUCT WATER LINES AND AIR LINES

This work shall consist of furnishing and installing temporary pipes, fittings and connections to temporarily relocate and reconstruct existing water lines and air lines that are in conflict with other work under this contract at various locations shown on the plans. The following existing water line and air line facilities shall be temporarily relocated during the progress of the contract work and reconstructed to its new location:

Water lines serving hose stations for vehicle fire and pavement washdown emergencies (8" and smaller Schedule 40 steel pipes).

Air lines serving ongoing bridge painting operations (4" and smaller Schedule 40 steel pipes).

All water and air lines shall be maintained in continuous operation during the life of this contract, except for brief shutdown periods as further described in this section.

Temporary piping shall be installed by the Contractor when necessary to maintain continuous service while the work progresses.

Temporary water and air lines provided by the Contractor to maintain service shall have a pressure rating of 200 psi.

Water lines and air lines shall be reconstructed to their new locations upon completion of all portions of contract work which were in conflict with the existing facilities. Work and material to reconstruct water lines and air lines to new locations shall conform to the design of the existing facilities, with work meeting the requirements of Section 15-2.05, “Reconstruction,” of the Standard Specifications.

The Contractor shall submit to the Engineer a plan and schedule for facility shutdowns within 40 working days of approval of the contract. The plan shall show specific location of tie-ins, the order in which the Contractor proposes to carry out the work, the dates on which he will start the various shutdowns, and the dates for establishing permanent service.

The Contractor shall notify the Engineer at least 72 hours prior to the need to shutdown such facilities to make tie-ins to Contractor-installed relocations. Prior to making the cut in existing facilities, the first order of work shall be to install all bypass lines and extensions up to the point of connection so that system down-time is minimized.

After receiving the Engineer’s approval to make cuts in such existing facilities or to reconstruct the facilities, the Contractor shall make the tie-in and then restore service within 2 hours of the shutdown.

Relocate and reconstruct air lines and water lines will be paid for on the basis of lump sum.

The contract lump sum price paid for relocate and reconstruct water lines and air lines shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved to relocate and reconstruct air lines and water lines, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.31M REMOVE WATER LINES AND AIR LINES

Existing abandoned water lines and air lines shown on the plans that are in the way of or obstructing the structural work shall be removed and disposed of. Exact limits of removal will be determined by the Engineer.

The ends of the pipelines shall be securely closed by a water tight fitting plug. Plugs shall consist of material that is compatible with the existing facility.

Remove water lines and air lines will be paid for on the basis of lump sum.

The contract lump sum price paid for remove water lines and air lines shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved to remove air lines and water lines, complete in place, including disposal, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.32 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.

Before clearing and grubbing operations begin, drainage inlet protection, silt fencing at the toe of slopes, and stabilized vehicle entrances shall be in place. Clearing and grubbing operations shall result in no visible dust. No material containing lead shall be deposited on public roads. The Contractor shall indemnify the State from any costs due to spillage of material containing lead during transport.

The Contractor shall separate soil from vegetation, and the soils will remain on the site.

All activities controlled by the Contractor, except cleanup or other required work, shall be confined within the limits of work.

Attention is directed to "Aerially Deposited Lead, General" elsewhere in these specifications.

Clearing and grubbing operations shall result in no visible dust. No material containing lead shall be deposited on public roads. The Contractor shall indemnify the State from any costs due to spillage of material containing lead during transport. The Contractor shall separate soil from vegetation, and the soils will remain on the site.

10-1.33 EARTHWORK

Earthwork shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

Attention is directed to "Aerially Deposited Lead, General" and "Contaminated and Hazardous Materials, General", elsewhere in these special provisions regarding contaminated and hazardous materials.

Earthwork below elevation 4.6' National Geodetic Vertical Datum (NGVD) for purposes of constructing temporary site access, installing temporary platforms or work trestles will not be allowed.

Attention is directed to Section “Non-Storm Water Discharges” elsewhere in these special provisions.

Surplus excavated material and those materials classified as "materials with aerially deposited lead" and "contaminated and hazardous material" shall become the property of the Contractor and shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

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 remove base and surfacing and no additional compensation will be allowed therefor.

Hazardous and contaminated material is expected to be encountered at the locations shown on the plans and summarized in the following table, "SOIL ANALYTICAL RESULTS - Richmond-San Rafael Bridge" of this section. Hazardous and contaminated material at dry ground locations shall be designated, measured and paid for as structure excavation (Type DH), and hazardous and contaminated material at ground water or surface water locations shall be designated, measured and paid for as structure excavation (Type AH), all within the limits shown on the plans.

Sealed cofferdams shall be used around all excavated areas at pier bases at all upland locations and in shallow Bay waters to minimize and/or prevent erosion, sedimentation, and contamination of the work. Sealed cofferdams will be required at various pier locations including but not limited to: Pier No. 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 71R, 72, 72R, 73, 73R, 74, 74R, 75, 75R, 76, 76R, 77, 77R.

SOIL ANALYTICAL RESULTS
Richmond-San Rafael Bridge
Seismic Retrofit Project

Pier No.	Loca-tion	Sample Depth[1] (ft bgs)	Lead Concentrations			Oil & Grease (mg/kg)	Ethyl-benzene (mg/kg)	Total Xylenes (mg/kg)	Toluene (mg/kg)	TPH-gasoline (mg/kg)	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	VOCs (µg/kg)	SVOCs (µg/kg)	Soil Classi-fication
			Total (mg/kg)	WET (mg/L)	TCLP (mg/L)										
66	Left	0.5	12	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	CA Haz
		5	740	33	0.7	510	NA	NA	NA	NA	NA	NA	NA	NA	
		10	12	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	
	Center	Surface	81.1	11	0.27	NA	ND	ND	ND	ND	ND	420	NA	NA	CA Haz
		2.5	10.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	13.4	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	
		7.5	11.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		10	10.8	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	
		19	11.5	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	
	Right	Surface	481	21	0.58	ND	ND	ND	ND	ND	ND	790	NA	NA	CA Haz
		2.5	526	19	1.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	12.4	ND	ND	NA	ND	ND	ND	ND	ND	ND	NA	NA	
		7.5	12.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		10	21.2	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	
		15	91.6	1.9	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	
		19	11.3	NA	NA	NA	ND	ND	ND	ND	48	ND	ND	ND	
67	Left	0.5	190	14	0.8	150	NA	NA	NA	NA	NA	NA	NA	NA	CA Haz
		5	260	12	0.7	450	NA	NA	NA	NA	NA	NA	NA	NA	
		10	13	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	
		Surface	96.7	10	0.75	NA	ND	0.0034	ND	ND	ND	710	NA	NA	
		2.5	107	11	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	8.57	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	
		7.5	16.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		10	11.1	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	
		13	10.2	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	
	Right	Surface	715	56	1.7	NA	ND	ND	ND	ND	ND	4500	NA	NA	CA Haz
		2.5	36.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	21.6	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	
		7.5	20.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		10	16.9	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	
		13	16.3	NA	NA	NA	ND	ND	ND	ND	ND	47	NA	NA	
68	Left	0.5	560	38	NA	2000[3]	ND[2]	ND[2]	NA	ND[2]	ND[2]	NA	ND[2]	ND[2]	CA Haz
		5.0	170	3.6	NA	870[3]	ND[2]	ND[2]	NA	ND[2]	ND[2]	NA	ND[2]	ND[2]	
		10.0	31[3]	NA	NA	780[3]	ND[2]	ND[2]	NA	ND[2]	ND[2]	NA	ND[2]	ND[2]	
		Surface	385	0.29	NA	NA	0.012	0.089	0.0014	ND	ND	380	NA	NA	
		2.5	13.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	10.3	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	
		7.5	8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		10	11.6	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	
		13	10.6	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	
	Right	Surface	154	18	0.7	NA	ND	ND	ND	ND	14	160	NA	NA	CA Haz
		2.5	12.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	13	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	
		7.5	24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		10	8.93	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	
		13	17.8	NA	NA	NA	ND	ND	ND	ND	ND	83	NA	NA	

Pier No.	Loca-tion	Sample Depth[1] (ft bgs)	Lead Concentrations			Oil & Grease (mg/kg)	Ethyl-benzene (mg/kg)	Total Xylenes (mg/kg)	Toluene (mg/kg)	TPH-gasoline (mg/kg)	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	VOCs (µg/kg)	SVOCs (µg/kg)	Soil Classi-fication
			Total (mg/kg)	WET (mg/L)	TCLP (mg/L)										
69	Left	0.5	17	NA	NA	1100	NA	NA	NA	NA	NA	NA	NA	NA	CA Haz
		5	16	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	
		10	7	NA	NA	4800	NA	NA	NA	NA	NA	NA	NA	NA	
		Surface	315	27	1.3	NA	ND	ND	ND	ND	ND	190	NA	NA	
69	Left	2.5	6.21	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	CA Haz
		5	5.4	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	
		7.5	6.56	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		10	5.52	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	
		15	10.7	NA	NA	NA	ND	ND	ND	ND	480	920	ND	ND	
	Right	Surface	332	34	0.91	NA	ND	0.75	0.0079	ND	ND	170	NA	NA	CA Haz
		2.5	70.3	3.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	16.1	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	
		7.5	4.09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		10	7.55	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	
		15	8.15	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	
70	Left	0.5	180	10	NA	2000[3]	ND[2]	ND[2]	NA	ND[2]	ND[2]	NA	ND[2]	ND[2]	CA Haz
		5.0	110	9.3	NA	870[3]	ND[2]	14[3]	NA	ND[2]	ND[2]	NA	ND[2]	ND[2]	
		10.0	31[3]	NA	NA	780[3]	ND[2]	ND[2]	NA	ND[2]	ND[2]	NA	ND[2]	ND[2]	
		15.0	9	NA	NA	20	ND	ND	NA	ND	ND	NA	ND	ND	
		18.0	10	NA	NA	ND	ND	ND	NA	ND	ND	NA	ND	ND	
		Surface	287	14	0.33	NA	0.0031	0.024	ND	ND	ND	590	NA	NA	
		2.5	318	15	0.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	72.9	16	2.0	NA	ND	ND	ND	ND	ND	1300	ND	ND	
		7.5	9.53	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		10	9.64	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	
		15	7.23	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	
		18	5.87	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	
	Right	Surface	156	12	0.18	NA	ND	ND	ND	ND	ND	150	NA	NA	CA Haz
		2.5	21.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	58.1	2.7	NA	NA	ND	ND	ND	ND	ND	1600	NA	NA	
		7.5	354	16	0.12	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		10	9.7	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	
		15	13.8	NA	NA	NA	ND	ND	ND	ND	38	71	NA	NA	
		18	8.23	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	
71	Left	Surface	255	18	0.58	NA	ND	0.0036	ND	ND	ND	290	NA	NA	CA Haz
		2.5	18.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	12.5	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	
		7.5	11.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		9	14.1	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	
	Center	0.5	25	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	
		5	750	18	2.1	ND	NA	NA	NA	NA	NA	NA	NA	NA	
		10	56	0.5	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	
	Right	Surface	67.9	1.6	NA	NA	ND	ND	ND	ND	79	980	NA	NA	Contaminated
		2.5	252	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	36.1	NA	NA	NA	ND	ND	ND	ND	31	200	NA	NA	
		7.5	21.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		9	5.37	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	

Pier No.	Loca-tion	Sample Depth[1] (ft bgs)	Lead Concentrations			Oil & Grease (mg/kg)	Ethyl-benzene (mg/kg)	Total Xylenes (mg/kg)	Toluene (mg/kg)	TPH-gasoline (mg/kg)	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	VOCs (µg/kg)	SVOCs (µg/kg)	Soil Classi-fication
			Total (mg/kg)	WET (mg/L)	TCLP (mg/L)										
72	Left	Surface	213	7.0	<0.02	NA	0.1	0.56	0.0059	ND	ND	860	NA	NA	CA Haz
		2.5	7.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	9.14	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	
		7.5	10.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		9.5	8.52	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	
	Center	0.5	44	NA	NA	2000[3]	ND[2]	ND[2]	NA	ND[2]	ND[2]	NA	ND[2]	ND[2]	CA Haz
		5.0	380	23	NA	870[3]	ND[2]	14[3]	NA	ND[2]	ND[2]	NA	ND[2]	ND[2]	
		10.0	31[3]	NA	NA	780[3]	ND[2]	ND[2]	NA	ND[2]	ND[2]	NA	ND[2]	ND[2]	
	Right	Surface	225	9.6	0.04	NA	0.0045	0.07	ND	ND	ND	600	NA	NA	CA Haz
		2.5	6.39	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	229	7.0	0.11	NA	ND	ND	ND	ND	700	2300	NA	NA	
		7.5	8.25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		9.5	85.5	3.9	NA	NA	ND	ND	ND	ND	ND	220	NA	NA	
73	Left	Surface	130	5.7	0.04	NA	0.047	0.42	ND	ND	160	140	NA	NA	CA Haz
		2.5	43.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	13.5	NA	NA	NA	ND	0.0051	ND	ND	130	180	32.1	ND	
		7.0	22.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	Center	0.5	13	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	Contaminated
		5	82	3	NA	5000	NA	NA	NA	NA	NA	NA	NA	NA	
	Right	Surface	89.4	7.7	<0.02	NA	0.02	0.12	0.0013	ND	96	140	NA	NA	CA Haz
		2.5	79.2	4.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	48.7	NA	NA	NA	ND	ND	ND	ND	ND	130	NA	NA	
		6.5	20.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
74	Left	0.5	56	6.3	NA	1300[3]	ND[2]	ND[2]	NA	ND[2]	ND[2]	NA	ND[2]	ND[2]	CA Haz
		5.0	17	NA	NA	460[3]	ND[2]	ND[2]	NA	ND[2]	ND[2]	NA	ND[2]	ND[2]	
		10.0	59[3]	2.8[3]	NA	880[3]	ND[2]	ND[2]	NA	ND[2]	ND[2]	NA	ND[2]	ND[2]	
		Surface	277	34	0.30	NA	0.0019	0.021	ND	ND	ND	430	NA	NA	
		2.5	15.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	39.3	NA	NA	NA	ND	ND	ND	ND	ND	790	ND	ND	
		7.5	48.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		11	8.62	NA	NA	NA	ND	ND	ND	ND	ND	990	ND	ND	
	Right	Surface	25.7	NA	NA	NA	0.0077	0.001	0.047	ND	ND	3900	NA	NA	Contaminated
		2.5	4.93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	9.3	NA	NA	NA	ND	ND	ND	ND	ND	320	NA	NA	
		8.5	14.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		11	<3.68	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	
75	Left	0.5	33	NA	NA	90	NA	NA	NA	NA	NA	NA	NA	NA	CA Haz
		5	33	NA	NA	210	NA	NA	NA	NA	NA	NA	NA	NA	
		10	15	NA	NA	60	NA	NA	NA	NA	NA	NA	NA	NA	
		15	12	NA	NA	310	100	800	NA	500	46	NA	2,000	NA	
		20	13	NA	NA	2200	ND	7	NA	0.2	ND	NA	22	NA	
		22	33	NA	NA	1200	ND	13	NA	0.4	ND	NA	14	NA	
		Surface	292	30	1.2	NA	ND	ND	ND	ND	ND	68	NA	NA	
		2.5	17.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	35.6	NA	NA	NA	ND	ND	ND	ND	ND	710	ND	ND	
		7.5	15.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		10	<4.27	NA	NA	NA	ND	ND	ND	ND	ND	53	NA	NA	
		15	6.62	NA	NA	NA	ND	0.0063	ND	ND	1,100	3,100	41.3	ND	

		22	4.39	NA	NA	NA	ND	ND	ND	ND	NA	NA	NA	NA	
	Right	0/6.0	16.8	NA	NA	NA	ND	ND	ND	ND	98	430	13	ND	Contaminated

Pier No.	Loca-tion	Sample Depth[1] (ft bgs)	Lead Concentrations			Oil & Grease (mg/kg)	Ethyl-benzene (mg/kg)	Total Xylenes (mg/kg)	Toluene (mg/kg)	TPH-gasoline (mg/kg)	TPH-Diesel (mg/kg)	TPH-Motor Oil (mg/kg)	VOCs (µg/kg)	SVOCs (µg/kg)	Soil Classi-fication
			Total (mg/kg)	WET (mg/L)	TCLP (mg/L)										
76	Left	0.5	200	14	NA	1300[3]	ND[2]	ND[2]	NA	ND[2]	ND[2]	NA	ND[2]	ND[2]	CA Haz
		5.0	17	NA	NA	460[3]	ND[2]	ND[2]	NA	ND[2]	ND[2]	NA	ND[2]	ND[2]	
		10.0	59[3]	2.8[3]	NA	880[3]	ND[2]	ND[2]	NA	ND[2]	ND[2]	NA	ND[2]	ND[2]	
		Surface	47	NA	NA	NA	ND	ND	ND	ND	ND	620	NA	NA	
		2.5	4.88	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
76	Left	5	16.4	NA	NA	NA	ND	ND	ND	ND	ND	77	25	1740	CA Haz
		7.5	16.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		10	10.7	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	
		15	<4.59	NA	NA	NA	ND	ND	ND	ND	ND	ND	27	ND	
		23	18.2	NA	NA	NA	ND	ND	ND	ND	ND	540	NA	NA	
	Right	0/6.0	18.1	NA	NA	NA	ND	ND	ND	ND	73	200	310	ND	Contaminated
	Sediment	0/6.0	815	5.7	0.298	NA	ND	ND	ND	ND	ND	1100	ND	ND	CA Haz
77	Left	0.5	43	NA	NA	1100	NA	NA	NA	NA	NA	NA	NA	NA	CA Haz
		5	24	NA	NA	2600	NA	NA	NA	NA	NA	NA	NA	NA	
		10	47	NA	NA	2400	NA	NA	NA	NA	NA	NA	NA	NA	
		15	19	NA	NA	870	ND	ND	NA	ND	ND	NA	ND	ND	
		20	20	NA	NA	380	ND	ND	NA	ND	60	NA	ND	ND	
		23	12	NA	NA	1900	ND	ND	NA	ND	56	NA	ND	ND	
		Surface	172	8.0	0.57	NA	ND	ND	ND	ND	ND	700	NA	NA	
		2.5	57.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		5	134	9.1	0.60	NA	ND	0.0062	ND	ND	ND	1,800	6.2	ND	
		7.5	74.6	2.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		10	33.7	NA	NA	NA	ND	ND	ND	ND	ND	110	NA	NA	
		15	7.75	NA	NA	NA	ND	ND	ND	ND	ND	58	ND	ND	
		23	55.9	1.7	NA	NA	ND	ND	ND	ND	77	220	NA	NA	
	Sediment Left	0/6.0	49.4	NA	NA	NA	ND	ND	ND	ND	92	560	ND	3,300	Contaminated
	Sediment Right	0/6.0	23.8	NA	NA	NA	ND	ND	ND	ND	25	260	ND	ND	Contaminated
78	Left	0.5	12000	NA	NA	1300[3]	ND[2]	ND[2]	NA	ND[2]	ND[2]	NA	ND[2]	ND[2]	RCRA Haz

Notes:
[1] This table incorporates.CH2M HILL (April 1997) and PSI (April 1998) analytical results.
[2] This chemical was not detected during analysis of a composite sample including soil from this sampling location and depth.
[3] This chemical was detected during analysis of a composite sample including soil from this sampling location and depth.
NA - Not analyzed.
ND - Analyzed but not detected.
WET – Waste Extraction Test.
TCLP – Toxicity Characteristic Leaching Procedure.
CA Haz – Concentration classified as hazardous waste under State of California Code of Regulations Title 22.
RCRA Haz - Concentration classified as hazardous waste under Code of Federal Regulations 40CFR 261.
VOCs – Volatile Organic Compounds reported as the sum of all detected compounds.
SVOCs – Semivolatile Organics Compounds reported as the sum of all detected constituents.
According to Assembly Bill No. 2784, waste that contains total lead in excess of 350 parts per million shall be disposed of at a Class I hazardous waste facility, unless the waste is disposed of at the site of generation pursuant to express approval of the Regional Water Quality Control Board prior to January 1, 1999.

10-1.33A DREDGING

All material, including bay sediment, gravel, and rock material resulting from Cast In Drilled Hole (CIDH) pile, Cast In Steel Shell (CISS) pile, test boring, micropile, structure excavation type (D), structure excavation (Type A), structure excavation (Type AH), and access, over-excavation, and maintenance dredging operations, located either (1) within the steel shells and rock sockets at CIDH piling, (2) within the steel shells at CISS piling, (3) at the test bores, (4) within the steel shells and rock sockets at micropiles, (5) structure excavation (Type D) for steel casing and precast concrete pile cap construction, and (6) barge access dredging within the locations described below, shall be considered dredging in these special provisions and under the terms of the various permits obtained by the Department. Attention is directed to “Upland Disposal” and “In-Bay (Aquatic) Disposal” of this section for disposal requirements of dredged material. Attention is directed to Sections "Permits and Licenses" and “Environmental Work Restrictions” of these special provisions.

Barge Access: For the Contractor's convenience, dredging for barge access purposes will be allowed in the area adjacent to the existing bridge to a maximum of 400 feet, measured perpendicular from the outside edge of the existing bridge deck, at the following locations:

Station U 250+00 to 280+00 (Left)
Station U 250+00 to 288+00 (Right)

Dredging for barge or equipment access will not be allowed at other locations.

Full compensation for barge access dredging shall be considered as included in the contract prices paid for the various contract items of work and no additional compensation will be allowed therefor.

Unless otherwise authorized in writing, all dredging shall be performed in the presence of the Engineer.

Sloping back of excavations beyond pay limits shown on the plans will be allowed. The maximum amount of actual dredging, as defined above, shall not exceed 84,000 cubic yards for the entire project and the maximum amount of actual dredging for barge access purposes at the above locations shall not exceed 135,000 cubic yards as determined by the pre-dredging, post-dredging and quality control surveys specified elsewhere in these special provisions. Over-excavation beyond the pay limits shown on the plans may be allowed if deemed necessary to complete the work, however no additional compensation shall be allowed therefore and these additional quantities are included in the maximum amount of dredging allowed. Excavation beyond the above limits for barge access shall not be allowed. Lateral displacement of bay sediment material shall not be allowed. Maintenance dredging and removal of material entering excavations from outside the limits of excavation dredged by the Contractor shall be removed and no additional compensation shall be allowed therefor and these additional quantities are included in the maximum amount of dredging allowed. Modifications to the existing permits proposing revisions to the maximum quantities of dredged material shall not be allowed. If during the progress of the work, it becomes apparent that the Contractor may exceed the maximum quantity of dredged material permitted for this project, the Contractor shall immediately stop all dredging activities and notify the Engineer in writing. The Contractor shall then reevaluate the construction methods used to perform the dredging work and shall submit a revised dredging operation plan, as outlined elsewhere in these special provisions, to the Engineer, outlining the proposal to complete the work without exceeding the permitted quantity of dredged material. This revised dredging operation plan may require the use of alternate means and methods of construction, such as use of shoring, which may be required to complete the work. The Contractor shall not be allowed to resume any dredging activities, until the revised dredging operation plan has been approved in writing by the Engineer. There shall be no compensation or extension of contract time in accordance with Section 8-1.09, "Right of Way Delays" of the Standard Specifications, for any delays resulting from conforming to the requirements of this section of the special provisions.

Dredging shall be done in accordance with the provisions of the various permits obtained by the Department. All dredged material shall be disposed of according to the permit requirements and these special provisions.

Dredging Operation Plan: Prior to beginning any dredging work, the Contractor shall submit a Dredging Operation Plan for approval 60 calendar days prior to the proposed commencement of dredging. Dredging shall not commence until all comments have been answered and written approval has been granted by the Army Corps of Engineers. The plan shall include the following:

Name and telephone number of the dredging Contractor’s representatives on site;
Army Corp of Engineers permit number;
Dredging start and completion dates;
Schedule of dredging operations including sequence of work, anticipated quantities and production rates;
Names of vessels;
Dump scow numbers or identification;
Bin or barge capacities;
Identification of work as either maintenance dredging or new dredging;

Discussion of proposed dredging procedures, including types of equipment to be used, method of slurry of the material with detailed drawings or specifications of the grid or centrifugal pump system;
Quality of material to be removed;
Overall location of the area authorized to be dredged;
A vicinity map showing the proposed In-Bay (Aquatic) and Upland disposal sites;
Proposed volume of material to be dredged and disposed;
Dredging design depth based on Mean Lower Low Water (MLLW) and typical cross section including overdepth;
and Date of last dredging operations and design depth.

The dredging operation plan shall also provide the following information:

1. The controls being established to ensure that dredging operations occur at the locations shown on the plans and as specified in these special provisions.
2. The controls being established to ensure that disposal of the dredged material at the disposal site is at the assigned location and depth and the horizontal and vertical positioning systems that will be utilized.
3. Method of determining horizontal and vertical electronic positioning of dredge or dump scow during entire dredging operation at dredge site, disposal site and en route to and from disposal site.
4. Contractor's Quality Control (CQC) procedures including:

    a. A description of the CQC organization including, a chart showing lines of authority; and acknowledgment that the Contractor quality control staff shall conduct the inspections for all aspects of the work specified and shall report to the Contractor's Project Manager, or someone of higher authority, in the Contractor's organization.
    b. The name, qualifications, duties, responsibilities and authorities of each person assigned a quality control function.
    c. A copy of the letter to the CQC manager; signed by an authorizing official of the firm, which describes the responsibilities and delegates the authorities of the CQC manager; shall be furnished to the CQC manager and shall be countersigned by the CQC manager acknowledging receipt.
    d. Reporting procedures and methods used to obtain information for quality control forms, including the submittal of displacement and capacity charts for all scows.

After acceptance of the Dredging Operation Plan, the Contractor shall notify the Engineer in writing of any proposed changes. Proposed changes are subject to acceptance by the Engineer.

Solid Debris Management Plan: The Contractor shall submit a solid debris management plan 60 calendar days prior to commencement of work, a plan which describes measures to ensure that solid debris generated during any contract demolition or construction operation is retained and properly disposed of. At a minimum the plan shall include the following:

Source and expected type of debris;
Debris retrieval method;
Disposal method and site;
Schedule of disposal operations;
and Debris containment method to be used, if floatable debris is involved.

All such debris shall become the property of the Contractor and shall be disposed of outside the State's right of way in accordance with Section 7-1.13 of the Standard Specifications. No such material shall be disposed of within Army Corps of Engineers and Bay Conservation and Development Commission jurisdictions. Material deemed to be of historical significance as determined by the Engineer shall become the property of the State and will be disposed of by the State.

Overflow: No overflow of dredged material or water will be allowed from the receiving barges, bins or dump scows during the dredging operations except as follows. Overflow will only be allowed if the Contractor includes provisions and operations acceptable to the Regional Water Quality Control Board, is included in the approved Storm Water Pollution Prevention Plan, and the material is designated for disposal at the Alcatraz disposal area. Where overflow is allowed, overflow time shall be limited to 15 minutes per barge load per day and the discharge shall be below the water surface.

In the event the Contractor chooses to fill a receiving barge, bin or dump scow, the receiving vessel shall be located in an approved anchor site.

Overflow and Leakage Monitoring Requirements: Barges or dump scows having more than 10% loss in draft while transporting material to the disposal site shall be recorded on the daily report and shall not be used until repaired.

The Contractor shall provide equipment that will furnish a continuous printed record of readings and measurements of bulk density and mass flow rate for each pump. These records shall be provided to the Engineer as requested and approved in the Dredging Operation Plan. The Contractor shall provide a list of equipment that will provide the required records. In the event either velocity and/or displacement equipment breaks down during the dredging operation, the following actions shall be accomplished:

1. An alternative means of measurement shall be performed as approved.
2. Alternative measurements shall not exceed a duration of 72 hours after the equipment breakdown or as otherwise approved by the Engineer. Verification of repairs shall be provided to the Engineer in the form of receipts or other documentation acceptable to the Engineer.

For hydraulic dredges the Contractor shall provide equipment that will furnish a continuous printed record of readings for measurement of flow rate of the material within 20 feet of the dredge pump, and furnish a continuous printed record of readings for measurement of flow rate of the material within 20 feet of the discharge manifold. The Contractor shall also furnish continuous velocity records at booster pumps. Equipment shall be accessible from above water platforms. If the readings from the velocity flow equipment indicate leakage within the system, the Contractor shall immediately cease work and repair the leaks. In the event that the dredged material is pumped into a barge or scow, displacement shall be monitored as specified for clamshell dredges after dredging and before disposal at the disposal site. The Contractor shall furnish to the Engineer, displacement and capacity plans of all scows.

For Clamshell Dredges, the Contractor shall monitor hull displacement of each scow loaded by the dredge. Monitoring shall be continuous from initial loading through discharge at the disposal site. The Contractor may use the general configuration in these special provisions for developing his system of monitoring displacement or submit his own method for approval. The method shall provide average hull displacement of each scow as specified. The data recorders shall store two minute averages of the one second input signals from the sensors. The Contractor shall provide and maintain throughout the duration of the contract, one data transfer unit with support software to the State within 30 Calendar days after award of the contract, which shall become State property upon completion of the contract. In the event the displacement monitoring equipment breaks down during the dredging operation for any of the scows, an alternative means of measurement shall be performed as approved by the Engineer and results reported using a form approved by the Engineer. Alternative measurements shall not exceed a duration of 72 hours after equipment breakdown. If repairs to the primary equipment is not accomplished within this period, the scow shall not be used until repaired.

The Contractor shall submit the continuous recording records specified for hydraulic dredge records and clamshell dredge reports on computer diskettes. Data shall be submitted on 3-1/2" (1.44 MB) disks, operating under MS-DOS 3.1 or newer version. All data shall be recorded in ASCII text. Any alternatives submitted by the Contractor shall be subject to the approval of the Engineer.

Control and Monitoring Surveys: A short to medium range Electronic Positioning System (EPS) or Global Positioning System (GPS) shall be provided on all vessels involved in dredging operations. The EPS shall be established, operated and maintained by the Contractor during the period of the contract when dredging work is actively underway. The EPS using range-range methods shall display and record the vessel's location continuously during dredging and transport for disposal. A continuous graphic printout plotter and/or graphic monitor shall be provided on any dredge utilizing a range-range positioning system and a complete record copy of the position data (dredge track history) including date, time, coordinates and Root Mean Square (quality of position closure); and such record shall be submitted to the Engineer as part of the daily report. The Engineer shall have access to the monitoring equipment in order to observe its operation during the dredging work.

The EPS system shall be similar or equal in design, performance, accuracy, operating characteristics, and frequency to those identified in the following technical reference; which is available for purchase at the listed source, or which may be reviewed at the Army Corps of Engineers Construction-Operations Division, San Francisco District Office, 333 Market Street, San Francisco, California:

"Hydrographic Surveying" Department of the Army Engineering Manual No. 1110-2-1003, 28 February 1991 (or latest version). Available at:

USACE Publications Depot
2803 52nd Avenue
Hyattsville, MD 20781-1102

The Contractor shall be responsible for establishing the horizontal control to locate active and/or passive shore-based EPS transmitter/receiver devices. All control shall meet Third Order, Class 1, accuracy standards as defined in the publication "Standards and Specifications for Geodetic Control Networks" published by the Federal Geodetic Control Committee (and referenced) under chapter 2 of the Army Corps of Engineers Manual "Hydrographic Surveying". The Contractor shall obtain all right-of-entry permits and/or leases as required to operate and maintain shore-based electronic equipment on public/private property.

EPS calibration techniques shall conform to standard hydrographic surveying practice; consistent with minimization of systematic errors inherent to, and consistent with, the selected EPS system as specified under Chapter 6 of the Army Corps of Engineers manual "Hydrographic Surveying". The Contractor shall be responsible for accurate and reliable EPS calibration for the duration of this contract.

Transporting and Disposal: The Contractor shall transport and dispose of the dredged material in accordance with these special provisions and the conditions of the various permits the State has obtained for this contract.

During transport to the disposal sites, no material shall be permitted to overflow, spill, or leak out of the barges, bins or dump scows.

Tug boats are required to use an electronic positioning system (i.e., a miniranger system with at least two transponders or a Global Positioning System (GPS) with a minimum accuracy and precision of 25 feet for disposal operations. If the positioning system fails, all disposal operations shall cease until the navigational capabilities are restored.

The Contractor shall maintain daily records of dredging operations, transportation schedules, barge load volumes disposed, and exact location and time of disposal.

The tug captain shall maintain a copy of all weather reports and shall make wind and sea observations.

The Contractor shall observe all dredging operations and submit reports containing; a description of operations for each barge load, a checklist, a transit route map, a printout of coordinates from each way point and release point, a record of radio transmission, and facsimile from the tug captain on a daily basis.

The Contractor shall allow observers from the State and other appropriate independent observers as specified in permits and approved by the Engineer to be present on disposal vessels on trips to the Alcatraz disposal area.

Development and implementation of a more sophisticated surveillance systems, which can be demonstrated to and approved by the Engineer to be effective and capable of being audited, may be substituted for one or more of the above provisions.

The Electronic Positioning System (EPS) and methods used for the dredge, as specified herein shall also be used to display and record the disposal vessel's location at one minute time intervals.

All of the above-mentioned documentation shall be submitted to the Engineer after each transportation and disposal events.

Upland Disposal: Landfill disposal shall be provided by the Contractor for the following dredged material:

a. Structure excavation (Type D) including existing rock and gravel backfill at the bell foundations.
b. Material resulting from the CIDH bedrock socket operations.
c. Synthetic slurry used in the CIDH or CISS pile operations.
d. Material in contact with synthetic slurry used in the CIDH or CISS pile operations.
e. Waste concrete resulting from the CIDH and CISS pile operation.
f. Material resulting from the test boring operations.
g. Material resulting from the micropile operations.
h. Serpentine material determined to be non-hazardous resulting from the CIDH, CISS, micropile, and test boring operation. Attention is directed to "Serpentine Material" of this section.
i. Material that does not pass through a debris grid as further described in "In-Bay (Aquatic) Disposal" of this section.
j. Excavation material at piers designated as structure excavation (Type AH) or structure excavation (Type DH).
k. Material resulting from removal of slope protection including but not limited to asphalt concrete, concrete, and other waste material at the locations shown on the plans.

The Contractor's attention is directed to the following table, "MATERIAL CLASSIFICATION" which shows the approximate quantities of existing rock and gravel at and around the bridge piers that may be encountered during dredging and piling operations. The information were obtained by the Department from record drawings and maps. It should be understood that the information in the following table is for information only and should not be construed as complete and accurate.

Location (Pier No.)	MATERIAL CLASSIFICATION						
	2.5" Graded Rock Backfill Contract No. 1020 (c. 1956) Volume (CY)	2.5" Graded Rock Backfill Contract No. 1034 (c. 1971) Volume (CY)	12" Graded Rock Backfill Contract No. 1034 (c. 1974) Volume (CY)	1-Ton Class Revetment Rock Contract No. 01056 (c. 1986) Volume (CY)	18" Max. Class Armor Rock Contract No. 1020 (c. 1986) Volume (CY)	1.5" Graded Rock Backfill Contract No. 002434 (c. 1987) Volume (CY)	1/4 Ton Armor Rock Contract No. 002434 (c. 1987) Volume (CY)
A	643	- -	- -	- -	- -	- -	- -
1	726	- -	- -	- -	- -	- -	- -
2	990	- -	- -	- -	- -	- -	- -
3	705	- -	- -	- -	- -	- -	- -
4	601	- -	- -	- -	- -	- -	- -
5	380	- -	- -	- -	- -	- -	- -
6	380	- -	- -	- -	- -	- -	- -
7	599	- -	- -	- -	- -	- -	- -
8	670	- -	- -	- -	- -	- -	- -
9	465	- -	- -	- -	- -	- -	- -
10	497	- -	- -	- -	- -	- -	- -
11	766	- -	- -	- -	- -	- -	- -
12	599	- -	- -	- -	- -	- -	- -
13	592	- -	- -	- -	- -	- -	- -
14	387	- -	- -	- -	- -	- -	- -
15	636	- -	- -	- -	- -	- -	- -
16	592	- -	- -	- -	- -	- -	- -
17	558	- -	- -	- -	- -	- -	- -
18	1043	- -	- -	- -	- -	- -	- -
19	1216	- -	- -	- -	- -	50	82
20	783	- -	- -	- -	- -	- -	78
21	893	- -	- -	- -	- -	- -	- -
22	773	- -	- -	- -	- -	- -	- -
23	909	- -	- -	- -	- -	- -	- -
24	1021	- -	- -	- -	- -	- -	- -
25	1422	- -	- -	- -	- -	- -	82
26	745	- -	- -	- -	- -	- -	- -
27	809	- -	- -	- -	- -	23	94
28	719	- -	- -	- -	- -	- -	- -
29	711	- -	- -	- -	- -	- -	- -
30	1396	- -	- -	- -	- -	67	143
31	1202	- -	- -	- -	- -	- -	- -
32	864	- -	- -	- -	- -	- -	47
33	1672	65	144	- -	- -	- -	- -
34	2203	98	106	282	772	- -	- -
35	1994	100	256		466	- -	- -
36	1268	- -	- -	- -	- -	- -	- -
37	784	- -	- -	- -	- -	- -	88
38	538	- -	266	- -	- -	- -	- -
39	635	- -	- -	- -	- -	- -	- -

Location (Pier No.)	MATERIAL CLASSIFICATION (Continued)						
	2.5" Graded Rock Backfill Contract No. 1020 (c. 1956) Volume (CY)	2.5" Graded Rock Backfill Contract No. 1034 (c. 1971) Volume (CY)	12" Graded Rock Backfill Contract No. 1034 (c. 1974) Volume (CY)	1-Ton Class Revetment Rock Contract No. 01056 (c. 1986) Volume (CY)	18" Max. Class Armor Rock Contract No. 1020 (c. 1986) Volume (CY)	1.5" Graded Rock Backfill Contract No. 002434 (c. 1987) Volume (CY)	1/4 Ton Armor Rock Contract No. 002434 (c. 1987) Volume (CY)
40	684	- -	- -	- -	- -	- -	- -
41	568	- -	- -	- -	- -	- -	- -
42	1106	- -	- -	- -	- -	- -	- -
43	190	- -	- -	- -	- -	- -	- -
44	1762	- -	- -	- -	- -	74	149
45	885	- -	- -	- -	- -	- -	- -
46	844	- -	- -	- -	- -	- -	- -
47	2583	69	126	- -	221	- -	- -
48	2418	- -	- -	- -	- -	- -	- -
49	1619	- -	- -	- -	- -	- -	- -
50	876	- -	- -	- -	- -	58	94
51	845	- -	- -	- -	- -	- -	- -
52	845	- -	- -	- -	- -	- -	- -
53	675	- -	- -	- -	- -	- -	- -
54	783	- -	- -	- -	- -	- -	- -
55	0	- -	- -	- -	- -	- -	- -
56	1147	- -	- -	- -	- -	57	108
57	1188	- -	- -	- -	- -	37	115
58	723	- -	- -	- -	- -	- -	- -
59	1032	- -	- -	- -	- -	- -	- -
60	987	- -	- -	- -	- -	- -	- -
61	909	- -	- -	- -	- -	- -	- -
TOTAL	57,057	332	898	282	1,459	366	1,080

The Contractor shall be responsible for locating upland disposal site(s) that meets appropriate requirements. Attention is directed to Sections "Water Pollution Control" and "Non-Storm Water Discharges" elsewhere in these special provisions regarding water pollution protection measures to be complied for any temporary upland receiving area prior to disposal to the approved upland landfill disposal site(s).

In-Bay (Aquatic) Disposal: Aquatic disposal has been approved for the bay sediment material not listed in "Upland Disposal" of this Section consisting of clay, silt, or sand resulting from cleaning out of pilings and casings.

Aquatic disposal shall be at the Alcatraz Dredged Material Disposal Site (DMDS, SF-11).

The Alcatraz Dredged Material Disposal Site (DMDS, SF-11) is a dispersive site defined as a circular area of radius 1000 feet with its center located at latitude 37º49'17" N; longitude 122º25'23" W. The specific location within the disposal area will be determined by the Army Corps of Engineers at the time of review of the dredging operation plan.

All dredged material shall be slurried in one of the following manners:

a. Pumped with a centrifugal pump prior to leaving the dredge site for the disposal site: or
b. The material shall pass through a debris grid, with a maximum opening size of 12 inches by 12 inches, which will cover the entire loading area of the dump scow. All material that does not pass through the grid will be considered solid debris and shall be disposed of as specified in "Upland Disposal" of this Section. At a minimum all solid debris shall be removed from the grid and disposed of at the end of each 8 hour shift.

Each tug boat shall maintain a computer printout from GPS or other approved navigation system showing transit routes and disposal coordinates including the time and position of the disposal barge when the barge doors open and close.

If performance of the Contractors work is delayed as a result of scheduling disposal of dredged material at the Alcatraz disposal site and if in the opinion of the Engineer this delay impacts the controlling operation, an extension of contract time determined pursuant to the provisions of Section 8-1.07, "Liquidated Damages," of the Standard Specifications will be granted. No additional compensation will be allowed therefor.

Serpentine Material: The material to be removed during installation of CIDH piling, CISS piling, test boring, and micropiling on this project may contain inclusions of serpentinite rock known to contain various forms of friable asbestos.

All serpentine rock material, resulting from the Contractor's operations, that releases levels of friable asbestos in excess of those established by DTSC shall be treated as hazardous as defined by Title 8 and Title 22. The Contractor shall conduct his operations in conformance with all applicable Federal, State and local laws pertaining to the safety of workers and public while performing work that has a potential for creating friable asbestos, such as during excavation, handling, drilling, transportation, depositing or working of serpentinite material during the work involved in CIDH piling, CISS piling, test boring, and micropiling installations. The Contractor's attention is directed to Title 8 regarding the health and safety requirements established by Cal-OSHA for the workers and the public.

All material determined to be hazardous, due to friable asbestos, generated from the work involved in CIDH piling, CISS piling, test boring, and micropiling installations shall be removed and transported from the work location to a disposal site which has been certified by the EPA and the State regulatory agencies having jurisdiction over the disposal site and the contaminants of concern.

The Contractor shall take all necessary precautions to prevent the uncontrolled flow of water (except for groundwater) from entering the areas known to contain friable asbestos. In case such water does enter an area know to contain friable asbestos, such water shall be tested for asbestos fiber prior to discharge. No disposal of such water by pumping or other means shall be performed until results of such testing have been submitted to the Engineer for review and approval. If the results of such testing indicate that the level of asbestos fibers exceeds levels considered allowable by the applicable regulatory agencies, the water shall be handled in accordance with all applicable laws and regulations. Should testing of water be required as a result of the failure of the Contractor's measures to prevent uncontrolled water from entering the area known to contain friable asbestos, this testing shall be performed at the Contractor's costs and no additional compensation will be allowed therefor.

Should groundwater be encountered in the areas known to contain friable asbestos, the above testing shall be performed. The handling, treatment or disposal if necessary will be performed in accordance with all applicable laws and regulations. The work of testing, handling, treatment or disposal of the groundwater will be paid for as extra work in accordance with Section 9-1.03, "Force Account," of the Standard Specifications.

The work of testing, handling, treatment or disposal of material determined to be hazardous due to friable asbestos will be paid for as extra work in accordance with Section 9-1.03, "Force Account," of the Standard Specifications.

Disposal Site Verification Log (DSVL): The Contractor shall submit a weekly log by 10:00 A.M. each Monday to the Engineer. The DSVL sheets attached to the Army Corps of Engineers Permit (Pages 1 & 2) shall be used to enumerate the work accomplished during the preceding week for submission to the Army Corps of Engineers, Regulatory Branch. The Vessel Traffic Control System will issue a confirmation number, which shall be included in the weekly log. If the DSVL is not submitted on Monday by 10:00 A.M., no work shall begin on the dredging operations for that week.

Hydrographic Surveys: The Contractor shall be responsible for providing an independent surveyor to perform the pre- and post-dredging and quality control surveys for performing the related computations and furnishing the required drawings.

The independent surveyor's equipment and work force shall be independent from the Contractor's. The name of the surveyor and samples of previous hydrographic work shall be submitted to the Engineer for review and approval.

The surveyor shall first complete the hydrographic survey at a bell pier for review and approval by the Engineer. Only upon approval by the Engineer shall the surveyor proceed with the remainder of the hydrographic survey. The Engineer shall be allowed to board all watercraft performing the hydrographic surveys.

The independent surveyor shall be required to document and certify in writing to the Engineer that he has at least three years of experience in hydrographic surveying of navigable channels and possess either a current land surveyor's or professional engineer's license valid in California and American Congress on Surveying and Mapping (ACSM) certification as an "Inshore Certified Hydrographic Surveyor." He shall provide documentation that modern electronic horizontal positioning and depth finding equipment are available for the surveys to be performed including DGPS (Differential Global Positioning System) capability and shall include as a minimum; the name, model, and year

of manufacture of the electronic equipment; the electronic frequencies of the horizontal positioning equipment and the depth finding equipment; and the manufacturer's stated positioning accuracy and capability of the equipment proposed for usage. In addition, he shall document availability of a safe and suitable workboat for operation in the water where the surveys are to be performed, and that experienced staff are available for the operation of the workboat as well as the operation and calibration of the electronic positioning and depth finding equipment calibration. Survey procedures, data collection equipment, methods and densities, and equipment calibration for this work shall follow the criteria given in the hydrographic survey manual specified in Section "Dredging" for a Class I hydrographic survey. Survey line spacing shall not exceed the limits given in Table 3-1 of the hydrographic survey manual for a Class I hydrographic survey unless approved by the Engineer. Survey lines shall be referenced to the project horizontal and vertical datum. Cross sections shall be run at 25 feet center to center (c/c) and shall extend 25 feet past the slope-original ground intersect point.

Contractor hydrographic survey procedures (positioning modes, EPS calibration, accuracy requirements, depth measurement/calibration, and data reduction, adjustment, processing, and plotting) shall conform to industry standards identified in the hydrographic survey manual specified elsewhere in these special provisions. Horizontal location observations shall compensate for errors, geodetic corrections, and atmospheric variations. Data recordation, annotation, and processing procedures shall be in accordance with the hydrographic survey manual specified elsewhere. Failure to perform and process such surveys in accordance with the manual and these specifications will result in rejection and nonpayment for work performed. All vertical control shall be of second order accuracy, including levels for the setting of tide gage to Mean Lower Low Water (MLLW) elevation. An automatic electronic tide recording system shall be required during all surveying and dredging operations.

Survey data shall include tidal cycle(s) (whether ebb, flood or slack tide conditions) while performing surveys.

The Contractor shall conduct surveys using electronic system positioning method in accordance with the Hydrographic Survey Manual. The Contractor shall use an echo sounder to obtain soundings. The analog recording of soundings shall indicate a calibration check (bar check) of the echo sounding at the beginning and end of each analog paper change and at such times as necessary to ensure sounding accuracy. Echo sounder shall have a frequency of 200 kHz, with 3.5 degrees cone measured at 6 dB point. The top of the return signal trace shall be the point of interpretation of sounding. The bar check shall be taken at identical locations. Soundings shall be on MLLW datum. The excavation centerlines and slope toes shall be field marked on the fathogram chart during the data acquisition. The contract station, time of survey, tide height and direction that line is surveyed shall also be marked on the fathograms. Annotated survey data shall include tidal cycle(s), i.e., slack or slack tide conditions are occurring while performing surveys.

Field notes shall indicate the location of each sounding line, the date and the time (hour and minutes) each sounding line was taken and explanation for any line terminated early. The tide shall be recorded for each line surveyed and noted on the sections during the survey. Notes shall include tidal data, i.e., height of tide (Mean Lower Low Water Datum), bar checks, time of the tide readings and date and location of the tide gage used for each survey.

Bound field survey books shall be used to record all field data. Fully automated survey systems shall require a field log to supplement the data recorded on magnetic media.

The cross sections of hydrographic sounding line survey results shall be plotted at the scales specified in Table 3-1 of the hydrographic survey manual or as approved by the Engineer. Soundings shall be plotted on transparent sheets and show pay quantity excavation templates shown on the plans with survey cross-section. The Contractor's firm name shall be printed on each sheet along with contract name, number and date of survey. Plot scales shall be as approved by the Engineer.

The Contractor shall perform Pre-Dredging Surveys no earlier than 60 calendar days and no later than 30 calendar days before commencement of dredging. The Pre-Dredging Survey shall be completed with accuracy to one-tenth foot which delineates the following areas to be dredged, with overdepth allowances, existing depths, estimated quantities to be dredged for the project, and estimated quantities for overdepth.

The Contractor shall perform hydrographic Quality Control Surveys thirty days after start of dredging and every thirty calendar days thereafter, and after any natural event that would create shoaling of previously dredged areas of the project (e.g., severe storms and earthquakes). These surveys shall verify that all foundation excavation dimensions are being obtained as specified. All surveys shall begin where dredging commenced and end as close as possible to last dredging position. The accuracy shall be consistent with the Pre-Dredging Survey above.

From the Quality Control Surveys, the Contractor shall compute quantities by the average end area method to the nearest cubic yard based on the sounding lines surveyed and the dredging section indicated on the contract drawings. Tabular summaries shall be submitted to show standard depth, overdepth, and total dredging quantities both incrementally and cumulative per pier location.

The Contractor shall perform a Post-Dredging Survey within 15 calendar days of the last disposal activity at each pier prior to placing backfill (last being defined as that activity after which no further activity occurs for 15 calendar days), a survey with accuracy to one-tenth foot which delineates the following: areas dredged: dredged depths, actual quantities dredged for the project, and actual quantities of overdepth. The Post-Dredging Survey shall

contain the dates of commencement and completion. The Contractor shall substantiate the total quantity dredged by including calculations used to determine the volume difference (in cubic yards) between the Pre- and Post Dredging Surveys and explain any variation in quantities greater than 15% beyond estimated quantities.

The quantities calculated from pre-dredging, quality control, and post-dredging surveys shall only be used for permit reporting purposes. Quantities from these surveys shall not be used for measurement of quantities for payment.

The Contractor shall submit all drawings, field notes and quantity computations within five (5) calendar days after completion of any survey. The number of sets of drawings shall be as specified below. The Contractor shall mail or deliver drawings and computations to the Engineer for review and submission to the various agencies.

1. Three (3) sets of transparent drawings for each survey.
2. Three (3) sets of computer sheet printouts or calculation sheets for dredging quantities for each survey.
3. Three (3) sets of cross sections for each survey.

The Contractor shall submit for each survey, the ASCII file of raw and corrected survey data. Data shall be on 31/2" (1.44 MB) disks, operating under MS-DOS 3.1 or newer version. The files shall have hydrosurvey information, in both raw and adjusted format. The raw data shall be original data from the hydrosurvey computer. The adjusted data shall be corrected to National Ocean Survey MLLW datum. The record of raw data shall be comma delimited and consist of the following information: index, “x” coordinate; “y” coordinate; “z” elevation; and time. Each adjusted record shall consist of the following information: index; “x” coordinate; “y” coordinate; “z” elevation; time; and tide. The index shall be the first entry, representing the sequence that each point was taken. The index shall be numerical, beginning with the number “one” and continuing until a 24 hour work effort is completed. Each day shall be in one file (one or more disks). This convention is applicable for both raw and adjusted data. Time shall be reported in Julian day and military hours and seconds. (For example, “17 March 1990, 9:00 A.M.” would be “170390, 090000”). The recording distance between the hydrosurvey points shall be 10 feet or less. All data recorded shall be in ASCII test. Other Data collection formats will be considered if presented by the Contractor. Revisions in collection format will not be considered after the project has begun. All alternatives shall be approved by the Engineer.

The Contractor shall provide a complete listing of hydrographic equipment he will use on the project prior to the survey conference specified herein below.

At least five (5) calendar days prior to performing any survey, the person responsible for that survey, the Contractor’s chief surveyor and/or the independent surveyor, shall meet with the Engineer in a survey conference to outline the scope of survey and section interval. No survey work shall be performed until such conference has taken place.

The Department will retain an amount equal to 5 percent of the estimated value of the associated item of work performed during each estimate period in which the Contractor fails to complete the hydrographic surveys.

Measurement and Payment: Structure excavation (Type D), structure excavation (Type A), and structure excavation (Type AH) will be measured in accordance with Section 19-3.07, "Measurement," of the Standard Specifications.

Full compensation for all dredging, Dredging Operation Plan preparation and updating; preparing and implementing Solid Debris Management Plan; overflow and leakage monitoring; performing control and monitoring surveys; transporting and disposal of all dredged material to upland and aquatic disposal sites, preparation of disposal site verification logs; and performing hydrographic surveys including data collection and preparation of drawings, cross-sections and calculations shall be considered as included in the contract prices paid per cubic yard for structure excavation (Type A), structure excavation (Type D) and structure excavation (Type AH) and no additional compensation will be allowed therefor.

10-1.34 EROSION CONTROL (TYPE D)

Erosion control (Type D) shall conform to the provisions in Section 20-3, "Erosion Control," of the Standard Specifications and these special provisions.

Erosion control work shall consist of applying 3 separate applications of erosion control materials to embankment slopes, excavation slopes, and other areas designated by the Engineer. The applications shall consist of the following and shall be applied in the following sequence:

Fiber, seed, commercial fertilizer, and water.
Straw.
Stabilizing emulsion, fiber, and water.

MATERIALS.--Materials shall conform to Section 20-2, "Materials," of the Standard Specifications and the following:

SEED.--Seed shall conform to the provisions in Section 20-2.10, "Seed," of the Standard Specifications. Individual seed species shall be measured and mixed in the presence of the Engineer.

Seed not required to be labeled under the California Food and Agricultural Code shall be tested for purity and germination by a seed laboratory certified by the Association of Official Seed Analysts, or a seed technologist certified by the Society of Commercial Seed Technologists.

Seed shall have been tested for purity and germination not more than one year prior to application of seed or seed shall be retested at the Contractor's expense.

Results from testing or retesting seed for purity and germination shall be furnished to the Engineer prior to applying seed.

NON-LEGUME SEED.--Non-legume seed shall consist of the following:

NON-LEGUME SEED			
Botanical Name (Common Name)	Percent (Minimum) Purity	Percent (Minimum) Germination	Pounds per acre (Slope measurement)
Eschscholzia californica (California Poppy)	90	70	1
Linaria moroccana (Baby Snapdragon)	95	80	2
Vulpia myuros 'Zorro' (Zorro Foxtail Fescue)	90	80	8
Bromus rubens (Panoche Red Brome)	90	85	15

A sample of approximately one ounce of non-legume seed may be taken from each seed container by the Engineer.

COMMERCIAL FERTILIZER.--Commercial fertilizer shall conform to the provisions in Section 20-2.02, "Commercial Fertilizer," of the Standard Specifications and shall have a guaranteed chemical analysis of 6 percent nitrogen, 20 percent phosphoric acid and 20 percent water soluble potash.

STABILIZING EMULSION (SOLIDS).--Stabilizing emulsion (solids) shall conform to the provisions in Section 20-2.11, "Stabilizing Emulsion," of the Standard Specifications and these special provisions, except that the requirement for an effective life of at least one year shall not apply.

Stabilizing emulsion shall be in a dry powder form, may be reemulsifiable, and shall be a processed organic adhesive used as a soil binder.

APPLICATION.--Erosion control materials shall be applied in 3 separate applications as follows:

The following mixture in the proportions indicated shall be applied with hydro-seeding equipment within 60 minutes after the seed has been added to the mixture:

Material	Pounds Per Acre (Slope measurement)
Fiber	500
Non-Legume Seed	26
Commercial fertilizer	450

When premixed seed from containers is added to hydro-seeding equipment, the entire contents of the containers shall be used in preparing the hydro-seeding mixture. Partial use of a container of premixed seed will not be permitted in a hydro-seeding mixture.

Straw shall be applied at the rate of 2 tons per acre (slope measurement). Incorporation of straw will not be required.

The following mixture in the proportions indicated shall be applied with hydro-seeding equipment:

Material	Pounds Per Acre (Slope measurement)
Fiber	500
Stabilizing emulsion (solids)	120

The ratio of total water to total stabilizing emulsion in the mixture shall be as recommended by the manufacturer of the emulsion, but shall not exceed 12 gallons of water per pound of stabilizing emulsion solids specified.

Once erosion control work is started in an area, all applications shall be completed in that area on the same working day.

10-1.35 ASPHALT CONCRETE

Asphalt concrete shall be Type A and shall conform to the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions.

The last sentence of the first paragraph in Section 39-2.01, "Asphalts," of the Standard Specifications and the fifth, sixth, seventh and eighth paragraphs of Section 39-3.03, "Proportioning," of the Standard Specifications shall not apply.

The second paragraph in Section 39-3.05, "Asphalt Concrete and Asphalt Concrete Base Storage," of the Standard Specifications is amended to read:

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 mix and changes it to individual batch delivery and prevents the segregation of product ingredients as the completed mix is placed into storage. The surge-batcher shall be center loading and shall be thermally insulated or heated or thermally insulated and 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 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.

The amount of asphalt binder to be mixed with the aggregate for asphalt concrete will be determined by the Engineer in accordance with California Test 367 using the samples of aggregates furnished by the Contractor in conformance with Section 39-3.03, "Proportioning," of the Standard Specifications.

The area to which paint binder has been applied shall be closed to public traffic. Care shall be taken to avoid tracking binder material onto existing pavement surfaces beyond the limits of construction.

10-1.36 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 B.

The elongation at break for nonwoven type rock slope protection fabric shall be 50 percent, minimum, instead of 50 percent, maximum.

10-1.37 MONUMENTS

Survey monuments shall conform to the provisions in Section 81, "Monuments," of the Standard Specifications and these special provisions.

Survey monuments shall be drilled and bonded into the bridge pier spandrel beams and diaphragms at various locations shown on the plans.

The holes shall be drilled by methods that will not shatter or damage the concrete adjacent to the holes. The drilled holes shall be clean and dry at the time of placing the bonding material and the survey discs.

Bonding material shall conform to the requirements in Section 95-2.01, "Binder (Adhesive), Epoxy Resin Base (State Specification 8040-01F-03)," of the Standard Specifications.

As part of the monument installation work, the Contractor shall perform the survey work to establish the horizontal coordinates (X and Y) and elevations on the installed monuments. The survey work shall be performed by a Land Surveyor licensed in the State of California. Survey work shall be done in accordance with the First Order Standards as

defined in "Standard and Specifications for Geodetic Control Networks", published by the Federal Geodetic Control Committee, February 1991 edition.

The datums to be used are as follows:

Horizontal controls:	North American Datum (NAD) 1983, California State Plane Coordinates, Zone III.
Vertical controls:	Elevations: National Geodetic Vertical Datum (NGVD), 1929.

Upon completion of the survey work, the survey reports including all computations, survey notes and other data used to accomplish the work shall be furnished to the Engineer and shall become the property of the State. Survey data shall include information and ties to United States Coast and Geodetic Survey (USC and GS) points at Red Rock and San Pablo Ridge.

In addition to the survey report, the Contractor shall submit a “Record of Survey Monumentation Map” showing each survey monument set and the control network used to produce the horizontal and vertical values. Such map shall be 18" x 26" in size with each sheet stamped and signed by the Contractor’s licensed land surveyor who performed the survey work.

Full compensation for furnishing licensed land surveyor and performing all survey work, including preparation of reports and record of survey monumentation map shall be considered as included in the contract unit price paid for survey monument and no additional compensation will be allowed therefor.

10-1.38 METAL BEAM GUARD RAILING

Metal beam guard railing shall conform to 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.

The ninth, eleventh and twelfth paragraphs in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications are amended to read:

Wood posts and blocks shall be timbers No. 1 (structural) grade Douglas fir or timbers No. 1 grade Southern yellow pine. Wood posts and blocks shall be graded in accordance with the provisions in Section 57-2, "Structural Timber," 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 as provided in Section 58, "Preservative Treatment of Lumber, Timber and Piling," with creosote, creosote-coal tar solution, creosote-petroleum solution (50-50), pentachlorophenol in hydrocarbon solvent, copper naphthenate, ammoniacal copper arsenate, ammoniacal copper zinc arsenate, or chromated copper arsenate (Southern yellow pine only) except that, 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, all 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.

Metal beam guard rail elements and any required backup plates, terminal sections, end sections, and return sections shall conform to the requirements of Type 2 W-Beam as shown in AASHTO Designation: M 180.

Note 5 on Standard Plan A77J is amended to read:

5. For approach railing details, see Type 1M flare on Revised Standard Plan RSP A77D and transition details on this plan.

10-1.39 CONCRETE BARRIER

Concrete barriers shall conform to the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

The requirements of the third paragraph in Section 83-2.02D(4), "Finishing," of the Standard Specifications shall not apply.

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

Grease shall conform to the requirements of Military Specification: MIL-S-8660.

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.

Bar reinforcing steel for use in concrete barriers shall be epoxy coated in conformance with the provisions in "Epoxy-Coated Reinforcement," elsewhere in these special provisions.

Full compensation for epoxy-coated bar reinforcement, slider plates, steel cover plates, concrete barrier transitions and concrete box barrier shall be considered as included in the contract price paid per linear foot for concrete barrier of the type or types listed in the Engineer's Estimate and no separate payment will be made therefor.

10-1.40 THERMOPLASTIC TRAFFIC STRIPES AND PAVEMENT MARKINGS

Thermoplastic traffic stripes (traffic lines) and pavement markings shall conform to the provisions in Sections 84-1, "General," and 84-2, "Thermoplastic Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

The State Specification No. for glass beads in Section 84-2.02, "Materials," of the Standard Specifications is amended to read "8010-21C-22 (Type II)."

Thermoplastic material shall conform to the requirements of State Specification No. 8010-21C-19.

At the option of the Contractor, permanent striping tape as specified in "Prequalified and Tested Signing and Delineation Materials" elsewhere in these special provisions, may be placed instead of the thermoplastic traffic stripes and pavement markings specified herein, except that STAMARK Brand Pavement Tape, Bisymmetric 1.75 Grade, manufactured by the 3M Company, shall not be used. Pavement tape, if used, shall be installed in accordance 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 as thermoplastic traffic stripe and thermoplastic pavement marking.

10-1.41 PAVEMENT MARKERS

Pavement markers shall conform to the provisions in Section 85, "Pavement Markers," of the Standard Specifications and these special provisions.

The second paragraph in Section 85-1.02, "Type of Markers," of the Standard Specifications shall not apply.

Certificates of compliance shall be furnished for pavement markers as specified in "Prequalified and Tested Signing and Delineation Materials" elsewhere in these special provisions.

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.

10-1.42 PREFABRICATED BENCH

Prefabricated bench shall be furnished and installed in accordance with the details shown on the plans and as provided in these special provisions.

Prefabricated bench unit shall be a reinforced concrete unit.

Concrete for precast benches shall have a minimum strength of 5,000 psi at 28 days. Cement shall be either Type II or III. Aggregates to be used for precast concrete benches shall have a maximum size of ¾ inch.

Integral color shall be pure mineral oxide, lime proof and non-fading. Color shall be selected by the Engineer from the manufacturer’s standard color chart prior to fabrications.

Reinforcing steel shall conform to provisions in Section 52, “Reinforcing Steel,” of the Standard Specifications, except for payment.

Prefabricated bench will be measured and paid for by the unit of the actual units installed.

The contract unit price paid for prefabricated bench shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in prefabricated bench, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

SECTION 10-1A. CONSTRUCTION DETAILS - SUBSTRUCTURE

10-1A.01 GENERAL

The items of work described in this section apply in general to the substructure portion of the Richmond- San Rafael Bridge.

10-1A.02 EXISTING FACILITIES

The work performed in connection with various substructure facilities shall conform to the provisions in Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

Attention is directed to "Existing Highway Facilities" elsewhere in these special provisions regarding materials to be salvaged, plans of the existing bridge and related bridge references.

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 Construction Safety Orders Title 8, of the California Code of Regulations including Section 5158, "Other Confined Space Operations."

The existing paint systems on Bridge Number 28-0100 consist of lead, chromium, and zinc. Any work that disturbs the existing paint system will expose workers to health hazards and will (1) produce debris containing heavy metal in amounts that exceed the thresholds established in Titles 8 and 22 of the California Code of Regulations or (2) produce toxic fumes when heated. All debris produced when the existing paint system is disturbed shall be contained.

DEBRIS CONTAINMENT AND COLLECTION PROGRAM.--Prior to starting work, the Contractor shall submit to the Engineer a debris containment and collection program for debris produced when the existing paint system is disturbed in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The program shall identify materials, equipment and methods to be used when the existing paint system is disturbed and shall include working drawings of any containment system, loads applied to the bridge by any containment structure, and provisions for ventilation and air movement for visibility and worker safety.

If the measures being taken by the Contractor are inadequate to provide for the containment and collection of debris produced when the existing paint system is disturbed, the Engineer will direct the Contractor to revise the operations and the debris containment and collection program. The directions will be in writing and will specify the items of work for which the Contractor's debris containment and collection program are inadequate. No further work shall be performed on the items until the debris containment and collection programs are adequate and, if required, a revised program has been approved for the containment and collection of debris produced when the existing paint system is disturbed.

The Engineer will notify the Contractor of the approval or rejection of any submitted or revised debris containment and collection program within 2 weeks of submittal of the Contractor's program or revised program.

The State will not be liable to the Contractor for failure to approve all or any portion of an originally submitted or revised debris containment and collection program, nor for any delays to the work due to the Contractor's failure to submit acceptable programs.

SAFETY AND HEALTH PROVISIONS.--Attention is directed to Section 7-1.06, "Safety and Health Provisions," of the Standard Specifications. Work practices and worker health and safety shall conform to the Construction Safety Orders Title 8, of the California Code of Regulations including Section 1532.1, "Lead."

The Contractor shall furnish to the Engineer a written Code of Safe Practices, and have an Injury and Illness Prevention Program, and a Hazard Communication Program in accordance with the provisions of Construction Safety Orders 1509 and 1510.

Prior to starting work that disturbs the existing paint system and at such times when revisions to the program are required by Section 1532.1, "Lead," the Contractor shall submit the compliance programs required in subsection (e)(2), "Compliance Program," of Section 1532.1, "Lead," of the Construction Safety Orders to the Engineer in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The compliance programs shall include the data specified in subsections (e)(2)(B) and (e)(2)(C) of Section 1532.1, "Lead." Approval of the compliance programs by the Engineer will not be required. The compliance programs shall be reviewed and signed by a Certified Industrial Hygienist (CIH) who is certified in comprehensive practice by the American Board of Industrial Hygiene (ABIH). Copies of all air monitoring or jobsite inspection reports made by or under the direction of the CIH in accordance with Section 1532.1, "Lead," shall be furnished to the Engineer within 10 days after date of monitoring or inspection.

DEBRIS HANDLING.--Temporary storage on the ground of the debris produced when the existing paint system is disturbed will not be permitted. Debris accumulated inside the containment system shall be removed before the end of each work shift. Debris shall be stored in approved leak proof containers and shall be handled in such a manner that no spillage will occur.

Disposal of debris produced when the existing paint system is disturbed shall be performed in accordance with all applicable Federal, State and Local hazardous waste laws. Laws that govern this work include:

1. Health and Safety Code, Division 20, Chapter 6.5 (California Hazardous Waste Control Act).
2. Title 22; California Code of Regulations, Chapter 30 (Minimum Standard for Management of Hazardous and Extremely Hazardous Materials).
3. Title 8, California Code of Regulations.

Except as otherwise provided below, debris produced when the existing paint system is disturbed shall be disposed of by the Contractor at an approved Class 1 disposal facility in accordance with the requirements of the disposal facility operator. The debris shall be hauled by a transporter currently registered with the California Department of Toxic

Substances Control using correct manifesting procedures and vehicles displaying current certification of compliance. The Contractor shall make all arrangements with the operator of the disposal facility and perform any testing of the debris required by the operator.

At the option of the Contractor, the debris produced when the existing paint system is disturbed shall be disposed of by the Contractor at a facility equipped to recycle the debris, subject to the following requirements:

Copper slag abrasive blended by the supplier with a calcium silicate compound shall be used for blast cleaning.

The debris produced when the existing paint system is disturbed shall be tested by the Contractor to confirm that the solubility of the heavy metals is below regulatory limits and that the debris may be transported to the recycling facility as a non-hazardous waste.

The Contractor shall make all arrangements with the operator of the recycling facility and perform any testing of the debris produced when the existing paint system is disturbed that is required by the operator.

WORK AREA MONITORING.--The Contractor shall perform work area monitoring of the ambient air in and around the work area at the bridge site to verify the effectiveness of the containment system. The work area monitoring shall consist of collecting, analyzing and reporting of air test results, and recommending any required corrective action when specified exposure levels are exceeded. The work area monitoring shall be carried out under the direction of a CIH. The samples shall be collected at locations designated by the Engineer.

Air samples shall be collected and analyzed in accordance with National Institute for Occupational Safety and Health (NIOSH) methods. Lead air samples shall be collected and analyzed in accordance with NIOSH Method 7082, with a limit of detection of at least 0.5 $\mu g/m^3$. Air samples for other metals shall be collected and analyzed in accordance with NIOSH Method 7300, with a limit of detection of at least one percent of the appropriate Permissible Exposure Limits (PELs) of California/Occupational Safety and Health Administration (Cal/OSHA). Alternative methods of sample collection and analysis, with equivalent limits of detection, may be used at the option of the Contractor.

The airborne metals exposure, outside either the containment system or work areas, shall not exceed the lower of either: (1) 10 percent of the Action Level specified for lead by Section 1532.1, "Lead," or (2) 10 percent of the appropriate PELs specified for other metals by Cal/OSHA.

The air samples shall be collected at least once per week during progress of work that disturbs the existing paint system. All air samples shall be analyzed within 48 hours at a facility accredited by the Environmental Lead Laboratory Accreditation Program of the American Industrial Hygiene Association (AIHA). When corrective action is recommended by the CIH, additional samples may be required by the Engineer to be taken, at the Contractor's expense.

There shall be no visible increase in the concentrations of heavy metal on the area affected when the existing paint system is disturbed. Any visible increase in the concentrations of heavy metal, after completion of work that disturbs the existing paint system, shall be removed at the Contractor's expense.

Air sample laboratory analysis results, including results of additional samples taken after corrective action as recommended by the CIH, shall be submitted to the Engineer. The results shall be submitted both verbally within 48 hours after sampling and in writing with a copy to the Contractor, within 5 days after sampling. Sample analysis reports shall be prepared by the CIH as follows:

For air sample laboratory analysis results, the date and location of sample collection, sample number, contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Post mile will be required on laboratory analysis results.

For air sample laboratory analysis results, the following will be required:

1. List of emission control measures in place when air samples were taken.
2. Air sample results shall be compared to the appropriate PELs.
3. Chain of custody forms.
4. Corrective action recommended by the CIH to ensure airborne metals exposure, outside either the containment system or work areas, is within specified limits.

CONTAINMENT SYSTEM.--The containment system shall consist of, at the option of the Contractor, (1) a ventilated containment structure, or (2) vacuum shrouded surface preparation equipment and drapes, tarps or other materials, or (3) equivalent containment system. The containment system shall contain all water, resulting debris, and visible dust produced when the existing paint system is disturbed.

For bridges over water, the containment system shall include a skimming boom consisting of a float with a skirt to collect floating debris.

The containment system shall provide the clearances specified under “Maintaining Traffic” of these special provisions.

Falsework or supports for the ventilated containment structure shall not extend below the vertical clearance level nor to the ground line at any location within the roadbed.

The ventilated containment structure shall conform to the provisions for falsework in Section 51-1.06, "Falsework," of the Standard Specifications.

The minimum total design load of the ventilated containment structure shall consist of the sum of the dead and live vertical loads. Dead load shall consist of the actual weight of the ventilated containment structure. Live loads shall consist of a uniform load of not less than 45 pounds per square foot, which includes 20 pounds per square foot of sand load, applied over the area supported, and in addition, a moving 1000 pound concentrated load shall be applied to produce maximum stress in the main supporting elements. Assumed horizontal loads need not be included in the design of the ventilated containment structure.

The ventilated containment structure may be supported with either rigid or flexible supports. The rigid or flexible containment materials on the containment structure shall retain air borne particles but may allow air flow through the containment materials. Flexible materials shall be supported and fastened to prevent escape of abrasive and blast materials due to whipping from traffic or wind and to maintain the clearances.

All mating joints between the ventilated containment structure and the bridge shall be sealed. Sealing may be by overlapping of seams when using flexible materials or by using tape, caulking, or other sealing measures.

Multiple flap overlapping door tarps shall be used at entry ways to the ventilated containment structure to prevent dust or debris from escaping.

Baffles, louvers, flapper seals or ducts shall be used at make-up air entry points to the ventilated containment structure to prevent escape of abrasives and resulting surface preparation debris.

The ventilated containment structure shall be properly maintained while work is in progress and shall not be changed from the approved working drawings without prior approval of the Engineer.

The ventilation system in the ventilated containment structure shall be of the forced input air flow type with fans or blowers.

Negative air pressure shall be employed within the ventilated containment structure and will be verified by visual methods by observing the concave nature of the containment materials while taking into account wind effects, or by using smoke or other visible means to observe air flow. The input air flow shall be properly balanced with the exhaust capacity throughout the range of operations.

The exhaust air flow of the ventilation system in the ventilated containment structure shall be forced into dust collectors (wet or dry) or bag houses.

PROTECTIVE WORK CLOTHING AND HYGIENE FACILITIES.--Wherever there is exposure or possible exposure to heavy metals or silica dust at the bridge site, the Contractor shall, for not more than 3 State personnel: (1) furnish, clean and replace protective work clothing and (2) provide access to hygiene facilities. The furnishing, cleaning and replacement of protective work clothing, and hygiene facilities shall conform to the provisions of subsections (g), "Protective work clothing and equipment," and (i), "Hygiene facilities and practices," of Section 1532.1, "Lead," of the Construction Safety Orders.

The protective work clothing and access to hygiene facilities shall be provided during exposure or possible exposure to heavy metals or silica dust at the bridge site and application of the undercoats of paint.

Protective work clothing and hygiene facilities shall be inspected and approved by the Engineer before being used by State personnel.

The protective work clothing shall remain the property of the Contractor at the completion of the contract.

PAYMENT.--Work area monitoring will be paid for on the basis of a lump sum price.

The contract lump sum price paid for work area monitoring shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in collecting and analyzing of samples of ambient air for heavy metals, complete in place, including reporting the test results, 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 containment system, protective work clothing and access to hygiene facilities for State personnel; and handling of debris produced when the existing paint system is disturbed, including testing, hauling, treatment, disposal fees and local taxes, shall be considered as included in the contract price paid for the item of work requiring the disposal of the debris produced when the existing paint system is disturbed and no additional compensation will be allowed therefor.

10-1A.02A BRIDGE REMOVAL (PORTION)

Removing portions of bridge shall conform to the requirements in Section 15-4, "Bridge Removal," of the Standard Specifications and these special provisions.

Bridge removal (portion) shall consist, in general, of removing concrete and steel portions of the existing bridge, as shown on the plans and as directed by the Engineer, including, but not limited to, portions of:

Steel stairs, ladders, platforms, and handrails
Steel bracing members

Concrete shafts
Concrete infill within steel tower legs
Gusset plates
Existing fasteners
Concrete at top of piers 19, 27, 33, 36, 46, 49, 55, 61
Concrete wall at piers 34, 35, 47 and 48
Four-ply roofing at pier 34
Portions of concrete walls and shafts at Piers 30, 4, 47, and 48
Performance test micropiles

Bridge removal (portion) (fender) shall consist of removing portions of existing fender systems, including the entire timber fender system at piers 33, 36, 46, and 49; portions of the existing ring beam and supporting steel pipe piles at piers 34, 35, 47, and 48; and any other portions of the fender systems shown on the plans.

Timber piles at Piers 33, 36, 46 and 49 shall be completely removed. Steel pipe piles within the limits of the reinforced concrete removal at Piers 34, 35,47 and 48 shall be completely removed.

A one-inch deep sawcut shall be made along the edge of all concrete to be removed at Piers 34, 35, 47 and 48.

The Contractor shall submit a complete bridge removal plan to the Engineer detailing procedures and sequence for removing portions of bridge substructure in a safe and controlled manner.

The bridge removal plan shall include the following:

The bridge removal sequence for the entire substructure, including staging of removal;
Equipment locations on the structure during removal operations;
Temporary support shoring or temporary bracing;
Locations where work is to be performed over navigational channels traffic; and
Details and locations of protective covers or other measures to assure that people, property and improvements will not be endangered.

Attention is directed to “Temporary Bracing Systems,” elsewhere in these Special Provisions.

Temporary support shoring, temporary bracing, and protective covers as required, shall be designed and constructed in conformance with the provisions in Section 51-1.06, "Falsework," of the Standard Specifications and the following:

The assumed horizontal load to be resisted by the temporary support shoring, and temporary bracing, for removal operations only, shall be the sum of the actual horizontal loads due to equipment, construction sequence or other causes and an allowance for wind, but in no case shall the assumed horizontal load to be resisted in any direction be less than 10 percent of the total dead load of the structure to be removed.

Temporary support shoring and temporary bracing, shall not encroach closer than the horizontal and vertical clearance restrictions specified in the U.S. Coast Guard “Checklist”.

The removal operations shall be conducted in such a manner that the portion of the structure not yet removed remains in a stable condition at all times.

The following additional requirements apply to the removal of portions of bridges whenever the removal work is to be performed over navigational waters:

Removal of portions of bridges shall conform to the requirements in Section "Relations With U.S. Coast Guard" of these special provisions.

The removal operations shall be limited to prevent any materials, equipment or debris from falling onto the navigational traffic.

The Contractor shall submit to the Engineer working drawings, with design calculations, for the proposed bridge removal plan. The bridge removal plan shall be prepared by an engineer who is registered as a Civil Engineer in the State of California. The design calculations shall be adequate to demonstrate the stability of the structure during all stages of the removal operations. Calculations shall be provided for each stage of bridge removal and shall include dead and live load values assumed in design of protective cover. At a minimum, a stage will be considered to be removal of primary bracing members or connections in any span at support locations.

The bridge removal plan shall conform to the requirements in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The number of sets of drawings and design calculations and times for review for any bridge removal plans shall be the same as specified for falsework working drawings in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications.

The time to be provided for the Engineer's review of the working drawings for removing specific structures, or portions thereof, shall be as follows:

Structure or Portion of Structure	Review Time - Weeks
28-0100 (Substructure)	6

Approval by the Engineer of the bridge removal plans or field inspection performed by the Engineer will in no way relieve the Contractor of full responsibility for the bridge removal plan and procedure.

Prior to proceeding with bridge removal where bridge removal plan is required, an engineer for the Contractor who is registered as a Civil Engineer in the State of California shall inspect the temporary support shoring, including temporary bracing and protective coverings, for conformity with the working drawings. The Contractor's registered engineer shall certify in writing that the temporary support shoring, including temporary bracing and protective coverings, substantially conform to the details on the working drawings, and that the material and workmanship are satisfactory for the purpose intended. A copy of this certification shall be available at the site of the work at all times.

The Contractor's registered engineer shall be present at the bridge site where bridge removal plan is required at all times when bridge removal operations are in progress. The Contractor's registered engineer shall inspect the bridge removal operation and report in writing on a daily basis the progress of the operation and the status of the remaining structure. A copy of the daily report shall be available at the site of the work at all times. Should an unplanned event occur, the Contractor's registered engineer shall submit immediately to the Engineer for approval, the procedure of operation proposed to correct or remedy the occurrence.

Existing footing concrete which is outside of the footing limits shown on the contract plans or original contract plans shall be removed as directed by the Engineer and such work will be paid for as extra work as provided in Section 4-l.03D of the Standard Specifications.

10-1A.02B TEMPORARY BRACING SYSTEMS

Temporary bracing systems for maintaining the stability and load carrying capacity of the existing structure during removal of portions of the steel towers, and during performance of the reconstruction and retrofit work shall be designed, furnished, constructed, monitored, maintained and removed in accordance with the requirements of these special provisions.

The temporary bracing system shall be designed to safely withstand the loads and load combinations shown on the plans.

The temporary bracing systems shall be designed for the service loads at the top of the towers as shown on the plans. Proposed changes to the construction sequence and application of temporary support jacking loads shall be subject to the Engineer's approval.

Temporary bracing systems shall include jacking assemblies and appurtenant items necessary to jack and support the structures during the removal and installation of new tower members.

Attention is directed to the sections, "Order of Work," and "Maintaining Traffic," of these special provisions regarding the construction sequences required.

Approval by the Engineer of the temporary bracing system working drawings or temporary bracing system inspection performed by the Engineer will in no way relieve the Contractor of full responsibility for the temporary bracing systems.

TEMPORARY BRACING SYSTEM DESIGN AND DRAWINGS.--The Contractor shall submit to the Engineer working drawings and design calculations for the temporary bracing systems. Such drawings and design calculations shall be signed by an engineer who is registered as a Civil Engineer in the State of California. The temporary bracing system working drawings and design calculations shall conform to the requirements in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The number of sets of drawings and design calculations and times for review for temporary bracing systems shall be the same as specified for falsework working drawings in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications.

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
28-0100	6

Working drawings for any part of the temporary bracing system shall include stress sheets, anchor bolt layouts, shop details, erection and removal plans.

The temporary bracing system working drawings shall include descriptions and values of all loads, including construction equipment loads, descriptions of equipment to be used, complete details and calculations for jacking and supporting the existing structure, and descriptions of the displacement monitoring system. The displacement monitoring system shall include equipment to be used, location of control points, method and schedule of taking measurements, and shall also include provisions to jack the structure should misalignment occur in the temporary bracing system.

A redundant system of supports shall be provided during jacking operations for backup should any of the jacks fail.

The Contractor may use the existing structure as part of the temporary bracing system support. Any use of the existing structure for support and the loads imposed shall be shown on the temporary bracing system drawings.

The temporary bracing system design calculations shall show a summary of computed stresses in the (1) temporary bracing system, (2) connections between temporary bracing system and the existing structure and (3) existing load supporting members. The computed stresses shall include the effect of the jacking sequence. The temporary bracing system design calculations shall also include a lateral stiffness assessment of the temporary bracing system and a comparison to the lateral stiffness of the existing bracing.

The design of temporary bracing systems will not be approved unless it is based on the use of loads and conditions which are no less severe than those described in the Section, "Temporary Bracing System Design Criteria," of these special provisions and on the use of allowable stresses which are no greater than those described in Section 51-1.06A(2), "Design Stresses, Loadings, and Deflections," of the Standard Specifications.

TEMPORARY BRACING SYSTEM DESIGN CRITERIA.--The temporary bracing system shall support the initial jacking loads and the minimum temporary bracing system design loads and the minimum lateral design forces shown on the plans. The vertical design loads shall be adjusted for the weight of temporary bracing and jacks, construction equipment loads and additional loads imposed by the Contractor's operations.

The temporary bracing system shall resist the specified lateral design forces due to wind loads imposed directly on the towers and temporary bracing systems.

The existing structure shall be mechanically connected to the temporary bracing system. The mechanical connections shall be capable of resisting the lateral temporary support design forces. Friction forces developed between the existing structure and temporary bracing system shall not be used to reduce the lateral forces and shall not be considered as an effective mechanical connection. The mechanical connections shall be designed to tolerate adjustments to the temporary bracing system frame throughout the use of the temporary bracing system.

MANUFACTURED ASSEMBLIES: Manufactured assemblies shall conform to the provisions in Section 51-1.06A(2), of the Standard Specifications and these special provisions.

Each jack shall be equipped with either a pressure gage or a load cell for determining the jacking force. Pressure gages shall have an accurately reading dial at least 6-inches in diameter. Each jack 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. Each jack and its gage shall be calibrated as a unit with the cylinder extension in the approximate position that it will be at final jacking force and shall be accompanied by a certified calibration chart. Load cells shall be calibrated and provided with an indicator by which the jacking force is determined.

TEMPORARY SUPPORT CONSTRUCTION.--Attention is directed to Paragraphs 1 through 7 of Section 51-1.06B, "Falsework Construction," of the Standard Specifications. All reference to falsework in these paragraphs shall also apply to temporary bracing systems.

Welding, welder qualification, and inspection of welding for all steel members shall conform to the requirements of ANSI/AASHTO/AWS D1.5.

Prior to proceeding with bridge removal, an engineer for the Contractor who is registered as a Civil Engineer in the State of California shall inspect the temporary bracing system, including jacking and displacement monitoring systems, for conformity with the working drawings. The Contractor's registered engineer shall certify in writing that the temporary bracing system, including jacking and displacement monitoring systems, substantially conform to the working drawings, and that the material and workmanship are satisfactory for the purpose intended. A copy of this certification shall be available at the site of the work at all times.

The Contractor's registered engineer shall be present at the bridge site at all times when jacking operations or adjustments are in progress and when bridge removal operations are in progress. The Contractor's registered engineer shall inspect the jacking and removal operation and report in writing on a daily basis the progress of the operation and the status of the remaining structure. A copy of the daily report shall be available at the site of the work at all times. Should an unplanned event occur, the Contractor's registered engineer shall submit immediately to the Engineer for approval, the procedure or proposed operation to correct or remedy the occurrence.

The Contractor shall perform an initial survey as part of the displacement monitoring system to record the location of the existing structure prior to the commencement of any work. Two copies of the survey shall be signed by an engineer, who is registered as a Civil Engineer in the State of California, and submitted to the Engineer.

Vandal-resistant displacement monitoring equipment shall be provided and maintained. Vertical and horizontal displacements of the temporary bracing system and the existing structure shall be monitored continuously during jacking operations and shall be accurately measured and recorded at least weekly during removal and reconstruction work. As a minimum, elevations shall be taken prior to the start of jacking operations, immediately after jacking is complete, after bridge removal is complete, before connecting the retrofitted structure to the existing structure, and after the temporary bracing system have been removed. As a minimum, the existing structure shall be monitored at the bent and at mid span of both adjoining spans. Control points at each location shall be located near the center and at both edges of the superstructure. The records of vertical and horizontal displacement shall be signed by an engineer who is registered as a Civil Engineer in the State of California and available to the Engineer at the jobsite during normal working hours, and a copy of the record shall be delivered to the Engineer at the completion of reconstructing each bent.

A force equal to the initial jacking load or the dead load shown on the plans shall be applied to the structure by the temporary bracing system and held until all initial compression and settlement of the system is completed before bridge removal work at the location being supported is begun.

Jacking operations shall be carefully controlled and monitored to ensure that the jacking loads are applied simultaneously to prevent distortion and excessive stresses that would damage the structure. The structure shall be jacked as necessary to maintain the total vertical and horizontal displacements at control points to less than 1/4 inch from the locations recorded prior to jacking or as modified by the Engineer.

Should unanticipated displacements, cracking or other damage occur, the construction shall be discontinued until corrective measures satisfactory to the Engineer are performed. Damage to the structure as a result of the Contractor's operations shall be repaired by the Contractor according to the requirements in Section 7-1.11, "Preservation of Property," of the Standard Specifications.

Following completion of the reconstruction, the monitored control points shall not deviate from the vertical or horizontal position by more than 1/4 inch from the initial survey elevations or the elevations as modified by the Engineer.

REMOVING TEMPORARY BRACING SYSTEMS.--Attention is directed to Section 51-1.06C, "Removing Falsework," of the Standard Specifications. All references to falsework in this section shall also apply to temporary bracing system, except that when public traffic is carried on the structure on temporary bracing system, paragraph 8 is amended to read:

> No temporary bracing system shall be released until the supported structure has attained 100 percent of the specified strength.

Attachments shall be removed from the existing structure and concrete surfaces restored to original conditions, except where permanent alterations are shown on the plans.

PAYMENT.--The contract lump sum price paid for temporary bracing system shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in designing, constructing, maintaining, and removing the temporary bracing system, including jacking the existing structure and monitoring displacements, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1A.02C RIVET REMOVAL AND HOLE REAMING

When existing rivets are to be removed and replaced with high-strength bolts, as shown on the plans, the rivet removal and hole reaming shall be in conformance with the requirements in these special provisions.

Attention is directed to the sections entitled "Steel Structures," "Clean and Paint Structural Steel," and “Existing Facilities,” of these special provisions regarding priming of exposed steel surfaces, and the proper collection and handling of existing paint system particles resulting from the removal and replacement of rivets.

The Contractor shall submit to the Engineer for review the proposed method of rivet removal and hole reaming. Rivet removal will not be permitted until the method for removing rivets and reaming holes is approved by the Engineer. The Contractor shall allow the Engineer 20 working days to review the submittal for the proposed method of rivet removal and hole reaming.

Should the Engineer fail to review the submittal for the proposed method of rivet removal and hole reaming 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 submittal for rivet removal and hole reaming, an extension of time commensurate with the delay in completion of the work thus caused will be granted in accordance with Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

At locations where rivets are to be removed, the rivets shall have their heads removed and the shank driven, drilled, cored or jacked out as required. Care shall be taken not to damage material to remain. Burning will not be permitted. The Contractor shall demonstrate removal methods using heat to the Engineer. Heat resulting from any removal methods shall not damage rivet holes or the surrounding materials.

When existing rivets are removed for the truss shoe retrofit, as shown on the plans, or at locations where existing connected plates are to remain and new plates added, the rivets shall have their head removed in a manner that will allow the shanks to be secured so that they remain in the hole. If the existing shank is damaged as a result of the Contractor's operation, the Contractor shall replace the existing shank with a temporary shank at his expense, to the satisfaction of the Engineer. Shanks shall be driven, drilled, cored or jacked out and replaced with a high-strength bolt or rod one at time. Burning will not be permitted.

Difficult rivet removal is anticipated due to restricted access. Difficult rivet removal is anticipated due to misalignment of existing plies in individual existing rivet holes.

Temporary bracing struts, as shown on the plans, shall be installed prior to removing rivets for replacing existing tower leg batten plates with new cover plates.

Where existing rivets are removed, the holes shall be enlarged not more than 1/16 inch in diameter greater than the nominal diameter of the new high-strength bolt. Holes shall be enlarged by reaming. Burning will not be permitted. Where reamed holes exceed the bolt diameter by more than 1/16 inch, the next larger size bolt shall be installed at the Contractor's expense.

Reaming shall conform to the provisions in Section 55-3.14A(3), "Reaming," of the Standard Specifications and the section entitled "Steel Structures," elsewhere in these special provisions.

At locations where surrounding material has been damaged as a result of the Contractor's operations, the surrounding material shall be repaired. When reaming of more that 1/16-inch in diameter greater than the nominal bolt diameter shown on the plans and the installation of an oversize bolt is required for the repair the reaming, furnishing and installing of oversized bolts shall be at the Contractor's expense.

At locations where rivet holes contain cracked, torn or otherwise damaged material due to conditions other than the Contractor's operations, The Contractor shall ream the hole and install an oversized bolt. Additional reaming more than 1/16-inch in diameter than the nominal diameter shown on the plans, including the difference between the actual cost of the bolt shown on the plans and oversized bolt, shall be completed as directed by the Engineer and will paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. Installing oversized bolts shall be at the Contractor's expense.

Inside surfaces of holes remaining after rivet removal and reaming shall be painted in accordance to, and be measured and paid for, as specified for existing steel surfaces in "Clean and Paint Structural Steel" elsewhere in these special provisions.

The contract unit price paid for rivet removal and hole reaming shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in removing existing rivets, including enlarging holes by reaming, complete in place, as shown on the plans, and 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.

The materials and installation of high-strength steel fasteners into the enlarged rivet holes shall be paid for as provided in Section 55, "Steel Structures," of the Standard Specifications and the section entitled "Steel Structures," elsewhere in these special provisions.

10-1A.02D REMOVE UNSOUND CONCRETE AND APPLY PORTLAND CEMENT CONCRETE PATCH (4" Depth)

The work shall consist of removing and disposing of unsound concrete on existing pier surfaces that are above the surrounding water surface, cleaning and preparing contact surfaces, and furnishing, placing and curing portland cement concrete patches. Unsound concrete shall be removed as shown on the plans and to the limits designated by the Engineer. Concrete patches shall be placed as shown on the plans and shall conform to the requirements of these special provisions.

Unsound concrete is that concrete that emits a relatively dead or hollow sound when its surface is tapped with a metal tool. Concrete encasing corroded reinforcing steel beyond the limits identified by said sound may be

considered as unsound concrete. The Engineer will determine the limits of unsound concrete and will mark the areas to be repaired.

Concrete shall be removed from the areas marked by the Engineer and to a depth determined adequate for the patch by the Engineer. Prior to removing concrete, a one-inch-deep saw cut shall be made along straight lines creating, where possible, closed rectangular areas.

Equipment and tools shall not be used to remove unsound concrete which, in the opinion of the Engineer, result in the removal of excess quantities of sound concrete. The maximum size of jackhammers to be used near portions of the piers to remain shall be 30 pound class. The maximum size of chipping hammers to be used underneath or around existing reinforcing bars to remain shall be 15 pound class. Equipment used shall be fitted with suitable traps, filters, drip pans, or other devices to prevent oil or other deleterious matter from discharging into the surrounding water.

Cleaning the contact surfaces shall be accomplished by abrasive blast cleaning the concrete and any exposed reinforcing steel as necessary to remove all rust, paint, grease, or other foreign material. A minimum of 1/8 inch of concrete shall be removed. Abrasive blast cleaning shall comply to the provisions in Section 59-2.02, “Bast Cleaning,” of the Standard Specifications.

Existing reinforcing steel which has been exposed shall be restored to position and blocked and tied in accordance with the provisions in Section 52, “Reinforcement,” of the Standard Specifications.

Prior to placing portland cement concrete patches the surfaces of the concrete shall be recleaned by pressure jetting and washing with clean water. The concrete surface to be patched shall remain continuously wet for at least one hour prior to placement of the concrete. Free water shall be removed prior to placing concrete.

When portland cement concrete patches are built-up using trowel-applied concrete, a thin cement slurry coat shall be applied to the concrete surface before dry-packed concrete is worked into the slurry coat while it is still moist. The concrete shall be built-up in successive layer while the proceeding concrete layer is still moist.

When necessary, forms shall be used to contain the portland cement concrete. Forms shall conform to the shape, lines and dimensions of the existing concrete members and shall be braced and tied together to maintain position and shape during placement of the concrete. The edges of the forms shall be sealed to prevent leakage during concrete placement. Formed concrete shall be thoroughly consolidated by vibration. Devices used to anchor formwork to existing concrete members shall be stainless steel. Anchors that remain in place shall be recessed at least one inch behind the exposed surface of the concrete. Recessed holes remaining after the loose components of the anchorage devices are removed shall be filled with mortar.

Portland cement concrete used in patches shall conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications and the following:

The combined aggregate shall consist of approximately 52 percent fine aggregate and 48 percent gravel. The size of the gravel shall be such that 100 percent passes the 1/2 inch screen and not more than 5 percent passes the No. 16 sieve, unless a larger size is ordered by the Engineer. The exact proportions of the aggregates shall be as determined by the Engineer.

The minimum mortar strength of the fine aggregate, when tested in accordance with California Test 515, shall be 100 percent relative to Ottawa sand.

A water-reducing admixture conforming to the requirements of Section 90-4, "Admixtures," of the Standard Specifications shall be added at the dosage directed by the Engineer. Such dosage will not exceed that recommended by the manufacturer of the admixture.

The penetration of concrete shall not exceed one inch.

Concrete shall be proportioned in conformance with the requirements in said Section 90 and shall contain a minimum of 658 pounds of portland cement per cubic yard. The concrete may be proportioned by weight or by volume.

Concrete patches shall be cured using pigmented curing compound in accordance with the requirements in Section 90-7.03, “Curing Structures,” of the Standard Specifications. Damage to the film of compound before expiration of 3 days after the concrete is placed shall be repaired immediately with additional compound.

In lieu of the portland cement concrete specified above, a two-component, polymer-modified, portland cement, fast-setting, non-sag patching mortar may be used. The properties of the cured polymer-modified portland cement mortar shall conform to the following:

1. Compressive strength (ASTM C-109 Modified) at 28 days: 7200 psi minimum
3. Splitting tensile strength (ASTM C-496) at 28 days: 850 psi minimum
4. Flexural strength (modulus of rupture) (ASTM C-78) at 28 days: 1650 psi minimum
5. Rapid freeze/thaw durability (ASTM C-666; Procedure A), relative durability factor at 300 cycles: 90 minimum
6. Bond Strength (ASTM C-882 Modified) at 28 days: 2500 psi minimum

7. Abrasion (Tabor Abrader) at 7 days, weight loss: 8.9 gm maximum (H-22 wheel; 1000 gm load; 1000 cycles)
8. Chloride and sulfate content: no chlorides or sulfates permitted

Two-component, polymer-modified, portland cement, fast-setting, non-sag patching mortar shall be applied to prepared surfaces in strict conformance with the manufacturer's recommendations.

Removing unsound concrete and patching with portland cement concrete will be paid for at the contract price per square foot for remove unsound concrete and apply portland cement concrete patch (4" depth). The quantity for remove unsound concrete and apply portland cement concrete patch (4" depth), in square feet, to be paid for will be determined from calculations based upon the actual square feet of unsound concrete removed.

At locations where the Engineer directs that unsound concrete be removed to a depth greater than 4 inches, but less than 8 inches, such locations will be measured as twice the actual surface area involved, and payment will be made at the contract price per square foot for remove unsound concrete and apply portland cement concrete patch (4" depth).

At those locations where the concrete surface to be repaired will come in complete contact with the grout used for the assembly of the precast concrete jackets, the Contractor, as approved by the Engineer, may forgo the placement of a portland cement concrete patch if the exposed reinforcement is coated with a rust-inhibitive paint immediately after abrasive blast cleaning, and the prepared surface will come in contact with grout within 30 working days of painting the exposed reinforcement. Concrete surfaces to be repaired that do not come in contact with grout within the prescribed time, will be recleaned and immediately patched. Rust-inhibitive paint shall be a zinc-rich primer complying with the requirements of Section 59-2.13, "Application of Zinc-Rich Primer," and Section 91-2, "Painting for Metal," of the Standard Specifications.

The contract price paid per square foot for remove unsound concrete and apply portland cement concrete patch (4" depth) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, including furnishing and applying rust-inhibitive paint when required, and for doing all the work involved in removing unsound concrete and patching with portland cement concrete in accordance with the details shown on the plans, the requirements in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1A.03 TEMPORARY FENDERING

Temporary fendering, consisting of floating rubber fenders, temporary fender protection, support and restraint systems, and temporary navigation lighting, for the protection and maintenance of existing structures during the removal of fenders or portions thereof, and during the performance of the reconstruction and retrofit work, shall be designed, furnished, constructed, monitored, maintained, and removed in accordance with the requirements of these special provisions.

Attention is directed to "Order of Work," and "Relations with U.S. Coast Guard," elsewhere in these special provisions.

At piers 34, 35, 47 and 48 a temporary support and restraint system, consisting of mooring lines, braces, piling, wire ropes or brackets, shall be designed to resist wind and wave loading, current forces, and the energy from a barge with a 2000 ton displacement traveling at 2.0 knots and impacting the portion of the existing fender nose to remain in place at angles of 45 and 90 degrees to the centerline of the bridge, as shown on the plans.

At piers 34, 35, 47 and 48 a temporary protection system shall be provided to protect the existing 12-inch diameter fender piles when the existing timber sheathing, concrete brackets and walers are removed, as shown on the plans. The protection system shall prevent barges and other marine craft from directly impacting the exposed piles.

Floating rubber fenders shall be placed at piers 33, 34, 35, 36, 46, 47, 48, and 49 as shown on the plans. Floating fenders shall consist of either foam-filled or pneumatic 8-foot diameter by 13-foot long rubber fenders. The fenders shall be equipped with netting and towing rings. Mooring lines and support brackets for connecting the rubber fenders to the existing piers shall be sized per the floating fender manufacturer's recommendations. The temporary floating rubber fenders shall remain the property of the Contractor after the project is completed.

One of the following floating rubber fenders shall be used:

PRODUCT	MANUFACTURER
TRELLEX – CRP 8’-3” Dia. x 13’-0” Foam Filled Floating Fender or equal	Svedala Trellex 3588 Main Street Keokuk, IA 52632 (319) 524-8430
PNEUMATIC 50 8’-0” Dia. x 13’-0” Yokohama Pneumatic Fender or equal	Mitsubishi International Corporation 333 South Hope Street Los Angeles, CA 90071 (213) 687-2958

Barges moored to the piers during the retrofit construction may be considered as temporary fenders permitting the temporary removal of the floating rubber fenders along the sides of the piers protected by the barges, subject to the Engineer’s approval.

Navigation fender light assemblies mounted on the existing fenders shall be relocated and new light assemblies added as shown on the plans. The temporary installation of navigation fender light assemblies shall conform to the requirements for “Electrical Work” elsewhere in these special provisions. Navigation lighting and radar reflectors shall be added to the channel side of moored barges that are used to replace temporary floating rubber fenders. The barge lighting shall be elevated to match the mean sea level elevation of the existing fender lighting and shall have the same intensity and rated visibility range. Lights and radar reflectors on barges shall comply with U.S. Coast Guard regulations. Lights added to barges will not be considered as a substitute for the fender lights to be relocated or added.

Proposed changes to the construction sequence, loads, and application of the temporary fendering shall be subject to the Engineer’s approval.

The temporary fendering shall be maintained until the permanent fenders have been constructed.

TEMPORARY FENDERING DESIGN AND DRAWINGS.–The Contractor shall submit to the Engineer working drawings and design calculations for the temporary fendering. Such drawings and design calculations shall be signed by an engineer who is registered as a Civil Engineer in the State of California. The temporary fendering working drawings and design calculations shall conform to the requirements in Section 5-1.02, “Plans and Working Drawings,” of the Standard Specifications. The number of sets of drawings and design calculations and times for review for temporary fendering shall be the same as specified for falsework working drawings in Section 51-1.06A, “Falsework Design and Drawings,” of the Standard Specifications.

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 temporary fendering shall be as follows:

Structure or Portion of Structure	Review Time – Weeks
28-0100	8

Approval by the Engineer of the temporary fendering working drawings or the temporary fendering inspection performed by the Engineer will in no way relieve the Contractor of full responsibility for the performance of the temporary fendering.

The temporary fendering working drawings shall include descriptions and values of all loads, including construction equipment loads, descriptions of equipment to be used, complete details and calculations for temporarily supporting and restraining the existing fender noses to remain in place, for pile protection systems, and descriptions of the displacement monitoring system. The displacement monitoring system shall include equipment to be used, location of control points, method and schedule of taking measurements.

Working drawings for any part of the temporary fendering shall include stress sheets, anchor bolt layouts, mooring line layouts, shop details, and erection and removal plans.

The temporary support and restraint system shall include the effect of mooring or storing materials, equipment, and personnel on or adjacent to portions of the existing fenders to remain in place. The temporary support and restraint system shall be designed to function during all phases of the retrofit construction. Multiple sequenced installations and removal operations may be required.

The temporary fender pile protection system shall be designed to function under fluctuating tidal conditions and during all phases of the retrofit construction. The pile protection system shall not directly bear against nor be directly supported by the piles to be protected. Multiple sequenced installations and removal operations may be required.

The Contractor may use the existing piers to support the temporary fendering. Any use of the existing structure for support and the loads imposed shall be shown on the temporary fendering drawings.

TEMPORARY FENDERING DESIGN CRITERIA.--The design of temporary fendering shall be based on the use of allowable stresses which are no greater than those described in Section 51-1.06A(2), "Design Stresses, Loadings, and Deflections," of the Standard Specifications and as specified in these special provisions.

The temporary support and restraint system at piers 34, 35, 47 and 48 shall be designed to flex and dampen the motion of the existing fender portions to remain in place. The displacements at the top of the existing fender piles to remain in place shall be limited to 30 inches during the performance of the reconstruction and retrofit work.

The design barge loading and energy shall be determined using Section 3.12, “Barge Collision Force on Pier,” Section 3.13, “Barge Bow Damage Depth,” and Section C3.8, “Vessel Collision Energy,” of the “Guide Specification and Commentary for Vessel Collision Design of Highway Bridges,” Volume 1, dated 1990. Wave, current, wind and other environmental loads shall be determined using the Army Corps of Engineers “Shore Protection Manual,” Volume 1 and Volume 2, dated 1984, as applicable. The minimum return period for design loading shall be 10 years.

TEMPORARY FENDERING CONSTRUCTION.--After initial installation or major relocation of any temporary fendering, an engineer for the Contractor who is registered as a Civil Engineer in the State of California shall inspect the temporary fendering for conformity with the working drawings. The Contractor's registered Civil Engineer shall certify in writing that the temporary fendering substantially conform to the working drawings, and that the material and workmanship are satisfactory and will perform in accordance with the design criteria. A copy of this certification shall be available at the site of the work at all times. The Contractor's registered Civil Engineer shall be present before and during each phase of the fender reconstruction at piers 34, 35, 47, and 48. Should an unplanned event occurs the Contractor's registered Civil Engineer shall submit immediately to the Engineer for approval, the procedure or proposed operation to correct or remedy the occurrence.

The Contractor shall perform an initial displacement monitoring survey to record the location of the existing fender noses to remain in place at piers 34, 35, 47 and 48, prior to the commencement of any work. Two copies of the displacement monitoring survey shall be signed by an engineer, who is registered as a Civil Engineer in the State of California, and submitted to the Engineer. The initial displacement monitoring shall be performed twice daily for the first 5 calendar days, at times deemed representative of heaviest environmental loading as mutually agreed between the Engineer and the Contractor’s registered Civil Engineer. The existing fender noses to remain in place shall be resurveyed and monitored at least once a week thereafter or as directed by the Engineer.

No temporary fendering shall be removed until the fender reconstruction is complete and all connections to the exist piers are in place.

Attachments shall be removed from the existing structure and concrete surfaces restored to original conditions, except where permanent alterations are shown on the plans.

PAYMENT.--The contract lump sum price paid for the temporary fendering shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals (except for the temporary installation of navigation fender lighting), and for doing all the work involved in designing, constructing, monitoring, maintaining, relocating and removing temporary fendering, including monitoring displacements, protecting existing fender piles and for barge navigation lighting and radar reflectors, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1A.04 EARTHWORK (SUBSTRUCTURE)

Earthwork shall conform to the provisions in "Earthwork," elsewhere in these special provisions.

10-1A.05 PIER BACKFILL

Pier backfill shall consist of furnishing, placing, and spreading material around the structure piers to the limits shown on the plans or as directed by the Engineer in conformance with these special provisions.

Material for pier backfill shall be crushed rock or gravel or a combination of both. The material shall be free from organic matter, weak laminations and cleavage, and shall be of such character that is will not disintegrate from contact with or by action of water. The material shall conform to the quality requirements of Section 72-2.02, "Materials," of the Standard Specifications. The material shall conform to the following grading requirements.

Grading Limits of Pier Backfill	
Sieve Sizes	Percentage Passing
3-inch	100
1-1/2-inch	25 - 55
3/4-inch	5 - 15
3/8-inch	0 - 5

Pier backfill shall be placed as close as possible to the pier shafts as shown on the plans. Placement shall be by means of a tremie extending to a depth not more than 5 feet above the highest elevation at which the pier backfill is placed. The location of the bottom opening of the tube shall be controlled by a method approved by the Engineer. Pier backfill shall not be deposited on the existing structure or new construction during placement.

Equipment shall not be used to remove pier backfill deposited outside the limits shown on the plans or ordered by the Engineer.

The Contractor shall take soundings in the presence of the Engineer to verify the top of pier backfill elevation.

Pier backfill placed outside the limits shown on the plans will not be paid for.

The contract price paid per cubic yard for pier backfill shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all work involved in furnishing and placing pier backfill, complete in place, including sounding the top of the backfill, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1A.06 ARMOR ROCK

Armor rock shall consist of furnishing and placing armor rock around the structure piers to the limits shown on the plans or as directed by the Engineer in conformance with Section 72.2, “Rock Slope Protection,” of the Standard Provisions and these special provisions.

Armor rock shall be of such character that it will not disintegrate from contact with or by action of water. The material shall conform to the requirements of Section 72-2.02, "Materials," of the Standard Specifications. The material grading shall conform to the grading requirements of 1/4 ton class rock for rock slope protection of Section 72-2.02, "Materials," of the Standard Specifications.

Armor rock shall be placed using a clamshell bucket, orange peel bucket, or method approved by the Engineer. Rocks shall be placed as to provide a minimum of voids and larger rocks shall be placed in the toe course and on the outside surface of the armor rock. Local surface irregularities of the armor rock shall not vary from the planned slopes by more than one foot measured at right angles to the planned slope.

Releasing armor rock from a height greater than 5 feet above the highest elevation at which the armor rock is placed will not be permitted. Armor rock shall not be deposited on the existing structure or new construction during placement.

Placement methods shall deposit armor rock with a minimum of overcasting. Dragline buckets or other casting type equipment shall not be permitted. Equipment shall not be used to remove armor rock deposited outside the limits shown on the plans or ordered by the Engineer.

The Contractor shall take soundings in the presence of the Engineer to verify the top of armor rock elevations.

Full compensation for sounding the top of armor rock shall be considered as included in the contract price paid for cubic yard for armor rock and no additional compensation will be allowed therefor.

Armor rock will be measured by the cubic yard and paid for in the same manner specified for rock slope protection in Sections 72-2.04, “Measurement,” and 72-2.05, “Payment,” of the Standard Specifications.

10-1A.07 TEST BORINGS

Test borings shall consist of drilling test borings, taking samples, logging borings and furnishing test boring submittals to the Engineer.

Attention is directed to the “Order of Work,” elsewhere in these special provisions.

The “Soil and Rock Logging Classification Manual” is included in the "Materials Information" 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.

The Contractor shall complete one test boring at the center of each cast-in-drilled-hole (CIDH) concrete pile. Furthermore, at Pier 36, Pier 42, and Pier 47, the Contractor shall complete one test boring at the center of each cast-in-steel-shell (CISS) concrete pile.

The Contractor shall complete one test boring at each pier scheduled for the addition of micropiles as shown on the plans. Test borings for micropiles shall be centered between the foundation bells and within 5 feet of the existing diaphragm.

The Contractor shall notify the Engineer in writing not less than 2 weeks in advance of drilling test borings.

All test borings shall be made under the site supervision of, the log of test borings stamped by, and the test boring submittal signed by a Geologist or Civil Engineer who is registered in the State of California and has at least five years of geotechnical engineering experience of deep foundations in both soil and rock.

Test borings shall be made by rotary drill methods and shall be at least 3 inches in diameter.

For cast-in-drilled-hole concrete piling, continuous rock cores shall be made from the specified bottom of steel shell elevation down to 30 feet below the specified bottom of steel shell elevation.

For cast-in-steel-shell concrete piling, continuous rock cores shall be made from the specified pile tip elevation down to 30 feet below the specified pile tip elevation.

For micropiles, continuous rock cores shall be made from the approximate bedrock elevation shown on the plans for a length equal to the minimum length of bedrock embedment shown on the plans or for a length equal to the estimated length of bedrock embedment submitted by the Contractor to the Engineer, whichever is greater.

Standard Penetration Tests (SPT) shall be made in all soil types and performed in accordance with ASTM D1586 in each test boring at 5 foot maximum intervals and terminate when bedrock is encountered. Soil classification and descriptions shall conform to the requirements for visual-manual procedures in ASTM D2488. SPT's performed in test borings at the select CISS concrete pile locations shall start at the mudline. SPT's performed in test borings at the CIDH concrete pile locations shall start 50 feet above the expected top of bedrock elevation. SPT's performed in test borings at the micropile pier locations shall start 20 feet above the approximate bedrock elevations shown on the plans.

Bedrock shall be continuously cored with at least 90 percent core recovery. Rock shall not be logged from drill cuttings. Rock quality designation (RQD) shall be made at 5 foot maximum intervals. Rock shall be cored using an outer and inner core barrel drilling system. The outer core barrel shall be fitted with either a diamond impregnated or polycrystalline drill bit and have an out side diameter of at least 3 inches. The split inner tube core barrel shall have an inside diameter of at least 2 inches.

Prior to removal from the split inner tube barrels and placement into core boxes, rock cores shall be photographed. After core boxes are filled, and prior to removal from the drilling platform, rock cores shall be photographed. All rock core photographs shall be color, 5"x 7", and labeled with the borehole number, sample elevation, scale, and date and time photographed.

The rock cores shall be retained in rock core boxes that are labeled with the job contract number, the pile location, and the sample elevation. Rock core boxes shall be stored on or near the job site at a location approved by the Engineer. The Contractor shall preserve and secure the rock core samples in a weather protected facility until notified by the Engineer. The Engineer will instruct the Contractor to dispose of the rock core samples in accordance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications, or the Engineer will instruct the Contractor to transport the rock core samples to Translab at 5900 Folsom Boulevard, Sacramento, CA 95819.

The log of test borings including the soil and rock classification shall conform to the document "Soil and Rock Logging Classification Manual: Field Manual," published by the Engineering Service Center, Caltrans, dated August 1995.

After completion of all test borings, the Contractor shall furnish to Engineer, in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, a test boring submittal that includes rock cores, photographs of rock cores, a test boring report and the log of test borings.

All log of test borings shall be 22"x24" in size. For initial review, 4 sets of drawings shall be submitted. Within 3 weeks after final approval of the test boring submittal, one set of the corrected prints on 60 pound (minimum) good quality bond paper, 22"x24" in size, prepared by the Contractor shall be furnished to OSD.

Log of test borings shall show 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 on each sheet. The test boring/geotechnical subcontractor name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers. The following shall be shown on the log of test borings:

1. Stationing and offset of boring.
2. Northing and easting coordinates.
3. Reference elevation and datum.
4. Boring start and completion date.
5. Geotechnical notes and miscellaneous explanations.
6. Drill bit and sampler types and diameters.
7. Percent of core recovery and RQD.
8. Sample numbers.
9. SPT data.
10. Depth increments of borings.
11. Graphic log.
12. Soil classifications and descriptions.

13. Rock classifications and descriptions.
14. Log symbol legend.
15. Signature and seal of the Geologist or Civil Engineer.

The test boring report shall include the following:

1. Summary of drilling methods, drilling equipment, drill platforms, and any drilling difficulties encountered.
2. Location map of the surveyed position of the test borings relative to the existing pier and to the new pile locations (in California Coordinate System and bridge stationing).
3. Bore hole surveying notes.
4. Photographs of rock cores.
5. Copies of original daily drilling notes.

The Engineer will notify the Contractor in writing when a test boring submittal is complete and approved. The Engineer will require 3 weeks to review the working drawing submittal after a complete set has been received.

Should the Engineer fail to review the complete working drawing 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 working drawing submittal, an extension of time commensurate with the delay in completion of the work thus caused will be granted in accordance with Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Within 3 weeks of approving in writing the complete test boring submittal, the Engineer will supply the Contractor with written confirmation of, or revisions to, the specified pile tip or bottom of steel shell elevations shown on the plans for CISS or CIDH concrete piles. Steel shells for cast-in-place concrete piling shall not be fabricated or manufactured to length until written confirmation of, or revisions to, the specified pile tip, bottom or steel shell elevations have been supplied by the Engineer. Should the Engineer fail to supply confirmation of, or revision to the specified pile tip or bottom of steel shell elevations 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 this delay, an extension of time commensurate with the delay in completion of the work thus caused will be granted as provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Drill cuttings and excavated material resulting from test borings shall be disposed of in conformance with the provisions of "Earthwork," elsewhere in these special provisions. All other materials utilized in making test boring shall be disposed of in accordance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The contract lump sum price paid for test borings shall include full compensation for furnishing all labor, tools, equipment, and incidentals, and for doing all the work involved in drilling, sampling, logging and furnishing test boring submittals, and disposal of materials from test boring operations as specified in these special provisions, and as directed by the Engineer.

10-1A.08 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. These are available for inspection at the office of the Toll Bridge Program Duty Senior at District 04 Office, 111 Grand Avenue, Oakland, California 94612; telephone number (510) 286-5549.

Attention is directed to "Earthwork," "Permits and Licenses," "Relations with California Regional Water Quality Control Board," "Relations with US Army Corps of Engineers," "Relations with Bay Conservation and Development Commission," "Relations with US Coast Guard," "Obstructions," "Sound Control," and "Water Pollution Control" elsewhere in these special provisions.

Attention is directed to "Order of Work" elsewhere in these special provisions regarding test borings.

Attention is directed to "Welding Quality Control" of these special provisions regarding manufacturing, fabricating, and field splicing piling.

All material resulting from the installation of piling, including drill cuttings, and excavated material, shall be disposed on in conformance with "Earthwork" elsewhere in these special provisions. Material resulting from placing concrete in cast-in-place concrete piling, and from grouting micropiles, including slurry, shall be disposed of in conformance with the provisions of Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications unless otherwise permitted in writing by the Engineer. Attention is directed to Section "Non-Storm Water Discharges" of these special provisions.

Attention is directed to the provisions of Section 7-1.09, "Public Safety," of the Standard Specifications. Before performing any pile handling or pile installation operation at any location that is closer than the length of the pile being handled or installed to the edge of any traveled way open to public use, the Contractor shall submit to the Engineer, as

provided in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, a detail plan of the measures that will be employed to provide for the safety of traffic and the public.

Attention is directed to “Test Borings,” elsewhere in these special provisions. Test borings shall be completed and the steel shell lengths verified by the Engineer in writing prior to the Contractor fabricating steel shells to final length.

Proposals made by the Contractor to modify the specified pile tip elevations or bottom of steel shell elevations will not be considered.

Proposals made by the Contractor to modify the specified pile installation methods will not be considered.

Except for the piles to be placed at piers 33, 36 and 46 through 49, at the Contractor’s option, the wall thickness of the steel shells for cast-in-steel-shell concrete piling may be increased by a 1/2-inch and the concrete fill reduced to the top 10 feet below the specified cut-off elevation.

Difficult pile installation is anticipated due to the presence of soft bay mud overlying dense soils, caving soils, stiff soil layers, dense sand and gravel layers, possible conflict with existing piling, serpentine materials, tidal flow fluctuation, low overhead clearance, overhead utilities, the requirements of pile embedment into rock, sound control.

PILE DRIVING.--Pile driving shall consist of installing 14-inch diameter steel pipe piles (except for fender piles) and steel shells for cast-in-place concrete piling and shall conform to these special provisions.

General.--The provisions of Section 49-1.05, “Driving Equipment,” and Section 49-1.06, “Predrilled Holes,” of the Standard Specifications shall not apply to pile driving.

Pile driving shall be done with impact hammer approved by the Engineer. Impact hammers shall be steam, air, diesel, or hydraulic hammers. Impact hammers shall have sufficient energy to drive steel pipe piles and steel shells for cast-in-place concrete piling at a penetration rate of not less than 1/8-inch per blow at the following:

a. The specified tip elevation for 14-inch steel pipe piling and cast-in-steel concrete piling
b. The bottom of steel shell elevation for cast-in-drilled-hole concrete piling.

Vibratory hammers shall not be used. Steel shells for cast-in-place concrete piling may be installed with drop hammers. Drop hammers are permitted only if the Contractor can demonstrate that the driving system provides uniform bearing on the pile or steel shell and shall have sufficient energy to drive the steel shells at a penetration rate of not less than 1/8 inch per blow at the specified penetration.

Steam or air hammers shall be furnished with boiler or air compressor with a capacity at least equal to that specified by the manufacturers of the hammers to be used. The boiler or compressor shall be equipped with an accurate pressure gage at all times. The valve mechanism and other parts of steam, air, or diesel hammers shall be maintained in first-class condition so that the length of stroke and number of blows per minute for which the hammer is designed will be obtained. Inefficient steam, air, hydraulic, or diesel hammers shall not be used.

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 use of followers or underwater hammers for driving steel pipe piling and steel shells for cast-in-place piling will be permitted when authorized in writing by the Engineer.

Driven 14-inch steel pipe piles shall be driven to obtain the requirements determined by the criteria in Section 49-1.08, “Bearing Value and Penetration,” of the standard specifications.

Cast-In-Place Concrete Piling.--Attention is directed to “Information Handout” regarding “Driveability Study” provided by the State. Said “Driveability Study” contains geotechnical data and conforms to the provisions of paragraph 5, Section 2-1.03, “Examination of Plans, Specifications, and Site Work” of the Standard Specifications.

Steel shells for cast-in-steel-shell concrete piling shall be driven to the specified tip elevation shown on the plans unless directed otherwise by the Engineer. Steel shells for cast-in-drilled-hole concrete piling shall be driven to the top of bedrock elevation shown on the plans unless directed otherwise by the Engineer. Reinforced driving tips to achieve specified penetration are not mandatory, but may be used by the Contractor to maintain integrity of the end of the steel shells.

Steel shells shall be installed open-ended and no internal plates other than weld backup plates shall be used. The axis of the steel shell shall not deviate from plumb by more than 1 1/2 inches per 10 feet of length.

Attention is directed to “Construction Sequence” under “Precast Concrete Pile Cap Assembly” of these special provisions regarding pile alignment and guidance through precast concrete pile caps.

For elevations above the plane of pile cutoff, the Contractor shall provide steel shells sufficiently long or provide temporary conduits to contain the slurry, water, material resulting from drilling and pile clean out, and excess concrete so that they may be conveyed above the water surface for disposal. If a temporary steel conduit is used, the connection between the temporary conduit and the steel shell shall be watertight.

For cast-in-drilled-hole concrete piling, the materials surrounding the bottom of the steel shell shall not enter the pile shaft during construction of the bedrock socket, prior to, and during placement of the concrete. The Contractor shall take

measures to prevent the inflow of materials. At the Contractor's option, the steel shell may be driven below the bottom of steel shell elevation as shown on the plans.

In addition to driving, at the Contractor's option, internal jetting, rotations (without vibration), use of pull-down or jack-down method, or drilling through the center of the steel shells may be used to obtain the specified tip elevation or bottom of steel shell elevation. Equipment or methods used for internal jetting or drilling holes shall not cause quick soil conditions, scouring or caving of the hole. Jetting, spudding, or other soil disturbance techniques on the outside of the steel shells will not be permitted. Internal jetting shall not be used within 15 feet of the bottom of the steel shell at any time during installation.

Internal jetting and drilling may only be used when the steel shell penetration rate is less than 1.0 foot per 100 blows using an impact hammer with at least a minimum manufacturer's energy rating of 350,000 foot-pounds per blow. Lighter hammers may be used in the early stages of driving but they will not be approved for use in conjunction with internal jetting and drilling, at any time.

When drilling through the center of steel shells, holes with a diameter less than the inside diameter of the steel shell, may be drilled to within a level of 2 pile diameters above the position of the bottom of steel shell at any time during pile installation.

Holes drilled between the region that is 2 pile diameters above the position of the bottom of steel shell and the end of the steel shell, shall have a diameter less than 75 percent of the inside diameter of the steel shell.

When the penetration rate for steel shells using an impact hammer with at least a minimum manufacturer's energy rating of 350,000 foot-pounds per blow is less than 1.0 foot per 200 blows, holes may be drilled a maximum distance of 5 feet beyond the position of the bottom of steel shell, but not beyond the specified tip or bottom of steel shell elevation shown on the plans, provided that the holes have a diameter less than 50 percent of the inside diameter of the steel shell.

Drilling to advance steel shells shall be performed under a full head of slurry that is equal to the external seawater level, except drilling below a level of 2 pile diameters above the position of the bottom of steel shell shall be carried out using a full head of synthetic slurry equal to the external seawater level.

Driven steel shells for cast-in-place concrete piling shall be installed to the specified penetration; bearing value will not be determined by the criteria in paragraphs 3 through 7 of Section 49-1.08, "Bearing Value and Penetration," of the Standard Specifications.

STEEL PIPE PILING.--Steel pipe piling shall consist of 14-inch diameter pipe piles and permanent steel casing for micropiles and shall conform to these special provisions.

The provisions of Section 49-5, "Steel Piles," of the Standard Specifications shall not apply to steel pipe piling.

Steel pipe piles shall have diameters and wall thicknesses as shown on the plans. Steel pipe piles shall conform to the specifications of ASTM Designation: A252, Grade 3.Steel pipe piling shall conform to the following requirements:

1. The carbon equivalency (CE) as defined in AWS D 1.1, Section XI5.1, shall not exceed 0.45.
2. The sulfur content shall not exceed 0.05 percent.

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.

The Contractor shall be responsible for any requirements that are in addition to ASTM 252 specifications (including tolerances for maintaining diameter, circumference, roundness, and cross-sectional area) that are required in order to conform with welding requirements for manufacturing, fabricating and splicing.

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.

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. Steel pipe pile splices that are made at a permanent manufacture or fabrication facility, and that are made prior to furnishing the Certificate of Compliance shall be complete penetration welds. Steel pipe pile splices that are made in the field shall be complete joint penetration groove welds.

Ends of steel pipe piling to be spliced that have been damaged during driving shall be removed to a sound and uniform section conforming to the tolerances for diameter, edge alignment and roundness required to meet the steel pile splice welding requirements. Pipe ends shall be field cut using automated guided cutting equipment. Manual flame cutting shall not be used.

Material for external shear rings, leveling plates, inserts, and shim plates for steel pipe piles shall conform to the requirements of ASTM Designation: A36. Shear rings shall be welded in conformance with AWS D1.1.

STEEL SHELLS.--Steel shells shall consist of steel shells for cast-in-steel-shell concrete piling, steel shells for cast-in-drilled-hole concrete piling, and steel pipe reinforcement used for micropiling and shall conform to the provisions in Section 49, "Piling," of the Standard Specifications, and these special provisions.

General.--Wherever reference is made to the following American Petroleum Institute (API) specifications in the Standard Specifications, on the project plans or in these special provisions, the year of adoption for these specifications shall be as follows:

API Codes	Year of Adoption
API 2B	1990
API 5L	1995

Handling devices may be attached to steel shells. Welds attaching these devices shall be aligned parallel to the longitudinal axis of the steel shell and shall conform to the requirements of "Field Welding" specified herein. Permanent bolted connections shall be corrosion resistant. Prior to making attachments, the Contractor shall submit a plan to the Engineer that includes the locations, handling and fitting device details and connection details. Attachments shall not be made to the steel shell until the plan is approved in writing by the Engineer. The Engineer shall have 14 calendar days to review the plan. 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 plan, 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.

Each length of steel shell shall be marked in conformance with the requirements of ASTM Designation: A 252 and also with end match markings as required by the Contractor.

Manufactured Steel Shells.--Manufactured steel shells are defined as steel shells that are produced at a facility where an electric fusion welder, electric resistance welder, or seamless pipe operation is used in conformance with ASTM Designations: A 252, A 53, A 135, A 139, API 5L, or AWWA C200; where this steel pipe can have lengths at least 30 feet long without a circumferential splice; and where this manufacturing can be done on a daily basis.

Manufactured steel shells shall conform with the requirements of ASTM 252, Grade 3, except for steel pipe reinforcement used for micropiling which shall conform to the requirements of API-5L, Grade X52, and the following requirements:

1. Shells shall be of the nominal diameter and the nominal wall thickness as the pipe piles shown on the plans unless otherwise specified in the special provisions.
2. The carbon equivalency (CE) as defined in AWS D 1.1, Section XI5.1, shall not exceed 0.45.
3. The sulfur content shall not exceed 0.05 percent.
4. The outside circumference of the steel shell end shall not vary by more than 0.375-inch from that corresponding to the diameter shown on the plans.
5. The maximum allowable variation in edge alignment for adjacent steel shell ends to be welded shall be 0.1875 times the wall thickness, but not more than 0.063-inch.
6. Steel shell straightness shall conform to the requirements of API 5L, Section 7.6, "Straightness."
7. Welds made at a permanent manufacturing facility shall be made by either an automatic fusion weld or an electric resistance weld process.
8. Twenty-five percent of each longitudinal, circumferential and spiral weld made at a permanent manufacturing facility shall receive nondestructive testing (NDT) by either radiographic, radioscopic, real time imaging systems or ultra sonic methods that are in conformance with the requirements of AWS D1.1. Records of this testing shall be made available to the Engineer upon request. The acceptance and repair criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional NDT shall be performed. The additional NDT shall be made on both sides of the repair for a length equal to 10% of the length of the steel shell outside circumference. After the additional NDT is performed, and if more repairs are required that have a cumulative length equal to or more than 10% of the length of the steel shell outside circumference, then the entire splice weld shall receive NDT.

Fabricated Steel Shells.--Fabricated steel shells are defined as steel shells produced at a facility where a variety of steel fabrication including roll forming and welding steel plate into pipe is performed, where this pipe is at least 3/4-inch in wall thickness, where this pipe is produced in conformance with API 2B, and where this fabrication can be done on a daily basis.

Fabricated steel shells shall conform to API 2B and the following requirements:

1. The carbon equivalency (CE) as defined in AWS D 1.1, Section XI5.1, shall not exceed 0.45.
2. The sulfur content shall not exceed 0.05 percent.
3. API site license and API monogram are not required.
4. Weld filler metal shall conform to the requirements of AWS D1.5 for the welding of ASTM Designation: A 709, Grade 50 steel, except that the qualification, pretest and verification test requirements need not be conducted provided that certified test reports are provided for the consumables to be used.
5. Twenty-five percent of each longitudinal and circumferential weld made at a permanent fabrication facility shall receive NDT by either radiographic, radioscopic, real time imaging systems or ultra sonic methods that are in conformance with the requirements of AWS D1.1. Records of this testing shall be made available to the Engineer upon request. The acceptance and repair criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional NDT shall be performed. The additional NDT shall be made on both sides of the repair for a length equal to 10% of the length of the steel shell outside circumference. After the additional NDT is performed, and if more repairs are required that have a cumulative length equal to or more than 10% of the length of the steel shell outside circumference, then the entire splice weld shall receive NDT.

Field Welding.--Field welding of steel shells is defined as welding performed after the certificate of compliance has been furnished by the manufacturer or fabricator and shall conform to the following requirements:

1. Match marking of steel shell ends at the manufacturing or fabrication facility is recommended to ensure weld joint fit-up. Prior to positioning any 2 sections of steel shell to be spliced by field welding, including those that have been match marked at the manufacturing or fabrication facility, the Contractor shall equalize the offsets of the steel shell ends to be joined and match mark the steel shell ends.
2. Welds made in the flat position or vertical position (where the longitudinal steel shell axis is horizontal) shall be single-vee groove welds. Welds made in the horizontal position (where the longitudinal steel shell axis is vertical) shall be single-bevel welds. Joint fit-ups shall conform to the requirements for tubular sections in AWS D1.1 and these special provisions.
3. The minimum thickness of the backing ring shall be 1/4-inch and the ring shall be continuous. Radiographic, magnetic particle or ultrasonic testing shall be used to assure soundness of the backing ring per requirements in AWS D1.1, Section 6. All splices in the backing ring shall be made by complete penetration welds. These welds shall be completed and inspected prior to final insertion into a steel shell end. Attachment of backing rings to steel shell ends shall be done using the minimum size and spacing of tack welds that will securely hold the backing ring in place. Tack welding shall be done in the root area of the weld splice. Cracked tack welds shall be removed and replaced prior to subsequent weld passes. The gap between the backing ring and the steel shell wall shall be no greater than 1/16-inch. One localized portion of the splice, that is equal to or less than a length that is 20% of the outside circumference of the steel shell, as determined by the Engineer, may be offset by a gap equal to or less than 1/4-inch provided that this localized portion is first seal welded using shielded metal arc E7016 or E7018 electrodes. The Contractor shall mark this localized portion so that it can be referenced during NDT. Backing rings shall have a minimum width of 1 1/2 times the thickness of the steel shell to be welded so that they will not interfere with the interpretation of the NDT.
4. For steel shells with an outside diameter greater than 42-inches and with a wall thickness greater than one inch, the root opening tolerances may be increased to a maximum of 3/16-inch over the specified tolerances.
5. Weld filler metal shall conform to the requirements shown in Table 4-1 of AWS D1.5 for the welding of ASTM Designation: A 709, Grade 50 steel, except that the qualification, pretest and verification test requirements need not be conducted provided that certified test reports are provided for the consumables to be used.
6. For field welding, including attaching backing ring and making repairs, the preheat and interpass temperature shall be in accordance with AWS D1.1, Section 3.5 "Minimum Preheat and Interpass Temperature Requirements," with Table 3.2, Category C; and the minimum preheat and interpass temperature shall be 150° F, regardless of the steel shell wall thickness or steel grade. In the event welding is disrupted, preheating to 150° F must occur before welding is resumed.
7. Welds shall not be water quenched. Welds shall be allowed to cool unassisted.
8. Splices made by field welding steel shells shall receive NDT as follows:

Radiographic testing (RT) shall be used for each field weld, including splices that are made onto a portion of the steel shell that has been installed and any repair made to a splice weld. Testing shall be done

at locations selected by the Engineer. The length of a splice weld, not including repairs, where RT is to be used, shall have a cumulative length that is equal to 25% of the steel shell outside circumference. The Engineer may select several locations on a given splice for RT. The top cover pass shall be ground smooth at the locations to be tested. The acceptance criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional RT shall be performed. The additional RT shall be made on both sides of the repair for a length equal to 10% of the length of the steel shell outside circumference. After the additional RT is performed, and if more repairs are required that have a cumulative length equal to or more than 10% of the length of the steel shell outside circumference, then the entire splice weld shall be radiographically tested.

At the option of the Contractor, ultrasonic testing may be substituted as the NDT method for splices made by field welding steel shells, as follows:

Ultrasonic testing (UT) shall be used for each field weld, including splices that are made onto a portion of the steel shell that has been installed and any repair made to a splice weld. Testing shall be done at locations selected by the Engineer. The length of a splice weld, not including repairs, where UT is to be used, shall have a cumulative length that is equal to 25% of the steel shell outside circumference. The Engineer may select several locations on a given splice for UT. The acceptance criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional UT shall be performed. The additional UT shall be made on both sides of the repair for a length equal to 10% of the length of the steel shell outside circumference. After the additional UT is performed, and if more repairs are required that have a cumulative length equal to or more than 10% of the length of the steel shell outside circumference, then the entire splice weld shall be ultrasonically tested.

9. For steel shells, the Engineer shall be allowed 48 hours to review the "Welding Report," specified in "Welding Quality Control" of these special provisions, and respond in writing after all the required items have been received. No field welded steel shells shall be installed, and no reinforcement in the piling shall be encased in concrete until the Engineer has approved the above requirements in writing. Should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.
10. At the Contractor's option, a steel shell may be re-tapped to prevent set-up; however, the field welded splice shall remain at least 3 feet above the work platform until that splice is approved in writing by the Engineer.

Personnel performing NDT will be required to verify their qualifications prior to performing nondestructive testing for effected steel piles by both written and practical exams. Information regarding these exams is available at the Transportation Laboratory.

DRIVING SYSTEM SUBMITTAL--Prior to installing driven steel shells for cast-in-drill-hole concrete piling and cast-in-steel-shell concrete piling, the Contractor shall provide a driving system submittal, including driveability analysis, in accordance with provisions in Section 5-1.02, “Plans and Working Drawings,” of the Standard Specifications. A driving system submittal is not required for 14-inch diameter steel pipe piles or permanent steel casings for micropiling. A submittal shall be made for each pile size and hammer size within 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	Piers Represented by Control Locations
28-0100	Pier 37	Piers 37, 38, and 49
	Pier 33	27and33
	Pier 47	Piers 46 and 47
	Pier 41	Piers 36, 41,42, and 48

The driving system submittal shall contain an analysis showing that the proposed driving systems will install the steel shells to the specified tip elevation or bottom of steel shell elevation for cast-in-drilled-hole concrete piling. Driving systems shall generate sufficient energy to drive the steel shells with stresses not more than 95 percent of the specified yield strength of the 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, any assumptions made regarding drilling through the center of open ended steel shells, and assumptions regarding pile set-up during welding and welding inspection operations at splices.
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.

   When the driveability analysis hammers indicate that steel shell penetration rates are less than 1.0 foot per 200 blows or the driving stresses will exceed 80% of the specified yield strength of the steel shell, the study shall include assumptions for drilling through the center of steel shells as specified elsewhere in these special provisions.
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 elsewhere 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 3 weeks 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 as specified 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 3 weeks to review each revised and each new driving system submittal after a complete set has been received, as determined by the Engineer.

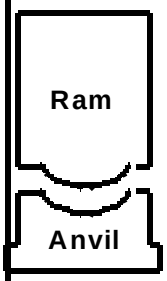
Approval of pile driving equipment shall not relieve the Contractor of his responsibility to drive piling free of damage to the specified penetration.

Full compensation for driving system submittals shall be considered as included in the contract price paid for piling of the types shown in the Engineer’s Estimate and no additional compensation will be allowed therefor.

CALIFORNIA DEPARTMENT OF TRANSPORTATION
OFFICE OF TRANSPORTATION LABORATORY

PILE AND DRIVING DATA FORM

Structure Name :_____ Contract No. :_____
_____ Project:_____
Structure No. :_____ Pile Driving Contractor or Subcontractor____
Dist./Co./Rte./P.M.:_____ _____
(Pile Driven By)



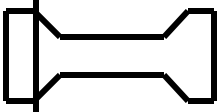
Hammer

Manufacturer:_____ Model:_____
Type:_____Serial No.:_____
Rated Energy:_____ at _____ Length of Stroke

Modifications: _____
_____
_____
_____
_____

Capblock (Hammer Cushion)

Material:_____
Thickness:_____ Area:_____
Modulus of Elasticity - E:_____ (P.S.I.)
Coefficient of Restitution - e:_____



Pile Cap

Helmet
Bonnet
Anvil Block
Drivehead

Weight:_____

Pile Cushion

Material:_____
Thickness:_____ Area: _____
Modulus of Elasticity - E:_____ (P.S.I.)
Coefficient of Restitution - e:_____

Pile

Pile Type:_____
Length (In Leads):_____
Weight/ft.:_____Taper:_____
Wall Thickness:_____
Cross Sectional Area:_____ sq.in.
Design Pile Capacity:_____ (Tons)
Description of Splice:_____
_____
Tip Treatment Description:_____
_____

DISTRIBUTION
One Copy Each To:

Translab Geotechnical Engineering
Translab Engineering Geology
Resident Engineer

Note: If mandrel is used to drive the pile, attach separate manufacturer's detail sheet(s) including weight and dimensions.

Submitted By:_____ Date:_____

Phone No.:_____

CAST-IN-PLACE CONCRETE PILING.--Cast-in-place concrete piling shall conform to the provisions in Section 49-4, "Cast-In-Place-Concrete Piling," of the Standard Specifications and these special provisions.

Cast-in-place concrete piling shall consist of cast-in-drilled-hole concrete piling and cast-in-steel-shell concrete piling. Cast-in-drilled-hole concrete piling shall consist of permanent steel shells driven to bedrock with drilled or cored bedrock sockets and reinforced concrete fill as shown on the plans. Cast-in-steel-shell concrete piling shall consist of driven open ended steel shells filled with concrete.

Attention is directed to “Fenders” elsewhere in these special provisions regarding embedment of fender piles in cast-in-place piling.

Materials.--Concrete filling for cast-in-place concrete piles is designated by compressive strength and shall have a minimum 28-day compressive strength of 4000 pounds per square inch.

Aggregate grading shall conform to the requirements of Section 90-3, “Aggregate Gradings,” and these special provisions. The combined aggregate grading for the concrete shall be the 1” Max. grading.

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. The grading requirements for the optional 1/2” maximum coarse aggregate or the 3/8” maximum coarse aggregate are shown in the following table:

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
3/4”	100	100		
1/2”	82 - 100	80 - 100	100	
3/8”	X ± 15	X ± 22	X ± 15	X ± 20
No. 4	0 - 15	0 - 18	0 – 25	0 ñ 28
No. 8	0 - 6	0 - 7	0 – 6	0 ñ 7

The gradation proposed by the Contractor for the optional 1/2” x No. 4 primary aggregate or for the 3/8” x No. 8 primary aggregate shall be within the following percentage passing limits:

Primary Aggregate Nominal Size	Sieve Size	Limits of Proposed Gradation
1/2” x No. 4	3/8”	40 ñ 78
3/8” x No. 8	3/8”	50 ñ 85

The combined aggregate grading for the 1/2” x No. 4 primary aggregate nominal size or for the 3/8” x No. 8 primary aggregate nominal size shall be within the following limits:

Grading Limits of Combined Aggregate		
	Percentage Passing	
Sieve Sizes	1/2” Maximum	3/8” Maximum
3/4-inch	100	100
1/2-inch	90 ñ 100	90 ñ 100
3/8-inch	55 ñ 86	55 ñ 86
No. 4	45 ñ 63	45 ñ 63
No. 8	35 ñ 49	35 ñ 49
No. 16	25 ñ 37	25 ñ 37
No. 30	15 ñ 25	15 ñ 25
No. 50	5 ñ 15	5 ñ 15
No. 100	1 ñ 8	1 ñ 8
No. 200	0 ñ 4	0 ñ 4

The optional 1/2” x No. 4 and 3/8” x No. 8 aggregate gradations may require special mixing to meet grading requirements and may not be commercially available in some locations.

The fourth paragraph in Section 49-4.01, "Description," of the Standard Specifications shall not apply.

Cast-in-place concrete piles 24 inches in diameter or larger shall be constructed so that the excavation methods and the concrete placement procedures shall provide for depositing concrete under synthetic slurry or water slurry as noted elsewhere in these special provisions.

The concrete filling for cast-in-place concrete piles shall be dense and homogeneous. The methods used to place the concrete shall prevent segregation. The nominal and maximum penetrations shown below shall be used in lieu of the penetrations listed in the table in Section 90-6.06, "Amount of Water and Penetration."

Cast-in-place Concrete Piles	Pile Size	Concrete Penetration, Inches (Note 1)		Concrete Vibration Required
		Nominal	Maximum	
Under Slurry	24" and larger in diameter	equal to or greater than 3 1/2	(Note 2)	(Note 3)

Note 1: Type F or Type G chemical admixtures may be required to achieve the specified penetration, while other admixtures such as Type B or Type D may be required for extended workability. When admixtures are used in accordance with the requirements in Section 90-4, "Admixtures," the penetration of the concrete will be measured after the admixture is added.

Note 2: Concrete shall be proportioned to prevent excessive bleed water and segregation.

Note 3: Concrete placed under slurry shall not be vibrated.

Section 51-1.10, "Concrete Deposited Under Water," shall not apply to cast-in-place concretepiling.

Concrete deposited under slurry shall contain not less than 658 pounds of cementitious material per cubic yard, of which not less than 15 percent shall be mineral admixture. Silica fume and anti-washout admixture are not required. The water-to-cementitious material ratio for concrete shall not exceed 0.50.

Construction.--The Contractor shall submit a placing plan to the Engineer for approval prior to producing the test batch for cast-in-place concrete piling and at least 2 weeks prior to constructing piling. The plan shall include complete description, details, and supporting calculations as listed below:

Requirements for all cast-in-place concrete piling:

1. Concrete mix design, certified test data, and trial batch reports.
2. Methods and equipment used for drilling and constructing bedrock sockets.
3. Methods and equipment for steel shell installation.
4. Placing, positioning and supporting bar reinforcement.
5. Methods and equipment for accurately determining the depth of concrete, including sounding methods for continuously monitoring the top of the concrete surface and for determining the embedment of the tip of the tremie during concrete placement, and the actual and theoretical volume placed.
6. Concrete batching, delivery, and placing systems with time schedules and capacities therefor.
7. Concrete placing rate calculations. When requested by the Engineer, calculations shall be based on the static head on the concrete and losses throughout the placing system, including anticipated head of slurry and concrete to be displaced.
8. Suppliers test reports on the physical and chemical properties of the slurry and any proposed slurry chemical additives including Material Safety Data Sheet.
9. Slurry testing equipment and procedures.
10. Removal and disposal of excavation, slurry, and contaminated concrete, including methods and rates of removal.
11. Slurry agitating, recirculating, and cleaning methods and equipment.

12. Support system for inspection pipes.

In addition to compressive strength requirements, the consistency and cohesiveness 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 a minimum of 4 cubic yards, batched and mixed with the same or similar equipment and procedures as planned for the permanent concrete piling. The test batch shall be produced and delivered to the job 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 accordance 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 the specified nominal penetration and a penetration of at least 2 inches after 10 hours. To achieve the specified penetration a Type B retarding admixture may be required. 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 accordance with Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," unless otherwise approved in writing by the Engineer.

Cleaning Out Steel Shells.--Care shall be taken during cleanout of the steel shells to prevent disturbing the material surrounding the shell. Equipment or methods used for cleanout shall not cause blow-ins, quick soil conditions, scouring, or caving around or below the tip of the steel shells. Air lifting shall not be used to clean out shells.

Cleanout shall be performed under a full head of slurry equal to the external seawater level, except cleanout below a level of 2 pile diameters above the position of the bottom of steel shell shall be carried out using a full head of synthetic slurry equal to the external seawater level.

The steel shells shall be free of any soil, rock, or other material deleterious to the bond between the steel shell and concrete prior to placing reinforcement and concrete.

Constructing Bedrock Sockets.--Care shall be taken during construction of the bedrock sockets to prevent disturbing the material surrounding the bottom of the steel shell. Equipment and methods used for constructing the bedrock socket shall not cause quick soil conditions, or cause scouring or caving around or below the bedrock socket. Bedrock sockets shall be constructed under a full head of synthetic slurry. The bedrock socket for cast-in-drilled hole concrete piling shall extend at least 30 feet below the bottom of the steel shell. If the Contractor, at the Contractor's option, elects to drive the steel shell below the elevation shown on the plans, the bottom of the bedrock socket shall be lowered so that the socket extends at least 30 feet below the bottom of the steel shell If the Contractor, at the Contractor's option, drives the steel shell below the bottom of steel shell elevation or drills the hole below the specified tip elevation, the Contractor shall extend the reinforcement and the inspection pipes to 4 inches clear of the bottom of the drilled hole.

Rock sockets shall be free of any soil, rock, or other material deleterious to the bond between the rock and concrete prior to placing reinforcement and concrete.

Placing Reinforcement.--Reinforcement shall be placed and secured symmetrically about the axis of the pile and shall be securely blocked to clear the sides of the steel shell and rock socket. If after placement of the reinforcement and prior to placing concrete caving occurs, or deteriorated foundation material accumulates on the bottom of the hole or drill cuttings settle out of the slurry, as determined by the Engineer, the reinforcement shall be removed and the bottom of the drilled hole recleaned.

Placing Concrete.--Concrete for cast-in-place concrete piling shall be deposited under slurry by means of the tremie method. Concrete placement shall commence within a period of 24 hours after the steel shells for cast-in-steel-shell concrete piling have been cleaned out, or after completing the construction of the bedrock sockets for cast-in-drilled-hole concrete piling in order to prevent deterioration of the surrounding foundation material.

During concrete placement the slurry level shall be maintained within one foot of the external sea level unless otherwise approved in writing by the Engineer.

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 8 hours between placing the first load of concrete and completion of placing the final load of concrete in the pile, unless otherwise approved in writing by the Engineer. The concrete shall be placed with concrete pumps and a gravity fed 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 a tremie tube or tubes with diameters not less than 10 inches. Concrete pumps may be used to charge suitably sized funnels or hoppers to facilitate the transfer of concrete to the gravity fed tremie. No more than one tube shall be supplied from a single funnel or hopper.

Concrete may be delivered to the tremie hopper by pump, conveyor, or other means that will provide a continuous flow of concrete. Concrete pumps, conveyors, or other delivery systems shall not discharge concrete directly into the delivery tubes or steel shells.

The delivery tube system shall consist of watertight tubes with gasketted joints and with sufficient rigidity to keep the ends always in the mass of concrete placed. Tremie tubes shall be marked to allow the distance from the surface of

the water to the mouth of the tremie to be determined. 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. Fully operational standby concrete delivery equipment, adequate to complete the work in the time specified, shall be provided at the site during concrete placement.

Spillage of concrete into the slurry during concrete placing operations shall not be allowed. Delivery tubes shall be capped at the end of the tube with a water tight cap, or plugged above the slurry level with a good quality, tight fitting, non-collapsing moving plug that will expel the slurry from the tube as it is charged with concrete. The cap or plug shall be designed to be released as the tube is charged. The 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 pile, and then the embedment of the tip shall be maintained at least ten feet below the top surface of the concrete. The Contractor shall continuously monitor the top of concrete during concrete placement. 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, the tube charged with concrete, and the operation restarted by pushing the capped tube a minimum of 5 feet (or to the bottom of the pile, which ever is less) into the concrete and then reinitiating the flow of concrete.

The concrete delivery tube system shall remain fixed horizontally while concrete is flowing.

Pile concrete shall be free of contamination from slurry or residual foundation material. It is anticipated that air lifting to remove concrete contaminated by slurry and residual foundation material will be required.

A log of the placing of the concrete in each cast-in-place concrete pile 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 steel shell, 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 pile 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.

Temporary steel casings may be furnished and placed tight in the bedrock socket where necessary to prevent 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. The concrete in the temporary casing shall be maintained at a level at least 5 feet above the bottom of the temporary casing. Temporary 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 temporary casings shall not leave voids or cause contamination of the concrete with soil, water, slurry or other materials, or cause segregation of the concrete.

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.

Inspection Pipes.--Vertical inspection pipes shall be provided in all cast-in-drilled hole 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.

Inspection pipes shall be Schedule 40 polyvinyl chloride pipe with an inside diameter of 2 inches and Schedule 40 black metal pipe with an inside diameter of 1 1/2 inches. Each inspection pipe shall be capped top and bottom and shall have watertight couplers to provide a clean, dry and unobstructed clear opening of 2 inches for polyvinyl chloride pipe and 1 1/2 inches for black metal pipe from at least 2 feet above the work platform down to the specified pile tip elevation. The elevation of the work platform shall be at least 3 feet above MHHW. It is anticipated that extension of the pile reinforcement, steel rods, templates, and bracing will be required to support the inspection pipes.

In addition to inspection pipes, provisions should be made for the lateral support of downhole seismic sensor casings through fender piles as shown on the plans.

Attention is directed to “Seismic Sensors” elsewhere in these special provisions for sensor and casing requirements.

Polyvinyl chloride inspection pipes shall be placed around the pile, inside the 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. Steel inspection pipes shall be placed around the pile, outside the spiral or hoop reinforcement, at a uniform spacing not exceeding 2 feet 9 inches measured along the circle passing through the center of inspection pipes. Steel inspection pipes may be tied to spiral or hoop reinforcement. Inspection pipes shall be installed in straight alignment and securely fastened in place to prevent misalignment during installation of the reinforcement and placing concrete in the hole. Polyvinyl chloride and steel inspection pipe layouts shall be staggered respectively.

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.

Within 2 hours of the completion of the concrete placement, water shall be placed and maintained in the inspection pipes until the testing is complete.

After placing concrete and before requesting structural adequacy tests, each polyvinyl chloride 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. Each black metal inspection pipe shall be checked prior to testing by passing a 1-inch diameter, 8-inch long rigid cylinder through the complete length of the pipe. The Contractor shall replace each polyvinyl inspection pipe that the cylinder does not pass through with a 2-inch diameter hole cored through the concrete for the entire length of the pile. Cored holes shall be located approximately 9 inches inside the reinforcement, and coring shall not damage the pile reinforcement.

Cored holes shall be made with a split tube type core barrel. 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 as to location and made available for inspection by the Engineer.

Structural adequacy tests of the concrete will be made by the Engineer, without cost to the Contractor. Tests will include gamma ray. Tests may also include cross-hole sonic logging and other means of inspection selected by the Engineer. After requesting structural adequacy tests, the Contractor shall allow 3 weeks for the Engineer to conduct these tests. 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.

If the Engineer determines that the concrete for a given pile is structurally inadequate, then that pile will be rejected and all depositing of concrete 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 review a mitigation plan for each rejected cast-in- drilled-hole concrete pile, and this plan shall conform to the requirements 5-1.02, “Plans and Working Drawings,” of the Standard Specifications. The mitigation plan shall be stamped and signed by an engineer who is licensed as a Civil Engineer by the State of California. The plan shall show the State assigned contract number, bridge number, full name of the structure as shown on the contract plans, District-County-Route-Post mile, the Contractor (and Subcontractor if applicable) name on each sheet. The plans shall show the location of the rejected pile.

The mitigation plan shall show complete details for repair of the rejected pile and include the following:

a. Methods and equipment for determining the extent of the structural inadequacy.
b. Methods and equipment for removal of unsound concrete and rejected materials.
c. Methods and equipment for preservation and restoration of native materials.
d. Construction sequence, methods and equipment, material delivery, concrete or grout mix design, placing system, and placing rates. For grout repair include minimum grout pressure and grout pressure hold time calculations.
e. List of materials and estimated quantities of the materials to be used for mitigation.
f. Means for preservation or restoration of inspection tube.
g. List of personnel who will perform each operation along with their qualifications.

When repairs are performed, the Contractor shall submit to the Engineer a report within 10 days of completion of the repair. This report shall include quantification of the extent of the structural inadequacy and state exactly what repair work was performed. This report shall be stamped and signed by and engineer that is licensed by the State of California. This plan shall show the State assigned contract number, bridge number, full name of the structure as shown on the contract plans, District-County-Route-Post mile, and the Contractor (and Subcontractor if applicable) name on each sheet.

No extension of time or compensation will be made for the submittal and review of a mitigation plan for rejected piling.

All inspection pipes and cored holes shall be dewatered and filled with grout after tests are completed. Grout shall conform to the requirements 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.

SLURRY.--Slurry shall be either synthetic slurry or water slurry, except when synthetic slurry is specifically required as noted elsewhere in these special provisions. Slurry shall conform to the requirements of these special provisions. Mineral slurry shall not be used.

Water used for mixing slurry shall conform to the requirements in Section 90-2.03, "Water," of the Standard Specifications and these special provisions. Natural ground water and seawater in the steel shellsmay be used for mixing slurry.

Slurry shall not weaken the bond between the concrete and both the reinforcement and the foundation material at the sides of the excavation.

Slurry 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 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.

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.

Synthetic Slurry.--Synthetic slurries shall be used in conformance with the manufacturer's recommendations and these special provisions. The following synthetic slurries may be used:

PRODUCT	MANUFACTURER
SlurryPro CDP	KB Technologies Ltd. Suite 216 735 Broad Street Chattanooga, TN 37402 (800) 525-5237
Super Mud	PDS Company 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.

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.

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, sea water may be used for mixing slurry, 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) - during drilling - 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, sea water may be used for mixing slurry, 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 Slurry.--At the option of the Contractor water may be used as slurry for cast-in-place concrete piling except when synthetic slurry is specifically required as noted elsewhere in these special provisions.Water slurry shall be tested for conformance to the requirements shown in the following table:

WATER SLURRY		
PROPERTY	REQUIREMENT	TEST
Density (pcf) - during drilling - 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.		

MICROPILING.-- Micropiling consisting of small diameter steel pipe reinforcement grouted in place shall conform to the design requirements and layout shown on the plans and these special provisions.

General.--Attention is directed to "Test Borings," elsewhere in these special provisions. The Contractor shall not fabricate steel pipe to finished length for performance test micropiles until test borings and micropile working drawings are approved by the Engineer.

Attention is directed to the Materials Information in the section entitled "Existing Highway Facilities," elsewhere in these special provisions, for existing pile driving records that shall be used to generate bedrock contours. The length of bedrock embedment that is shown on the plans is the minimum length required to overcome pile group effects. This minimum embedment shall not be reduced. The Contractor shall determine if additional length of bedrock embedment is required and shall furnish micropiling of sufficient length to meet the performance acceptance criteria specified herein. The Contractor shall provide a drilling method, and grouted hole diameter that will meet the specified performance acceptance criteria.

The Contractor shall provide equipment capable of drilling and advancing permanent steel casing through foundation material that may include existing timber piles.

Materials.—Permanent steel casing for micropiles shall conform to the details shown on the plans and the requirements found in "Steel Pipe Piling" elsewhere in these special provisions. Steel pipe reinforcement for micropiles shall conform to the details shown on the plans and the requirements found in "Steel Shells" elsewhere in these special provisions. Steel pipe reinforcement for micropiling shall conform to the requirements for API-5L Grade X52.

Material for shear rings shall conform to the requirements of ASTM Designation: A36. Shear rings shall be welded in conformance with AWS D1.1 and "Welding Quality Control," elsewhere in these special provisions.

Grout shall be designated by compressive strength and shall have a minimum 28-day compressive strength of 6,000 pounds per square inch when tested in conformance with ASTM Designation: C942. Grout shall consist of portland cement, water, mineral admixture, and silica fume. The water content of the grout shall not be more than 4 gallons per 94 pounds of cement.

The grout shall contain mineral admixture in an amount not less than 15 percent by weight of the amount of cement, mineral admixture, and silica fume required to satisfy the specified compressive strength.

The grout shall contain silica fume in an amount not less than 4 percent by weight of the amount of cement, mineral admixture, and silica fume required to satisfy the specified compressive strength.

The quality of the grout shall be determined by the Engineer in accordance with California Test 541. The efflux time of a grout sample immediately after mixing shall not be less than 15 seconds and not more than 35 seconds.

Type F or Type G chemical admixture shall be used to achieve the specified fluidity and to disperse the admixtures. When admixtures are used in accordance with the provisions of Section 90-4, "Admixtures," of the Standard Specifications and these special provisions, the quality of the grout will be measured after the admixture is added.

Working Drawings—The Contractor shall submit complete project specific working drawings for the micropile system to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. All working drawings for micropiling shall be 22" x 34" in size. For review and approval, 10 sets of drawings shall be submitted. Within 12 weeks after approval of the working drawings, one set of the corrected prints on 60 pound (minimum) good quality bond paper, 22" x 34" in size, prepared by the Contractor shall be furnished to the Office of Structure Design, Documents Unit, P.O. Box 942874, MS #9, Sacramento, CA 94274-0001 (1801 30th Street, Sacramento, CA 95816), Telephone (916) 227-8252.

Working drawings for micropiling shall show 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 on each drawing and calculation sheet. The pile vendor company name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

Working drawings for micropiles shall contain all information required for the construction and quality control of the piling, including the following:

1. Information on headroom and space requirements for installation equipment that verify that the proposed equipment can perform at the site.
2. Step-by-step procedure describing all aspects of pile installation including personnel, testing, and equipment to assure quality control. This step-by-step procedure shall be shown on the working drawings in sufficient detail so that the Engineer can monitor the construction and quality of these micropiles.
3. Details for coring and drilling plumb holes through the existing foundation bells and into bedrock along with the details for coring templates and staging platforms.
4. Details for temporary water tight conduits for conveying drill cuttings and slurries above the water surface.
5. Details of centralizers.
6. Grout mix designs.
7. Details and procedures involved in testing components, including grout.
8. Details and procedures for constructing load test frames, making frame connections, connections to existing foundations, connections to test pile extensions, and other related equipment and components.
9. Permanent steel casing and steel pipe reinforcement splice locations.
10. Details of equipment and operation for grouting and post grouting procedures. Details shall be included for monitoring grout quality, volume installed and pressure during installation.
11. Information on the minimum cure time and strength requirements of the pile system for test piles.
12. Required permanent steel casing and steel pipe reinforcement lengths, calculations substantiating required bedrock embedment lengths, and the bedrock contours at each pier.

After the test boring submittal is approved the Contractor shall finalize the required bedrock embedment lengths for the steel pipe reinforcement, and develop bedrock elevation contours at one foot intervals at each pier for the purpose of calculating the bedrock elevation that is expected to be encountered during construction of each micropile. The contours shall be developed from available data consisting of existing pile driving records and individually recorded existing pile tip elevations, the approximate bedrock elevations, and the approved test boring submittal. The Contractor shall finalize the permanent steel casing and steel pipe reinforcement fabrication lengths for each micropile.

The Contractor's fabrication lengths shall include an additional 5 feet of length beyond that required to meet the minimum embedment lengths shown on the plans or the lengths required to meet the specified performance acceptance criteria for micropiles specified elsewhere in these special provisions in order to allow an adjustment in length during micropile installation. For steel pipe reinforcement, the additional 5 feet of length shall be added to the bottom of the pipe and an additional 5 foot length of steel shear rings added beyond the required length shown on the plans.

The Contractor shall include the required bedrock embedment, permanent steel casing and steel pipe reinforcement length data, and the bedrock elevation contours in the working drawings details for micropiling prior to submitting the micropile working drawings to the Engineer for approval. The Contractor shall use a layout plan and numbering system that will allow the location of each micropile to be identified and referenced during micropile construction.

A supplement to the working drawings shall include the following:

Construction details, structural details, and load test results from at least three previous successful installations by the Contractor installing micropiles or rock embedded and grouted-in-place pipe piles under conditions similar to those required for this project. The installations shall be from three separate test sites.

The Contractor shall submit to the Engineer calculations, structural details, and construction details for the design of the load test frame and platform to be used for testing the micropiling at each pier where micropiling is to be installed. The test frame and access platform shall support at least 125 percent of the tension test load applied to the piles to be tested as shown on the plans. The vertical design load shall be adjusted for the weight of the test load

frame and access platform, construction equipment loads, and the additional loads to be imposed by the testing operations. The construction equipment loads shall be the actual weight of the construction equipment but in no case shall the access platforms be designed for less than 25 pounds per square foot of the platform deck area. The design of the load test frame and access platform will not be approved unless it is based on the use of allowable stresses which are no greater than those described in Section 51-1.06A(2), "Design Stresses, Loadings, and Deflections," of the Standard Specifications. The elevation of the access platform shall be at least 3 feet above MHHW.

The Contractor shall provide the hydraulic jack(s) and jacking system equipment to provide the uplift force for the load test system. In supplement to the working drawings, the Contractor shall include the make, model, and specifications of the hydraulic jacking system. The hydraulic jack(s) shall conform to ANSI B30.1, and shall be calibrated with the pump in accordance with ASTM D-3689-90 such that it can be used as a secondary load measurement device.

Pile load testing equipment and procedures shall be in general conformance with ASTM D-3689-90. The load test setup to be used shall be as described in section 4.3, "Load Applied to Pile by Hydraulic Jack(s) Acting Between Supported Test Beam(s) and a Reaction Frame Anchored to the Pile," of ASTM D-3689-90.

The wire line to attach to the extensometer shall be a multi-strand, stainless steel wire rope with a 1/16-inch maximum diameter and a minimum 200 pound breaking strength. The top end of the wire rope shall be completed with an oval sleeve fitting. Provisions shall be provided for attaching the wire temporarily to the top of the steel pipe reinforcement as shown on the plans.

The Contractor may use the existing structure as part of the load test frame and platform support. Any use of the existing structure for support and the loads imposed shall be shown on the test frame and access platform drawings. The Contractor shall verify by calculation the adequacy of the existing foundation for loads imposed by the proposed load test frames and platforms.

The design calculations shall show a summary of computed stresses in the existing foundation, load test frame and access platform, and the connections between the load test frame and access platform and existing structure. The design calculations shall include the effects of the load test jacks and test loading equipment. The design calculations shall include a lateral stiffness assessment and shall verify that the piling and proposed test loading equipment have sufficient lateral support for stability to withstand the imposed test loads.

The working drawings and supplement shall be stamped and signed by an engineer who is licensed as a Civil Engineer in the State of California. The Engineer will notify the Contractor in writing when the submitted working drawings and supplement have been determined to be complete. The Contractor shall allow the Engineer 6 weeks to review the working drawing submittal after a complete set has been received.

No micropile shall be installed until the Engineer has approved, in writing, the working drawing submittal for micropiling.

Should the Engineer fail to review the complete working drawing 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 working drawing submittal, an extension of time commensurate with the delay in completion of the work thus caused will be granted in accordance with Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Construction—It is anticipated that cleaning of the existing foundation bells will be required prior to installing templates for coring operations.

Steel casings around the existing foundation bells shall be installed and grouted as shown on the plans prior to starting coring operations. Attention is directed to "Steel Casings," elsewhere in these special provisions.

Prior to coring and grooving the cored holes, as shown on the plans, the Contractor shall demonstrate the adequacy of his grooving operation by grooving at least 1 test specimen in the presence of the Engineer. The test specimen shall have minimum dimensions of 3 feet by 3 feet by 3 feet. Concrete for constructing the test specimen shall have a minimum 28-day compressive strength of 4000 pounds per square inch. The concrete test specimen shall conform to the provisions in "Concrete Structures" elsewhere in these special provisions. The specimen shall be constructed with a vertical 14-inch diameter formed hole centered in the specimen. The Contractor shall groove the cored hole using the same equipment, materials, and procedures proposed for production grooving. Grooving shall conform to the details shown on the plans. The location where the test specimen is to be cast and grooved will be designated by the Engineer. Test specimens 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.

Full compensation for test specimens, grooving and disposal of test specimens shall be considered as included in the contract unit price paid for micropiling and no additional compensation will be made therefor.

Prior to coring, the Contractor shall design and install a temporary template over the conical section of the existing foundation bell to accurately locate and align the coring equipment, to create a level surface for starting coring operations, and for securing temporary watertight casings or conduits to convey excavated materials, drill cuttings, slurries, and grouts above the water surface for disposal. Coring of existing foundation bells shall conform to the

provisions in “Core Concrete,” elsewhere in these special provisions. Cores shall be made available for inspection by the Engineer. The temporary template shall be removed after the installation of the micropiling at a pier is complete.

The holes through the existing foundation bell shall be cored to no more than the maximum diameter of the size shown on the plans, and by methods that will not shatter or damage the concrete adjacent to the holes.

If an existing steel H-pile is encountered during foundation bell coring operations, or if an existing steel H-pile prevents the completion of a cored hole or the subsequent advancement of the permanent steel casing, the Contractor shall immediately notify the Engineer in writing.

After coring holes through the existing foundation bells, the perimeter of the cored holes shall be grooved as shown on the plans.

Permanent steel casings shall be advanced to bedrock through the grooved cored holes. Vibratory hammers shall not be used to advance the permanent steel casings. Permanent steel casings may require firm seating into the bedrock to prevent the loss of grout into the foundation material during grouting. Permanent steel casings shall extend to three feet above the water surface to prevent contaminating the surface of the grooved cored holes by excavated foundation materials and drill cuttings.

If an existing falsework timber pile is encountered during installation of the permanent steel casing, the Contractor shall immediately notify the Engineer in writing. Any additional effort required to drill and advance permanent steel casing through foundation material containing an existing falsework timber pile will be paid for as extra work, as provided for in Section 4-1.03D of the Standard Specifications.

When required, permanent steel casings shall be embedded into bedrock as shown on the plans. Permanent steel casings shall be advanced into the bedrock layer using steel casing cutting shoes, casing rotation, and internal rotary drilling methods. Percussion drilling methods to advance permanent steel casings into bedrock shall not be used. Drill cuttings shall be removed from the interior of the casing. Flushing drill cuttings or other material on the outside of the permanent steel casing will not be allowed. The maximum outside diameter of steel casing cutting shoes, inclusive of the cutting teeth, shall not be more than 1/2-inch larger than the outside diameter of the permanent steel casing. Internal drilling, for the purpose of advancing permanent steel casings, shall not performed beyond the tip of the casings at anytime. The Contractor shall be responsible for furnishing and fabricating permanent steel casings which meet the required tolerance limitations of the casing rotation and drilling methods, and equipment used by the Contractor.

Drilling to advance permanent steel casings and clean out of the permanent steel casings shall be performed under a full head of slurry equal to the external seawater level, except drilling and clean out below a level of two pile diameters above the position of the bottom of permanent steel casing shall be carried out using a full head of synthetic slurry equal to the external seawater level. Bedrock sockets shall be constructed under a full head of synthetic slurry. Slurry for drilling, clean out, and coring foundation material and for placing micropile grout shall conform to the requirements of “Slurry” elsewhere in these special provisions.

To construct the rock sockets shown on the plans, an over-reaming tool may be required. Temporary support of the permanent steel casing may be required.

Foreign material dislodged or drawn into the hole during construction of the micropiles shall be removed. All loose material existing at the bottom of the hole after drilling operations are complete shall be removed prior to installing steel pipe and placing grout.

Prior to cutting off the permanent steel casing, as shown on the plans, the Contractor shall verify micropile clearances in the bedrock socket in the presence of the Engineer by passing an 10.5 inch diameter rigid cylinder 2 feet long through the complete length of the micropile. Should the cylinder be unable to pass freely through the hole during testing, the Contractor shall enlarge the bedrock socket by over-reaming. All debris shall be removed from the entire length of the micropile. The Contractor shall also demonstrate that proposed methods for cutting permanent steel casing will not damage the adjacent structure.

Steel pipe reinforcement shall be clean and free of oil, grease, dirt, or other extraneous material, and shall be installed using centralizers to maintain a uniform clearance between the steel pipe reinforcement and the permanent steel casing, foundation bell, cored holes, and bedrock socket.

Steel pipe reinforcement that is longer than required as a result of bedrock being above, or less than 5 feet below, the calculated bedrock elevation shall be cut off to the required length. If more than 5 feet of pipe reinforcement requires removal, The Contractor shall add additional steel shear rings to satisfy the length requirement shown on the plans. No additional compensation or time extension will be considered by the Engineer for cutting steel pipe reinforcement to length. Welding additional steel shear will be paid for as extra work, as provided for in Section 4-1.03D of the Standard Specification.

Steel pipe reinforcement and permanent steel casings that are shorter than required as a result of bedrock being more than 5 feet below the calculated bedrock elevation shall be extended by splicing on additional lengths of casing and pipe reinforcement, and adding additional steel shear rings. Splicing additional lengths of permanent steel casing and steel pipe reinforcement and adding shear rings will be paid for as extra work, as provided for in Section 4-1.03D of the Standard Specifications.

Should splicing be necessary due to bedrock elevations being lower than calculated (as shown on the approved working drawings), the Contractor shall immediately notify the Engineer in writing.

Drilling operations during micropile installation shall be conducted under the site supervision of a Geologist or Civil Engineer who is registered in the State of California and has at least five years of geotechnical engineering experience in deep foundations in both soil and rock. Micropile drilling operation logs, stamped and signed by the Contractor's Geologist or Civil Engineer shall be submitted to the Engineer for review at the completion of drilling each micropile rock embedment hole. The micropile drilling operation logs shall include the elevation at which bedrock was encountered and the required length adjustments, if any, for the permanent steel casings or steel pipe reinforcement. The drilling logs shall substantiate the recorded bedrock elevations by tabulated drilling rates, and by a classification of the drill cuttings before and after rock is encountered. The drilling logs shall use the same plan layout and micropile location numbering system that was used on the approved micropile working drawings.

After permanent steel casing is cut-off, a seal shall be installed as shown on the plans between the top of the permanent steel casing and cored hole in the existing foundation bell to prevent grout leakage during the grouting operations.

Micropiles to be tested shall have provisions for attaching testing equipment within a 2-foot-long region one and a half feet above the work platform.

A positive means of support shall be provided for maintaining the position of the permanent steel casing and steel pipe reinforcement until the grout has set.

The interior of the steel pipe reinforcement may be pre-grouted with pre-grout and post-grout tubes in place, provided that no gaps in the grout column occur at steel pipe reinforcement splices. Grout within the steel pipe reinforcement shall be dense, homogeneous, and continuous for the full length of the micropile.

Micropile Grouting.--Grouting shall conform to the provisions of Section 50-1.09, "Bonding and Grouting," of the Standard Specifications and these special provisions. The Contractor shall submit a grouting plan to the Engineer for approval at least 3 weeks prior to grouting the performance test micropile. The plans shall include complete descriptions, details, and supporting calculations for the following:

1. Grout mix design and type of materials used in the grout including certified test data and trial batch reports.
2. Grouting equipment, including capacity and relation to the grouting demand and working conditions as well as provisions for back-up equipment and spare parts.
3. Types and sizes of grout hoses, connections, and grout delivery systems.
4. Methods and equipment for placing, positioning, and supporting the steel pipe reinforcement.
5. Methods and equipment for accurately determining the depth of the grout and the volume of grout to be placed.
6. Procedures and schedules for grout batching, mixing, and pumping including provisions for handling slurry and for post grouting.
7. Grouting rate calculations The calculations shall be based on the initial pump pressures or static head on the grout and losses throughout the placing system, including anticipated head of slurry to be displaced.
8. Contingency procedures for handling blockage of ducts or equipment breakdowns.
9. Estimated curing time for grout to achieve specified strength.

Grouting equipment shall be sufficient for completion of grouting of each pile in one continuous operation at the required rate. The grouting equipment shall be capable of producing uniformly mixed grout with adequate fluidity.

The maximum grouting rate for micropiling shall not exceed 10 feet per minute.

Post-grouting tubes shall be installed with grouting ports at maximum five foot intervals within the length of the bedrock sockets.

The first stage grout for the micropiles shall be grouted to the elevation shown on the plans. The zone above the first stage grout zone shall be free of grout at the completion of the first stage grouting operation. After drilling bedrock sockets, first stage grouting shall take place in a continuous and expeditious manner in order to prevent deterioration of

the surrounding foundation material. After proof testing operations at a pier are completed, the annular space above the first stage grout zone shall be flushed clean with water and the remainder of the micropile grouted.

Micropile Testing.--The Contractor shall incorporate provisions for State-furnished load cells and other State-furnished load testing apparatus into the design of the load test frame.

Performance of micropile testing as shown on the plans and as specified in these special provisions will be determined by the Engineer. The tension loading tests will be made when the grout in the micropiles has developed the compressive strength shown on the plans.

The State will furnish the load cell for primary measurement of load, and the displacement transducers. The Contractor shall furnish labor and all other materials, tools, equipment, and incidentals as required to assist in the testing of the micropiles, including load test frames and platforms, jacks, wire lines, bearing plates, drills, and other test equipment.

The Contractor shall notify the Engineer in writing not less than one week in advance of installing the micropiles to be load tested.

The Contractor shall notify the Engineer in writing when the load test frame is complete in place and the grout has achieved the specified compressive strength. After written notification the Engineer will require not more than one week per each load test location to perform testing.

The Engineer will require not more than 2 weeks to review micropile performance test data and not more than 4 working days to review micropile proof test data for each load test location.

Should the Engineer fail to complete the micropile load tests and review the test results within these 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, an extension of time commensurate with the delay in completion of the work thus caused will be granted as provided in Section 8-1.09, "Right of Way Delays."

Performance And Proof Testing--Performance and proof load testing of micropiles shall conform to the requirements of these special provisions and the following:

The Engineer will conduct performance micropile tests consisting of tension load testing and proof micropile tests consisting of tension load testing. Performance tests will be used to evaluate the micropile tensile capacity and approximate the compressive capacity. No compression testing of micropiles will be required. The Engineer may exceed the tension test loads shown on the plans. Proof tests will be used to ensure that the Contractor installs production micropiling with at least the same quality and methods that were used to install the performance test micropiles.

Performance test micropiles shall be installed with the same type of equipment that is to be used for installation of production micropiles.

If a performance test micropile fails to meet the specified acceptance criteria for testing, that pile will be rejected, and a replacement performance test micropile shall be constructed for re-testing at a location approved by the Engineer.

The Contractor shall allow the Engineer 3 weeks to complete performance micropile load tests at each control location. The Engineer may revise the required pipe embedment length –based on performance test results. Performance test results shall be approved by the Engineer prior to fabricating the steel pipe reinforcement to finished lengths for installing production piling and performing proof testing within the corresponding control locations as shown on the plans.

The acceptance criteria for performance tension load testing of micropiles is as follows:

The micropile shall achieve and sustain for 5 minutes the first tension performance test load applied which is equal to 120 percent of the tension test load shown on the plans with no more than the tabulated allowable maximum total vertical movement monitored at the location on the pile as shown on the plans.

Performance test micropiles 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."

The Engineer will conduct proof tests after the first micropile has been installed at a given pier. The Contractor shall not commence drilling of bedrock sockets at the remaining micropiles until the Engineer has approved the proof test of the first micropile. One additional micropile at a given pier will be randomly selected by the Engineer and proof tested. The Contractor shall not commence second stage grouting operations until all proof testing has been completed at a given pier.

The acceptance criterion for proof tension load testing of micropiles is as follows:

The pile shall sustain the first tension test load applied which is equal to the tension test load shown on the plans with no more than the tabulated allowable maximum total vertical movement monitored at the location on the pile as shown on the plans.

If a production micropile that is proof tested fails to meet the specified acceptance criterion, then that pile will be rejected, and one additional micropile will be randomly selected for testing. If the subsequent pile tested fails to meet the acceptance criteria, then that pile will also be rejected and all the other micropiles in that same pier will be tested.

When additional performance or proof load tests are required due to the failure of a micropile to achieve the specified acceptance criterion, the Contractor shall pay to the State $5,000.00 for each said additional load test performed.

Unless post-grouting procedures are implemented so that the micropile meets the acceptance criterion after retesting, rejected production micropiling shall be mitigated by repair measures, removal and replacement, or, when approved by the Engineer, the addition of a new micropile at the same pier. The Contractor shall submit to the Engineer for review a mitigation plan for each rejected micropile, and this plan shall conform to the requirements in "Working Drawings," for micropiling as well as the following:

1. The mitigation plan shall be stamped and signed by the same engineer that signed the initial micropile working drawings.
2. The plans shall show the location of the rejected pile.
3. The mitigation plan shall show complete structural details and calculations for the repair, removal and replacement, or the addition of a new micropile. The details and calculations shall include analysis of the entire support: pile cap dimensions, pile cap reinforcement, pile anchorage, pile group effects, changes to the overall pile support stiffness. Calculations shall include geotechnical assessment of the additional new micropile as a single element and also the entire support as a composite element. These structural details and calculations shall be independently checked, stamped and signed by a second engineer who is licensed as a Civil Engineer by the State of California.

All specifications for micropiling shall apply to the repair, removal and replacement, and addition of new micropiling.

No extension of time or additional compensation will be made for submittal and review of a mitigation plan for rejected micropiling.

MEASUREMENT AND PAYMENT.--Measurement and payment for the various types and classes of piles in this section "Piling" shall conform to the provisions in Sections 49-6.01, "Measurement," and 49-6.02, "Payment," of the Standard Specifications and these special provisions.

Cast-in-place concrete piling will be paid for as provided in Section 49-6.02, "Payment," of the Standard Specifications except that, when the diameter of cast-in-place concrete piling is shown on the plans as 24-inch or larger, reinforcement in such piling will be paid for as bar reinforcing steel (bridge).

Full compensation for furnishing and installing steel shells, jetting and drilling to assist installation of steel shells, other work necessary to obtain the required steel shell penetration, cleaning out steel shells; for disposal of material resulting from pile installation; for furnishing and using temporary casing; for drilling or coring bedrock; for drilling oversize bedrock sockets, filling cave-ins and oversize bedrock sockets with concrete, and redrilling through concrete; for slurry, depositing concrete under slurry, and test batches; inspection pipes, filling inspection holes and pipes with water and then with grout; and seismic sensor casings shall be considered as included in the contract prices paid per linear foot for the type of cast-in-place concrete piling of the sizes listed in the Engineer's Estimate and no additional compensation wil be allowed therefor.

When at the Contractor's option, the Contractor installs a steel shell to depths below the bottom of steel shell elevation shown on the plans, no additionsl compensation will be made for furnishing and installing additional steel shell length, bar reinforcement, concrete, and inspection pipes.

No additional compensation will be made for cast-in-drilled-hole concrete pile length that is constructed below the specified pile tip elevation.

Full compensation for jetting, drilling or other work necessary to obtain the required steel shell penetration; for cleaning out steel shells; for disposal of materials resulting from pile installation; and for slurry, depositing concrete under slurry, and test batches; shall be considered as included in the contract prices paid per linear foot for furnishing steel shells for cast-in-steel shell piling of the types and sizes listed in the Engineer's Estimate and no additional compensation will be allowed therefor.

No additional compensation will be made for steel shells used in cast-in-steel shell concrete piling which are substituted, at the Contractor's option, for the steel shells shown on the plans.

Driven piling or steel shells which are substituted, at the Contractor's option, for the piling or steel shells shown on the plans will be measured and paid for as furnish piling and drive pile of the type shown in the Engineer's Estimate.Full

compensation for furnishing and installing the pile cap leveling plate assemblies, including elastomeric bearing pads and shims shall be considered as included in the contract price paid per linear foot for furnish piling, and no additional compensation will be allowed therefor.

Full compensation for locating existing radially battered piles and for making adjustments to the installation of the steel shells and 14-inch diameter steel pipe piles to avoid conflict with the existing piles shall be considered as included in the contract prices paid for the types and sizes of piling involved, and no additional compensation will be allowed therefor.

Micropiles will be measured and paid for by the unit.

Performance test micropiling will be paid for by the unit as micropile.

The contract unit price paid for micropiling shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the micropiles, including permanent steel casings, seals, grout, reinforcement, cutting tips, drill bits, pile anchorage, and disposing of materials resulting from pile installation, 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 Contractor shall furnish labor, materials, tools, equipment, and incidentals as required to assist the Engineer in the installation, operation and removal of State-furnished test equipment. Full compensation for said work and materials shall be considered as included in the contract unit price paid for micropiling shown on the plans and in the Engineer's Estimate and no additional compensation will be allowed therefor.

Full compensation for constructing load test frames and access platforms and furnishing all labor, materials, tools, equipment, and incidentals, including test jacks, wire lines, and bearing plates at pile load test sites, maintaining the load test frames and access platforms at the test site, for providing waterborne transport for test personnel and equipment to gain access to the load test frames and access platforms, and for completely restoring test sites shall be considered as included in the contract unit price paid for micropiling and no additional compensation will be allowed therefor.

No payment will be made for micropiles that are proof tested and fail to meet any of the specified testing requirements. No payment will be made for micropiles installed out of place, for imperfect micropiles, or for damaged micropiles.

No payment will be made for additional concrete coring, concrete, reinforcement, or any other costs resulting from replacing rejected micropiles or for placing additional micropiling in piers and/or footings with piles that failed to meet the specified testing requirements.

Full compensation for all post grouting procedures shall be considered as included in the contract unit price paid for micropiling and no additional compensation will be allowed therefor.

Full compensation for conforming to all of the requirements of “Steel Pipe Piling” and “Steel Shells” elsewhere in these special provisions shall be considered as included in the contract prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

If a portion or all of the steel shells, pipe reinforcement, 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 piling of the types shown in the Engineer's Estimate and that have steel shell, pipe reinforcement, or steel pipe piling components will be reduced $5,000 for each manufacture or fabrication site located more than 300 air line miles from both Sacramento and Los Angeles and an additional $3,000 ($8,000 total) for each manufacture or fabrication site located more than 3,000 air line miles from both Sacramento and Los Angeles.

10-1A.09 FENDER PILING

Fender piling shall consist of furnishing and driving steel pipe piling for the fender retrofit in accordance with the details shown on the plans and shall conform to the provisions in Section 49, “Piling,” of the Standard Specifications, and these special provisions.

Steel pipe piles shall have diameters and wall thicknesses as shown on the plans. Steel pipe piles shall conform to the specifications of ASTM Designation: A252, Grade 3.

Steel pipe piling shall conform to the following requirements:

1. The carbon equivalency (CE) as defined in AWS D 1.1, Section XI5.1, shall not exceed 0.45.
2. The sulfur content shall not exceed 0.05 percent.

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.

The Contractor shall be responsible for any requirements that are in addition to ASTM 252 specifications (including tolerances for maintaining diameter, circumference, roundness, and cross-sectional area) that are required in order to conform with welding requirements for manufacturing, fabricating and splicing.

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.

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. Steel pipe pile splices that are made at a permanent manufacture or fabrication facility, and that are made prior to furnishing the Certificate of Compliance shall be complete penetration welds. Steel pipe pile splices that are made in the field shall be complete joint penetration groove welds.

Ends of steel pipe piling to be spliced that have been damaged during driving shall be removed to a sound and uniform section conforming to the tolerances for diameter, edge alignment and roundness required to meet the steel pile splice welding requirements. Pipe ends shall be field cut using automated guided cutting equipment. Manual flame cutting shall not be used.

Material for external shear rings, leveling plates, inserts, and shim plates for steel pipe piles shall conform to the requirements of ASTM Designation: A36. Shear rings shall be welded in conformance with AWS D1.1.

Attention is directed to “Welding Quality Control,” elsewhere in these special provisions.

Epoxy coated bar reinforcing steel for the steel pipe piles will not be required.

The piles, pile anchorage at piers 33, 36, 46, and 49, and pile base plates devices for the fender retrofit shall be painted with flame sprayed plastic as shown on the plans and in accordance with Section 10-1A.27, “Steel Casings,” elsewhere in these special provisions.

Coated piling, piling anchorage devices and piling base plates shall be protected from damage. Bare metal slings or chokers shall not be used. Procedures which cause damage to the coating will not be permitted. Should damage to the coating occur, as determined by the Engineer, it shall be repaired at the Contractor’s expense.

Bearing and penetration of the piles shall conform to the provisions in Section 49-1.08 of the Standard Specifications.

At the Contractor’s option the pile tip detail shown on the plans may be modified for driving through areas of existing rock backfill, armor rock and other large rock at the piers.

The Contractor shall identify areas of existing rock backfill, armor rock and other large rock by consulting the as-built plans of the following contracts included as "Materials Information":

1003	Substructure
1020	Pier Backfill
1034	Rock Backfill at Piers
01056	Pier Scour Repair
002434	Pier Rock Backfill Repairs

The above as-built plans are available for inspection at the Toll Bridge Program Duty Senior, Caltrans District 4, 111 Grand Avenue, Oakland, CA 94612, telephone (510) 286-5549, fax (510) 286-4563. Attention is also directed to the table, "Material Classification" in the section, "Dredging" of these special provisions.

Jetting of piles will not be permitted.

Installing steel pile extensions for fender support shall consist of placing steel pipe piling at the CIDH and CISS piles at Piers 33, 36 and 46 through 49 and shall conform to the provisions in Section 49, “Piling,” of the Standard Specifications except as otherwise noted on the plans and indicated in these special provisions.

Voids between pile extensions and inside of socket shall be filled with a one component polyurethane sealant. Polyurethane sealant shall be of commercial quality and suitable for the use intended. No polyurethane sealant shall be used without the prior written consent of the Engineer.

Install 12-inch diameter XS steel sensor pile extensions shall consist of installing one 12-inch diameter XS steel pile extension at a CISS pile at Pier 48, in accordance with the details shown on the plans, and shall conform to the provisions in Section 49, “Piling,” of the Standard Specifications except as otherwise noted on the plans and specified in these special provisions.

Voids between sensor pile extensions and inside of socket shall be filled with a one component polyurethane sealant. Polyurethane sealant shall be of commercial quality and suitable for the use intended. No polyurethane sealant shall be used without the prior written consent of the Engineer.

MEASUREMENT AND PAYMENT.--Measurement and payment for the various types and sizes of piles in this section, "Fender Piling" shall conform to the provisions in Sections 49-6.01, "Measurement," and 49-6.02, "Payment," of the Standard Specifications and these special provisions.

Full compensation for furnishing and installing piling appurtenances including anchorage devices, pile anchorage cables and related hardware, base plates, bar reinforcing steel, and for furnishing the concrete to fill the piles shall be considered as included in the contract price paid per lineal foot for the sizes of piles shown in the Engineer's Estimate, and no additional compensation will be allowed therefor.

Full compensation for furnishing and applying the protective coating to the piling, piling anchorage devices and piling base plates shall be considered as included in the contract prices paid per lineal foot for furnish 12-inch, 14-inch and 16-inch steel piling and no separate payment will be made therefore.

Full compensation for furnishing and installing necessary templates and guides for placing the steel pipe piles at the CIDH and CISS piles, supporting the piles during construction, making cutoffs of the piles as required, furnishing and installing one component polyurethane sealant, and placing the concrete within the piles shall be considered as included in the contract price paid for install steel pie extensions and no separate payment will be made therefore.

Full compensation for furnishing and installing necessary templates and guides for placing the steel pipe pile extensions at the CIDH and CISS seismic piles, supporting the piles during construction, making cutoffs of the piles as required, furnishing and installing one component polyurethane sealant, and placing the concrete within the piles shall be considered as included in the contract price paid for install steel pile extensions for seismic sensors and no separate payment will be made therefore.

If a portion or all of the steel shells, pipe reinforcement, 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 piling of the types shown in the Engineer's Estimate and that have steel shell, pipe reinforcement, or steel pipe piling components will be reduced $5,000 for each manufacture or fabrication site located more than 300 air line miles from both Sacramento and Los Angeles and an additional $3,000 ($8,000 total) for each manufacture or fabrication site located more than 3,000 air line miles from both Sacramento and Los Angeles.

10-1A.10 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 Office of Structure Design, Documents Unit, P.O. Box 942874, Sacramento, California 94274-0001 (1801 30th Street, Sacramento, CA 95816), telephone (916) 227-8230, 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 such 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 the said Office 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 60 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.

All new metal surfaces of high strength bars and anchorages for prestressing shall be cleaned and painted in accordance with the provisions in Sections 59-2, "Painting Structural Steel," and 91, "Paint," of the Standard Specifications and the following:

> The surfaces to be cleaned and painted shall be dry blast cleaned in accordance with the provisions of Surface Preparation 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 not less than 1.5 mils as measured in accordance with ASTM Designation: D 4417.

All blast cleaned surfaces shall receive a single undercoat consisting of a waterborne inorganic zinc coating conforming to the provisions of AASHTO Designation M 300, Type II, except that the first 3 sentences of Section 4.7, "Primer Field Performance Requirement," and the entire Section 4.7.1 of the AASHTO Specification shall not apply. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory, (916) 227-7000.

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to the provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

Inorganic zinc coating shall not be applied with 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 inorganic zinc coating shall be not less than 4 mils nor more than 8 mils.

All areas where mudcracking occurs in the inorganic zinc coating shall be blast cleaned and repainted with inorganic zinc coating to the specified thickness.

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 for determining the jacking stress, 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. The pressure gages shall be fully functional and have accurately reading dials at least 6 inches in diameter. Each jack with gages 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 by means of which the prestressing force in the tendon may be determined. 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 permanently anchored at 25 percent or more of the specified minimum ultimate tensile strength of the prestressing steel shall be calibrated at 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;
2) calibrating the gages mechanically with a dead weight tester or other approved means prior to calibration of the jacking equipment by the Transportation Laboratory,
3) providing sufficient labor, equipment, and material to install and support the jacking equipment and calibration equipment at the Transportation Laboratory and to remove the equipment after the calibration is complete, and;
4) plotting the calibration results.

Each jack used to stress tendons 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.

High strength bars shall be anchored in bonded zones during stressing operations as shown on the plans. The Contractor is responsible for providing an anchorage system capable of developing the stressing loads within the bonded zone. At the Contractor’s option, mechanical anchors or additional bond length may be employed to achieve anchorage of the high strength bars. High strength bars shall be jacked to the proof loads shown on the plans.

High-strength bar and anchorage cover concrete will be measured and paid for as Structural Concrete, Bridge.

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 work involved in furnishing, painting, placing, and tensioning the prestressing steel in cast-in-place concrete structures, and existing pier shafts (except for anchorage of pinned base assemblies), complete in place, including prestressed bar anchorage assemblies as shown on the plans as specified in the Standard Specifications and these special provisions and as directed by the Engineer.

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, and no additional compensation will be allowed therefor.

10-1A.11 CONCRETE STRUCTURES

Portland cement concrete structures shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Attention is directed to Sections entitled “Environmental Work Restrictions” and “Relations With U.S. Coast Guard” of these special provisions concerning various types of work restrictions related to environmental issues and aid to navigation and waterways on this project.

Shotcrete shall not be used as a alternative construction method for reinforced concrete members unless otherwise specified.

The first sentence of the tenth paragraph in Section 51-1.05, “Forms,” of the Standard Specifications is amended to read:

> 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 such plywood.

The second paragraph in Section 51-1.22, "Measurement," of the Standards Specifications is amended to read:

> 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 of said 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.

CONCRETE FENDERS.--Structural concrete, fender shall consist of constructing the cast-in-place fender ring beam at Piers 33,36, 46 and 49, and new cast-in-place portions of the existing fender ring beam at Piers 34, 35, 47 and 48.

Concrete shall have a 28-day compressive strength of 4,000 pounds per square inch or greater.

The water/cement ratio shall not exceed 0.50.

Mortar specified at the pile anchorage devices at Piers 33, 36, 46 and 49 shall have a 28-day compressive strength of 4,000 pounds per square inch or greater.

New exterior surfaces of the cast-in-place ring beams, precast bracket and waler units, and precast and cast-in-place bumper seats shall be coated with at least two coats of polyurea as indicated in “Concrete Coatings” in Section 10-1.25, “Precast Concrete Jacket Assembly” of these special provisions.

Prestressing rods for attaching the precast units shall conform to the specifications of ASTM Designation: A 722, Type 1; anchor plates shall conform to the specifications of ASTM Designation: A514, and nuts shall conform to the specifications of ASTM Designation: A 325. All components of the prestressing system shall be galvanized in accordance with the provisions in Section 75-1.05, “Galvanizing,” of the Standard Specifications.

Cracks in cast-in-place bumper seats shall be cleaned and filled so that all portions of the crack which are wider that 0.005-inch are completely filled with epoxy. The epoxy used shall be a 2-component waterproof epoxy which is specifically manufactured for use in filling cracks in concrete structures by pressure injection methods and which has a deflection temperature not less than 120° F. when tested in accordance with the provisions of ASTM designation: D 648.

Interior surfaces of cast-in-place cells in the fender ring beams, except the lost soffit, shall be coated with two applications of curing compound at the rate of one gallon per 150 square feet for each application. This is in addition to forms-in-place curing, if any.

BUILT-UP ASPHALT ROOFING.--Replacing portions of existing flashing and roofing at Pier 34 shall consist of furnishing and installing a 4-ply asphalt built-up roof covering in accordance with the details shown on the plans and these special provisions.

Built-up roofing shall be an asphalt/glass-fiber felt roof system with an asphalt emulsion surface.

Descriptive data and applicable roofing specifications shall be submitted for approval. Roofing specifications shall include materials to be used, details and methods of application of the various materials for replacing portions of existing flashing and roofing system proposed by the Contractor. The Contractor shall allow the Engineer 30 working days to review the descriptive data and specification submittal after a complete submittal has been received.

Ply felts shall be asphalt impregnated, glass-fiber roofing felts conforming to ASTM Designation: D2178, Type IV.

Protective coating shall be emulsified asphalt conforming to ASTM Designation: D1227, Type IV.

Bitumen shall be roofing asphalt conforming to ASTM Designation: D312, type to be determined by the manufacturer of the roofing material.

Asphalt/cement primer shall conform to ASTM Designation: D41.

Asbestos-free, bituminous plastic cement shall conform to ASTM Designation: D4586, Type II.

Base flashing shall be asphalt-impregnated glass fiber and coated with weather grade asphalt and surfacing with inert non-combustible granules.

Flashing felt strips shall be asphalt impregnated glass fiber conforming to ASTM Designation: D2178, Type IV.

Galvanized sheet metal shall conform to ASTM Designation: A361.

Nominal 4-inch minimum grout cants shall be installed at all intersections of the roof deck and vertical walls. Grout for cants shall conform to Section 51-1.135, “Mortar,” of the Standard Specifications.

Built-up roofing materials shall be applied in accordance with the installation instructions contained in the approved specifications submittal and these special provisions to provide a watertight, non-leaking roof covering.

Built-up roofing shall not be applied in wet weather or when the ambient air temperature is below 50° F. Roofing material shall not be applied to wet or damp surfaces. Surfaces to be covered shall be smooth, hard, and dry; and shall be free from high spots, depressions, dust, loosened material and debris. Openings, holes or crevices shall be filled or covered before any roofing material are applied.

Built-up roofing materials shall be applied in accordance with the approved descriptive data and specifications submittal, and these special provisions.

Concrete and grout surfaces shall be primed as required prior to application of the membrane and flashing. Roofing membrane shall be applied in four plies with interply mopping of asphalt. Roofing plies shall be solid mopped to cants and extended up vertical walls and curbs, without mopping, for a height not less than 3 inches above the cants.

Flashing shall be installed in accordance with the details in the specifications submittal. Sheet metal joints shall be soldered.

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 his 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.

BONDING.--Joints between new and existing concrete shall be given surface preparation and coated with epoxy adhesive where shown on the plans, as follows:

Surface preparation shall be performed prior to placing the adhesive.

Joints made within the mass of existing concrete by cutting, chipping, or grinding shall be cleaned free of all loose and deleterious material by thorough brooming and by compressed air jetting.

Original surfaces of existing concrete shall be cleaned free of bitumens, grease, paint, and other deleterious materials and clean aggregate of at least 3/8 inch size shall be exposed by abrasive blast cleaning or machine scarifying.

The joints shall be surface dry and the ambient temperature shall be 50° F., or above, when the adhesive is applied.

The epoxy adhesive shall be furnished and applied in conformance with the provisions in Sections 95-1, "General," and 95-2.03, "Epoxy Resin Adhesive for Bonding New Concrete to Old Concrete," of the Standard Specifications. The adhesive shall be worked onto the surface with stiff brushes, or equal.

Concrete shall be placed before the epoxy adhesive begins to set and within the time limit required for the type of epoxy used.

FURNISH RUBBER FENDER BUMPER.--Rubber fender bumpers shall be furnished as shown on the plans, as specified in these special provisions and as directed by the Engineer.

New bumpers shall be cylindrical in shape having an outside diameter of approximately 63 inches (1600 mm) and an inside diameter of approximately 31 1/2” (800 mm). The length of the cylinder shall be 4 feet. The bumper shall have a minimum energy absorption of 60 ft-kips per foot at 50 percent deflection, with a reaction of 53 kips per foot, maximum. Rubber compounds shall conform to the specifications of ASTM D 2000.

The rubber fender bumpers shall be manufactured by a firm that is regularly engaged in the making of specialized rubber products for use in waterfront wharves, docks and fender systems.

INSTALL NEW AND SALVAGED RUBBER FENDER BUMPER.--The rubber fender bumpers removed under Section 10-1.14A, “Bridge Removal (Portion)”, and the new bumpers shall be installed as shown on the plans and as directed by the Engineer.

The salvaged bumpers shall be installed at the pier from which they are removed.

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 for the items of work involved and no separate payment will be made therefor.

Full compensation for furnishing built-up asphalt roofing including all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in replacing portions of existing flashing and roofing complete in place, as shown on the plans, shall be considered as included in the contract price paid per cubic yard for structure concrete, bridge and no separate payment will be made therefor.

Full compensation for cast-in-place bumper seats shall be considered as included in the contract prices paid for the various contract items of work and no additional compensation will be allowed therefor.

Full compensation for furnishing rubber fender bumpers shall be considered as included in the contract price paid per cubic yard for Structural Concrete, Fender, and no separate payment will be allowed therefor.

Full compensation for installing salvaged and new rubber fender bumpers complete in place, including all labor, materials, tools, equipment and incidentals, unless otherwise specified, and for doing all work involved in installing the rubber fender bumpers, shall be considered as included in the contract prices paid for Structural Concrete, Fender, and no additional compensation will be allowed therefor.

Full compensation for prestressing, including furnishing prestressing rods and necessary hardware, shall be considered as included in the contract price paid for furnishing and installing the various precast units and no separate payment will be made therefor.

Full compensation for (a) applying polyurea to the cast-in-place concrete ring beams, the precast concrete brackets and waler units, and the precast and cast-in-place concrete seats for the rubber bumpers, (b) for applying curing compound to the interior surfaces of the concrete cells, and (c) for injecting epoxy at the cast-in-place bumper seats, shall be considered as included in the contract price paid for the various concrete items and no separate payment will be made therefor.

Full compensation for bonding joints between new and existing concrete, including surface preparation, furnishing and applying epoxy adhesive, and for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in bonding joints between new and existing concrete, complete in place shall be considered as included in the contract price paid per cubic yard for structural concrete, fender and for and no separate payment will be made therefor.

10-1A.12 PRECAST CONCRETE PILE CAP ASSEMBLY

Precast concrete pile cap assemblies of the type shown on the plans shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Attention is directed to "Order of Work", "Piling", "Steel Casing" and "Fenders" elsewhere in these special provisions.

Attention is directed to Sections entitled, “Environmental Work Restrictions” and “Relations With U.S. Coast Guard” of these special provisions concerning various types of work restrictions related to environmental issues and aid to navigation and waterways on this project.

Precast Elements.--Concrete for precast concrete pile cap elements is designated by compressive strength. Precast concrete shall not contain less than 658 pounds of cementitious material per cubic yard of concrete, of which not less than 15% shall be mineral admixture.

The water-to-cementitious material ratio for precast concrete shall not exceed 0.40.

Aggregate grading for precast concrete shall conform to the requirements of Section 90-3, “Aggregate Gradings,” of the Standard Specifications and these special provisions. Aggregate grading shall conform to the requirements of 1/2" maximum combined aggregate grading found in "Cast-In-Place Concrete Piling," elsewhere in these special provisions.

Concrete for precast concrete pile cap elements shall contain mineral admixture and silica fume. The concrete shall contain silica fume in an amount not less than 40 pounds per cubic yard of concrete in addition to cement and mineral admixture.

Precast concrete elements shall be cured in conformance with the requirements for piles with a class designation ending in C (corrosion resistance) in Section 90-7.05, "Curing Precast Prestressed Concrete Piles," of the Standard Specifications.

Tremie Concrete.--Tremie concrete used to join precast concrete pile cap elements is designated by compressive strength. Tremie concrete shall not contain less than 752 pounds of cementitious material per cubic yard of concrete, of which not less than 15% shall be mineral admixture. The water-to-cementitious material ratio for tremie concrete shall not exceed 0.45.

Aggregate grading for tremie concrete shall conform to the requirements of 1/2" maximum combined aggregate grading found in "Cast-In-Place Concrete Piling" elsewhere in these special provisions.

In addition to the admixtures for precast concrete elements, except for silica fume, tremie concrete shall contain an anti-washout admixture. Silica fume shall not be used in tremie concrete.

Anti-washout admixture shall be used in conformance with the manufacturer’s recommendations and these special provisions. The following anti-washout admixtures shall be used:

PRODUCT	MANUFACTURER
Kelco-Crete or equal	Kelco Company 8355 Aero Drive San Diego, CA 92123 (619) 292-4900
Rheomac UW 450 or equal	Master Builders, Inc. Admixture Division 23700 Chagrin Blvd. Cleveland, OH 44122 (216) 831-5500
Sikament 100 SC Sikament 300 SC or equal	Sika - Western Region 12767 East Imperial Hwy. Santa Fe Springs, CA 90670 (310) 941-0231

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 the mixing of concrete or grout containing anti-washout mixture and shall remain at the location until released by the Engineer.

The washout resistance of the tremie concrete shall be determined by the U.S. Army Corps of Engineers test method CRD-C61, "Test Method for Determining the Resistance of Freshly Mixed Concrete to Washing Out in Water." The washout resistance of the tremie concrete shall be less than 1.5 percent cement loss per mass of cement paste.

The nominal and maximum penetrations shown below shall be used in lieu of the penetrations listed in the table in Section 90-6.06, "Amount of Water and Penetration."

Concrete	Concrete Penetration, Inches (Note 1)		Concrete Vibration Required
	Nominal	Maximum	
Placed Under Water	equal to or greater than 3 1/2	5 (Note 2)	(Note 3)

Note 1: Type F or Type G chemical admixtures may be required to achieve the specified penetration, while other admixtures such as Type B and/or Type D may be required for extended workability. When admixtures are used in accordance with the requirements in Section 90-4, "Admixtures," the penetration of the concrete will be measured after the admixture is added.

Note 2: Concrete shall be proportioned to prevent excessive bleed water and segregation.

Note 3: Concrete placed under water shall not be vibrated.

Other Materials.--Corrugated steel pipe shall conform to the requirements found in Section 66-3, “Corrugated Steel Pipe,” of the Standard Specifications.

Steel pipe for pile cap ties shall conform to the requirements for steel pipe piling found elsewhere in these special provisions.

Weldments for pile cap tie anchorages and splice assemblies shall conform to the requirements for “Steel Casing” elsewhere in these special provisions.

Steel pile cap ties, weldments, and lifting ears shall be coated with flame-sprayed plastic prior to installation as shown on the plans and in conformance with the requirements for flame-sprayed plastic found in “Steel Casing” elsewhere in these special provisions.

Cathodic protection as shown on the plans for pile cap ties shall conform to the requirements found in “Steel Casings,” elsewhere in these special provisions.

Elastomeric pads shall conform to the requirements for elastomeric bearing pads elsewhere in these special provisions and shall be bonded to bearing plates with adhesive conforming to Federal Specification MMM-A-121.

Grout and grouting procedures for filling annular spaces between corrugated steel pipe embedded in precast concrete pile caps and steel pipe piles shall conform to the provisions for grout found in "Micropiling," elsewhere in these special provisions.

All other grout and grouting procedures for filling various annular spaces between precast concrete pile cap assemblies and other structure elements as shown on the plans shall conform to the provisions for grout found in "Steel Casing," elsewhere in these special provisions.

High strength rod assemblies for pile cap ties and anchorage of steel casings to precast concrete pile cap assemblies shall conform to the provisions in "Steel Casing," elsewhere in these specifications. The high strength rod assemblies shall be coated with a corrosion protection covering after galvanizing, as shown on the plans. The protective covering shall be selected from the Department's list of approved products for mechanical butt splices for epoxy-coated bar reinforcement. The list is available from the Transportation Laboratory, Sacramento, California.

Embedded steel pipe sleeves shall conform to the provisions for steel pipe found in "Steel Structures" elsewhere in these special provisions. The inside surfaces of the steel pipe sleeves shall be coated with fusion-bonded epoxy after galvanizing, as shown on the plans. Fusion-bonded epoxy shall conform to ANSI/AWWA Standard C213, "Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines."

Embedded pipe sleeve assemblies shall be galvanized in conformance with the provisions in Section 75, "Miscellaneous Metal" of the Standard Specifications.

Embedded stainless steel inserts for lifting ears, fenders and bumper supports shall conform to the requirements of ASTM A276, type 316. Associated bearing angles shall conform to the requirements of Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

Neoprene strip shall be furnished and installed in accordance with the details shown on the plans, and these special provisions. 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 protective board will not be required.

Embedded steel reaction collars in precast pile cap assemblies shall conform to the provisions of Section 55, "Steel Structures," of the Standard Specifications and these special provisions. Steel reaction collars shall not be painted and shall be clamped together prior to constructing precast elements.

Erecting Pile Cap Assembly.--The Contractor shall submit an erection plan to the Engineer for approval prior to producing the test batch for tremie concrete and at least 10 working days prior to erecting precast concrete pile cap assemblies. The plan shall include complete description, details, and supporting calculations as listed below:

1. Requirements for placing concrete under water in precast concrete pile cap assembly:
2. Concrete mix designs, certified test data, and trial batch reports.
3. Methods and equipment installing precast pile cap elements including considerations for pile alignment, cleaning existing concrete, jacking stresses, temporary guide system for piling, and corrosion protection.
4. Placing, positioning and supporting bar reinforcement and pile cap ties.
5. Design of silt screens or covers to prevent silting at tremie blockouts prior to concrete placement or washout during tremie concrete curing.
6. Methods and equipment for placing concrete under water, including accurately determining the depth of concrete, sounding methods for continuously monitoring of the top of concrete and tip of tremie tube elevations during placement, and actual and theoretical volume placed
7. Concrete batching, delivery, and placing systems with time schedules and capacities therefor.
8. Concrete placing rate calculations. When requested by the Engineer, calculations shall be based on the static head on the concrete and losses throughout the placing system, including anticipated head of water and concrete to be displaced.

In addition to the erection plan, the Contractor shall conduct an above-water pre-assembly of the first two-bell pier pile cap assembly to verify the Contractor's means of erection. The pre-assembly should include support piles, shimming and jacking operations, and erection of steel casings. No grouting shall be required.

In addition to compressive strength requirements, the consistency of the concrete to be deposited under water shall be verified before use by producing a 4 cubic yard batch. The test batch shall be produced and delivered to the job under conditions and in time periods similar to those expected during the placement of concrete in the pile cap assemblies. Concrete for the test batch shall be placed under water in a suitable container of adequate size to allow testing in accordance with California Test 533. The test batch shall demonstrate that the proposed concrete mix design achieves the specified nominal penetration and a penetration of at least 2 inches after 4 hours. The time period shall begin at the start of placement. The concrete shall not be vibrated or agitated during the test period. Twenty-eight days after concrete placement, at least six concrete cores shall be taken from the trial batch concrete and shall be tested for 28 days compressive strength per ASTM C143. Upon completion of testing, the concrete shall be disposed of in accordance with

Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," unless otherwise approved in writing by the Engineer. Precast concrete pile cap elements shall be aligned and jacked in-place as shown on the plans prior to placing tremie concrete.

Surfaces of existing foundations to be in contact with grout or tremie concrete shall be cleaned of surface laitance, marine growth and foreign material. High pressure water jets and/or mechanical devices, or other approved methods may be employed. Local areas not exceeding a total of 1000 square inches in 10 square feet which consists of thin (1/4" or less) firmly attached calcareous shell deposits, are acceptable.

Piles for precast concrete pile cap assemblies shall conform to the provisions for "Piling," elsewhere in these special provisions. Piles shall be driven to match the elevation of the existing concrete template as shown on the plans. Pile cap leveling plates, pile inserts and shim sizes shall be established based upon top of pile surveys performed by the Contractor.

During erection of the precast concrete pile cap elements, the Contractor shall provide temporary shims at the interface with the existing foundation bells to maintain a minimum annular space as shown on the plans.

The Contractor shall be responsible for designing and furnishing jacking apparatus required to join segments of the two-bell precast pile cap assembly with a minimum capacity of 60,000 pounds.

Construction Sequence.--Steel pile cap ties at four-bell pile cap assemblies and jacking apparatus at two-bell pile cap assemblies shall be installed to connect elements of the pile cap assemblies prior to placing tremie concrete.

Pile cap tie anchorage blockouts in precast elements may be used by the Contractor to adjust pile cap ties during installation.

The Contractor shall be responsible for furnishing and installing a containment dam for the tremie concrete at the pile cap tie anchorage blockout.

Tremie concrete for all pile cap types shall be placed prior to grouting the annular space between pile cap assemblies and existing foundation bells.

The annular space between the existing foundation bells and the bell casing and precast concrete pile cap assembly shall be grouted prior to driving steel piles through pile caps.

The Contractor shall be responsible for designing, furnishing and installing a temporary pile centralizer or guide system for placement of steel shells through the precast pile cap assembly. The guide system shall ensure that during initial placement the steel shells are centered in the pile cap opening and will be no more than one inch out of alignment in any direction. The temporary guide system shall be designed to protect the precast pile cap assembly from damage during initial steel shell placement. The temporary guide system used to set the steel shells may also be used to maintain pile alignment during driving operations provided that the pile cap assemblies and pile cap assembly support piles are not overstressed.

The Contractor shall monitor the location of the steel shells relative to the openings in the precast pile cap assemblies during driving operations. The steel shells shall not come in contact with the pile cap assemblies at any time. If necessary, the Contractor shall provide a means for controlling the location of the pile to prevent contact between the pile and pile cap assembly.

Section 51-1.10, "Concrete Deposited Under Water," shall not apply to depositing concrete under water for joining precast concrete pile cap elements.

The Contractor shall deposit concrete under water by means of the tremie method. Concrete pumps shall not be used to directly deposit concrete under water.

The concrete 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 2 hours between placing the first load of concrete and completion of placing the final load of concrete at the pile cap, unless otherwise approved in writing by the Engineer. The concrete shall be placed with a 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 tremie tube or tubes which are at least 10 inches in diameter fed by a suitable size funnel or hopper to facilitate the transfer of sufficient concrete to the tremie. No more than one tube may be supplied from a single hopper.

The delivery tube system shall consist of watertight tubes with gasketted joints with sufficient rigidity to keep the ends always in the mass of concrete placed. Delivery tube joints shall allow for the upper sections of the delivery tube to be removed as placement progresses. Tremie tubes shall be marked to allow for determination of the distance from the surface of water to the mouth of the tremie. If only one delivery tube is utilized to place the concrete, the tube shall be placed near the center of the spaced to be filled. Multiple tubes shall be uniformly spaced. Tremies shall not be used without space for a tube.

Delivery tubes shall be capped at the end of the tube with a water tight cap. The cap shall be designed to be released as the tube is charged. The tremie tube shall extend to the bottom of the precast element blockout 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 water into the tube. The tip of the delivery tube shall be within 5 inches of the bottom of the precast element blockout, and then the embedment of the tip shall be maintained below the top surface of the concrete. The

Contractor shall continuously monitor the top of concrete while placing 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 water, the tube charged with concrete, and the operation restarted by pushing the capped tube to the bottom of the precast element blockout into the concrete and then reinitiating the flow of concrete.

The tubes delivering concrete shall remain fixed horizontally while concrete is flowing. Horizontal distribution of concrete shall be accomplished by the flow of concrete after exiting the tube or by halting placement, moving the pipe, reestablishing the seal, and resuming placement.

Measurement and Payment.--Precast concrete pile cap assemblies will be measured and paid by the assembled unit in the same manner specified for precast concrete members in Section 51-1.22, "Measurement," and Section 51-1.23, "Payment," of the Standard Specifications.

Full compensation for furnishing Contractor-designed jacking assembly apparatus, stainless steel inserts, steel reaction collars, bearing angles, corrugated steel pipes, and pile cap tie elements coated with flame-sprayed plastic, including cathodic protection systems, shall be considered as included in the contract unit price paid for furnishing precast concrete pile cap assembly of the type shown on the plans and no additional compensation will be allowed therefor.

Full compensation for cleaning existing concrete, installing and removing temporary shims, furnishing and installing elastomeric bearing pads, neoprene strip, performing erection pile surveys, leveling and jacking of pile cap assembly, providing silt screens, providing temporary guide system for piling, erecting above-water pre-assembly, placing tremie concrete and grout under water, including packers and seals, placing steel pipe ties, and installing cathodic protection measures complete in place shall be considered as included in the contract unit price paid for erect precast concrete pile cap assembly of the types shown on the plans and listed in the Engineer's estimate and no additional compensation will be allowed therefor.

Full compensation for coating high strength rod assemblies with corrosion protection coverings shall be considered as included in the contract unit price paid for furnishing precast concrete pile cap assembly of the type shown on the plans and no additional compensation will be allowed therefor.

Full compensation for coating steel pipe sleeve surfaces with fusion-bonded epoxy shall be considered as included in the contract unit price paid for furnishing precast concrete pile cap assembly of the type shown on the plans and no additional compensation will be allowed therefor.

10-1A.13 PRECAST CONCRETE BRACKET AND WALER UNITS AND PRECAST CONCRETE SEATS

Precast reinforced concrete bracket and waler units at Piers 34, 35, 47 and 48, and precast concrete seats for the rubber fender bumpers at all the above piers shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

The number of precast concrete brackets and walers to be paid for as shown in the Engineer’s Estimate is based on the number of units shown on the plans and has no relationship as to whether or not the unit contains 2 stems or 3 stems.

10-1A.14 PRECAST CONCRETE JACKET ASSEMBLY

Precast reinforced concrete jacket assemblies of the type shown on the plans shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Attention is directed to “Core Concrete,” “Prestressing Concrete,” and “Fenders” elsewhere in these special provisions.

Attention is directed to Sections entitled “Environmental Work Restrictions,” and “Relations With U.S. Coast Guard” of these special provisions concerning various types of work restrictions related to environmental issues and aid to navigation and waterways on this project.

High strength bars, ducts, and anchorages used to connect concrete jacket assemblies shall conform to the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications.

The Contractor shall design precast concrete members for all the loads during lifting, handling, and installation. Each precast concrete member shall be marked to indicate its final location in the structure and the date of fabrication. Identification marks shall correspond to the placing plans.

The Contractor may propose alternative sizes for precast concrete jacket segments to the Engineer as part of the working drawing submittal.

Concrete mix design and curing requirements for precast concrete elements shall conform to the requirements for precast concrete in “Precast Concrete Pile Cap Assembly,” elsewhere in these special provisions.

Grout and grouting procedures for filling various annular spaces between precast jacket assemblies and other structure elements as shown on the plans shall conform to the provisions for grout found in “Steel Casing” elsewhere in these special provisions.

Grouting and procedures for grouting high strength bars in ducts and cored holes shall conform to the requirements for bonding and grouting in Section 50, "Prestressing," of the Standard Specifications and these special provisions.

Embedded stainless steel inserts for lifting ears, fenders and bumper supports shall conform to the requirements of ASTM A276, type 316. Associated bearing angles shall conform to the requirements of Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

Concrete Coatings.--Concrete coatings shall be applied to precast concrete elements within the limits shown on the plans. One of the following concrete coating systems shall be used:

PRODUCT	MANUFACTURER
POLYQuik or equal	Williamette Valley Company 660 McKinley Street Eugene, OR 97402 (541) 484-9621
TC-300 or equal	Thane Coat 12725 Royal Drive Stafford, TX 77477 (281) 565-7001

Alternate coatings of equal quality may be submitted to the Engineer for approval.

Concrete coatings shall be used in conformance with the manufacturer's recommendations and these special provisions. The concrete coating shall have a minimum dry film thickness of 60 mils.

The color of the concrete coating shall match the color of the precast concrete elements.

A manufacturer's representative, as approved by the Engineer, shall provide technical assistance for the use of their product. The representative shall be present at the location of the mixing and application of concrete coating and shall remain at the location until released by the Engineer.

Coating shall be applied at least 30 days after fabrication of precast elements. At least 48 hours prior to application of coating, the entire concrete surface to be coated shall be blasted to conform with the requirements of the manufacturer. Bugholes with a maximum dimension greater than 0.5 inch shall be sacked with epoxy mortar. Cracking with a crack width greater than 0.01 inch and less than 0.03 inch shall be repaired by applying high capillary, low viscosity epoxy over the crack prior to coating. Cracking with a crack width greater than 0.03 inch shall be repaired per manufacturer's recommendations.

The coating shall be applied in accordance with the manufacturers recommendations and with adherence to the requirements of National Association of Corrosion Engineers recommendation RP-0892 for concrete coatings as applicable. The Contractor shall submit to the Engineer for approval the coating properties including adhesion to concrete, chemical resistance to seawater, ultraviolet resistance, and abrasion resistance, and application procedures 35 working days prior to use.

An erection frame with at least four (4) lifting points shall be used to lift the precast segments. The lifting force shall be vertical without inducing lateral loads in the precast segments.

Submittals.--The Contractor shall submit the following documents to the Engineer for approval at least 6 weeks prior to the start of the precast operations:

1. Shop drawings showing precast segments layouts, reinforcement, forming and fabrication details, unit identification marks, applicable post-tensioning details, support methods, lifting methods, transport and interchange handling methods, detailed erection sequences and design loadings, joint seals and detail design of joints with adjacent materials. Shop drawings shall conform to the requirements of Section 5-1.02, "Plans and Drawings," of the Standard Specifications. Shop drawings shall be prepared under the direction of a Civil Engineer registered in the State of California.

   The Contractor may use the existing structure to support precast concrete jacket assembly erection equipment. Any use of the existing structure for support and the loads imposed shall be shown on the shop drawings. The Contractor shall verify by calculation the adequacy of the existing structure for loads imposed by the proposed erection equipment.

   The design calculations shall show a summary of computed stresses in the existing structure and the connections between any proposed erection equipment and existing structure. Design calculations shall be stamped and signed by an engineer who is licensed as a Civil Engineer in the State of California.

2. Precast concrete and grout mix designs prepared by the Contractors shall meet all the requirements in these special provisions.

3. Erection plan for the segments of the precast concrete elements, including an inspection program, plans and working drawings of erection frames, calculations for erection frames and for temporary support bracing. Drawings and calculations shall be stamped and signed by a Civil Engineer registered in the State of California.

The Contractor shall submit the erection plan at least 8 weeks prior to installation.

Damage caused during transporting and handling shall be reported to the Engineer. The damage shall be repaired prior to final installation, unless approved by the Engineer in writing.

Precast concrete components shall not be shipped from the casting yard to the site until the cylinder tests show that the concrete has attained the required 28-day strength as shown on the plans and required coatings have been applied.

The Contractor shall be responsible for lifting and transporting precast concrete components. Damaged members shall be replaced or repaired at the Contractor's cost.

Surfaces of existing pier to be in contact with grout shall be cleaned of surface laitance, marine growth and foreign materials prior to placing grout. High pressure water jets and/or mechanical devices, or other approved methods may be employed. Local areas not exceeding a total of 1000 square inches in 10 square feet which consists of thin (1/4" or less) firmly attached calcareous shell deposits, are acceptable.

Matching halves of precast concrete jacket segments shall be connected prior to installing the next vertical precast segment.

Horizontal contact bearing surfaces of adjacent precast segments shall be match cast as shown on the plans. Horizontal contact surfaces shall be epoxy bonded during erection as shown on the plans.

Adjacent precast concrete jackets for piers shall be coated with epoxy bonding agent and post-tensioned together with vertical high strength bars as shown on the plan.

The epoxy adhesive shall be furnished and applied in conformance with the provisions of Section 95, "Epoxy," of the Standard Specifications. The adhesive shall be worked onto the surfaces with stiff brushes, or equal.

Manufacturer's pot life for epoxy shall conform to the erection requirements shown on the plans.

Precast concrete segments shall be post-tensioned together in one half the time it takes for the first applied epoxy to set as shown on the plans.

Surface preparation shall be performed prior to placing the adhesive. The joints shall be cleaned free of all loose and deleterious material by thorough brooming and by compressed air jetting. The joints shall be surface dry and the ambient temperature shall be 50° F or above, when the adhesive is applied unless otherwise approved by the Engineer.

Cored holes shall conform to the requirements for "Core Concrete" elsewhere in these special provisions.

For constructing the cored holes which penetrate through the existing reinforced concrete diaphragms and the precast elements, the drill for drilling the holes through the precast concrete units and the existing reinforced concrete, shall be rigidly supported by a fixed or traveling frame affixed to the precast concrete or existing reinforced concrete, so that holes will be normal to the surfaces penetrated with a maximum deviation from straightness of not more than ? inch.

The Contractor shall submit a grouting plan to the Engineer for approval at least 2 weeksprior to production grouting. The plan shall include complete description, details, and supporting calculations as listed below:

a. Grouting equipment, including capacity in relation to the grouting demand, working conditions as well as provisions for back-up equipment and spare parts.

b. Types and sizes of grout hoses and connections.

c. Methods and equipment for accurately determining the depth of the grout and the volume of the grout placed.

d. Grout batching, mixing, and pumping procedure including post grouting.

e. Grouting rate calculations. Calculations shall be based on the initial pump pressures or static head on the grout and losses throughout the placing system including anticipated head of water or slurry grout to be displaced.

f. Contingency procedures for handling blockage of ducts or equipment breakdown.

Grout seals shall be used to fill the gap between the pier diaphragm and precast jacket and seal off the edges of the annular spaces between the pier shafts and precast jackets as shown on the plans.

The Contractor shall limit the grouting rate to 6 cubic yards per hour, to minimize stresses and deformations in the precast jackets during grouting. At the Contractor's option, high strength bars as shown on the plans, a separate bracing system, or other means may be employed to restrain the precast concrete elements during grouting. Except where shown on the plans, restraints shall not pass through the columns. The grout shall be allowed to set up prior to placing the next lift of grout, unless a bracing system is used. The maximum height of each lift of grout shall be 20 feet.

Precast jackets shall be positioned with spacers to center the units around the existing shafts and diaphragms at the location shown on the plans. Spacers may be secured by doweling to the inside of the precast concrete units.

Prior to grouting, high pressure water jetting shall be used to flush the ducts and bars to remove dirt, oil, and other foreign substances that may interfere with the grouting and bonding.

The grouting equipment shall use a gravity feed to the inlet pump. The storage hopper must be kept at least partially full at all times during the pumping operation to prevent air from being drawn into the prestressing tendon ducts.

The use of compressed air for pumping shall not be allowed.

Cored holes of the sizes shown in the Engineer's Estimate will be measured and paid for per linear foot, as described elsewhere in these special provisions.

Precast concrete jacket assemblies will be measured and paid for by the assembled unit in the same manner specified for precast concrete members in Section 51-1.22, "Measurement," and Section 51-1.23, "Payment," of the Standard Specifications.

Full compensation for furnishing and placing epoxy on contact surfaces on precast segments, cleaning concrete surfaces, and grouting annular spaces, and furnishing, installing, and removing erection frames shall be included in the contract price paid for erect precast concrete jacket assembly of the type shown on the plans and no separate payment will be made therefor.

Full compensation for furnishing, installing, stressing and pressure grouting vertical and horizontal high strength bars in the precast concrete jacket segments as shown on the plans and in accordance with these special provisions, shall be considered as included in the unit price paid for erect precast concrete jackets and no additional payment will be made therefor.

Full compensation for installation of stainless steel inserts and for application of concrete coatings shall be considered as included in the contract price paid for furnish precast concrete assembly of the type shown on the plans and no separate payment will be made therefor.

Full compensation for repair of damages caused during transporting and handling shall be considered as included in the contract price paid per unit for the precast concrete assembly furnished and no additional payment will be made therefor.

10-1A.15 DRILL AND BOND DOWEL (EPOXY CARTRIDGE)

Drilling and bonding dowels or threaded rods with epoxy cartridge systems shall conform to the details shown on the plans and the requirements in these special provisions.

Reinforcing steel dowels shall be epoxy-coated and shall conform to the provisions for bar reinforcement in "Epoxy-Coated Bar Reinforcement" of these special provisions.

The epoxy cartridge system shall consist of (1) a bonding material that is a two-component epoxy contained in a cartridge having two separate chambers and (2) an applicator that is a special dispensing gun having a replaceable static mixing nozzle. The epoxy cartridge system used shall be appropriate for the service temperature and ambient concrete temperature at the time of installation.

The Contractor may select an epoxy cartridge system which has been evaluated and found acceptable for use on this project by the Transportation Laboratory. For a listing of acceptable epoxy cartridge systems for this project, contact the Transportation Laboratory, telephone: (916) 227-7000.

If the Contractor elects to use an epoxy cartridge system other than those accepted by the Transportation Laboratory, the determination as to the quality and suitability of the alternative epoxy cartridge system will be made in the same manner as provided for in Section 6-1.05, "Trade Names and Alternatives," of the Standard Specifications.

Each epoxy cartridge shall be clearly and permanently marked with the manufacturer's name, model number of epoxy cartridge system, manufacturing date, and lot number. Each carton of epoxy cartridges shall contain the manufacturer's recommended installation procedures, minimum cure time, and such warning or precautions concerning the contents as may be required by State or Federal Laws and Regulations.

Each shipment of the epoxy cartridge system, regardless of which epoxy product is furnished, shall be accompanied by a Certificate of Compliance as provided in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall state that the material complies in all respects to the specifications and data submitted in obtaining acceptance.

The holes shall be drilled by methods that will not shatter or damage the concrete adjacent to the holes. If reinforcement is encountered during drilling, before the correct 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 correct depth.

Unless otherwise specified or shown on the plans, the hole depth and the hole diameter shall be as recommended by the manufacturer. The drilled holes shall be clean and dry at the time of placing the bonding material and the steel dowels.

After bonding, dowels shall be supported as necessary to prevent movement during curing and shall remain undisturbed until the epoxy has cured the minimum time specified by the manufacturer. Dowels that are improperly bonded, as determined by the Engineer, will be rejected. New holes shall be drilled, and new dowels placed and securely bonded to the concrete at the Contractor's expense.

Unless otherwise provided, reinforcing steel dowels to be bonded into drilled holes will be paid for as bar reinforcing steel (epoxy-coated).

Unless otherwise provided, drilling and bonding dowels or threaded rods with epoxy cartridges will be measured and paid for by the unit as drill and bond dowel (epoxy cartridge). The number of units to be paid for will be determined from actual count of the completed units in place.

The contract unit price paid for drill and bond dowel (epoxy cartridge) shall include full compensation for furnishing all labor, materials (except reinforcing steel dowels), tools, equipment and incidentals, and for doing all work involved in

drilling the holes, including coring through reinforcement when approved by the Engineer, and bonding the dowels with epoxy cartridges, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1A.16 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.

Reinforcing steel dowels shall be epoxy-coated and shall conform to the provisions for bar reinforcement in “Epoxy-Coated Bar Reinforcement” elsewhere in 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 (epoxy-coated).

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.

10-1A.17 DRILL AND BOND DOWELS (FENDER)

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 be epoxy-coated, and shall conform to the provisions for bar reinforcement in "Epoxy-Coated Reinforcement (Fenders)" elsewhere in 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) (fender).

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 (fender) 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.

10-1A.18 CORE CONCRETE

Coring concrete shall consist of coring holes through reinforced concrete bridge members as shown on the plans and in conformance with the requirements in these special provisions.

For cored holes greater than 10 feet in length, the following shall apply:

Prior to coring, the Contractor shall submit, in accordance with Section 5-10.2, “Plans and Working Drawings,” of the Standard Specifications, the methods and equipment to be used in the coring operations.

The deviation in alignment of cored holes from that shown on the plans shall not be more than 1/2 inch per 10 feet of cored hole length with a maximum deviation of not more than 3 inches.

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. Sea water may be used for core drilling operations performed underwater.

If the Contractor elects to use couplers for fabricating shaft high-strength bars to required length, portions of the cored hole diameter shown on the plans shall be enlarged by one inch to accommodate the coupler. Full compensation for coring larger holes shall be considered as included in the contract price paid per linear foot for core concrete of the sizes listed in the Engineer's Estimate and no additional compensation will be allowed.

When a grooved concrete surface within cored holes is shown on the plans, the existing concrete surface shall be grooved to a depth of approximately 1/2-inch by mechanical equipment.

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, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

Full compensation for grooving concrete surfaces shall be considered as included in the contract price paid per linear foot for core concrete and no additional compensation will be allowed.

10-1A.19 CORE CONCRETE (1-1/2 INCH, FENDER)

Coring concrete shall consist of coring 1 1/2 inch diameter holes into reinforced concrete bridge members at the Type I and II anchors 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. Immediately after coring, the concrete cores shall be identified by the Contractor with a description of the core locations and submitted to the Engineer for inspection. When reinforcement is cut, coring operations shall be terminated, and the Contractor shall submit to the Engineer for approval, the procedure proposed to repair the cut reinforcement and to prevent further cutting of reinforcement.

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 enter the Bay.

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 (1-1/2 inch, fender) 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.

10-1A.20 REINFORCEMENT

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

Attention is directed to "Welding Quality Control" elsewhere in these special provisions.

The first paragraph of Section 52-1.02A, "Bar Reinforcement," of the Standard Specifications is amended as follows:

Reinforcing bars shall be low-alloy steel deformed bars conforming to the specifications of ASTM Designation: A 706/A 706M.

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 52-1.02D, "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 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. One mechanical lap splice unit per splice shall be used.

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. All 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 replaced with the following:

52-1.08B Butt Welded Splices.—All 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.

Only the joint details and dimensions as shown in Figure 3.2, “Direct Butt Joints,” of AWS D1.4-92, 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 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.

All 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:

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 replaced with the following:

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 replaced with the following:

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 lab. 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 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 with the deformation pattern 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 replaced with the following:

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 D1.4 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.

All 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 three 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. Development on the jobsite 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.

10-1A.21 WELDED HEADED BAR REINFORCEMENT

Welded headed bar reinforcement, consisting of furnishing and friction welding heads onto one or both ends of bar reinforcement, shall conform to the details shown on the plans, the provisions of Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

GENERAL.--Prior to performing any manufacturing, the Contractor shall submit to the Engineer the manufacturer's Quality Control Manual (QCM) for the fabrication of welded headed bar reinforcement. As a minimum, the manual shall include the following:

1) The pre-production procedures for the qualification of materials and equipment;
2) The methods and frequencies for performing all quality control procedures during production;
3) The calibration procedures and calibration frequency for all equipment;
4) A system for the identification and tracking of all welds. The system shall have provisions for permanently identifying each weld and the parameters used to perform it;
5) The welding procedure specification (WPS); and
6) A system for marking welded headed bar reinforcement.

A daily production log for the manufacture of welded headed bar reinforcement shall be kept by the manufacturer for each day of production. The log shall clearly indicate the production lot numbers, the heats of bar material and head material used in the manufacture of each production lot, the number of bars in each production lot, welding records, including tracking and production parameters for all welds, and results of all tests performed. A test report shall be furnished by the manufacturer containing, on a per heat basis, the chemical analysis of the bar and of the head material, including all elements represented in the carbon equivalent formula in ASTM Designation: A 706/A 706M, in addition to phosphorus and sulfur.

A production lot of welded headed bar reinforcement is defined as 150 reinforcing bars, or fraction thereof, of the same bar size, with welded heads of the same size and type, produced from bar material of a single heat number and head material of a single heat number. A new production lot shall be started if the heat number of either the bar material or the head material changes before the maximum production lot size of 150 is reached.

The daily production log shall be submitted in writing to the Engineer within 7 calendar days following the manufacture of any welded headed bar reinforcement.

The manufacturer shall furnish certificates of compliance to the Engineer in accordance with the provisions in Section 6-1.07, "Certificates of Compliance," for all material used in the manufacture of welded headed bar reinforcement.

MATERIALS AND MANUFACTURE.--All bar reinforcement to be used in the fabrication of welded headed bar reinforcement shall conform to the provisions of "Reinforcement" elsewhere in these special provisions.

Heads to be used in the fabrication of welded headed bar reinforcement shall be forge formed or cut from properly identified heats of mold cast or strand cast steel using the open-hearth, basic oxygen or electric-furnace process. The chemical composition of the heads shall conform to the requirements in ASTM Designation: A 29/A 29M, A 36/A 36M, A 108 Grade 1018, A 304, A 572/A 572M, or A 706/A 706M. Forging of heads shall conform to the requirements in ASTM Designation: A 788. Heads cut from plate shall conform to the provisions of Section 55, "Steel Structures," of the Standard Specifications.

Welding, welder qualifications, and inspection of welding shall conform to the requirements for friction welding in ANSI/AWS C6.1.

All welding shall be performed at an established and permanent fabrication facility.

All equipment used to perform friction welding shall be fitted with an effective in-process monitoring system to record essential production parameters that describe the process of welding the head onto the bar reinforcement. As a minimum, the parameters to be recorded shall include friction welding force, forge force, rotational speed, friction upset distance and time, forge upset distance and time, and other elements of the production process. The data from this in-process monitoring shall be recorded and preserved by the manufacturer and shall be provided to the Engineer upon request.

Heads shall be forge formed or cut from plate into a round, elliptical, or rectangular shape. Nominal head dimensions to be used for standard bar sizes shall conform to the following:

Nominal Head Dimensions			
Standard Bar Designation No.	Min. thickness in.	Min. cross-sectional area $in.^2$	Min. width in
3	0.375	1.1	0.75
4	0.4375	2.0	0.87
5	0.500	3.1	1.00
6	0.5625	4.4	1.38
7	0.625	6.0	1.46
8	0.625	7.9	1.57
9	0.6875	10.0	1.69
10	0.750	12.7	2.00
11	0.8125	15.0	2.17
14	1.250	22.5	2.56
18	1.625	40.0	3.15
Notes: (1) These head dimensions are based on concrete compressive strength of 4300 psi. (2) The head thickness shall be measured parallel to the reinforcing bar longitudinal axis, and the head width shall be measured perpendicular to the reinforcing bar axis. (3) The cross-sectional area of the head shall be the projected area measured perpendicular to the axis of the bar.			

The Contractor may request, in writing, to use alternative head dimensions to those specified herein. The alternative head dimensions shall be designed using the concrete compressive strength shown on the plans. Alternative head dimensions will not be considered for approval unless it can be proven by the Contractor that the alternative heads have been successfully produced and have had at least 2 years of satisfactory service in conditions similar to this application. The Contractor shall furnish, at the Contractor's expense, documentation satisfactory to the Engineer that the alternative head dimensions are suitable for the intended application. The documentation shall include, but not be limited to, calculations and test reports showing the following:

1) The alternative head is capable of resisting the nominal tensile strength of the reinforcing bar when the bar reinforcement with welded head is embedded in concrete; and
2) Shear or bending forces do not cause premature failure of the alternative head or crushing failure of the concrete under the alternative head.

Quality Control (QC) is the responsibility of the Contractor. As a minimum, the Contractor shall perform inspection and testing prior to welding, during welding and after welding and as necessary to ensure that materials and workmanship conform to the requirements of the specifications.

All equipment and materials for performing all pre-production and production testing shall be furnished by the Contractor at the Contractor's expense. All testing shall be performed 1) at the manufacturer's plant or at an approved laboratory, 2) in the presence of the Engineer, unless otherwise directed in writing, and 3) at the Contractor's expense.

TENSILE TEST CRITERIA.--Tensile testing of the welded headed bar reinforcement shall be performed in accordance with the requirements described in ASTM Designation: A 370.

Tensile test specimens shall be the full cross-section of the bar as rolled with a head attached to one end of the reinforcing bar. A specimen with a head welded to one end shall be placed in the testing machine with the head supported by a steel plate or other fixture to prevent movement and bending of the head. The fixture shall be placed

concentrically with the longitudinal axis of the reinforcing bar directly against the flat inner surface of the head. The fixture shall provide clearance between the head support and the head-to-bar connection. Provisions shall be made for clearance between the support and any weld or forming material on the reinforcing bar-to-head connection. The free end of the bar, without a head attached, shall be gripped by the test machine.

All tensile test specimens for welded headed bar reinforcement shall conform to the following requirements:

1) The tensile strength, yield strength and elongation shall conform to the requirements in Table 2, "Tensile Requirements," in ASTM Designation: A 706/A 706M;
2) At rupture, there shall be no observed partial or total fracture of the head, the head-to-bar connection or the reinforcing bar within one bar diameter of the head-to-bar connection; and
3) At rupture, there shall be visible signs of necking in the reinforcing bar, at a minimum distance of one bar diameter away from the head-to-bar connection.

PRE-PRODUCTION TESTING.--Prior to production, successful test results from 3 tensile tests and 3 bend tests shall be furnished by the Contractor for each combination of 1) reinforcing bar size, 2) head size, 3) head type and, 4) head material specification to be used in the work. Bend tests will not be required for reinforcing bars Nos. 14 and 18.

Tensile tests shall conform to the requirements of "Tensile Test Criteria" of this section.

The bend tests shall be performed in accordance with the requirements described in ASTM Designation: A 706/A 706M, except that the test specimen shall be bent around a test mandrel to an angle of at least 90-degrees.

The mandrel shall be placed so as to directly bend the welded region. The mandrel dimensions for bend testing shall conform to the requirements for mandrel (pin) diameters in ASTM Designation: A 706/A 706M. The centerline of the bend test mandrel shall be placed at the intersection of the reinforcing bar and the weld.

Bend test specimens shall be the full cross-section of the bar as rolled with a head attached to one end of the reinforcing bar. For welded heads directly attached to the end of the reinforcing bar where the head interferes with placement of the bend test mandrel, sufficient head material and any excess material associated with the welding process shall be removed along one edge of the reinforcing bar to provide a flat surface on the specimen for the bend mandrel. For welded headed bar reinforcement where the head does not interfere with the positioning of the bend test mandrel, no specimen preparation shall be performed.

All welded headed bar reinforcement bend test specimens shall conform to the following requirements:

1) There shall be no observed partial or total fracture of the head, the head-to-bar connection or the bar within one bar diameter of the head-to-bar connection; and
2) There shall be no cracking on the outside of the bent portion.

PRODUCTION TESTING.--Production testing shall be performed using samples that have been randomly selected by the Engineer from each production lot of welded headed bar reinforcement which is ready for shipment to the job site. The Engineer shall be notified in writing at least 7 days prior to conducting any tests.

A minimum of 3 samples of welded headed bar reinforcement from each production lot shall be tested. One tensile test shall be conducted on each sample.

All tensile test specimens shall conform to the requirements of "Tensile Test Criteria" of this section, except that if one of the test specimens fails to meet said requirements, one retest may be performed on one additional sample, selected by the Engineer, from the same production lot. Should this additional test specimen, or should more than one of the original test specimens, fail to meet said requirements, all welded headed bar reinforcement represented by the tests will be rejected in accordance with the provisions in Section 6-1.04, "Defective Materials," of the Standard Specifications.

All welded headed bar reinforcement of each bar size from each production lot to be shipped to the site shall be tagged in such a manner that each such production lot can be accurately identified at the job site. All unidentified welded headed bar reinforcement received at the job site will be rejected.

MARKING.--All welded headed bar reinforcement shall be identified by a distinguishing set of marks legibly stamped onto the flat outer side of the head, away from the bar, to denote the following:

1) Point of Origin--Letter or symbol established as the manufacturer's designation.
2) Type of Welded Headed Reinforcing Bar--Letter T indicating that the welded headed bar reinforcement was produced to this specification.

MEASUREMENT AND PAYMENT.--Full compensation for placing the completed welded headed bar reinforcement into the work shall be considered as included in the contract unit prices paid for erect precast concrete pile cap assembly and erect precast concrete jacket assembly and no additional compensation will be allowed therefor.

10-1A.22 EPOXY-COATED REINFORCEMENT

Epoxy-coated reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

Section 52-1.02B, "Epoxy-coated Bar Reinforcement," of the Standard Specifications is replaced with the following:

52-1.02B Epoxy-coated Prefabricated Reinforcement.—Bar reinforcement to be epoxy-coated shall conform to the ASTM Designation and grade required or permitted by Section 52-1.02A, "Bar Reinforcement," for the location or type of structure involved. The coated bar reinforcement shall conform to the provisions of ASTM Designation: A 934/A 934M except as provided herein.

Wire reinforcement to be epoxy-coated shall conform to the ASTM Designation and grade required or permitted by Section 52-1.02D, "Reinforcing Wire and Plain Bars," for the location or type of structure involved. The coated wire reinforcement shall conform to the provisions for Class A, Type 2 coating of ASTM Designation: A 884/A 884M except as provided herein.

Appendices X1 and X2, "Guidelines For Job-Site Practices," of ASTM Designation: A 884/A 884M and A 934/A 934M, respectively, shall apply except as provided herein. The term "shall" shall replace the term "should" in these appendices. Section X1.2 of Appendix X1 and Section X2.2 of Appendix X2 shall not apply.

All coatings shall be purple or gray in color.

Except for field welding of butt splices, all welding of reinforcement shall be complete prior to epoxy coating the reinforcement.

Bending of epoxy-coated reinforcement after the coating has been applied will not be allowed.

When any portion of a reinforcing bar or wire requires epoxy coating, the entire bar or wire shall be coated; except, when the bar or wire is spliced outside of the limits of epoxy coating shown on the plans, epoxy coating will not be required on the portion of bar or wire beyond the splice.

Within areas where epoxy-coated reinforcement is required, tie wire and bar chairs or other metallic devices used to secure or support the reinforcement shall be plastic-coated or epoxy-coated to prevent corrosion of the devices or damage to the coated reinforcement.

Prior to coating, the Contractor shall furnish to the Transportation Laboratory a representative 4-ounce sample from each batch of epoxy coating material to be used. Each sample shall be packaged in an airtight container identified with the manufacturer's name and batch number.

Two 30-inch long samples of coated bar or wire reinforcement from each size and from each load shipped to the jobsite shall be furnished to the Engineer for testing. These samples shall be representative of the material furnished. These samples, as well as any additional random samples taken by the Engineer, may be tested for specification compliance. Additional sampling, and all tests performed by the Engineer, may be performed at any location deemed appropriate by the Engineer. Failure of any sample to meet the requirements of the specifications will be cause for rejection.

If any bar tested for coating thickness or for adhesion of coating fails to meet the requirements for coated bars in Section 9 of ASTM Designation: A 934/A 934M, 2 retests on random samples taken from bars represented by the failed test will be conducted for each failed test. If the results of both retests meet the specified requirements, the coated bars represented by the samples may be certified as meeting the test requirements.

If any wire reinforcement tested for coating thickness or for flexibility fails to meet the requirements for coated wire in Section 8 of ASTM Designation: A 884/A 884M, 2 retests on random samples taken from wire represented by the failed test will be conducted for each failed test. If the results of both retests meet the specified requirements, the coated wire represented by the samples may be certified as meeting the test requirements.

Epoxy-coated reinforcement shall be covered with an opaque polyethylene sheeting or other suitable protective material to protect the reinforcement from exposure to sunlight, salt spray and weather. For stacked bundles, the protective covering shall be draped around the perimeter of the stack. The covering shall be adequately secured; however, it should allow for air circulation around the reinforcement to prevent condensation under the covering. Epoxy-coated reinforcement shall not be stored within 1000 feet of ocean or tidal water for more than 2 months.

All visible damage to coatings caused by shipping, handling or installation shall be repaired as required for repairing coating damaged prior to shipment as specified in ASTM Designation: A 934/A 934M for bar reinforcement or ASTM Designation: A 884/A 884M for wire reinforcement. When the extent of coating damage prior to repair exceeds 2 percent of the bar or wire surface area in any one foot length, repair of the bar or wire will not be allowed and the coated bar or wire will be rejected.

The patching material and process shall be suitable for field application. The patching material shall be prequalified as required for the coating material and shall be either identified on the container as a material compatible with the reinforcement coating, or shall be accompanied by a Certificate of Compliance certifying that the material is compatible with the reinforcement coating. Damaged areas shall be patched in accordance with the patching material manufacturer's recommendations.

Except for lap splices, all splices for epoxy-coated reinforcement shall be coated with a corrosion protection covering that is on the Department's list of approved products. The covering shall be installed in accordance with

the manufacturer's recommendations and as directed by the Engineer. The list is available from the Office of Materials Engineering and Testing Services, 5900 Folsom Boulevard, Sacramento, CA 95819, telephone (916) 227-7000.

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

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," shall be furnished for each shipment of epoxy-coated bar or wire reinforcement certifying that the coated bars or wire conform to the requirements of ASTM Designation: A 934/A 934M for bars or A 884/A 884M for wire and Section 52-1.02B, "Epoxy-coated Bar Reinforcement." Said Certificate of Compliance shall include all the certifications specified in ASTM Designation: A 934/A 934M for bars or ASTM Designation: A 884/A 884M for wire and a statement that the coating material has been prequalified by acceptance testing performed by the Valley Forge Laboratories, Inc., Devon, Pennsylvania.

Any portion of bar or wire reinforcement extending beyond the limits for epoxy coated reinforcement shown on the plans will be measured and paid for as bar reinforcing steel (bridge).

10-1A.23 EPOXY-COATED REINFORCEMENT (FENDER)

Epoxy-coated reinforcement used in the seismic retrofit of the fenders shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

Section 52-1.02B, "Epoxy-coated Bar Reinforcement," of the Standard Specifications is replaced with the following:

52-1.02B Epoxy-coated Prefabricated Reinforcement.—Bar reinforcement to be epoxy-coated shall conform to the ASTM Designation and grade required or permitted by Section 52-1.02A, "Bar Reinforcement," for the location or type of structure involved. The coated bar reinforcement shall conform to the provisions of ASTM Designation: A 934/A 934M except as provided herein.

Wire reinforcement to be epoxy-coated shall conform to the ASTM Designation and grade required or permitted by Section 52-1.02D, "Reinforcing Wire and Plain Bars," for the location or type of structure involved. The coated wire reinforcement shall conform to the provisions for Class A, Type 2 coating of ASTM Designation: A 884/A 884M except as provided herein.

Appendices X1 and X2, "Guidelines For Job-Site Practices," of ASTM Designation: A 884/A 884M and A 934/A 934M, respectively, shall apply except as provided herein. The term "shall" shall replace the term "should" in these appendices. Section X1.2 of Appendix X1 and Section X2.2 of Appendix X2 shall not apply.

All coatings shall be purple or gray in color.

Except for field welding of butt splices, all welding of reinforcement shall be complete prior to epoxy coating the reinforcement.

Bending of epoxy-coated reinforcement after the coating has been applied will not be allowed.

When any portion of a reinforcing bar or wire requires epoxy coating, the entire bar or wire shall be coated; except, when the bar or wire is spliced outside of the limits of epoxy coating shown on the plans, epoxy coating will not be required on the portion of bar or wire beyond the splice.

Within areas where epoxy-coated reinforcement is required, tie wire and bar chairs or other metallic devices used to secure or support the reinforcement shall be plastic-coated or epoxy-coated to prevent corrosion of the devices or damage to the coated reinforcement.

Prior to coating, the Contractor shall furnish to the Transportation Laboratory a representative 4-ounce sample from each batch of epoxy coating material to be used. Each sample shall be packaged in an airtight container identified with the manufacturer's name and batch number.

Two 30-inch long samples of coated bar or wire reinforcement from each size and from each load shipped to the jobsite shall be furnished to the Engineer for testing. These samples shall be representative of the material furnished. These samples, as well as any additional random samples taken by the Engineer, may be tested for specification compliance. Additional sampling, and all tests performed by the Engineer, may be performed at any location deemed appropriate by the Engineer. Failure of any sample to meet the requirements of the specifications will be cause for rejection.

If any bar tested for coating thickness or for adhesion of coating fails to meet the requirements for coated bars in Section 9 of ASTM Designation: A 934/A 934M, 2 retests on random samples taken from bars represented by the failed test will be conducted for each failed test. If the results of both retests meet the specified requirements, the coated bars represented by the samples may be certified as meeting the test requirements.

If any wire reinforcement tested for coating thickness or for flexibility fails to meet the requirements for coated wire in Section 8 of ASTM Designation: A 884/A 884M, 2 retests on random samples taken from wire represented by the failed test will be conducted for each failed test. If the results of both retests meet the specified requirements, the coated wire represented by the samples may be certified as meeting the test requirements.

Epoxy-coated reinforcement shall be covered with an opaque polyethylene sheeting or other suitable protective material to protect the reinforcement from exposure to sunlight, salt spray and weather. For stacked bundles, the protective covering shall be draped around the perimeter of the stack. The covering shall be adequately secured; however, it should allow for air circulation around the reinforcement to prevent condensation under the covering. Epoxy-coated reinforcement shall not be stored within 1000 feet of ocean or tidal water for more than 2 months.

All visible damage to coatings caused by shipping, handling or installation shall be repaired as required for repairing coating damaged prior to shipment as specified in ASTM Designation: A 934/A 934M for bar reinforcement or ASTM Designation: A 884/A 884M for wire reinforcement. When the extent of coating damage prior to repair exceeds 2 percent of the bar or wire surface area in any one foot length, repair of the bar or wire will not be allowed and the coated bar or wire will be rejected.

The patching material and process shall be suitable for field application. The patching material shall be prequalified as required for the coating material and shall be either identified on the container as a material compatible with the reinforcement coating, or shall be accompanied by a Certificate of Compliance certifying that the material is compatible with the reinforcement coating. Damaged areas shall be patched in accordance with the patching material manufacturer's recommendations.

Except for lap splices, all splices for epoxy-coated reinforcement shall be coated with a corrosion protection covering that is on the Department's list of approved products. The covering shall be installed in accordance with the manufacturer's recommendations and as directed by the Engineer. The list is available from the Office of Materials Engineering and Testing Services, 5900 Folsom Boulevard, Sacramento, CA 95819, telephone (916) 227-7000.

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

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," shall be furnished for each shipment of epoxy-coated bar or wire reinforcement certifying that the coated bars or wire conform to the requirements of ASTM Designation: A 934/A 934M for bars or A 884/A 884M for wire and Section 52-1.02B, "Epoxy-coated Bar Reinforcement." Said Certificate of Compliance shall include all the certifications specified in ASTM Designation: A 934/A 934M for bars or ASTM Designation: A 884/A 884M for wire and a statement that the coating material has been prequalified by acceptance testing performed by the Valley Forge Laboratories, Inc., Devon, Pennsylvania.

Any portion of bar or wire reinforcement extending beyond the limits for epoxy-coated reinforcement (fender) shown on the plans will be measured and paid for as bar reinforcing steel (bridge).

10-1.A.24 STEEL STRUCTURES

Construction of steel structures shall conform to the provisions in Section 55, "Steel Structures," of the Standard Specifications and these special provisions.

Attention is directed to "Welding Quality Control" elsewhere in these special provisions.

GENERAL.—

All manufacturing processes for steel fastener and high strength steel fastener assemblies 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 such steel material shall be considered a manufacturing process subject to these 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 fastener and high strength steel fastener assemblies. 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 exceptions allowed herein.

Structural steel shall include all elements required to construct steel tower retrofits at piers, including eccentric braced frames, moment frames, top horizontal struts, cover plates at existing tower legs, uplift dampers, and high-strength bars required for anchorage of towers to the existing substructure.

High-strength bars included as part of the steel tower anchorages to the existing shafts and the horizontal bars as part of the uplift dampers at the base of select steel towers shall conform to the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications and these special provisions.

Cored holes with high-strength threaded rods to be bonded and pressure grouted, as shown on the plans, shall be bonded and grouted under pressure in accordance with these special provisions.

Bonding shall conform to the details shown on the plans and the provisions in Section 83-2.02D(1), "General," of the Standard Specifications.

Grout shall conform to the provisions in Section 50-1.09, “Bonding and Grouting,” of the Standard Specifications.

The top of the cored hole to be pressure grouted shall be sealed, and have inlet and outlet valves, and have grout tubes and exit ports for pressure grouting the hole from the bottom up. Grouting equipment and grouting operations shall conform to the provisions in Section 50-1.09, “Bonding and Grouting,” of the Standard Specifications.

The first paragraph in Section 55-1.02, "Drawings," of the Standard Specifications is amended to read:

> The Contractor shall submit working drawings for structural steel to the Office of Structure Design, (OSD) for approval in accordance with the provisions in Section 5-1.02, “Plans and Working Drawings.” For initial review, 6 sets of the drawings shall be submitted for highway bridges and 10 sets shall be submitted for railroad bridges. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to OSD for final approval and for use during construction.

The seventh paragraph in Section 55-1.02, "Drawings," of the Standard Specifications is amended to read:

> At the completion of each structure on the contract, one set of reduced prints on 60 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 that 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 eighth paragraph in Section 55-1.02, "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 on the upper left side of each page 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 first sentence of the second paragraph in Section 55-1.03, “Inspection,” of the Standard Specifications is amended to read:

> The Contractor shall furnish to the Engineer a copy of mill orders, certified mill test reports, a Certificate of Compliance for all fabricated structural steel to be used in the work, other than steel which is to be used under the provisions in Section 55-2.07, “Unidentified Stock Material,” and other reports or certificates required by the specifications.

Certified mill test reports for the material of the link beam flanges and web, and for the steel flange plates and rolled shapes for moment frame towers which have flange reductions shall be approved by the Engineer prior to the start of fabrication.

MATERIALS.--The first paragraph, including the material table, in Section 55-2.01, "Description," of the Standard Specifications is amended to read:

> **Description.**--The various materials shall conform to the specifications of ASTM as listed in the following tabulation with certain modifications and additions as specified:

MATERIAL	SPECIFICATION
Structural steel	ASTM Designation: A 709/A 709M, Grade 36 [250] or A 36/A 36M[a]
High strength low alloy columbium vanadium steel	ASTM Designation: A 709/A 709M, Grade 50 [345] or A 572/A 572M, Grade 50 [345][a]
High strength low alloy structural steel	ASTM Designation: A 709/A 709M, Grade 50W [345 W] or A 588/A 588M[a]
High-yield strength, quenched and tempered alloy steel plate suitable for welding	ASTM Designation: A 709/A 709M, Grade 100 [690] and Grade 100W [690W] or A 514/A 514M[a]
Steel fasteners for general applications:	
Bolts and studs which include threaded rods and nonheaded anchor bolts	ASTM Designation: A 307 or AASHTO Designation: M 314, Grade 36 or 55
Nuts	ASTM Designation: A 563 including Appendix X1[b,c]
Washers	ASTM Designation: F 844
High strength steel fasteners:	
Bolts for structural steel joints	ASTM Designation: A 325 or A 325X
Bolts and studs which include threaded rods and nonheaded anchor bolts, for general applications	ASTM Designation: A 449
Nuts	ASTM Designation: A 563 including Appendix X1[b] or A 563M including Appendix X1[b,c]
Washers	ASTM Designation: F 436 or F 436M

Direct tension indicators	ASTM Designation: F 959 or F 959M, zinc coated
Carbon steel for forgings, pins and rollers	ASTM Designation: A 668/A 668M, Class G
Alloy steel for forgings	ASTM Designation: A 668/A 668M, Class G
Pin nuts	ASTM Designation: A 36/A 36M
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
Carbon steel structural tubing	ASTM Designation: A 500, Grade B or A 501
Steel pipe (Hydrostatic testing will not apply)	ASTM Designation: A 53, Type E or S, Grade B; A 106, Grade B; or A 139, Grade B
Stud connectors	ASTM Designation: A 108 and ANSI/AASHTO/AWS D1.5

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

(b) Nuts made and marked in accordance with the requirements of ASTM Designation: A 194/A 194M, Grade 2H are an acceptable substitution for heavy hex nuts complying with ASTM Designation: A 563, Grade DH. This substitution is permitted, provided that the zinc coating, overtapping, lubrication, rotational capacity requirements and testing of the substituted nuts meet the same requirements as specified for the A 563 nuts, including all supplementary requirements. Proof load testing and stresses required for ASTM A 194 zinc-coated nuts shall be the same as required for ASTM A 194 plain uncoated nuts.

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

The second paragraph in Section 55-2.01, "Description," of the Standard Specifications is deleted.

The fifth paragraph in Section 55-2.01, "Description," of the Standard Specifications is amended to read:

All structural steel plate used for the fabrication of steel tower frames, horizontal struts, uplift dampers, and cover plates shall meet the longitudinal Charpy V-notch impact value requirements specified herein. Sampling procedures shall conform to the provisions in ASTM Designation: A 673. The H (Heat) frequency of testing shall be used for structural steels conforming to ASTM Designations: A 709/A 709M, Grades 36, 50 and 50W. The P (Piece) frequency of testing shall be used for structural steel conforming to ASTM Designation: A 709/A 709M, Grades 100 and 100W. Charpy V-notch impact values shall be determined in accordance with ASTM Designation: E 23.

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

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

The steel flange plates and the rolled shapes for the moment frame towers which will have flange reductions as shown on the plans shall have a maximum yield strength no greater than 60,000 pounds per square inch.

Steel plates for the webs of link beam members shall have a maximum yield strength no greater than 60,000 pounds per square inch.

Steel for flanges and webs of link beam members and the flange plates with flange reductions shall conform to the requirements in ASTM Designation: A 709 Grade 50T2 and the following supplementary requirements:

S2	Frequency of Tension Tests
S5	Ultrasonic Examination
S14	Bend Test
S83	Non-Fracture-Critical, T, Material, Toughness Tests and Markings
S93	Fine Austentic Grain Size
S93	Limitation on Weld Repair (Fracture Critical Member Only)

Ultrasonic examinations shall conform to the requirements in ASTM Designation: A 578. Steel for flanges and webs of link beam members and flange plates with flange reductions shall satisfy the requirements for Acceptance Standard - Level III when tested in conformance with ASTM Designation: A 578.

Steel for flanges and webs of link beam members and flange plates with flange reductions shall satisfy the requirements for Testing Zone 3 when tested in conformance with ASTM Designation: A 709, Supplementary Requirement – S83, “Non-Fracture-Critical, T, Material; Toughness Tests and Marking.”

The second and fourth paragraphs in Section 55-2.02, “Structural Steel,” of the Standard Specifications are deleted.

Section 55-2.02, “Structural Steel,” of the Standard Specifications is amended by adding the following paragraph after the first paragraph:

Changes in the structural steel members, including girder flange plates, shall be approved in writing by the Engineer prior to fabrication. Rolled shapes may not be substituted for welded sections, and welded sections may not be substituted for the rolled shapes shown on the plans.

All structural steel rolled shapes shall conform to the Charpy V-notch impact values specified for steel plate in Section 55-2, "Materials," of the Standard Specifications.

High-strength fastener assemblies, and other bolts attached to structural steel with nuts and washers shall be zinc-coated.

CHECK TESTING.--Structural steel shall conform to the designated ASTM Standard and the check testing requirements of this section.

Check samples shall be furnished for each heat of each thickness of plate used for flanges and webs of the link beam members, flange plates with flange reductions, and each size of rolled shape.

Steel plates, shapes or bars containing check samples shall be furnished from the mill with extra length in order to provide for removal of material for check samples at the point of fabrication. Check samples may be cut from either end of the designated plate, shape or bar.

At the option of the Contractor, check samples may be removed at the rolling mill rather than at the point of fabrication. The sample will be removed from the mill plate that will be stripped by the fabricator to produce the designated plate and may be taken from any location within that plate. The mill plate from which samples are removed shall be marked with the same identifying numbers as are used on the samples. If the Contractor requests that samples be

removed at the rolling mill, the Contractor will be charged for the cost of providing State inspection at the mill to witness the removal of samples, as provided in Measurement and Payment of these special provisions.

Unless otherwise directed, material for check samples shall be removed by the Contractor in the presence of the Engineer. Check samples for plates wider than 24 inches shall be 14 inches wide and 18 inches long with the long dimension transverse to the direction of rolling. Check samples for all other products shall be 18 inches long, taken in the direction of rolling, and the width shall be the product width. Check samples shall be removed and delivered to the Engineer before the material is fabricated into components and preferably when it is still being prepared for fabrication. The direction of rolling, heat numbers, and plate numbers shall be marked on the samples with paint or other indelible marking material or may be steel stamped in one corner of the plate.

Unless otherwise directed, check samples shall be delivered to the Transportation Laboratory at the Contractor's expense. The check samples will be tested by the Transportation Laboratory for compliance with the requirements specified in ASTM and these special provisions. Check sample test results will be reported to the Contractor within 2 weeks of delivery to the Transportation Laboratory. In the event several samples are submitted on the same day, an additional day will be added for each 2 samples submitted. The test report will be made for the group of samples.

The results of the tensile and impact tests shall not vary more than 5 percent below specified minimum or 5 percent above specified maximum requirements except that if the initial check test results vary more than 5 percent but not more than 10 percent from the specified requirements, a re-test may be performed on another sample from the same heat and thickness. The results of the re-test shall not vary more than 5 percent from the original specified requirements. If the results of check tests exceed these permissible variations, all material planned for use from the heat represented by said check samples shall be subject to rejection.

FABRICATION.--The first paragraph of Section 55-3.05, “Facing and Bearing Surfaces,” of the Standard Specifications is amended to read:

55-3.05 Faying (Contact) and Bearing Surfaces.—Surfaces of bearing and base plates and other metal surfaces that are to come in contact with each other or with ground concrete surfaces or with asbestos sheet packing shall be flat to within 1/32 inch tolerance in 12 inches and to within 1/16 inch tolerance overall. Surfaces of bearing and base plates and other metal bearing surfaces that are to come in contact with preformed fabric pads, elastomeric bearing pads or portland cement mortar shall be flat to within 1/8 inch tolerance in 12 inches and to within 3/16 inch tolerance overall.

Paragraphs 1 through 5, excluding Section 55-3.14A, of Section 55-3.14, "Bolted Connections," of the Standard Specifications are amended to read:

55-3.14 Bolted Connections.—Bolted connections in structural steel joints, unless otherwise shown on the plans or specified in the special provisions, shall be made with high-strength steel fastener assemblies. These fastener assemblies shall consist of either 1) a high-strength steel bolt, nut and hardened washer or 2) a tension control bolt, nut and hardened washer. A direct tension indicator (DTI) may be used with the high-strength bolt, nut and hardened washer assembly.

Bolted connections using fastener assemblies shall conform to the "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" (RCSC Specification) approved by the Research Council on Structural Connections of the Engineering Foundation, and the provisions of these special provisions.

When reference is made to the RCSC Specification, the "Allowable Stress Design" version shall be used when allowable stress design is shown on the plans and the "Load and Resistance Factor Design" version shall be used when load factor design or load and resistance factor design is shown on the plans.

All connections made with fastener assemblies shall be tensioned and inspected after tensioning, whether classified as a slip critical or bearing type connection, unless otherwise designated on the plans.

The hardened washer shall be installed under the nut or bolt head, whichever is the element turned in tightening. Nuts shall be located, wherever practicable, on the side of the member that will not be visible from the traveled way. Nuts for bolts that will be partially embedded in concrete shall be located on the side of the member that will be encased in concrete.

Each length and diameter of fastener assemblies used in any one joint of a high-strength bolted connection shall be from the same rotational capacity lot. The Contractor shall keep a record of which rotational capacity lots are used in each joint.

The Contractor shall provide, calibrate and maintain the equipment and tools necessary for the preliminary testing, installation and inspection of all fasteners.

Bolt tension measuring devices and torque wrenches shall be calibrated within one year prior to first being used on the job, and a minimum of once each year thereafter. This calibration shall be done by a qualified independent laboratory or authorized warranty repair and calibration center recognized by the tool manufacturer. Bolt tension measuring devices shall be calibrated, to within one percent of the actual tension value, with a minimum of 4

verification readings evenly spaced over a range of 20 to 80 percent of full scale. Torque wrenches shall have either a dial gage or digital read-out. Torque wrenches shall be calibrated, to within 2 percent of the actual torque value, with a minimum of 4 verification readings evenly spaced over a range of 20 to 100 percent of full scale. Test equipment used for certification and calibration standards shall be traceable to the National Institute of Standards and Technology.

Prior to the use of bolt tension measuring devices or torque wrenches, the Contractor shall furnish to the Engineer certificates of calibration with plots of verification readings for each device or wrench.

In addition to the submittals required in Section 55-1.03, "Inspection," of the Standard Specifications, the Contractor shall furnish certified test reports of tests on fastener components and fastener assemblies performed prior to shipment to the job-site. Certified test reports for fastener components and fastener assemblies shall be furnished to the Engineer prior to use of the fastener assembly. The certified test reports shall include the rotational capacity lot numbers for fastener assemblies supplied and test reports specified in the "Certification," "Report," "Number of Tests and Retests," and "Certification and Test Report" sections in the appropriate ASTM specifications for the fastener components.

For all bolted connections, the contact surfaces shall be cleaned and coated before assembly in conformance with the provisions for cleaning and painting structural steel in the special provisions.

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

55-3.14B Installation.—If water soluble lubricants are used on nuts, fastener installation will not be permitted when surface moisture is present at a high-strength bolted connection. The Engineer may require the Contractor to perform additional installation tension tests and rotational capacity tests before fastener installation and tensioning is performed at any high-strength bolted connection during inclement weather.

Bolts shall be tightened to the required tension by use of a tension control bolt installation wrench, a pneumatic or hydraulic wrench, a calibrated manual torque wrench, the turn-of-nut method, or by using mechanically zinc coated direct tension indicators. The pneumatic or hydraulic wrench shall have an adjustable control unit that can be set to positively shut off at the desired torque.

The threaded ends of fastener assemblies projecting past the outer face of the nut (thread stickout), where first full formed threads are present, shall be at least flush with, but not extend more than 1/4 inch beyond, the outer face of the nut. A maximum of one hardened washer, in addition to the single washer required under the turned element, may be installed under the non-turning element of the fastener assembly. The thread stickout of studs, rods and anchor bolts, shall be at least 1/8 inch, and there shall be a minimum of 3 full threads located within the grip of the connection. In addition, a minimum of 3 full threads shall be located between the bearing surfaces of the bolt head and nut. The total stickout shall not be excessive.

Larger bolts, having diameters up to 1/4 inch greater than the diameter of the bolt shown on the plans, may be used if approved by the Engineer provided that spacing and edge distance requirements for the larger bolt are met and the net section is adequate.

When DTIs are used, one DTI shall be installed under each bolt head with the DTI protrusions contacting the bearing surface of the bolt head. To tension the bolt, the bolt head shall be held stationary and the nut turned. Unless otherwise specified, manufacturer's installation procedures shall be followed. Each bolt shall be tensioned in at least 2 tightening stages until at least 50% of the gaps on each DTI are greater than zero and less than 0.005 inch. Complete crushing of all DTI protrusions (0 gaps) on any given DTI will be cause for rejection.

Unless otherwise specified, manufacturer's installation procedures for tension control bolts shall be followed.

The same head orientation shall be used within any one high-strength bolted connection.

55-3.14C Rotational Capacity Testing Prior to Shipment to Job Site.—Rotational capacity tests on fastener assemblies shall be performed as specified in the special provisions.

55-3.14D Installation Tension Testing and Rotational Capacity Testing After Arrival to Job Site.—Installation tension tests and rotational capacity tests on fastener assemblies shall be performed as specified in the special provisions.

55-3.14E Inspection.—For all types of fastener assemblies, at least 10%, but no fewer than 2 bolts in each high-strength bolted connection shall be inspected after tensioning in conformance with the requirements of Section 9, "Inspection," of the RCSC Specification. The inspection of a completed joint shall be performed within 48 hours after all fasteners in this joint have been tensioned. The Contractor shall be responsible for determining the job inspecting torque as specified in Section 9(b), "Arbitration Inspection," of the RCSC Specification. A separate inspecting torque shall be determined and used for each different rotational capacity lot of fasteners. The procedure described for determining arbitration torque in steps 1 through 9 of the "Arbitration of Disputes Inspection Torque Method-

Short Bolts," section of the "Structural Bolting Handbook," published by the Steel Structures Technology Center, Incorporated shall replace Section 9(b)(2) of the RCSC Specification for determining the job inspecting torque for short bolts. Bolt tension shall be checked at locations selected by the Engineer. Work required to perform such inspection shall be done by the Contractor in the presence of the Engineer and in such a manner that the Engineer can read the torque wrench gage or access the DTI gaps during inspection.

Rotational Capacity Testing Prior to Shipment to Job Site.—Rotational capacity tests shall be performed on all lots of high-strength fastener assemblies prior to shipment to the job site. Galvanized assemblies shall be tested as galvanized. One hardened washer shall be used under each nut for the tests.

Each combination of bolt production lot, nut lot and washer lot shall be tested as an assembly.

A rotational capacity lot number shall be assigned to each combination of lots tested. Each shipping unit of fastener assemblies shall be plainly marked with the rotational capacity lot number.

Two fastener assemblies from each rotational capacity lot shall be tested.

The following equipment, procedure and acceptance criteria shall be used to perform rotational capacity tests on, and determine acceptance of long bolts. Fasteners are considered to be long bolts when full nut thread engagement can be achieved when installed in a bolt tension measuring device.

Long Bolt Test Equipment:

1. Calibrated bolt tension measuring device with adequate tension capacity for the bolts being tested.
2. Calibrated dial or digital torque wrench. A torque multiplier may be required for large diameter bolts.
3. Spacer washers or bushings. When spacer washers or bushings are required, they shall have the same inside diameter and equal or larger outside diameter as the appropriate hardened washers conforming to the requirements of ASTM Designation: F436.
4. Steel beam or member, such as a girder flange or cross frame, to which the bolt tension measuring device will be attached. The device shall be accessible from the ground.

Long Bolt Test Procedure:

1. Measure the bolt length. The bolt length is defined as the distance from the end of the threaded portion of the shank to the underside of the bolt head.
2. Install the nut on the bolt so that 3 to 5 full threads of the bolt are located between the bearing face of the nut and the underside of the bolt head. Measure and record the thread stickout of the bolt. Thread stickout is determined by measuring the distance from the outer face of the nut to the end of the threaded portion of the shank.
3. Insert the bolt into the bolt tension measuring device and install the required number of washers, and additional spacers as needed, directly beneath the nut to produce the thread stickout measured in Step 2.
4. Tighten the nut using a hand wrench to a snug-tight condition. The snug tension shall not be less than the Table A value but may exceed the Table A value by a maximum of 2 kips.

Table A

High-Strength Fastener Assembly Tension Values to Approximate Snug-Tight Condition	
Bolt Diameter (inches)	Snug Tension (kips)
1/2	1
5/8	2
3/4	3
7/8	4
1	5
1 1/8	6
1 1/4	7
1 3/8	9
1 1/2	10

5. Match-mark the assembly by placing a mark on one corner of the nut and a heavy reference start line on the face plate of the bolt tension measuring device which aligns with the mark on the nut. Place an additional mark on the outside of the socket that overlays the mark on the nut corner. It will be visible while turning

the nut. Make an additional mark on the face plate, either 2/3 of a turn, one turn, or 1 1/3 turn clockwise from the heavy reference start line, depending on the bolt length being tested as shown in Table B.

Table B

Required Nut Rotation for Rotational Capacity Tests(a,b)	
Bolt Length (measured in Step 1)	Required Rotation (turn)
4 bolt diameters or less	2/3
Greater than 4 bolt diameters but no more than 8 bolt diameters	1
Greater than 8 bolt diameters, but no more than 12 bolt diameters(c)	1 1/3
(a) Nut rotation is relative to bolt, regardless of the element (nut or bolt) being turned. For bolts installed by 1/2 turn and less, the tolerance shall be plus or minus 30 degrees; for bolts installed by 2/3 turn and more, the tolerance shall be plus or minus 45 degrees. (b) Applicable only to connections in which all material within grip of the bolt is steel. (c) When bolt length exceeds 12 diameters, the required rotation shall be determined by actual tests in a suitable tension device simulating the actual conditions.	

6. Turn the nut to achieve the applicable minimum bolt tension value listed in Table C. After reaching this tension, record the moving torque, in foot-pounds, required to turn the nut, and also record the corresponding bolt tension value in pounds. Torque shall be measured with the nut in motion. Calculate the value, T (in ft-lbs), where T=[(the measured tension in pounds) x (the bolt diameter in inches) / 48 in/ft].

Table C

Minimum Tension Values for High-Strength Fastener Assemblies	
Bolt Diameter (inches)	Minimum Tension (kips)
1/2	12
5/8	19
3/4	28
7/8	39
1	51
1 1/8	56
1 1/4	71
1 3/8	85
1 1/2	103

7. Turn the nut further to increase bolt tension until the rotation listed in Table B is reached. The rotation is measured from the heavy reference line made on the face plate after the bolt was snug-tight. Record this bolt tension.
8. Loosen and remove the nut and examine the threads on both the nut and bolt.

Long Bolt Acceptance Criteria:

An assembly shall pass the following requirements to be acceptable: 1) the measured moving torque (Step 6) shall be less than or equal to the calculated value, T (Step 6), 2) the bolt tension measured in Step 7 shall be greater than or equal to the applicable turn test tension value listed in Table D, 3) the nut shall be able to be removed from the bolt without signs of thread stripping or galling after the required rotation in Step 7 has been

achieved, 4) the bolt does not shear from torsion or fail during the test and 5) the assembly does not seize before the final rotation in Step 7 is reached. Elongation of the bolt in the threaded region between the bearing face of the nut and the underside of the bolt head is expected and will not be considered a failure. Both fastener assemblies tested from one rotational capacity lot shall pass for the rotational capacity lot to be acceptable.

Table D

Turn Test Tension Values	
Bolt Diameter (inches)	Turn Test Tension (kips)
1/2	14
5/8	22
3/4	32
7/8	45
1	59
1 1/8	64
1 1/4	82
1 3/8	98
1 1/2	118

The following equipment, procedure and acceptance criteria shall be used to perform rotational capacity tests on and determine acceptance of short bolts. Fasteners are considered to be short bolts when full nut thread engagement cannot be achieved when installed in a bolt tension measuring device.

Short Bolt Test Equipment:

1. Calibrated dial or digital torque wrench. A torque multiplier may be required for large diameter bolts.
2. Spud wrench or equivalent.
3. Spacer washers or bushings. When spacer washers or bushings are required, they shall have the same inside diameter and equal or larger outside diameter as the appropriate hardened washers conforming to the requirements of ASTM Designation: F436.
4. Steel plate or girder with a hole to install bolt. The hole size shall be 1/16 inch greater than the nominal diameter of the bolt to be tested. The grip length, including any plates, washers, and additional spacers as needed, shall provide the proper number of threads within the grip, as required in Step 2 below.

Short Bolt Test Procedure:

1. Measure the bolt length. The bolt length is defined as the distance from the end of the threaded portion of the shank to the underside of the bolt head.
2. Install the nut on the bolt so that 3 to 5 full threads of the bolt are located between the bearing face of the nut and the underside of the bolt head. Measure and record the thread stickout of the bolt. Thread stickout is determined by measuring the distance from the outer face of the nut to the end of the threaded portion of the shank.
3. Install the bolt into a hole on the plate or girder and install the required number of washers, and additional spacers as needed, between the bearing face of the nut and the underside of the bolt head to produce the thread stickout measured in Step 2.
4. Tighten the nut using a hand wrench to a snug-tight condition. The snug condition shall be the full manual effort applied to the end of a 12 inch long wrench. This applied torque shall not exceed 20 percent of the maximum allowable torque in Table E.

Table E

Maximum Allowable Torque for High-Strength Fastener Assemblies	
Bolt Diameter (inches)	Torque (ft-lbs)
1/2	145
5/8	285
3/4	500
7/8	820
1	1220
1 1/8	1500
1 1/4	2130
1 3/8	2800
1 1/2	3700

5. Match-mark the assembly by placing aligning marks, one on a corner of the nut, a radial line across the flat on the end of the bolt, and a heavy reference start line on the steel plate or girder. Place an additional mark on the outside of the socket that overlays the mark on the nut corner. It will be visible while turning the nut. Make 2 additional small marks on the steel plate or girder, one 1/3 of a turn and one 2/3 of a turn clockwise from the heavy reference start line on the steel plate or girder.
6. Using the torque wrench, tighten the nut to the rotation value listed in Table F. The rotation is measured from the heavy reference line described in Step 5 made after the bolt was snug-tight. A second wrench shall be used to prevent rotation of the bolt head during tightening. Measure and record the moving torque after this rotation has been reached. The torque shall be measured with the nut in motion.

Table F

Nut Rotation Required for Turn-of-Nut Installation(a,b)	
Bolt Length (measured in Step 1)	Required Rotation (turn)
4 bolt diameters or less	1/3
(a) Nut rotation is relative to bolt, regardless of the element (nut or bolt) being turned. For bolts installed by 1/2 turn and less, the tolerance shall be plus or minus 30 degrees. (b) Applicable only to connections in which all material within grip of the bolt is steel.	

7. Tighten the nut further to the 2/3 turn mark as indicated in Table G. The rotation is measured from the heavy reference start line made on the plate or girder when the bolt was snug-tight. Verify that the radial line on the bolt end is still in alignment with the start line.

Table G

Required Nut Rotation for Rotational Capacity Test	
Bolt Length (measured in Step 1)	Required Rotation (turn)
4 bolt diameters or less	2/3

8. Loosen and remove the nut and examine the threads on both the nut and bolt.

Short Bolt Acceptance Criteria:

An assembly shall pass the following requirements to be acceptable: 1) the measured moving torque from Step 6 shall be less than or equal to the maximum allowable torque from Table E, 2) the nut shall be able to be removed from the bolt without signs of thread stripping or galling after the required rotation in Step 7 has been achieved, 3) the bolt does not shear from torsion or fail during the test and 4) the assembly does not seize before the final rotation in Step 7 is reached. Elongation of the bolt in the threaded region between the bearing face of

the nut and the underside of the bolt head will not be considered a failure. Both fastener assemblies tested from one rotational capacity lot shall pass for the rotational capacity lot to be acceptable.

Installation Tension Testing and Rotational Capacity Testing After Arrival on Job Site.—Installation tension tests and rotational capacity tests on high-strength fastener assemblies shall be performed by the Contractor prior to acceptance or installation, and after arrival of the fastener assemblies on the job-site. The installation tension tests and rotational capacity tests shall be performed at the job-site, in the presence of the Engineer, on each rotational capacity lot of fastener assemblies.

Installation tension tests shall be performed on 3 representative fastener assemblies in conformance with Section 8, "Installation and Tightening," of the RCSC Specification. For short bolts, Section 8(d), "Joint Assembly and Tightening of Slip-Critical and Direct Tension Connections," of the RCSC Specification shall be replaced by the "Pre-Installation Testing Procedures," of the "Structural Bolting Handbook," published by the Steel Structures Technology Center, Incorporated.

The rotational capacity tests shall be performed in conformance with the requirements for rotational capacity tests in "Rotational Capacity Testing Prior to Shipment to Job Site" of these specifications.

At the Contractor’s expense, additional installation tension tests, tests required to determine job inspecting torque and rotational capacity tests shall be performed by the Contractor on each rotational capacity lot, in the presence of the Engineer, if 1) any fastener is not used within 3 months after arrival on the jobsite, 2) fasteners are improperly handled, stored, or subjected to inclement weather prior to final tightening, 3) significant changes are noted in original surface condition of threads, washers or nut lubricant or 4) the Contractor's required inspection is not performed within 48 hours after all fasteners in a joint have been tensioned.

Failure of a job-site installation tension test or a rotational capacity test will be cause for rejection of unused fasteners which are part of the rotational capacity lot.

When DTIs are used, installation verification tests shall be performed in conformance with appendix section X1.4 of ASTM Designation: F959, except that bolts shall be initially tensioned to a value 5 percent greater than the minimum required bolt tension.

Surface Preparation.—For all bolted connections, the 1) contact surfaces, 2) surfaces of outside existing members within the grip under bolt heads, nuts and washers and 3) inside surfaces of bolt holes shall be cleaned and coated before assembly in conformance with the provisions for cleaning and painting structural steel of these special provisions.

Sealing.—The perimeter around all DTI gaps shall be completely sealed with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II. The sealant shall be gray in color and have a minimum thickness of 1/16 inch. If painting is required, the sealing compound shall be applied prior to painting.

When zinc-coated fasteners are used, the sheared end of each tension control bolt shall be completely sealed with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II. The sealant shall be gray in color and shall have a minimum thickness of 1/16 inch. The sealant shall be applied to a clean sheared surface on the same day that the splined end is sheared off.

Thread Locking System.—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 will 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.

Welding.—The third paragraph of Section 55-3.17, "Welding," of the Standard Specifications is amended to read:

> The extent of radiographic testing on groove welds shall be in accordance with the requirements in ANSI/AASHTO/AWS D1.5, Subsection 6.7.1.2.

All structural steel components for the eccentrically braced frames and moment frames, and in addition the top horizontal struts at Piers 30, 34, 35, 44, 47, and 48 are defined as main members subject to tension and stress reversal. The main members include the pinned base assemblies, columns, horizontals, diagonals, all bracing members, intermediate ties to existing tower legs, collar beam assemblies at existing truss shoes, and steel attachments to existing tower legs and their connections.

In addition to the 10 percent magnetic particle testing for fillet welds, all filet welds for the link beams shall be 100 percent magnetic particle tested.

The flat side of all butt welded joints shall not deviate from flatness by more than 3/16 inch in a length of 2 feet centered over the weld joint.

Table 2.2 of ANSI/ AASHTO/AWS D1.5 is superseded by the following table:

Base Metal Thickness of the Thicker Part Joined, in.	Minimum Partial Joint Penetration Groove Weld Size, in.*
Over 1/4 to 1/2 inclusive	3/16
Over 1/2 to 3/4 inclusive	1/4
Over 3/4 to 1 1/2 inclusive	5/16
Over 1 1/2 to 2 1/4 inclusive	3/8
Over 2 1/4 to 6 inclusive	1/2
Over 6	5/8

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

Dimensional details and workmanship for welded joints in tubular and pipe connections shall conform to the provisions in Part A, Common Requirements of Nontubular and Tubular Connections and Part D, Specific Requirements for Tubular Connections, in Section 2 of AWS D1.1.

BEARINGS AND ANCHORAGES.--The last three paragraphs in Section 55-3.19, "Bearings and Anchorages," of the Standard Specifications are amended to read:

Grout to be placed below masonry plates or bearing plates of the bearing assemblies shall conform to the requirements in ASTM Designation: C107. The minimum 28-day compressive strength shall not be less than 7,500 pounds per square inch.

Stainless steel plates shall conform to the requirements of ASTM Designation: A240, Type 304.

Belleville spring washers shall be installed at structural steel anchorage assemblies as shown on the plans. One of the following spring washers shall be used:

PRODUCT	MANUFACTURER
Belleville spring washer 24-L-225 or equal	Solon Manufacturing Company 425 Center Street Chardon, OH 44024 (216) 286-7149
Belleville spring washer B2680-250-S or equal	Barnes Group 16319 Arthur Street Cerritos, CA 90703 (310) 926-8381

Alternate Belleville spring washers of equal quality may be submitted to the Engineer for approval.

Brass shim plates shall consist of commercially available half hard cartridge brass (UNS-260) of 0.30 to 0.26 zinc content.

The Contractor shall ultrasonically test existing bearing plates within 6 inches of all field welds shown on the plans. Ultrasonic testing shall conform to the provision of ASTM Designation: A 578. Ultrasonic test reports shall be submitted to the Engineer.

Within 10 working days of receipt of the completed reports for a given location, the Engineer will notify the Contractor in writing if any repairs to existing bearing plates are required.

Existing bearing plates shall be repaired by the Contractor as directed by the Engineer. Repairing existing bearing plates will be paid for as extra work, as provided for in Section 4-1.03D of the Standard Specifications.

MEASUREMENT AND PAYMENT.--Measurement and payment for steel structures shall conform to the provisions in Sections 55-4.01, "Measurement," and 55-4.02, "Payment," of the Standard Specifications and these special provisions.

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

> If a portion or all of the welded structural steel is fabricated more than 300 air line miles from both Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. Whereas it is and will be impracticable and extremely difficult to ascertain and determine the actual increase in such expenses, it is agreed that payment to the Contractor for furnishing said structural steel from each fabrication site located more than 300 air line miles from both Sacramento and Los Angeles will be reduced $5,000 or by an amount computed at $0.020 per pound of structural steel fabricated, whichever is greater, or in the case of each fabrication site located more than 3,000 air line miles from both Sacramento and Los Angeles, payment will be reduced $8,000 or by $0.036 per pound of structural steel fabricated, whichever is greater.

If a portion or all of check samples are removed at a mill more than 300 air line miles from both Sacramento and Los Angeles, shop inspection expenses will be sustained by the State which are in addition to expenses incurred for fabrication site inspection. Payment to the Contractor for furnishing structural steel will be reduced $2,000 for each mill located more than 300 air lines miles from both Sacramento and Los Angeles.

Full compensation for furnishing and installing all materials, equipment, and incidentals for structural steel shim plates, stainless steel plates and connectors, neoprene pads and gaskets, brass shims, Belleville spring washers and direct tension indicators, and ultrasonic testing of existing bearing plates, complete in place shall be considered as included in the contract price paid per pound, respectively, for furnish and erect structural steel (bridge) and no separate payment will be made therefor.

Full compensation for furnishing PTFE bearing assemblies, including furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the bearings and delivery to the job site shall be considered as included in the contract price paid per pound for furnish structural steel (bridge) and no separate payment will be made therefor.

Full compensation for doing all work involved with prestressing of steel tower anchorages to existing shafts and prestressing horizontal bars as part of the uplift dampers, including furnishing and installing high strength bars and bar anchorage assemblies and pressure grouting high strength bars, shall be considered as included in the contract price paid per pound for furnish and erect structural steel and no separate payment will be made therefor.

Full compensation for installing PTFE bearing assemblies, including furnishing all labor, tools, equipment, and incidentals, and for doing all the work involved in installing the bearings complete in place as shown on the plans, shall be considered as included in the contract price paid per pound for erect structural steel (bridge) and no separate payment will be made therefor.

Full compensation for doing all work involved with bonding and pressure grouting high-strength threaded rods in cored holes, including furnishing and installing high-strength threaded rods, shall be considered as included in the contract price paid per pound for furnish and erect structural steel and no separate payment will be made therefor.

10-1A.25 PTFE BEARING ASSEMBLY

PTFE bearings, consisting of unreinforced elastomeric bearing pads, polytetrafluoroethylene (PTFE) surfacing, and stainless and steel plates, 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.

Attention is drected to "Steel Structures," elsewhere in these special provisions regarding payment for PTFE bearing assemblies.

The Contractor shall submit to the Office of Structures Design, Documents Unit, P.O. Box 942874, Mail Stop 9, Sacramento, California 94274-0001 (1801 30th Street, Sacramento, CA 95816), telephone (916) 227-8230, for approval in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," working drawings of the PTFE bearings. For initial review, 4 sets of such drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to the said Office for final approval and for use during construction.

Working drawings shall be 22" x 34" or 11" x 17" in size and each drawing and calculation sheet shall include the job site name of the structure as shown on the contract plans, District-County-Route, bridge number, and contract number.

Working drawings shall be submitted sufficiently in advance of the start of the affected work to allow time for review by the Engineer and correction by the Contractor of the drawings without delaying the work. Such time shall be proportional to the complexity of the work but in no case shall such time be less than 6 weeks after complete drawings and all support data are submitted. The location of match marks on plate edges shall be shown on the working drawings.

At the completion the contract, one set of reduced prints on 60 pound (minimum) bond paper, 11 inches by 17 inches in size, of the corrected original tracings of all working drawings shall be furnished to the Engineer.

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 manufacturer shall furnish certificates of compliance in accordance with Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for all material used in the PTFE bearings.

The shear modulus of the elastomer in the elastomeric bearing pads shall be 110±11 psi.

Elastomeric bearing pads shall be all elastomer without fabric or steel reinforcement and shall be manufactured to the required thicknesses shown on the plans. Stacking or cold bonding of individual pads of a lesser thickness to attain the thickness shown on the plans will not be permitted. The elastomer shall conform to the requirements in Section 51-1.12H(1), "Plain and Fabric Reinforced Elastomeric Bearing Pads," of the Standard Specifications.

PTFE sheet shall be made from unfilled PTFE resin and shall conform to the following requirements:

Test	Test Method	Requirements
Tensile strength (Minimum)	ASTM D 1457	2800 psi
Elongation (Minimum)	ASTM D 1457	200 %

The PTFE resin shall be virgin material (not reprocessed) meeting the requirements of ASTM Designation: D 1457. Specific gravity shall be from 2.13 to 2.19. Melting point shall be 623° F. (±2° F.).

The PTFE sliding surface shall be provided with lubricant dimples with a maximum diameter of 0.32 inch, a minimum depth of 0.08 inch and a maximum depth of one half of the PTFE sheet thickness. The dimples shall be uniformly distributed within the area 1/4 inch from the edges of the PTFE sheet and occupy between 20 percent and 30 percent of the PTFE sheet area.

Stainless steel plates shall conform to the requirements of ASTM Designation: A 240, Type 304.

Steel plates, except stainless steel, shall conform to the requirements of ASTM Designation: A 36.

Welding of structural steel shall conform to the requirements of AWS D1.1.

The PTFE sheet shall be adhesive bonded to the steel plate under controlled factory conditions. The adhesive material shall be an epoxy resin conforming to the requirements of Federal Specification: MMM-A-134.

Contact surfaces of PTFE sheet and steel plate to be bonded shall be uniformly roughened to a minimum roughness height value of 250 micro-inches.

The side of the PTFE sheet to be bonded shall be factory treated by the sodium naphthalene or sodium ammonia process, after the contact surface is roughened.

After completion of the bonding operation the PTFE surface shall be smooth and free from bubbles. The PTFE sheet shall show no signs of delamination and shall be fully bonded in the recess.

The stainless steel plate shall be bonded to the steel sole plate under pressure using epoxy resin adhesive and then mechanically connected with 18-8 stainless steel cap screws. At the Contractor's option, the stainless steel plate may be perimeter welded to the sole plate. Stainless steel electrodes shall be used in accordance with the requirements of the electrode manufacturer.

After completion of the mechanical connection or weld operation, the stainless steel plate shall be smooth and free from waves.

The flatness of the bearing elements shall be controlled such that upon completion of the bearing assembly the PTFE/stainless steel sliding interface shall be in full bearing.

The mating surface of the stainless steel plate with the PTFE surfacing shall have a surface finish of less than 10 micro inches root-mean-square (rms), determined according to ANSI Standard B46.1. The sliding element of the production bearings shall have a first movement static coefficient of friction not exceeding 0.10 when tested without the coating of silicone grease.

Steel reinforced elastomeric bearing pads shall be fully vulcanized to the steel plates under factory controlled conditions and the bond shall have a peel-strength of at least 30 pounds per inch as determined by California Test 663.

Metal surfaces of bearings exposed to the atmosphere in the completed work, except stainless steel surfaces, shall be cleaned and painted in accordance with the following:

Cleaning: Surfaces to be cleaned shall be dry blast cleaned in accordance with the provisions 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 accordance with ASTM Designation: D 4417.

Painting: All blast cleaned surfaces shall receive a single undercoat consisting of a waterborne inorganic zinc coating conforming to the provisions of AASHTO Designation M 300, Type II, except that the first 3 sentences of Section 4.7, "Primer Field Performance Requirement," and the entire Section 4.7.1 of the AASHTO Specification shall not apply. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory, (916) 227-7000.

The color of the final application of inorganic zinc coating shall essentially match Federal Standard 595B No. 36373.

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to the provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

Inorganic zinc coating shall not be applied when the atmospheric or surface temperature is less than 45° F. nor more than 100° F. nor when the relative humidity exceeds 85 percent.

The single undercoat of inorganic zinc coating shall be applied to the required dry film thickness in 2 or more applications within 4 hours after blast cleaning.

The total dry film thickness of all applications of the single undercoat of inorganic zinc coating shall be not less than 4 mils nor more than 8 mils.

Painted surfaces damaged or burned during installation and all 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 testing operations shall be determined by the Contractor. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to locate 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 no more than 6 locations per bearing in accordance with 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 cure will be checked by the Engineer. 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.

Finish coats will not be required on the bearings.

After installation the top of the assembly shall be removed and a 1/16 inch thick coating of silicone grease shall be applied to the entire PTFE surface and the bearing reassembled without damage to the mating sliding surfaces. Silicone grease shall conform to Military Specification: MIL-S-8660.

Damaged bearings and bearings with scratched mating surfaces shall be returned to the factory for replacement or resurfacing.

All individual components shall be permanently die-stamped on 2 of 4 sides with markings consisting of bearing number and contract number. Each bearing shall have a unique bearing number and match marks on plate edges to insure correct assembly at the job site.

10-1A.26 REINFORCED, RECYCLED PLASTIC AND COMPOSITE PLASTIC LUMBER

Reinforced, Recycled Plastic (RRP) and Composite Plastic (CP) lumber shall consist of furnishing and installing RRP or CP members as shown on the plans and as described in these special provisions.

Recycled plastic shall meet the requirements of a recycled product. Recycled product shall be defined as all materials, goods, and supplies, no less than 50 percent of the total weight of which consists of secondary and postconsumer waste with not less than 10 percent of its total weight consisting of postconsumer waste. Postconsumer waste is defined as a finished material which would have been disposed of as a solid waste, having completed its life cycle as a consumer item, and does not include manufacturing waste. Secondary waste is defined as fragments of finished products or finished products of a manufacturing process, which has converted a resource into a commodity of real economic value, and includes postconsumer waste, but does not include excess virgin resources of the manufacturing process.

JGS 12/17/98 Per RW The cross-sectional dimensions of the lumber shall not vary more than ±1/2-inch nor shall the length vary more than ±1 inch from the dimensions shown on the plans.

SUBMITTALS.--The Contractor shall submit complete working drawings to the Office of Structure Design, Documents Unit, P.O. Box 942874, Mail Stop 9, Sacramento, CA 94274-0001 (1801 30th Street, Sacramento, CA 95816), telephone (916) 227-8230, in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications.

The working drawings shall show complete details of component layout and attachment details and shall be supplemented by manufacturer's material test reports, manufacturer's performance data, and 2 copies of the printed literature for the product.

For initial review, 5 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to the Office of Structure Design for final approval and use during construction. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to the Office of Structure Design for final approval and for use during construction.

The Contractor shall allow the Engineer 3 weeks to review the drawings after a complete set has been received. 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 working drawings review, 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.

MATERIALS AND FABRICATION FOR RRP LUMBER.--The plastic for RRP lumber shall be a mixture of one or more of the following thermoplastics: high density polyethylene, medium density polyethylene, low density polyethylene, or high density polypropylene. The lumber shall be mixed with appropriate colorants to produce a black or dark brown color, and with ultra violet inhibitors and antioxidants so that the resulting plastic portion of the product meets the physical property requirements specified herein. RRP lumber shall consist of a dense outer skin, not less than 3/16-inch thick, surrounding a less dense core.

The RRP lumber shall be cast or extruded into a continuous and homogenous member that will result in the member having no joints. Any interior voids in the lumber shall not exceed 1/2-inch diameter. At any exposed end of the member, there shall not be more than one void greater than 1 inch in diameter, and no more than 4 voids greater than 1/4-inch in diameter. RRP lumber shall have a smooth outer skin with a minimum of exposed voids and shall be straight and true, free of twist, curvature, bulging and other undesirable deformations.

RRP lumber shall be reinforced with fiberglass reinforcing elements meeting the physical property requirements specified herein. The reinforcing elements shall extend continuously through the length of the member, without splices. During the casting or extruding process, reinforcing elements must be held firmly in the position indicated by the manufacturer. Each piece of RRP lumber shall be permanently marked with the manufacturer’s name.

RRP lumber shall be cut, beveled, drilled, countersunk, and otherwise fabricated in accordance with the manufacturer’s recommendations by technicians who are skilled and experienced in the trade. Fabrication shall be done in the manufacturer’s facilities to the greatest extent possible.

RRP lumber shall be shipped in a manner that will minimize scratching or damage to outer surfaces. RRP lumber shall be stacked on dunnage above ground. Lumber shall be stacked so that it may be readily inspected and shall be stored in a manner that will avoid undue injury. RRP lumber shall be handled with rope slings. Sharp instruments shall not be used in handling the lumber. RRP lumber damaged in shipping or handling will be rejected.

MATERIALS AND FABRICATION FOR CP LUMBER.--The plastic for the shell of CP lumber shall be produced from polyester or epoxy resin reinforced with E glass and shall be mixed with the appropriate colorants, ultraviolet inhibitors and antioxidants, so that the resulting plastic shell meets the physical property requirements specified herein.

The core material for CP lumber shall be a lightweight aggregate polymer concrete meeting physical property requirements described herein.

The CP lumber shall be produced continuously and homogeneously without joints and with the full cross-sectional dimensions that are shown on the plans. The CP lumber shall be seamless with a smooth outer surface and shall be straight and true, free of twist, curvature, bulging and other undesirable deformation. Any interior voids in the core material shall not exceed 1/2-inch diameter. Each piece of CP lumber shall be permanently marked with the manufacturer’s name.

All cut ends of the CP lumber shall be sealed with a cap securely held in place with an adhesive recommended by the manufacturer. The adhesive shall show no more than a 10% decrease in strength when tested in accordance with ASTM Designation: D3164 following 2 cycles of exposure in accordance with ASTM Designation: D1183, Procedure D. The procedure shall be modified so that the cold temperature phase of the procedure shall be at -20°+3°C and the high temperature phase shall be at 60°+3°C.

All CP lumber shall be coated with a black (Federal Standard 595B No. 37030) or dark brown (Federal Standard 595B No. 30097) coating to a minimum dry film thickness of 1.5 mils. No visible color change in the coating shall occur when tested in accordance with ASTM Designation: D4329 using UVB-313 bulbs operating at a UV intensity of 0.47 W/m² measured at 310 nm for 100 cycles. The cycle shall be 4 hours of ultraviolet (UV) exposure at 60°C and 4 hours of condensate (CON) exposure at 40°C The coating shall have a minimum initial adhesion value of 150 psi when tested in accordance with ASTM Designation: D4541. The coating shall show no more than a 10% decrease in its initial adhesion strength following 2 exposure cycles in accordance with ASTM Designation: D1183, Procedure D as modified above.

CP lumber shall be shipped in a manner that will minimize scratching or damage to outer surfaces. CP lumber shall be stacked on dunnage above ground. Lumber shall be stacked so that it may be readily inspected and shall be stored in a manner that will avoid undue injury. CP lumber shall be handled with rope slings. Sharp instruments shall not be used in handling the lumber. CP lumber damaged in shipping or handling will be rejected.

PHYSICAL PROPERTY REQUIREMENTS.--The RRP and CP lumber shall have physical properties as listed in the following table:

PROPERTY	TEST	REQUIREMENT	
		RRP	CP
Density	ASTM D792, Procedure A; ASTM E12	Skin: 55-63 lbs/cf. Core: 45-55 lbs/cf.	Shell: 110 lbs/cf, min.
Water Absorption	ASTM D570 (maximum weight increase)	Skin: 0.5% max. at 24 hrs. Core: 1.0% max. at 2 hrs 3.0% max at 24 hrs.	Shell: 0.1% max. at 2 hrs. 0.2 % max. at 24 hrs.
Brittleness	ASTM D746	Skin: No break at -40°C at 5 ft-lbs/in.	Shell: No break at -45°C at 5 ft-lbs/in.
Impact Resistance	ASTM D746, Modified	Skin: 4 ft-lbs/in., min.	Shell: 25 ft-lbs/in., min.
Hardness	ASTM D2240	Skin: 45-75 (Shore D)	Shell: 45-75 (Shore D)
Ultraviolet Deterioration	ASTM D4329 UVB-313 (See Note 1)	Skin: For 500 hrs. exposure: Shore D durometer hardness shall not change more than 1%	Shell: 2000 hrs. exposure: less than 10% loss if structural strength (See Note 2)
Abrasion	ASTM D4060	Skin: Weight loss:<0.5 g wear index: 2.5-3.0 cycles: 10,000 wheel: CS17 load: 1 kg	
Chemical Resistance	ASTM D543	Sea Water < 1.5% weight increase Gasoline < 7.5% weight increase No. 2 Diesel < 6.0% weight increase	

Stiffness, minimum lb-in^2 (for rectangular sections, value specified is for the weak axis)		1.40×10^8 for 8 x 10 lumber 1.52×10^8 for 8 x 12 lumber 2.76×10^8 for 10 x 10 lumber 3.38×10^8 for 10 x 12 lumber 4.60×10^8 for 12 x 12 lumber	4.54×10^8 for 8 x 10 lumber 5.41×10^8 for 8 x 12 lumber 8.74×10^8 for 10 x 10 lumber 10.4×10^8 for 10 x 12 lumber 17.9×10^8 for 12 x 12 lumber
Ignition Temperature	ASTM D1929-91a	over 650°F	over 650°F
Marine Borers		total resistance	total resistance
Dry Rot		total resistance	total resistance
Shrinkage/ Swelling		negligible	negligible

Note 1: ASTM D4329 using UVB 313 bulbs operating at a UV intensity of 0.47 W/m^2 /nm measured at 310 nm. The exposure cycle shall be 4 hours of ultraviolet (UV) exposure at 60°C and 4 hours condensate (CON) exposure at 40°C.

Note 2: The exposure cycle shall be the same as in Note 1. Structural values to be measured:
ASTM D638 - tensile strength, tensile modulus
ASTM D790 - flexural strength, flexural modulus
ASTM D256 - Izod impact

The fiberglass reinforcing elements for the RRP lumber shall have the following properties:

PROPERTY	TEST	REQUIRE-MENT
Flexural Strength	ASTM D790	70,000 psi, min.
Compression Modulus	ASTM D695	40,000 psi, min.
Tensile Strength	ASTM D638	70,000 psi, min.

The core for the CP lumber shall have the following properties:

PROPERTY	REQUIRE-MENT
Density	110 lbs/cu. ft., min.
28 Day Compressive Strength	5,000 psi, min.

MEASUREMENT.--RRP and CP lumber will be measured by thousand foot board measure. The quantity to be paid for shall be determined from nominal widths and thicknesses and the actual lengths of the pieces in the finished assembly.

PAYMENT.--The contract price paid per thousand foot board measure for RRP and CP lumber shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, unless otherwise specified, and for doing all work involved in furnishing and installing RRP and CP lumber, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1A.27 STEEL CASINGS

Steel 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 "Steel Structures" elsewhere in these special provisions.

Attention is directed to “Welding Quality Control” elsewhere in 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 steel casings and anchorage weldments shall conform to ASTM Designation: A 709/A 709M, Grade 50.

High strength threaded rods and fasteners for steel casings shall conform to ASTM Designation A354 Grade BD and shall be installed snug tight in 3/16-inch oversized holes.

High strength rod assemblies shall be galvanized using a mechanically-deposited zinc coating conforming to ASTM B695, Class 50.

CLEAN AND PAINT STRUCTURAL STEEL.--All new metal surfaces, except where galvanized, shall be cleaned and painted in accordance with the provisions in Sections 59-2, "Painting Structural Steeal," nd 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.

Steel casing surfaces in contact with grout shall not be considered embedded in concrete.

Where flame sprayed plastic is shown on the plans, the exposed exterior surfaces and exterior surfaces below ground or water shall be cleaned and painted with a coat of flame sprayed plastic, and the remaining new metal surfaces shall be cleaned and painted with waterborne inorganic zinc coating. The waterborne inorganic zinc coating will not be required under flame sprayed plastic.

External weldments for lifting ears and bolted steel casing connections shall be coated with flame-sprayed plastic. Lifting devices shall prevent damage to protective coatings.

A qualified representative of the manufacturer of the flame sprayed plastic shall be present during the first 3 days of flame sprayed plastic application and shall be available for advice during the remaining time of flame sprayed plastic application.

Blast cleaning or application of flame sprayed plastic shall conform to the requirements for blast cleaning or application of solvent-borne paint in Section 59-1.02, "Weather Conditions," of the Standard Specifications, except the maximum surface temperature restrictions shall be in accordance with these special provisions.

Steel casing surfaces to be painted with flame sprayed plastic shall be blast cleaned and painted with the flame sprayed plastic in the vicinity of the job-site.

Steel 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 accordance with the provisions of Surface Preparation Specification No. 10, "Near White Blast Cleaning," of the Steel Structures Painting Council. For surfaces coated with waterborne inorganic zinc coating, blast cleaning shall leave a dense, uniform, angular, anchor pattern of no less than 1 1/2 mils as measured in accordance with ASTM Designation: D 4417, and for surfaces to be coated with flame sprayed plastic, blast cleaning shall leave a dense, uniform, angular, anchor pattern of between 2 and 3 mils.

PAINTING.--Except for surfaces to be coated with flame sprayed plastic, all blast cleaned surfaces shall receive a single undercoat, and exposed surfaces shall receive a single undercoat and a final coat. The single undercoat and final coat shall consist of a waterborne inorganic zinc coating conforming to the provisions of AASHTO Designation M 300, Type II, except that the first 3 sentences of Section 4.7, "Primer Field Performance Requirement," and the entire Section 4.7.1 of the AASHTO Specification shall not apply. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory, (916) 227-7000.

The color of the final coat of inorganic zinc coating shall closely match Federal Standard 595B No. 36373.

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to the provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

Inorganic zinc coating shall not be applied when the atmospheric or surface temperature is less than 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.

Except as approved by the Engineer, a minimum curing time of 72 hours shall be allowed between application of inorganic zinc coating and pressure rinsing with fresh water.

All exposed areas of inorganic zinc coating, where finish coats are specified, shall be thoroughly rinsed with a pressure system using fresh water and 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 inorganic zinc coating shall be tested for adhesion and cure. The locations of the tests will be determined by the Engineer. The sequence of the testing operations shall be determined by the Contractor. The testing for adhesion and cure will be performed no sooner than 72 hours after application of the single undercoat of inorganic zinc coating. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to locate 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 in accordance with 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 cure will be checked by the Engineer. 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.

The final coat of inorganic zinc coating shall be applied after testing for adhesion, testing for cure, and completion of all operations that may damage the steel surface, including correction of skips and holidays, or areas of non-uniform appearance.

The area to receive the final coat of inorganic zinc coating shall be lightly roughened by abrasive blasting using an abrasive no larger than 30 mesh. Abrasive blasting shall remove no more than 0.5 mil of inorganic zinc. The surface to be lightly roughened shall be free from moisture, dust, grease or any deleterious material. The undercoated areas of the under surfaces of bottom flanges shall be protected from abrasive blast cleaning operations.

The final coat of inorganic zinc coating shall be applied to the required dry film thickness in one uniform application within 24 hours after light roughening. The dry film thickness of the final coat of inorganic zinc coating shall be not less than 1 mil nor more than 3 mils.

The total dry film thickness of all applications of the single undercoat and final coat of inorganic zinc coating shall be not less than 5 mils nor more than 11 mils.

Finish coats will not be required.

Flame sprayed plastic shall be applied in one continuous operation within 8 hours after blast cleaning. Any seams in the flame sprayed plastic shall be horizontal and fused completely together.

Surfaces to be coated with flame sprayed plastic shall receive a flame sprayed plastic which consists of thermoplastic powder, pigments, and other additives which are melt-blended by the manufacturer specifically for application through a propane gas flame.

The thermoplastic powder shall be an ethylene methacrylic acid copolymer (EMA), or at the Contractor's option, ethylene acrylic acid copolymer (EAA) and shall have the following properties:

Property	EMA Requirement	EAA Requirement	ASTM Designation
Melt Index, at 190°C. and 2.16 Kg load, g/10 minutes	32 ± 3	20 ± 3	D 1238
Density, g/cm^3	0.930 to 0.940	0.940 to 0.970	D 792
Hardness, Shore D	48 ± 2	54 ± 2	D 2240

The color of flame sprayed plastic shall closely match Federal Standard 595B No. 26408.

Prior to application of flame sprayed plastic, the Contractor shall furnish to the Transportation Laboratory a representative one pound sample from each batch of pre-blended flame sprayed plastic material. Each sample shall be packaged in an air tight container identified with the manufacturer's name and the manufacturer's batch number.

Flame spray equipment shall be operated in accordance with the manufacturer's instructions.

Surfaces to receive flame sprayed plastic shall be preheated to between 170°F and 190° F immediately prior to coating. The Contractor at his expense shall verify the surface temperature using an infrared thermometer.

The minimum thickness of flame sprayed plastic shall be 15 mils.

The coating of flame sprayed plastic shall be free of pinholes when tested with a low voltage, 67.5 volts, wet sponge holiday detector. The coating of flame sprayed plastic shall have a minimum adhesion to steel of 1000 pounds per square inch when measured at no more than 4 locations on each column in accordance with ASTM Designation: D 4541. The locations of pinhole and adhesion tests will be determined by the Engineer. The Contractor at his expense shall: (1) verify compliance with the pinhole and adhesion requirements, (2) furnish test results to the Engineer, and (3) repair the coating after testing.

GROUTING.--Grouting shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications and these special provisions.

Prior to installing steel casings and grout, the existing concrete surfaces of the foundation bells shall be cleaned of surface laitance, marine growth and foreign material prior to placing grout. High pressure water jets and/or mechanical devices, or other approved methods may be employed. Local areas not exceeding a total of 1000 square inches in 10 square feet which consists of thin (1/4” or less) firmly attached calcareous shell deposits, are acceptable.

Grout shall be designated by compressive strength and shall have a minimum 28-day compressive strength of 5,000 pounds per square inch when tested in conformance with ASTM Designation: C942.

Grout shall consist of portland cement, water, mineral admixture, fine aggregate, and anti-washout admixture.

The cement content of the grout shall not be less than 846 pounds per cubic yard of grout. The grout shall contain fine aggregate (sand) with a cement to sand content ratio not less than 1:2 by weight. Fine aggregate shall conform to the requirements of Section 90-2, "Materials," of the Standard Specifications.

Mineral admixture shall conform to the provisions in Section 90-4.02, "Admixture," of the Standard Specifications. Grout shall contain mineral admixture in an amount not less than 25 percent, by weight of the amount of cement and mineral admixture required to satisfy the specified compressive strength.

Anti-washout admixture shall conform to the provisions in "Admixture," elsewhere in these special provisions. The washout resistance of the cement shall be less than 1.5 percent cement loss of the group when tested in accordance with U.S. Army Corps of Engineers test method CRD-C61, "Test Method for Determining the Resistance of Freshly Mixed Concrete to Washing Out in Water."

The water content of the grout shall not be more than 5 gallons per 94 pounds of cement.

The quality of the grout shall be determined by the Engineer in accordance with California Test 541. The efflux time of a group sample immediately after mixing shall be not less than 20 seconds and not more than 40 seconds.

Type F or Type G chemical admixture shall be used to achieve the specified fluidity and to disperse the admixtures. When admixtures are used in accordance with the requirements of Section 90-4, "Admixtures," of the Standard Specifications, the quality of concrete will be measured after admixture is added.

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 foundations. The grout shall harden prior to placing the next lift of grout, unless a bracing system is used.

Casings shall be sealed at the bottom. Grout shall be pumped into the casing such that the grout head is maintained uniformly around the foundation. Steel casings shall be shimmed and leveled to maintain annular clearances and alignment with precast concrete pile cap assemblies. Seals and packers shall be installed as required for dense and homogeneous grout placement.

Casings shall be positioned with spacers to center the casing around the existing foundation at the location shown on the plans. Spacers may be welded to the inside of the casing.

Clamps, valves, and other accessories shall be completely removed not less than 24-hours after placing grout. Voids shall be filled with grout and finished flush with the exterior surface of the casing. Lifting ear weldments that have been coated with flame sprayed plastic need not be removed. Grout injection ports attached to the exterior of the steel casing shall not be used.

CATHODIC PROTECTION—The cathodic protection system consists of marine aluminum alloy anodes mounted on steel casings with welded studs and galvanized washers and nuts.

The cathodic protection system shall be installed on the steel casing prior to casing installation.

Cathodic protection systems shall not be coated with flame-sprayed plastic.

Materials.--Aluminum Anodes - the galvanic aluminum anodes shall be cast aluminum specifically designed for marine cathodic protection applications. The anode manufacturer shall have been continuously engaged in the production of marine cast aluminum anodes for a minimum of 5 years. Anodes shall be cast around a flush mount, steel core as shown on the plans.

Anodes shall be cast with a mercury-free alloy and shall have a chemical composition of alloy that conforms to the following:

Indium	0.01% minimum
Silicon	0.05%-0.2%
Zinc	2.8%-6.5%
Copper	0.01% maximum
Iron	0.15% maximum
Aluminum	remainder (99.85% pure)

One of the following reference electrodes shall be used:

PRODUCT	MANUFACTURER
Reference Electrode Model IP-AGD-LWnnn or equal	Electrochemical Devices, Inc. P.O. Box 31 Albion, RI 02802 (410) 333-6112
Reference Electrode Model SRE-0040-SFB/HD or equal	Borin Manufacturing 2934 Beverly Glen Circle Bel Air, CA 90077 (310) 822-1000

#18 AWG THHN black wire shall be attached to the reference electrode and #14 AWG THHN white wire shall be attached to the top of the steel casing as shown on the plans. An epoxy suitable for underwater application shall be applied per the manufacturer's recommendations to completely cover the attachment location at the top of the steel casing and the length of any bare wire.

The conduit housing the reference electrode wires shall be mounted to the concrete using non-metallic straps and ASTM Designation A276, type 316 stainless steel anchorage devices.

Electrical Characteristics.--The completed anode assembly shall have a Cu-CuSO4 half cell potential between -1100 and -1150 millivolts in 20 Ohm-cm seawater and a minimum actual current capacity of 1150 amp-hours per pound.

Alternate anode casting dimensions may be submitted for the dimensions shown on the plans as long as the net aluminum weight, the same general configuration and the center to center distance on the flush mount core are maintained.

The anode manufacturer will provide written, independent certification that the aluminum alloy meets the chemical composition and electrical characteristics as shown on the plans and as described in these special provisions.

Anodes shall be installed below MLLW in the radial position one foot from the end of the stiffener plates as shown on the plans. The nominal spacing and distance for the bottom of the steel bell casing is shown on the plans.

Galvanized mounting studs shall be welded to the steel casing.

System Acceptance Criteria.--A complete potential survey and physical anode inspection by divers of each cathodically protected submerged steel element shall be completed within 30 to 90 days after installation. The survey shall be completed with a hand held reference cell/meter probe. The negative cathodic voltage (potential) shall be at least 0.800 Volt between the steel element and the reference electrode. The survey shall include a correlation between the surface potentials taken from the permanent reference electrodes and the direct underwater potential. The potential survey and anode inspection shall be performed under the supervision of a Corrosion Engineer registered in the State of California or a National Association of Corrosion Engineers (NACE) certified Corrosion Specialist. The Contractor shall submit inspection reports and survey results to the Engineer for approval, in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The anode inspection reports and potential survey results shall be signed by the Corrosion Engineer or NACE certified Corrosion Specialist supervising the survey and inspection.

MEASUREMENT AND PAYMENT.--Steel casings will be measured and paid for in accordance with the provisions in Section 55-4.01, "Measurement," of the Standard Specifications and these special provisions.

The contract price paid per pound for steel casing shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in steel casings filled with grout, complete in place, including high strength rods and anchorage weldments, cleaning existing concrete, and 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.

Full compensation for furnishing and coating of flame sprayed plastic shall be considered as included in the contract price paid per pound for steel casing and no additional compensation will be allowed therefor.

Full compensation for furnishing and installing cathodic protection systems, including system acceptance criteria, shall be considered as included in the contract price paid per pound for steel casing and no additional compensation will be allowed therefor.

10-1A.28 CLEAN AND PAINT STRUCTURAL STEEL

Exposed new metal surfaces and connections to existing steel, 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.

No extension of contract time will be granted as a result of temperature or humidity which exceeds the limits for cleaning or painting designated herein, except as approved by the Engineer.

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 is 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 nozzle shall have a maximum fan tip angle of 30°.

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 second paragraph in Section 59-2.01, “General,” of the Standard Specifications is amended to read:

All exposed surfaces of structural steel and other metals, including inside surfaces of bolt holes when required, except galvanized or metalized surfaces, shall be cleaned and painted.

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 and deck placement, but before applying subsequent paint, areas where paint has been damaged or has deteriorated and exposed unpainted surfaces shall be thoroughly cleaned, 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 third paragraph in Section 59-2.12, "Painting," of the Standard Specifications is amended to read:

Contact surfaces of stiffeners, railings, built up members, or any open seam exceeding 6 mils in width that would retain moisture, shall be caulked with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II, or other approved material. The sealing compound shall be applied no sooner than 72 hours after the last application of undercoat. The sealing compound shall be allowed to cure as recommended by the manufacturer prior to water rinsing and the application of the first finish coat. When no finish coats are applied, the sealing compound shall be gray in color.

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 in conformance with the requirements of Steel Structure Painting Council Specification SSPC-PA2.

The existing paint systems consist of materials listed in "Existing Highway Facilities" of these special provisions.

CLEANING.--Exposed new metal surfaces and areas of connections to existing steel, except where galvanized, shall be dry blast cleaned and dry spot blast cleaned, respectively, in conformance with the provisions of Surface Preparation Specification No. 10, "Near White Blast Cleaning," of the Steel Structures Painting Council. Blast cleaning shall leave 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.

The areas of connections to existing steel to be dry spot blast cleaned shall consist of, as a minimum: (1) new and existing contact surfaces and existing member surfaces under bolt heads, nuts or washers of high-strength bolted connections, (2) exposed bare surfaces of existing steel remaining after trimming, cutting, drilling or reaming and (3) areas of existing steel within a 4-inch radius measured in any direction from the of point of application of heat for welding or flame cutting.

Abrasives used for blast cleaning existing steel shall conform with the requirements of Abrasive Specification No. 1, “Mineral and Slag Abrasives,” of the Steel Structures Painting Council and shall not contain hazardous material. Silica sand abrasives, if used, shall be Class A as defined above.

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, except for silica sand.

The inside surfaces of bolt holes shall be cleaned in conformance with the provisions of Surface Preparation Specification No. 1, “Solvent Cleaning,” of the Steel Structures Painting Council, and visible rust shall be removed.

PAINTING.--Blast cleaned surfaces shall receive a single undercoat consisting of a waterborne inorganic zinc coating conforming to the provisions of 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 ASTM Designation: D520. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory.

The inside surfaces of bolt holes shall be painted with one application of a zinc rich primer (organic vehicle type).

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

Inorganic zinc coating shall not be applied when the atmospheric or surface temperature is less than 45° F nor more than 85° F nor when the relative humidity exceeds 85 percent.

The single undercoat of inorganic zinc coating shall be applied to the required dry film thickness in 2 or more applications within 4 hours after blast cleaning.

Areas where mudcracking occurs in the inorganic zinc coating shall be blast cleaned and repainted with inorganic zinc coating to the specified thickness.

All exposed area of inorganic zinc coating shall be thoroughly rinsed with a pressure system using fresh water and 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 inorganic zinc coating shall be tested for adhesion and cure. The locations of the tests will be determined by the Engineer. The sequence of the testing operations shall be determined by the Contractor. The testing for adhesion and cure will be performed no sooner than 72 hours after application of the single undercoat of inorganic zinc coating. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to determine the location of the tests and to test the inorganic zinc coating cure. The inorganic zinc coating shall pass both of the following tests:

The inorganic zinc coating shall have a minimum adhesion to steel of 600 psi when measured at no more than 6 locations per span on each girder using a self-aligning adhesion tester in conformance with the requirements in ASTM Designation: D 4541. The Contractor, at the Contractor's expense, shall: (1) verify compliance with the adhesion requirements, (2) furnish test results to the Engineer, and (3) repair the coating after testing.

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 shall be thoroughly water rinsed.

Exposed areas of inorganic zinc coating shall receive a minimum of 2 finish coats of an exterior grade latex paint supplied by the manufacturer of the inorganic zinc coating.

The first finish coat shall be applied within 48 hours following water rinsing.

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
Viscosity, 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 in confomance with 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. 34272. 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 existing paint. 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.

Cleaning and painting of existing contact surfaces of high strength bolted connections that contain rust, loose paint or other foreign substances, except loose dirt and dust, will be considered as extra work as specified in Section 4-1.03D, "Extra Work," of the Standard Specifications. Cost of repair of damage to existing paint caused by the Contractor's operations shall be borne by the Contractor.

MEASUREMENT AND PAYMENT.--Dry spot blast cleaning and undercoat painting of blast cleaned areas of existing surfaces will be measured by the square foot of spot blast cleaned areas, and will be paid for as spot blast clean and paint undercoat.

The contract price paid per square foot for spot blast clean and paint undercoat shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in spot blast cleaning and painting undercoat on the existing surfaces 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 clean and paint structural steel shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in cleaning and painting the exposed surfaces of the new structural steel and finish coat on undercoated areas of existing metal, complete in place, including rinsing with a pressure system, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1A.29 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" elsewhere in these special provisions.

Miscellaneous metal (bridge) shall consist of the miscellaneous bridge metal items listed in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications, and the following:

Ladders and safety cages
Stairs and landings
Platforms and handrails
Access doors

Miscellaneous metal (bridge) (fender) shall consist of the miscellaneous bridge metal items listed in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications that are to be used on the fender retrofit, and the following:

1. Hardware for connecting RRP or CP lumber sheathing to the pier fenders.
2. C15 x 40 wales and related hardware at Piers 33, 36, 46 and 49.
3. Type I, II and III anchors, including threaded rods; concrete anchorage devices and inserts; chain and related hardware.
4. Boarding ladders, boarding ramps and related attachment hardware.
5. Pipe railing and related concrete anchorage devices.

All structural steel shapes and plates shall conform to the specifications of ASTM Designation: A36.

The concrete inserts at the precast concrete column jackets, comprised of fabricated bolt sleeves, bolts and threaded rods, and all other parts of inserts that are embedded in concrete, shall be fabricated from stainless steel, conforming to the specifications for ASTM Designation: A 276, Type 316.

Steel pipe for railing and inserts as shown on the plans shall be galvanized, Schedule 40, conforming to the specifications of ASTM Designation: A120.

Carbon steel structural tubing shall conform to the specifications of ASTM Designations A36 or A500, Grade B, except tubing of sizes 2x2x0.1875 or smaller shall conform to the specifications of ASTM Designation: A513. Anchor shackle, chain and connecting links shall be commercial quality, suitable for the use intended, and shall be galvanized.

All galvanized steel contact surfaces to be placed against concrete shall be coated with a single component elastomeric type sealant conforming to the provisions in Federal Specification TT-S-00230C(2).

All miscellaneous bridge metal, except stainless steel items and boarding ladders, shall be galvanized as specified in Section 75-1.05, "Galvanizing," of the Standard Specifications.

Epoxy coating and grit shall be applied to all boarding ladders as shown on the plans.

Full compensation for furnishing and applying epoxy coating and grit to boarding ladders shall be considered as included in the contract price paid for miscellaneous bridge metal and no separate payment will be made therefor.

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.

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 the ferrule loop type.

All metal parts of anchorage devices shall be fabricated from stainless steel conforming to the requirements of ASTM Designation: A 276, Type 304 or 316 except as indicated on the plans.

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.

10-1A.30 COLUMN RESTRAINER BRACKET

Column restrainer brackets consisting of high strength bars, plates, and incidentals shall conform to the details shown on the plans and the requirements in "Steel Structures," elsewhere in these special provisions and these special provisions.

Attention is directed to "Prestressing," elsewhere in these special provisions.

Non-shrink grout shall conform to the requirements of ASTM Designation: C 1107.

Grouting shall conform to the provisions of Section 50-1.09, "Bonding and Grouting," of the Standard Specifications.

High strength bar assemblies shall conform to the materials and sampling requirements for prestressing steel in "Prestressing," elsewhere in these special provisions and the following:

The high strength bars shall conform to the requirements of ASTM Designation: A 722, including all supplementary requirements.

All new metal surfaces of restrainer units shall be cleaned and painted in accordance with the provisions in Sections 59-2, "Painting Structural Steel," and 91, "Paint," of the Standard Specifications and the following:

The surfaces to be cleaned and painted shall be dry blast cleaned in accordance with the provisions of Surface Preparation 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 not less than 1.5 mils as measured in accordance with ASTM Designation: D 4417.

All blast cleaned surfaces shall receive a single undercoat consisting of a waterborne inorganic zinc coating conforming to the provisions of AASHTO Designation M 300, Type II, except that the first 3 sentences of Section 4.7, "Primer Field Performance Requirement," and the entire Section 4.7.1 of the AASHTO Specification shall not apply. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory, (916) 227-7000.

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to the provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

Inorganic zinc coating shall not be applied with the atmospheric or surface temperature is less than 45°F or more than 85°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 inorganic zinc coating shall be not less than 4 mils nor more than 8 mils.

All areas where mudcracking occurs in the inorganic zinc coating shall be blast cleaned and repainted with inorganic zinc coating to the specified thickness.

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 not less than 100 percent of the specified ultimate tensile strength of the steel bar.

The Contractor shall be responsible for determining the required lengths of the bar assemblies.

The bar assemblies shall be shipped as a complete unit including anchorage device and coupler.

Column restrainer brackets will be measured and paid for by the unit.

Full compensation for cleaning and painting of column restrainer brackets shall be considered as included in the contract unit price paid for column restrainer bracket and no additional compensation will be allowed therefor.

Full compensation for drilling holes in existing structural steel and concrete, bonding dowels, bonding dowels with epoxy cartridge, placing grout below restrainer bracket, and placing grout in column restrainer bracket shall be considered as included in the contract unit price paid for column restrainer bracket and no additional compensation will be allowed therefor.

Full compensation for doing all the work involved with horizontal prestressing of the column restrainer bracket including furnishing and installing high strength bars and anchorage assemblies shall be considered as included in the contract unit price paid for column restrainer bracket and no separate payment will be made therefor.

SECTION 10-1B. CONSTRUCTION DETAILS - SUPERSTRUCTURE

10-1B.01 GENERAL

The items of work described in this section apply in general to the superstructure portion of the Richmond- San Rafael Bridge.

10-1B.02 EXISTING FACILITIES

The work performed in connection with various superstructure facilities shall conform to the provisions in Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

Attention is directed to "Existing Highway Facilities" elsewhere in these special provisions regarding materials to be salvaged, plans of the existing bridge and related bridge references.

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 Construction Safety Orders Title 8, of the California Code of Regulations including Section 5158, "Other Confined Space Operations."

The existing paint systems on Bridge Number 28-0100 consist of lead, chromium and Zinc. Any work that disturbs the existing paint system will expose workers to health hazards and will (1) produce debris containing heavy metal in amounts that exceed the thresholds established in Titles 8 and 22 of the California Code of Regulations or (2) produce toxic fumes when heated. All debris produced when the existing paint system is disturbed shall be contained.

DEBRIS CONTAINMENT AND COLLECTION PROGRAM.--Prior to starting work, the Contractor shall submit to the Engineer a debris containment and collection program for debris produced when the existing paint system is disturbed in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The program shall identify materials, equipment and methods to be used when the existing paint system is disturbed and shall include working drawings of any containment system, loads applied to the bridge by any containment structure, and provisions for ventilation and air movement for visibility and worker safety.

If the measures being taken by the Contractor are inadequate to provide for the containment and collection of debris produced when the existing paint system is disturbed, the Engineer will direct the Contractor to revise the operations and the debris containment and collection program. The directions will be in writing and will specify the items of work for which the Contractor's debris containment and collection program are inadequate. No further work shall be performed on the items until the debris containment and collection programs are adequate and, if required, a revised program has been approved for the containment and collection of debris produced when the existing paint system is disturbed.

The Engineer will notify the Contractor of the approval or rejection of any submitted or revised debris containment and collection program within 2 weeks of submittal of the Contractor's program or revised program.

The State will not be liable to the Contractor for failure to approve all or any portion of an originally submitted or revised debris containment and collection program, nor for any delays to the work due to the Contractor's failure to submit acceptable programs.

SAFETY AND HEALTH PROVISIONS.--Attention is directed to Section 7-1.06, "Safety and Health Provisions," of the Standard Specifications. Work practices and worker health and safety shall conform to the Construction Safety Orders Title 8, of the California Code of Regulations including Section 1532.1, "Lead."

The Contractor shall furnish to the Engineer a written Code of Safe Practices, and have an Injury and Illness Prevention Program, and a Hazard Communication Program in accordance with the provisions of Construction Safety Orders 1509 and 1510.

Prior to starting work that disturbs the existing paint system and at such times when revisions to the program are required by Section 1532.1, "Lead," the Contractor shall submit the compliance programs required in subsection (e)(2), "Compliance Program," of Section 1532.1, "Lead," of the Construction Safety Orders to the Engineer in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The compliance programs shall include the data specified in subsections (e)(2)(B) and (e)(2)(C) of Section 1532.1, "Lead." Approval of the compliance programs by the Engineer will not be required. The compliance programs shall be reviewed and signed by a Certified Industrial Hygienist (CIH) who is certified in comprehensive practice by the American Board of Industrial Hygiene (ABIH). Copies of all air monitoring or jobsite inspection reports made by or under the direction of the CIH in accordance with Section 1532.1, "Lead," shall be furnished to the Engineer within 10 days after date of monitoring or inspection.

DEBRIS HANDLING.--Temporary storage on the ground of the debris produced when the existing paint system is disturbed will not be permitted. Debris accumulated inside the containment system shall be removed before the end of each work shift. Debris shall be stored in approved leak proof containers and shall be handled in such a manner that no spillage will occur.

Disposal of debris produced when the existing paint system is disturbed shall be performed in accordance with all applicable Federal, State and Local hazardous waste laws. Laws that govern this work include:

1. Health and Safety Code, Division 20, Chapter 6.5 (California Hazardous Waste Control Act).
2. Title 22; California Code of Regulations, Chapter 30 (Minimum Standard for Management of Hazardous and Extremely Hazardous Materials).
3. Title 8, California Code of Regulations.

Except as otherwise provided below, debris produced when the existing paint system is disturbed shall be disposed of by the Contractor at an approved Class 1 disposal facility in accordance with the requirements of the disposal facility operator. The debris shall be hauled by a transporter currently registered with the California Department of Toxic Substances Control using correct manifesting procedures and vehicles displaying current certification of compliance. The Contractor shall make all arrangements with the operator of the disposal facility and perform any testing of the debris required by the operator.

At the option of the Contractor, the debris produced when the existing paint system is disturbed shall be disposed of by the Contractor at a facility equipped to recycle the debris, subject to the following requirements:

Copper slag abrasive blended by the supplier with a calcium silicate compound shall be used for blast cleaning.

The debris produced when the existing paint system is disturbed shall be tested by the Contractor to confirm that the solubility of the heavy metals is below regulatory limits and that the debris may be transported to the recycling facility as a non-hazardous waste.

The Contractor shall make all arrangements with the operator of the recycling facility and perform any testing of the debris produced when the existing paint system is disturbed that is required by the operator.

WORK AREA MONITORING.--The Contractor shall perform work area monitoring of the ambient air and soil in and around the work area at the bridge site to verify the effectiveness of the containment system. The work area monitoring shall consist of collecting, analyzing and reporting of air and soil test results, and recommending any required corrective action when specified exposure levels are exceeded. The work area monitoring shall be carried out under the direction of a CIH. The samples shall be collected at locations designated by the Engineer.

Air samples shall be collected and analyzed in accordance with National Institute for Occupational Safety and Health (NIOSH) methods. Lead air samples shall be collected and analyzed in accordance with NIOSH Method 7082, with a limit of detection of at least 0.5 $\mu g/m^3$. Air samples for other metals shall be collected and analyzed in accordance with NIOSH Method 7300, with a limit of detection of at least one percent of the appropriate Permissible Exposure Limits (PELs) of California/Occupational Safety and Health Administration (Cal/OSHA). Alternative methods of sample collection and analysis, with equivalent limits of detection, may be used at the option of the Contractor.

The airborne metals exposure, outside either the containment system or work areas, shall not exceed the lower of either: (1) 10 percent of the Action Level specified for lead by Section 1532.1, "Lead," or (2) 10 percent of the appropriate PELs specified for other metals by Cal/OSHA.

The air samples shall be collected at least once per week during progress of work that disturbs the existing paint system. All air samples shall be analyzed within 48 hours at a facility accredited by the Environmental Lead Laboratory Accreditation Program of the American Industrial Hygiene Association (AIHA). When corrective action is recommended by the CIH, additional samples may be required by the Engineer to be taken, at the Contractor's expense.

20 soil samples shall be collected prior to start of work, and 20 soil samples shall be collected within 36 hours following completion of cleaning operations of existing structural steel. Where the cleaning operations extend over large areas of soil or many separate areas of soil at each bridge site, the samples shall be collected at various times during the contract, as determined by the Engineer. A soil sample shall consist of 5 plugs, each 3/4 inch diameter and 1/2 inch deep, taken at each corner and center of a one foot square area. Soil samples shall be analyzed for total lead, chromium and Zinc in accordance with Method 3050 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846 published by the United States Environmental Protection Agency.

There shall be no increase in the concentrations of heavy metal in the soil in the area affected when the existing paint system is disturbed. When soil sampling, after completion of work that disturbs the existing paint system, shows an increase in the concentrations of heavy metal, the area affected shall be cleaned and resampled at the Contractor's expense until soil sampling and testing shows concentrations of heavy metal less than or equal to the concentrations collected prior to start of work.

In areas where there is no exposed soil, there shall be no visible increase in the concentrations of heavy metal on the area affected when the existing paint system is disturbed. Any visible increase in the concentrations of heavy metal, after completion of work that disturbs the existing paint system, shall be removed at the Contractor's expense.

Air and soil sample laboratory analysis results, including results of additional samples taken after corrective action as recommended by the CIH, shall be submitted to the Engineer. The results shall be submitted both verbally within 48

hours after sampling and in writing with a copy to the Contractor, within 5 days after sampling. Sample analysis reports shall be prepared by the CIH as follows:

For both air and soil sample laboratory analysis results, the date and location of sample collection, sample number, contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Post mile will be required.

For air sample laboratory analysis results, the following will be required:

1. List of emission control measures in place when air samples were taken.
2. Air sample results shall be compared to the appropriate PELs.
3. Chain of custody forms.
4. Corrective action recommended by the CIH to ensure airborne metals exposure, outside either the containment system or work areas, is within specified limits.

For soil sample laboratory analysis results, the concentrations of heavy metal expressed as parts per million will be required.

CONTAINMENT SYSTEM.--The containment system shall consist of, at the option of the Contractor, (1) a ventilated containment structure, or (2) vacuum shrouded surface preparation equipment and drapes, tarps or other materials, or (3) equivalent containment system. The containment system shall contain all water, resulting debris, and visible dust produced when the existing paint system is disturbed.

For bridges over water, the containment system shall include a skimming boom consisting of a float with a skirt to collect floating debris.

The containment system shall provide the clearances specified under "Maintaining Traffic" of these special provisions, except that when no clearances are specified a vertical clearance of 15 feet and a horizontal clearance of 32 feet shall be provided for the passage of public traffic.

Falsework or supports for the ventilated containment structure shall not extend below the vertical clearance level nor to the ground line at any location within the roadbed.

The ventilated containment structure shall conform to the provisions for falsework in Section 51-1.06, "Falsework," of the Standard Specifications.

The minimum total design load of the ventilated containment structure shall consist of the sum of the dead and live vertical loads. Dead load shall consist of the actual weight of the ventilated containment structure. Live loads shall consist of a uniform load of not less than 45 pounds per square foot, which includes 20 pounds per square foot of sand load, applied over the area supported, and in addition, a moving 1000 pound concentrated load shall be applied to produce maximum stress in the main supporting elements. Assumed horizontal loads need not be included in the design of the ventilated containment structure.

The ventilated containment structure may be supported with either rigid or flexible supports. The rigid or flexible containment materials on the containment structure shall retain air borne particles but may allow air flow through the containment materials. Flexible materials shall be supported and fastened to prevent escape of abrasive and blast materials due to whipping from traffic or wind and to maintain the clearances.

All mating joints between the ventilated containment structure and the bridge shall be sealed. Sealing may be by overlapping of seams when using flexible materials or by using tape, caulking, or other sealing measures.

Multiple flap overlapping door tarps shall be used at entry ways to the ventilated containment structure to prevent dust or debris from escaping.

Baffles, louvers, flapper seals or ducts shall be used at make-up air entry points to the ventilated containment structure to prevent escape of abrasives and resulting surface preparation debris.

The ventilated containment structure shall be properly maintained while work is in progress and shall not be changed from the approved working drawings without prior approval of the Engineer.

The ventilation system in the ventilated containment structure shall be of the forced input air flow type with fans or blowers.

Negative air pressure shall be employed within the ventilated containment structure and will be verified by visual methods by observing the concave nature of the containment materials while taking into account wind effects, or by using smoke or other visible means to observe air flow. The input air flow shall be properly balanced with the exhaust capacity throughout the range of operations.

The exhaust air flow of the ventilation system in the ventilated containment structure shall be forced into dust collectors (wet or dry) or bag houses.

PROTECTIVE WORK CLOTHING AND HYGIENE FACILITIES.--Wherever there is exposure or possible exposure to heavy metals or silica dust at the bridge site, the Contractor shall, for not more than 3 State personnel: (1) furnish, clean and replace protective work clothing and (2) provide access to hygiene facilities. The furnishing, cleaning and

replacement of protective work clothing, and hygiene facilities shall conform to the provisions of subsections (g), "Protective work clothing and equipment," and (i), "Hygiene facilities and practices," of Section 1532.1, "Lead," of the Construction Safety Orders.

The protective work clothing and access to hygiene facilities shall be provided during exposure or possible exposure to heavy metals or silica dust at the bridge site and application of the undercoats of paint.

Protective work clothing and hygiene facilities shall be inspected and approved by the Engineer before being used by State personnel.

The protective work clothing shall remain the property of the Contractor at the completion of the contract.

PAYMENT.--Work area monitoring will be paid for on the basis of a lump sum price.

The contract lump sum price paid for work area monitoring shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in collecting and analyzing of samples of ambient air and soil for heavy metals, complete in place, including reporting the test results, 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 containment system, protective work clothing and access to hygiene facilities for State personnel; and handling of debris produced when the existing paint system is disturbed, including testing, hauling, treatment, disposal fees and local taxes, shall be considered as included in the contract price paid for the item of work requiring the disposal of the debris produced when the existing paint system is disturbed and no additional compensation will be allowed therefor.

Existing footing concrete which is below ground and outside of the footing limits shown on the contract plans or original contract plans shall be removed as directed by the Engineer and such work will be paid for as extra work as provided in Section 4-l.03D of the Standard Specifications.

Additional exploratory work of bridge members for unforeseen damage shall be done as directed by the Engineer and will be paid for as extra work as provided in Section 4-1.03 D of the Standard Specifications.

10-1B.02A BRIDGE REMOVAL (PORTION)

Removing portions of bridge shall conform to the requirements in Section 15-4, "Bridge Removal," of the Standard Specifications and these special provisions.

Bridge removal (portion) shall consist, in general, of removing portions of bridge described as follows:

Richmond-San Rafael Bridge
(Br. No. 28-0100)

LOCATION A

Bridge removal (portion) shall include removal of portions of the existing upper and lower deck concrete for installing new seismic isolation joint assemblies, portions of existing pier concrete for truss shoe replacement and new seismic isolation bearings at Pier 19 and 61. The work also includes but not limited to the removal of existing floor beams and stringers, existing expansion joint assemblies, portions of existing sidewalk supports, existing truss vertical members, existing lower lateral bracing, existing truss shoes and pins, portion of existing upper and lower chord members in the truss and other structural element portions as shown on the plans.

LOCATION B

Bridge removal (portion) shall include removal of portions of the existing pier concrete, existing cable restrainers and steel truss shoes for truss shoe replacement and new seismic isolation bearings at Pier 55, 57, 58, 59 & 60.

LOCATION C

Bridge removal (portion) shall include removal of portions of the existing upper and lower deck concrete for installing new expansion joint assemblies and lock-up beam assembly at Pier 27, 33, 36, 46 & 49. The work shall also includes but not limited to the removal of existing floor beams and stringers, existing expansion joint assemblies, portions of existing sidewalk support, lower lateral bracing and other structural element portions, as shown on the plans.

LOCATION D

Bridge removal (portion) shall include removal of the entire reinforced concrete approach trestle. The work shall also includes but not limited to the removal of existing concrete deck slab, railing, utilities, concrete girders, bent caps and piles.

LOCATION E

Bridge removal (portion) shall include removal of concrete and steel members at the two plate girder span approaches. The work shall also includes but not limited to the removal and re-installation of existing vertical restrainer, the removal and re-installation of existing maintenance rail, removal of maintenance rail hanger and plate restrainer, and the removal of the existing tremie seal slab for footing retrofitting at the east plate girder span approach.

All removed materials that are not to be salvaged or used in the reconstruction shall become the property of the Contractor and shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

Piling shall be removed to at least the mudline.

The method of removal shall be selected by the Contractor. Equipment or procedures that damage the existing bridge, as determined by the Engineer, shall not be used.

Bar reinforcing steel designated to remain that are damaged as a result of the Contractor's operations shall be repaired by the Contractor at his expense, to the satisfaction of the Engineer.

The Contractor shall submit a complete bridge removal plan to the Engineer detailing procedures and sequence for removing portions of bridge, including all features necessary to remove the bridge portions in a safe and controlled manner.

The bridge removal plan shall include the following:

The bridge removal sequence for the entire approach trestle, portions of the existing upper and lower deck concrete for installing new seismic isolation joint assemblies and expansion joint assemblies, the portions of existing pier concrete for installing new seismic isolation bearings, including staging of bridge removal;

Equipment locations on the structure during removal operations;

Temporary support shoring or temporary bracing;

Locations where work is to be performed over traffic; and

Details and locations of protective covers or other measures to assure that people, property and improvements will not be endangered.

Temporary supports, temporary bracing, and protective covers as required for removal operations only, shall be designed and constructed in conformance with the provisions in Section 51-1.06, "Falsework," of the Standard Specifications and the following:

The assumed horizontal load to be resisted by the temporary support, and temporary bracing, for removal operations only, shall be the sum of the actual horizontal loads due to equipment, construction sequence or other causes and an allowance for wind, but in no case shall the assumed horizontal load to be resisted in any direction be less than 10 percent of the total dead load of the portion of structure to be removed.

The following additional requirements apply to the removal of portions of bridges that are over or adjacent to roadways that may be closed to public traffic for only brief periods of time:

The closure of roadways to public traffic shall conform to the requirements under "Order of Work" and "Maintaining Traffic" of these special provisions.

Prior to closing a roadway to traffic to accommodate bridge removal operations, the Contractor shall have all necessary men, materials and equipment at the site as needed to proceed with the removal work in an expeditious manner. While the roadway is closed to traffic, work shall be pursued promptly and without interruption until the roadway is reopened to public traffic.

All removal operations shall be performed during periods of time that the roadway is closed to public traffic except as specified herein for preliminary work.

Preliminary work shall be limited to operations that will not reduce the structural strength or stability of the bridge, or any element thereof, to a level which in the judgment of the Engineer would constitute a hazard to the public. Such preliminary work shall also be limited to operations that cannot cause debris or any other material to fall onto the roadway. Protective covers may be used in order to perform preliminary work such as chipping or cutting the superstructure into segments, provided the covers are of sufficient strength to support all loads and are sufficiently tight to prevent dust and fine material from sifting down onto the traveled way or waterway. Protective cover shall extend at least 4 feet beyond the limit of the work underway. Temporary support, temporary bracing, and protective covers shall not encroach closer than 8 feet horizontally from the edge or 15 feet vertically above any traffic lane or shoulder that is open to traffic.

During periods when the roadway is closed to public traffic, debris from bridge removal operations may be allowed to fall directly onto the lower roadway providing adequate protection is furnished for all highway facilities. The minimum protection for paved areas shall consist of an earthen pad approximately 2 feet thick placed over the area where debris can fall. Prior to reopening the roadway to traffic, all debris, protective pads and devices shall be removed and the roadway swept clean with wet power sweepers or equivalent methods.

The removal operations shall be conducted in such a manner that the portion of the structure not yet removed remains in a stable condition at all times. For girder bridges, each girder shall be completely removed within a span before the removal of the adjacent girder is begun.

The following additional requirements apply to the removal of portions of bridges whenever the removal work is to be performed over traffic or waterway:

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 shall conform to the requirements under "Order of Work," and "Maintaining Traffic," of these special provisions.

The protective cover shall prevent any materials, equipment or debris from falling onto the traffic or waterway. 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 or waterway.

The protective cover shall extend at least 10 feet beyond the edge of bridge removal.

Before removal, the protective cover shall be cleaned of all debris and fine material.

The removal operations shall be conducted in such a manner that the portion of the structure not being removed remains in a stable condition at all times.

The Contractor shall submit to the Engineer working drawings, with design calculations, for the proposed bridge removal plan. The bridge removal plan shall be prepared by an engineer who is registered as a Civil Engineer in the State of California. The design calculations shall be adequate to demonstrate the stability of the structure during all stages of the removal operations. Calculations shall be provided for each stage of bridge removal and shall include dead and live load values assumed in design of protective cover. At a minimum, a stage will be considered to be removal of the deck, the soffit, or the girders, in any span; or walls, bent caps or columns at support locations.

The bridge removal plan shall conform to the requirements in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The number of sets of drawings and design calculations and times for review for any bridge removal plans shall be the same as specified for falsework working drawings in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications.

The time to be provided for the Engineer's review of the working drawings for removing specific structures, or portions thereof, shall be as follows:

Structure or Portion of Structure	Review Time - Weeks
Approach trestle	5
Plate girder span approaches	4
Pier 19	5
Pier 27	4
Pier 33	4
Pier 36	4
Pier 46	4
Pier 49	4
Pier 55	4
Pier 57	4
Pier 58	4
Pier 59	4
Pier 60	4
Pier 61	5

Approval by the Engineer of the bridge removal plans or field inspection performed by the Engineer will in no way relieve the Contractor of full responsibility for the bridge removal plan and procedure.

Prior to proceeding with bridge removal where bridge removal plan is required, an engineer for the Contractor who is registered as a Civil Engineer in the State of California shall inspect the temporary support shoring, including temporary bracing and protective coverings, for conformity with the working drawings. The Contractor's registered engineer shall certify in writing that the temporary support shoring, including temporary bracing and protective coverings, substantially conform to the details on the working drawings, and that the material and workmanship are satisfactory for the purpose intended. A copy of this certification shall be available at the site of the work at all times.

The Contractor's registered engineer shall be present at the bridge site where bridge removal plan is required at all times when bridge removal operations are in progress. The Contractor's registered engineer shall inspect the bridge removal operation and report in writing on a daily basis the progress of the operation and the status of the remaining structure. A copy of the daily report shall be available at the site of the work at all times. Should an unplanned event occur, the Contractor's registered engineer shall submit immediately to the Engineer for approval, the procedure of operation proposed to correct or remedy the occurrence.

10-1B.02B RECONSTRUCT STEEL BRIDGE RAILING

Steel bridge railing of the type shown on the plans shall be removed, refabricated and installed in accordance with the details shown on the plans.

Two sets of shop drawings showing details of the refabrication of removed material and the fabrication of new material, including a material list of new material, giving the type of metal proposed for use and the specifications therefor, shall be furnished by the Contractor to the Engineer for his use in administering the contract, in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications.

Refabrication of removed material, furnishing and fabrication of new material, and installation of the railing shall conform to the provisions corresponding to the type of railing to be reconstructed in Section 83-1, "Railings," of the Standard Specifications.

Abraded and damaged galvanized surfaces on the removed material shall be repaired in accordance with the requirements in Section 75-1.05, "Galvanizing," of the Standard Specifications.

Reconstruct steel bridge railing will be measured by linear foot from end to end or between the points of connection to the existing metal railing, along the face of the reconstructed railing, with no deductions for gaps in railing for lighting and sign supports.

The contract price paid per linear foot for reconstruct steel bridge railing shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in removing existing steel bridge railing, reconstructing the steel bridge railing, complete in place, including new supporting steel members and connections, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1B.02C TEMPORARY STRUCTURE

This work shall consist of designing, constructing, and relocating temporary structures which span from new precast concrete girder bridge to existing I girder bridge as shown on the plans and as specified in the Standard Specifications and these special provisions. Temporary structure shall also include temporary deck bridging for bridging expansion joint and closure joint gaps during simple span conditions of construction sequence and prior to installation of expansion joints.

DESIGN AND WORKING DRAWINGS.--The Contractor shall submit to the Engineer working drawings and design calculations for the temporary structure and temporary deck bridging. The drawings and design calculations shall be signed by a registered Civil Engineer in the State of California. Working drawings shall conform to the requirements in Section 5-1.02, “Plans and Working Drawings,” of the Standard Specifications. The time to be provided for the Engineer’s review of the working drawings for the temporary structure and deck bridging shall be 4 weeks.

The Contractor shall design the temporary structure and temporary deck bridging in accordance with the Bridge Design Specifications (1983 AASHTO with Interims and Revisions by Caltrans). When calculating the vertical loads, the Contractor shall include construction equipment loads and additional loads imposed by the Contractor's operations. The construction equipment loads shall be the actual weight of the construction equipment, but in no case shall be less than 20 pounds per square foot of deck surface area of the temporary structure or temporary deck bridging. In lieu of an analysis to determine horizontal loads, the Contractor may design the temporary structure and temporary deck bridging to resist a horizontal force in any direction of no less than 25 percent of the total dead load of the temporary structure or temporary deck bridging. This horizontal force shall be applied at the centroid of the temporary structure or temporary deck bridging. Design of the temporary structure utilizing any part of the existing structure shall consider the effect of both the vertical and lateral loads on the existing pile foundations. Design calculations prepared by the Contractor shall provide full design evaluations of the pile foundations in terms of load carrying capacity of the elements to which the temporary structure is being supported, and the lateral stability to the

overall pile. The temporary structure and deck bridging shall have a uniform surface texture that provides a coefficient of friction of not less than 0.35.

The temporary deck bridging shall be mechanically connected to the precast concrete girders while subjected to vehicular loads and shall not overstress, induce permanent forces into or produce cracking in the precast concrete girders.

CONSTRUCTION.--The temporary structure and temporary deck bridging shall be constructed to substantially conform to the temporary structure and deck bridging drawings. The materials used in the temporary structure and deck bridging construction shall be of the quality necessary to sustain the stresses required by the design. Welding, welder qualification, and inspection of welding shall conform to the requirements of ANSI/AASHTO/AWS D1.5. The temporary deck bridging surface shall not vary more than 1/4 inch vertically or 1/2 inch horizontally from the adjacent precast concrete girder deck surfaces. When temporary deck bridging is no longer needed to bridge the gap, all temporary deck bridging and connections shall be removed from the precast concrete girders.

PAYMENT.--The contract lump sum price paid for temporary structure shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in furnishing and erecting the temporary structures and temporary deck bridging, complete in place, including designing and relocating the temporary structures and deck bridging as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1B.02D TEMPORARY SUPPORTS

Temporary supports for existing structures during bridge removal, reconstruction and retrofit work shall be designed, furnished, constructed, monitored, maintained and removed in accordance with the requirements of these special provisions.

Temporary supports shall consist, in general, of providing temporary supports in the following locations described as follows:

LOCATION A

Temporary supports including jacking, prestressing existing steel truss members required for the installation of seismic isolation bearings and removing high strength steel rods after seismic isolation bearing is in place at Piers 19 and 61 as shown on the plan.

LOCATION B

Temporary supports including jacking, prestressing existing steel truss members required for the installation of seismic isolation bearings and removing high strength steel rods after seismic isolation bearing is in place at Piers 55, 57, 58, 59, and 60 as shown on the plan.

LOCATION C

Temporary supports including jacking existing truss members for the replacement of existing truss shoe pins as shown on the plan.

LOCATION D

Temporary supports including providing lateral bracing supports for maintaining the stability and load carrying capacity of the existing structure after the removal and during the replacement of the spandrel beam at Piers 71 to 77 and Piers 72R to 77R as shown on the plans. The existing structure shall not be used to carry the temporary support loads shown on the plans. No jacking is required at these locations.

Construction sequence and application of temporary support jacking loads for Locations A, B, and C only shall be as shown on the plans. Proposed changes to the construction sequence and application of temporary support jacking loads shall be subject to the Engineer's approval. Construction sequence for Location C shall be as shown on the plans. Proposed changes to the construction sequence shall be subject to the Engineer’s approval.

Temporary supports shall include jacking assemblies and appurtenant items necessary to jack and support the structures at Locations A, B, and C. For Location D, temporary supports shall include appurtenant items necessary to support the structure during the removal and replacement of the existing spandrel beams.

Prestressing existing steel truss members to provide temporary supports for installing seismic isolation bearings shall be as shown on the plans and shall conform to "Prestressing Existing Steel Truss Members," elsewhere in these special provisions.

Attention is directed to the sections, "Order of Work," and "Maintaining Traffic," of these special provisions regarding the construction sequences.

Approval by the Engineer of the temporary support working drawings or temporary support inspection performed by the Engineer will in no way relieve the Contractor of full responsibility for the temporary supports.

TEMPORARY SUPPORT DESIGN AND DRAWINGS.--The Contractor shall submit to the Engineer working drawings and design calculations for the temporary supports. Such 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 working drawings and design calculations shall conform to the requirements in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The number of sets of drawings and design calculations and times for review for temporary supports shall be the same as specified for falsework working drawings in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications.

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
East plate girder span approach, (Pier 71 thru 77, and 71R thru 77R)	4
Pier 19	5
Pier 55	4
Pier 57	4
Pier 58	4
Pier 59	4
Pier 60	4
Pier 61	4
Pin Replacement	4

Working drawings for any part of the temporary supports shall include stress sheets, anchor bolt layouts, shop details, erection and removal plans.

The temporary support working drawings shall include descriptions and values of all loads, including construction equipment loads, descriptions of equipment to be used, complete details and calculations for jacking at Location A, B, and C and supporting the existing structure, and descriptions of the displacement monitoring system. The displacement monitoring system shall include equipment to be used, location of control points, method and schedule of taking measurements, and shall also include provisions to jack the structure at Location A, B & C should settlement occur in the temporary supports.

For temporary support, Location A, B, and C a redundant system of supports shall be provided during the entire jacking operation for backup should any of the jacks fail. The redundant system shall include stacks of steel plates added as necessary to maintain the redundant supports at each jack location within 1/4 inch of the jacking sill or corbels.

When footing type foundations are to be used, the Contractor shall determine the bearing value of the soil and shall show the values assumed in the design of the temporary supports on the temporary support drawings. Anticipated temporary support foundation settlement shall be shown on the temporary support drawings.

When pile type foundations are to be used, the temporary support drawings shall show the maximum horizontal distance that the top of a temporary support pile may be pulled in order to position it under its cap. The temporary support plans shall also show the maximum allowed deviation of the top of the pile, in its final position, from a vertical line through the point of fixity of the pile.

Temporary support footings shall be designed to carry the design load imposed upon them without exceeding the estimated soil bearing values and anticipated settlements.

Design of the temporary support by utilizing any part of the existing structure shall consider the effect of the loads, both vertical and lateral load, on the existing shaft column and its foundation. Design calculations prepared by the Contractor shall provide full design evaluations of the shaft and foundations in terms of load carrying capacity of the elements to which the temporary support is being anchored, and the lateral stability to the overall column.

Bracing shall be provided, as necessary, to withstand all imposed loads during erection and removal of any temporary supports. The temporary support drawings shall show provisions for such temporary bracing or methods to be used to conform to these requirements during each phase of erection and removal. Wind loads shall be

included in the design of such bracing or methods. Wind loads shall conform to the applicable paragraphs in Section 51-1.06A(1), "Design Loads," of the Standard Specifications.

The temporary support design calculations shall show a summary of computed stresses in the (1) temporary supports, (2) connections between temporary supports and the existing structure and (3) existing load supporting members. The computed stresses shall include the effect of the jacking sequence for Locations A, B, and C. The temporary support design calculations shall also include a lateral stiffness assessment of the temporary support system and conform to the design values shown on the plans.

The design of temporary supports will not be approved unless it is based on the use of loads and conditions which are no less severe than those described in the Section, "Temporary Support Design Criteria," of these special provisions and on the use of allowable stresses which are no greater than those described in Section 51-1.06A(2), "Design Stresses, Loadings, and Deflections," of the Standard Specifications.

If falsework loads are imposed on temporary supports, the temporary supports shall also satisfy the deflection criteria described in Section 51-1.06A(2), "Design Stresses, Loadings, and Deflections," of the Standard Specifications.

TEMPORARY SUPPORT DESIGN CRITERIA.--The temporary supports at Locations A, B, and C shall support the initial jacking loads and the minimum temporary support design loads and the minimum lateral design forces shown on the plans. At location D, the temporary supports shall support the minimum lateral design forces shown on the plans applied in each horizontal direction at the locations shown on the plans. Unless otherwise stated on the plans, the minimum horizontal design force shall be equivelant to 10 percent of the total dead load to be supported by the temporary supports. The vertical design loads shall be adjusted for the weight of temporary supports and jacks at Locations A, B, and C only, construction equipment loads and additional loads imposed by the Contractor's operations. The construction equipment loads shall be the actual weight of the construction equipment but in no case shall be less than 20 pounds per square foot of deck surface area of the frame involved. A frame is defined as the portion of the bridge between expansion joints.

The temporary supports shall resist the specified lateral design forces, as shown on the plans, applied at the point where the temporary support to be removed meets the superstructure or at the locations shown on the plans for Location D. The lateral design forces to be resisted shall be increased to be compatible with the temporary support lateral stiffness if the stiffness exceeds the specified minimum. The temporary supports resisting longitudinal and transverse lateral loads shall be placed within a distance of not more than-15 feet from the existing bent.

The existing structure shall be mechanically connected to the temporary supports. The temporary supports shall be mechanically connected to their foundations. The mechanical connections shall be capable of resisting the lateral temporary support design forces. Friction forces developed between the existing structure and temporary supports shall not be used to reduce the lateral forces and shall not be considered as an effective mechanical connection. The mechanical connections shall be designed to tolerate adjustments to the temporary support frame throughout the use of the temporary supports.

If the concrete is to be prestressed, the temporary supports shall be designed to support any increased or readjusted loads caused by the prestressing forces.

MANUFACTURED ASSEMBLIES: Manufactured assemblies shall conform to the provisions in Section 51-1.06A(2), of the Standard Specifications and these special provisions.

Each jack shall be equipped with either a pressure gage or a load cell for determining the jacking force. Pressure gages shall have an accurately reading dial at least 6-inches in diameter. Each jack 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. Each jack and its gage shall be calibrated as a unit with the cylinder extension in the approximate position that it will be at final jacking force and shall be accompanied by a certified calibration chart. Load cells shall be calibrated and provided with an indicator by which the jacking force is determined.

SPECIAL LOCATIONS.--Attention is directed to Section 51-1.06A(3), "Special Locations," of the Standard Specifications. All reference to falsework in this Section shall also apply to temporary supports.

TEMPORARY SUPPORT CONSTRUCTION.--Attention is directed to Paragraphs 1 through 7 of Section 51-1.06B, "Falsework Construction," of the Standard Specifications. All reference to falsework in these paragraphs shall also apply to temporary supports.

Welding, welder qualification, and inspection of welding for all steel members shall conform to the requirements of ANSI/AASHTO/AWS D1.5.

Prior to proceeding with bridge removal, an engineer for the Contractor who is registered as a Civil Engineer in the State of California shall inspect the temporary supports, including jacking at Locations A, B, and C and displacement monitoring systems, for conformity with the working drawings. The Contractor's registered engineer shall certify in writing that the temporary supports, including jacking at Locations A, B, and C and displacement

monitoring systems, substantially conform to the working drawings, and that the material and workmanship are satisfactory for the purpose intended. A copy of this certification shall be available at the site of the work at all times.

The Contractor's registered engineer shall be present at the bridge site at all times when jacking operations or adjustments at Locations A, B, and C are in progress and when bridge removal operations are in progress. The Contractor's registered engineer shall inspect the jacking and removal operation and report in writing on a daily basis the progress of the operation and the status of the remaining structure. A copy of the daily report shall be available at the site of the work at all times. Should an unplanned event occur, the Contractor's registered engineer shall submit immediately to the Engineer for approval, the procedure or proposed operation to correct or remedy the occurrence.

The Contractor shall perform an initial survey as part of the displacement monitoring system to record the location of the existing structure prior to the commencement of any work. Two copies of the survey shall be signed by an engineer, who is registered as a Civil Engineer in the State of California, and submitted to the Engineer.

Vandal-resistant displacement monitoring equipment shall be provided and maintained. Vertical and horizontal displacements of the temporary supports and the existing structure shall be monitored continuously during jacking operations at Locations A, B, and C and shall be accurately measured and recorded at least weekly during removal and reconstruction work. As a minimum, elevations shall be taken prior to the start of jacking operations, immediately after jacking is complete at Locations A, B, and C, after bridge removal is complete, before connecting the retrofitted superstructure or spandrel beams to the substructure, and after the temporary supports have been removed. As a minimum, the existing structure shall be monitored at the bent, at the centerline of each temporary support and at mid span of both adjoining spans. Control points at each location shall be located near the center and at both edges of the superstructure. The records of vertical and horizontal displacement shall be signed by an engineer who is registered as a Civil Engineer in the State of California and available to the Engineer at the jobsite during normal working hours, and a copy of the record shall be delivered to the Engineer at the completion of reconstructing each bent.

At Locations A, B, and C a force equal to the initial jacking load or the dead load shown on the plans shall be applied to the structure by the temporary support system and held until all initial compression and settlement of the system is completed before bridge removal work at the location being supported is begun.

At Locations A, B, and C jacking operations shall be carefully controlled and monitored to ensure that the jacking loads are applied simultaneously to prevent distortion and excessive stresses that would damage the structure. The superstructure shall be jacked as necessary to maintain the total vertical displacements at control points to less than 1/4 inch from the elevations recorded prior to jacking or as modified by the Engineer.

Should unanticipated displacements, cracking or other damage occur, the construction shall be discontinued until corrective measures satisfactory to the Engineer are performed. Damage to the structure as a result of the Contractor's operations shall be repaired by the Contractor according to the requirements in Section 7-1.11, "Preservation of Property," of the Standard Specifications.

Following completion of the reconstruction, the monitored control points shall not deviate from the vertical position by more than 1/4 inch from the initial survey elevations or the elevations as modified by the Engineer.

Prestressing existing steel truss members to provide temporary supports for installing seismic isolation bearings at Pier 19 and 61 shall be carefully controlled and monitored to ensure that the deck elevation between one span and the adjacent span at the joint shall not be deviate from each other by more than 1/2 inch.

REMOVING TEMPORARY SUPPORTS.--Attention is directed to Section 51-1.06C, "Removing Falsework," of the Standard Specifications. All references to falsework in this section shall also apply to temporary supports, except that when public traffic is carried on the structure on temporary supports, paragraph 8 is amended to read:

> No temporary supports shall be released until the supported concrete has attained 100 percent of the specified strength.

Attachments shall be removed from the existing structure and concrete surfaces restored to original conditions, except where permanent alterations are shown on the plans.

PAYMENT.--The contract lump sum price paid for temporary supports shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in designing, constructing, maintaining, and removing the temporary supports, including jacking the existing structure and monitoring displacements, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1B.02E PRESTRESSING EXISTING STEEL TRUSS MEMBERS

Prestressing existing steel truss members for the installation of seismic isolation bearings at Pier 19, 55, 57, 58, 59, 60 and 61 shall conform to the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications and these special provisions.

High-strength steel rods shall conform to the materials and sampling requirements for prestressing steel in Section 50, "Prestressing Concrete," of the Standard Specification.

Working drawings for the prestressing shall include details for bearing plates, stiffener plates, couplers, anchorage devices and prestressing procedures.

Bearing plates, stiffener plates, couplers, anchorage devices and supporting members for prestressing steel truss members shall conform to the requirements under "Steel Structures," elsewhere in these special provisions. Structural concrete fills inside of existing diagonal truss members at Pier 19, 55, 57, 58, 59, 60 and 61 shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and the section entitled "Concrete Structures" of these special provisions.

High strength steel rods used for prestressing shall be removed and become the property of the Contractor after the seismic isolation bearings are in place.

Full compensation for furnishing the bearing plates, stiffener plates and supporting members for prestressing steel truss members shall be considered as included in the contract price paid per pound for furnish structural steel (bridge), and no additional compensation will be allowed therefor.

Full compensation for structural concrete fills inside of existing truss member at Pier, 19, 55, 57, 58, 59, 60 and 61 shall be considered as included in the contract price paid for the temporary support involved, and no additional compensation will be allowed therefor.

Prestressing existing steel truss members at Pier 19, 55, 57, 58, 59, 60 and 61 shall include furnishing all labor and materials except those listed under "Steel Structures," elsewhere in these special provisions.

Full compensation for prestressing existing steel truss members at Pier 19, 55, 57, 58, 59, 60 and 61 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 prices paid for temporary support, (Locations A and B) and no additional compensation will be allowed therefor.

10-1B.02F RIVET REMOVAL AND HOLE REAMING

When shown on the plans, existing rivets to be removed and replaced with high strength bolts, shall be removed and the resulting hole reamed in conformance with the requirements in these special provisions. When shown on the plans, existing rivets, to have their heads removed but not the rivet shanks, shall be removed in conformance with the requirements in these special provisions. Removing rivets shall conform to the requirements in Section 15, "Existing Highway Facilities," and Section 55, "Steel Structures," of the Standard Specifications and these special provisions. Attention is directed to the sections entitled "Steel Structures" and "Clean and Paint Structural Steel," of these special provisions regarding priming of exposed steel surfaces in connection with hole enlargement operations.

Attention is directed to Section 7-1.09, “Public Safety,” and Section 7-1.12, “Responsibility for Damage,” of the Standard Specifications. Attention is directed to the sections entitled "Existing Facilities," of these special provisions regarding the proper collection and handling of existing paint system particles resulting from this work.

Furnishing and installing high-strength bolts or rods at rivet removal locations, as shown on the plans, will be measured and paid for as provided in Section 55, “Steel Structures,” of the Standard Specifications and the section entitled "Steel Structures," elsewhere in these special provisions.

The Contractor shall submit to the Engineer for approval the proposed methods of rivet removal and hole reaming in accordance with the requirements in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The Engineer will notify the Contractor 20 days after receipt of the Contractor’s submittal whether the proposed methods are approved for rivet removal demonstration. After the Engineer has approved the proposed methods for rivet removal demonstration, the Contractor shall demonstrate his removal methods by removing rivets at ten separate locations as directed by the Engineer. Locations will vary in the number of piles, the access to the work and the size of the rivet. The approval of the rivet removal methods is contingent upon the successful removal of all the rivets designated in the demonstration locations. Prior to removing rivets, the State will conduct Magnetic Particle Testing (MT) to obtain base line information. Following rivet removal, the State will perform a second MT to determine if the rivet removal process has created discernable base metal damage. If the Contractor’s operation damages the existing steel, the individual rivet removal method will be rejected. The Engineer will notify the Contractor 7 days after completion of each rivet removal demonstration and corresponding MT whether the proposed methods are approved or rejected. Production rivet removal will not be permitted until the rivet removal and hole reaming methods have been approved by the Engineer. Throughout the contract additional MT will be conducted by the State at random locations to ensure compliance with the original approved removal methods. In the event that the Engineer determines that rivet removal work is resulting in damage to the existing steel, the

Contractor shall cease rivet removal operations until ~~a~~ new proposed methods for rivet removal has been submitted by the Contractor and approved by the Engineer.

At locations where rivets are to be removed, the rivets shall have their head removed and the shank driven, drilled, cored or jacked out and replaced with a bolt or rod one at each time. Care shall be taken not to damage remaining material. Burning will not be permitted. The Contractor shall demonstrate removal methods using heat to the Engineer. Heat resulting from any removal method shall not damage rivet holes or the surrounding materials.

At locations where rivets heads are to be removed but the shanks remain, the rivets shall have their head removed and the shanks shall be secured and remain in the hole. If the existing shank was damaged as a result of the Contractor's operation, the Contractor shall replace the existing shaft with a temporary shank at his expense, to the satisfaction of the Engineer. The shank shall be driven, drilled, cored or jacked out and replaced with a bolt or rod one at each time. Burning will not be permitted.

Difficult rivet removal is anticipated for 40 percent of the existing rivets with grip lengths greater than 2 1/2 inches and 5 percent of the existing rivets with grip lengths less than or equal to 2 1/2 inches. Difficult rivet removal is anticipated due to rusting of rivets inside the holes, tapered rivets, restricted access to the rivets and misalignment of existing. Difficult rivet removal will require tools and effort beyond simply removing the rivet head and driving out the shank.

Where existing rivets are removed, and the resulting holes require enlargement, the holes shall be enlarged not more than 1/16 inch in diameter greater than the new high-strength steel bolt nominal bolt diameter shown on the plans. Holes shall be enlarged by reaming. Burning will not be permitted. Where reamed holes exceed the bolt diameter by more than 1/16 inch, the next larger size bolt shall be installed at the Contractor's expense.

Reaming shall conform to the provisions in Section 55-3.14A(3), "Reaming," of the Standard Specifications and the section entitled "Steel Structures," elsewhere in these special provisions.

At locations where surrounding material has been damaged as a result of the Contractor's operations, the surrounding material shall be repaired. When reaming of more than 1/16-inch in diameter greater than the nominal bolt diameter shown on the plans and installing an oversize bolt is required for the repair, the reaming, furnishing and installing of oversized bolts shall be at the Contractor's expense.

At locations where rivet holes contain cracked, torn, or otherwise damaged material due to conditions other than the Contractor's operations, the Contractor shall ream the hole and install an oversized bolt. Additional reaming more than 1/16 inch in diameter than the nominal bolt diameter shown on the plans, including the difference between the actual cost of the bolt shown on the plans and the oversized bolt, shall be done as directed by the Engineer and will be paid for as extra work as provided in Section 4-1.03 D of the Standard Specifications. Installing oversized bolts shall be at the Contractor's expense.

Inside surfaces of holes remaining after rivet removal and reaming shall be painted in accordance to and be measured and paid for as specified for existing steel surfaces in "Clean and Paint Structural Steel" elsewhere in these special provisions.

Rivet removal and hole reaming will be measured and paid for by unit.

The contract unit price paid for rivet removal and hole reaming shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in removing rivets, including submitting the proposed method for rivet removal, enlarging holes by reaming, complete in place, as shown on the plans, as specified in these special provisions, and as directed by the Engineer, and no separate payment will be made for these included items.

Full compensation for removing rivet heads and securing shanks, as shown on the plans, shall be considered as included in the contract unit price paid for rivet removal and hole reaming and no additional compensation will be allowed therefor.

10-1B.02G FIELD DRILLING BOLT HOLES

Field drilling bolt holes on existing structural members, as shown on the plans shall be in conformance with the requirements in these special provisions.

Attention is directed to the sections entitled "Steel Structures" and "Clean and Paint Structural Steel," of these special provisions regarding priming of exposed steel surfaces in connection with drilling operations, and the proper collection and handling of existing paint system particles resulting from this work.

Field drilled holes shall conform to the provisions in Section 55-3.14A(2) "Drilling," of the Standard Specifications and the section entitled "Steel Structures," elsewhere in these special provisions.

Existing material that are damaged as a result of the Contractor's operation shall be repaired by the Contractor, at his expense, to the satisfaction of the Engineer.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in field drilling holes, complete in place, as shown on the plans shall be considered as included in the contract price paid per pound for erect structural steel (bridge), and no additional compensation will be allowed therefor.

10-1B.02H REMOVE EXISTING TRUSS SHOE PINS

Existing truss shoe pins shall be removed as shown on the plans and in conformance with the requirements in these special provisions.

Attention is directed to the sections entitled "Steel Structures" and "Clean and Paint Structural Steel," of these special provisions regarding priming of exposed steel surfaces in connection with hole enlargement operations, and the proper collection and handling of existing paint system particles resulting from this work.

The Contractor shall submit to the Engineer for approval the proposed method of truss shoe pin removal and replacement. The maximum number of pin can be removed and replaced within one span shall be one at each time. Pin removal will not be permitted until the removal and replacement method has been approved by the Engineer.

Attention is directed to the provisions in the sections entitled “Temporary Support,” of these special provisions. Temporary support shall be in place prior to any pin removal and shall be removed after new pin is in place.

When existing pins are removed, the shank shall be driven or drilled out. Burning will not be permitted.

Where existing pins are removed, the holes shall be enlarged not more than 1/32 inch in diameter greater than the new pins nominal diameter. Holes shall be enlarged by reaming. Burning will not be permitted. Holes shall be true to specified diameter, smooth and straight, at right angles to the axis of the member and parallel with each other. Where reamed holes exceed the pin diameter by more than 1/32 inch, a larger size pin which is 1/32 inch smaller than the pin hole diameter shall be installed at the Contractor's expense.

Reaming shall conform to the provisions in Section 55-3.14A(3), "Reaming," of the Standard Specifications and the section entitled “Steel Structures,” elsewhere in these special provisions.

Existing material that are damaged as a result of the Contractor’s operation shall be repaired by the Contractor, at his expense, to the satisfaction of the Engineer.

The contract unit price paid for removing existing truss shoe pins shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in removing existing truss shoe pins, including enlarging holes, complete in place, as shown on the plans, and as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1B.03 EARTHWORK (SUPERSTRUCTURE)

Earthwork shall conform to the provisions in "Earthwork," elsewhere in these special provisions.

10-1B.04 TEST BORINGS

Test borings shall consist of drilling test borings, taking samples, logging borings and furnishing test boring submittals to the Engineer.

Attention is directed to the “Order of Work,” elsewhere in these special provisions.

Attention is directed to “Earthwork,” regarding disposal of materials outside the highway right-or-way.

The “Soil and Rock Logging Classification Manual” is included in the "Materials Information" 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.

The Contractor shall complete one test boring at piers 62 through 77, and 71R through 77R, scheduled for the addition of micropiles as shown on the plans. Test borings for micropiles at piers 62 through 65, 75 through 77, 74R through 77R shall be centered between the pier shafts, and within 5 feet of the existing footing. Test borings for micropiles at piers 66 through 74, and 71R through 73R shall be centered between the existing footings and within 5 feet of the existing diaphragm.

The Contractor shall notify the Engineer in writing not less than 10 working days in advance of drilling test borings.

All test borings shall be made under the site supervision of, the log of test borings stamped by, and the test boring submittal signed by a Certified Engineering Geologist or Civil Engineer who is registered in the State of California and has at least five years of experience performing geotechnical, borehole logging specifically for deep foundation investigation in both soil and rock.

Advancement of test borings through soil or soil-like material shall be achieved by either one, or a combination of, mud-rotary, wireline punch core, or wireline soil coring methods, provided they can be configured for Standard Penetration Testing. Rock core drilling within test borings shall be performed by wireline drilling methods incorporating an outer core barrel and split inner tube core barrel assembly. The rock core drilling systems shall be configured for the recovery of either "N" size (1.9 inch$^{\pm}$ diam.) or "H" size (2.5 inch$^{\pm}$ diam.) rock core.

For micropiles, continuous rock cores shall be made from the approximate bedrock elevation shown on the plans for a length equal to the minimum length of bedrock embedment shown on the plans or for a length equal to the estimated length of bedrock embedment submitted by the Contractor to the Engineer, whichever is greater.

Standard Penetration Tests (SPT) shall be made in all soil types and performed in accordance with ASTM D1586 in each test boring at 5 foot maximum intervals and terminate when bedrock is encountered. Soil classification and

descriptions shall conform to the requirements for visual-manual procedures in ASTM D 2488. SPT's performed in test borings at the micropile pier locations shall start 20 feet above the approximate bedrock elevation as shown on the plans.

Prior to removal from the split inner tube core barrels and placement into core boxes, rock cores shall be gently washed with clean water and then photographed within 20 minutes after extraction from their parent test boring. After core boxes are filled, and prior to removal from the drilling platform, rock cores retained within them shall be photographed. All rock core photographs shall be color, 5″ x 7″, and labeled with the bridge number, pier number, borehole number, sample elevation, scale, and the date and the time photograph was taken.

Soil samples shall be preserved and transported in accordance with the requirements specified in Group C of ASTM D 4220.

Rock core samples shall be retained in standard core boxes constructed of either plastic, wax-coated corrugated cardboard, wood, or corrosion-proof metallic materials. The core boxes shall be of sufficient strength that will allow for a reasonable amount of careful handling, stacking, and shipment when filled with rock core. As a minimum, each core box shall be permanently labeled with the bridge name and number, pier, borehole and job contract numbers, and the date sampled. This information shall be placed on one end and the top of each core box. Rock core and soil samples shall be stored on or near the job site at a location approved by the Engineer. The Contractor shall preserve and secure the rock core and soil samples in a weather protected facility until notified by the Engineer. The Contractor shall provide suitable lighting and tables necessary within said storage facility that will enable the Engineer and other authorized personnel to examine the rock core and soil samples at any time. The Engineer will instruct the Contractor to dispose of the rock core and soil samples in accordance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications, and "Earthwork" elsewhere in these special provisions or the Engineer will instruct the Contractor to transport the rock core and soil samples to Engineering Services Center-Office of Structural Foundations at 5900 Folsom Boulevard, Sacramento.

Soil, rock, and discontinuity classifications and descriptions shall conform to the document "Soil and Rock Logging Classification Manual: Field Guide," published by the Engineering Service Center, Caltrans, dated August 1995.

The test boring field logs shall be divided into three sections on 8 1/2" x 11" water-resistant paper and formatted with the following minimum data requirements:

1. Header Data Section
   - Bridge Name and No.
   - Pier No.
   - Project
   - State Contract No.
   - Boring No.
   - Borehole Bridge Stationing and Offset
   - Borehole Northing and Easting Coordinates
   - Borehole Collar or Reference Elevation and Datum
   - Boring Start and Completion Date
   - Name of Logger(s)
   - Name of C.E.G. or P.E. On-site Logging Supervisor

2. Column Data Section
   - Notes
   - Drill Bit Type and Dimensions
   - Sampler Type and Dimensions
   - % Recovery of Rock Core and SPT Soil Samples
   - Sample No.
   - Standard Penetration Test Measurements (recorded for each of the three, 6-inch increments per test)
   - Sample Depth (below borehole collar or reference elevation)
   - Graphic Log
   - Soil, Rock Core and Discontinuity Classification and Description

3. Footer Data Section
   - Miscellaneous Explanations (such as SPT hammer make, model no., type)

Lead drill rig operators shall maintain daily drilling notes for each test boring on 8 1/2" x 11" water-resistant paper and formatted with the following minimum data requirements:

1. Header Data Section
   - Bridge Name and No.
   - Pier No.

- State Contract No.
- Boring No.
- Boring Start and Completion Date
- Name of Drilling Subcontractor
- Name of Lead Drill Rig Operator

2. Column Data Section
   - Boring Depth Interval
   - Drilling Methods
   - Drill Bit Type and Dimensions
   - Drilling Conditions and Driller's Comments
   - Drilling Time/Penetration Rates
   - Casing Diameter and Depths
   - Drilling Fluid Type, Color and Percent Returned
   - Sampler Type and Dimensions
   - % Sample Recovery

After completion of all test borings, the Contractor shall furnish to the Engineer a test boring submittal that includes rock cores, photographs of rock cores, a test boring report and the log of test borings.

Individual test boring submittals to the Engineer shall contain not less than 4 nor more than 20 boring logs. The test boring submittals shall include data from a minimum of 4 adjacent piers. In the event that several submittals are made simultaneously, or a submittal is made before the review of a previous submittal has been completed, the Contractor shall designate the sequence in which the submittals are to be reviewed. In such event, the time to be provided for the review of any submittal in the sequence shall not be less than the review time specified elsewhere, plus two weeks for each submittal of higher priority which is still under review.

The log of test borings shall conform with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. All log of test borings shall be 22" x 34" in size. For review, 4 sets of drawings shall be submitted to the Engineer. Within 3 weeks after final approval of the test boring submittal, one set of the corrected prints on 60 pound (minimum) good quality bond paper, 22" x 34" in size, prepared by the Contractor shall be furnished to the Office of Structure Design, Documents P.O. Box 942874, MS#9, Sacramento, CA 94274-0001 (1801 30th Street, Sacramento, CA 95816).

Log of test borings shall show 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 on each sheet. The test boring/geotechnical subcontractor name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers. The following shall be shown on the log of test borings:

1. Stationing and offset of boring.
2. Northing and easting coordinates.
3. Reference elevation and datum.
4. Boring start and completion date.
5. Geotechnical notes and miscellaneous explanations.
6. Drill bit and sampler types and diameters.
7. Percent of core recovery and RQD.
8. Sample numbers.
9. SPT data.
10. Elevation increments of borings.
11. Graphic log.
12. Soil classifications and descriptions.
13. Rock and discontinuity classifications and descriptions.
14. Log symbol legend.
15. Signature and seal of the Certified Engineering Geologist or Civil Engineer.

The test boring report shall include the following:

1. Summary of drilling methods, drilling equipment, drill platforms, and any drilling difficulties encountered.
2. Location map of the surveyed position of the test borings relative to the existing pier and to the new pile locations (in California Coordinate System and bridge stationing).
3. Bore hole surveying notes.
4. Photographs of rock cores.

5. Copies of original daily drilling notes.
6. Copies of original test boring field log sheets.
7. Disposition of soil and rock core samples.

The Engineer will notify the Contractor in writing when a test boring submittal is complete and approved.

Within 15 working days of approving in writing the complete test boring submittal, the Engineer will supply the Contractor with written confirmation of, or revisions to, the steel casing lengths for cast-in-place concrete piling. Steel casings for cast-in-place concrete piling shall not be fabricated to length until the written confirmation of, or revisions to, the steel casing lengths have been supplied by the Engineer. Should the Engineer fail to supply confirmation of, or revision to the steel casings lengths 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 this delay, an extension of time commensurate with the delay in completion of the work thus caused will be granted as provided in Section 8-1.09, "Right of Way Delays."

After the test borings are complete the Contractor shall finalize the required bedrock embedment, temporary steel casing, and micropile steel pipe lengths and include the required length data in the working drawing details for micro piling prior to submitting the micropile working drawings to the Engineer for approval.

Drill cuttings and excavated material resulting from test borings shall be disposed of in conformance with the provisions of "Earthwork," elsewhere in these special provisions. All other materials utilized in making test borings shall be disposed of in accordance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The contract lump sum price paid for test borings shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in taking, logging, and storing test borings, complete in place, including staging and entry requirements, transport of samples to Engineering Service Center, and disposal of boring spoils, rock cores and soil samples as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1B.05 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. These are available for inspection at the office of the Toll Bridge Program Duty Senior at District 04 Office, 111 Grand Avenue, Oakland, California 94612; telephone number (510) 286-5549.

Attention is directed to “Earthwork,” “Permits and Licenses,” “Relations with California Regional Water Quality Control Board,” “Relations with US Army Corps of Engineers,” “Relations with Bay Conservation and Development Commission,” “Relations with US Coast Guard,” “Obstructions,” “Sound Control,” and “Water Pollution Control” of these special provisions.

Attention is directed to “Order of Work” elsewhere in these special provisions regarding test borings.

Attention is directed to "Welding Quality Control" of these special provisions regarding manufacturing, fabricating, and field splicing piling.

All material resulting from the installation of piling, including drill cuttings, and excavated material, shall be disposed on in conformance with Sections “Earthwork” and “Non-Storm Water Discharges” elsewhere in these special provisions. Material resulting from placing concrete in cast-in-drilled-hole concrete piling, and from grouting micropiles, including slurry, shall be disposed of in conformance with the provisions of Section 7-1.13, “Disposal of Material Outside the Highway Right of Way,” of the Standard Specifications unless otherwise permitted in writing by the Engineer.

Attention is directed to the provisions of Section 7-1.09, "Public Safety," of the Standard Specifications. Before performing any pile handling or pile installation operation at any location that is closer than the length of the pile being handled or installed to the edge of any traveled way open to public use, the Contractor shall submit to the Engineer, as provided in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, a detail plan of the measures that will be employed to provide for the safety of traffic and the public.

Attention is directed to “Test Borings,” elsewhere in these special provisions. Test borings shall be completed and the steel shell lengths verified by the Engineer in writing prior to the Contractor fabricating steel shells to final length.

Proposals made by the Contractor to modify the specified bottom of steel casing elevations for the cast-in-drilled-hole piles will not be considered.

Proposals made by the Contractor to modify the specified pile installation methods will not be considered.

Difficult pile installation is anticipated due to the presence of soft bay mud overlying dense soils, caving soils, stiff soil layers, dense sand and gravel layers, hazardous and contaminated materials, serpentine materials,tidal flow fluctuation,low overhead clearance,overhead utilities, the requirements of pile embedment into rock, and sound control,.

Difficult pile installation is anticipated due to the presence of existing rip rap at Bent 1 of the concrete trestle replacement. The Contractor shall remove and replace existing rip rap to a condidtion as good as when the Contractor entered upon the work.

PILE DRIVING.—Pile driving shall consist of installing permanent steel casings for cast-in-drilled-hole concrete piling and temporary steel casings for micropiles and shall conform to these special provisions.

General.—The provisions of Section 49-1.05, "Driving Equipment," and Section 49-1.06, "Predrilled Holes," of the Standard Specifications shall not apply to pile driving.

Pile driving shall be done with impact hammer approved by the Engineer. Impact hammers shall be steam, air, diesel, or hydraulic hammers. Impact hammers shall have sufficient energy to drive permanent steel casings for cast-in-drilled-hole concrete piling at bottom of steel casing elevation and temporary steel casings for micropiles at approximate bedrock elevations, at a penetration rate of not less than 1/8-inch per blow.

Vibratory hammers shall not be used.

Steel casings for cast-in-drilled-hole concrete piling may be installed with drop hammers. Drop hammers are permitted only if the Contractor can demonstrate that the driving system provides uniform bearing on the steel casing and shall have sufficient energy to drive the steel casings at a penetration rate of not less than 1/8 inch per blow at the specified penetration. Steam or air hammers shall be furnished with boiler or air compressor with a capacity at least equal to that specified by the manufacturers of the hammers to be used. The boiler or compressor shall be equipped with an accurate pressure gage at all times. The valve mechanism and other parts of steam, air, or diesel hammers shall be maintained in first-class condition so that the length of stroke and number of blows per minute for which the hammer is designed will be obtained. Inefficient steam, air, hydraulic, or diesel hammers shall not be used.

For hammers with no visual way of observing the ram stroke, a printed readout showing hammer energy during driving operation shall be provided.

The use of followers or underwater hammers for driving permanent and temporary steel casings will be permitted when authorized in writing by the Engineer. When a follower or underwater hammer is used, its efficiency shall be verified by furnishing the first casing, and every tenth casing driven, sufficiently long and driving said casings without the use of a follower or underwater hammer.

Cast-In-Drilled-Hole Concrete Piling.—Steel casings for cast-in-place concrete piling shall be driven to the bottom of steel casing elevation shown on the plans unless directed otherwise by the Engineer. Bearing values will not be determined by the criteria in Paragraphs 3 through 7 of Section 49-1.08, "Bearing Value and Penetration," of the Standard Specifications.

Steel casings shall be installed open-ended and no internal plates other than weld backup plates shall be used. The axis of the steel casing shall not deviate from plumb by more than 1½ inches per 10 feet of length. Weld backup plates at casing splices shall not impede drilling operations.

For elevations above the plane of pile cutoff, the Contractor shall provide steel casings sufficiently long or provide temporary conduits to contain the slurry, water, material resulting from drilling and pile clean out, and excess concrete so that they may be conveyed above the water surface for disposal. If a temporary steel conduit is used, the connection between the temporary conduit and the steel casing shall be watertight.

The steel casing shall be firmly seated into bedrock to prevent the inflow of material surrounding the bottom of the steel casing. If material surrounding the bottom of the steel casing enters the pile shaft during construction of the bedrock socket, the Contractor shall take measures to prevent the inflow of material. Such measures may include redriving the steel casings or inserting temporary steel casings.

In addition to driving, at the Contractor's option, internal jetting, rotations (without vibration), use of pull-down or jack-down method, or drilling through the center of the steel casings may be used to obtain the bottom of steel casing elevation. Equipment or methods used for internal jetting or drilling holes shall not cause quick soil conditions, scouring or caving of the hole. Jetting, spudding, or other soil disturbance techniques on the outside of the steel casings will not be permitted. Internal jetting shall not be used within 15 feet of the bottom of the steel casing at any time during installation.

Internal jetting and drilling may only be used when the steel casing penetration rate is less than 1.0 foot per 100 blows using an impact hammer with at least a minimum manufacturer's energy rating of 80,000 foot-pounds per blow. Lighter hammers may be used in the early stages of driving but they will not be approved for use in conjunction with internal jetting and drilling, at any time.

When drilling through the center of steel casings, holes with a diameter less than the inside diameter of the steel casing, may be drilled to within a level of two pile diameters above the position of the bottom of steel casing at any time during pile installation.

Holes drilled between the region that is two pile diameters above the position of the bottom of steel casing and the end of the steel casing, shall have a diameter less than 75 percent of the inside diameter of the steel casing.

When the penetration rate for steel casings using an impact hammer with at least a minimum manufacturer's energy rating of 80,000 foot-pounds per blow is less than 1.0 foot per 200 blows, holes may be drilled a maximum distance of 5 feet beyond the position of the bottom of steel casing, but not beyond the bottom of steel casing elevation shown on the plans, provided that the holes have a diameter less than 50 percent of the inside diameter of the steel casing.

Drilling to advance steel casings shall be performed under a full head of slurry that is equal to the external seawater level, except drilling below a level of two pile diameters above the position of the bottom of steel shell shall be carried out using a full head of synthetic slurry equal to the external seawater level.

STEEL PIPE CASING.—Steel pipe casing shall consist of temporary steel casing for micropiles and shall conform to these special provisions.

The provisions of Section 49-5, "Steel Piles," of the Standard Specifications shall not apply to steel pipe casing.

Steel pipe casings shall be of the nominal diameter and the nominal wall thickness as the pipe casing shown on the plans unless otherwise specified in the special provisions. Steel pipe casings shall conform to the specifications of ASTM Designation: A252, Grade 3.

Steel pipe casing shall conform to the following requirements:

1. The carbon equivalency (CE) as defined in AWS D 1.1, Section XI5.1, shall not exceed 0.45.
2. The sulfur content shall not exceed 0.05 percent.

The manufacturer or fabricator of steel pipe casing shall furnish a Certificate of Compliance stating that the pipe casing 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 pipe casing.

The Contractor shall be responsible for any requirements that are in addition to ASTM 252 specifications (including tolerances for maintaining diameter, circumference, roundness, and cross-sectional area) that are required in order to conform with welding requirements for manufacturing, fabricating and splicing.

Steel pipe casing shall not be joined by welded lap splicing.

Steel pipe casing 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. Steel pipe casing splices that are made at a permanent manufacture or fabrication facility, and that are made prior to furnishing the Certificate of Compliance shall be complete penetration welds. Steel pipe casing splices that are made in the field shall be complete joint penetration groove welds.

Ends of steel pipe casing to be spliced that have been damaged during driving shall be removed to a sound and uniform section conforming to the tolerances for diameter, edge alignment and roundness required to meet the steel pipe casing splice welding requirements. Pipe ends shall be field cut using automated guided cutting equipment. Manual flame cutting shall not be used.

STEEL PIPE PILING

Description.--Steel pipe piling shall consist of permanent steel casing for cast-in-drilled-hole concrete piling and steel pipe used for micropiling shall conform to these special provisions.

General.-- The provisions of Section 49-5, "Steel Piles," of the Standard Specifications shall not apply to steel pipe piling.

Wherever reference is made to the following American Petroleum Institute (API) specifications in the Standard Specifications, on the project plans or in these special provisions, the year of adoption for these specifications shall be as follows:

API Codes	Year of Adoption
API 2B	1990
API 5L	1995

The manufacturer or fabricator of steel pipe piling shall furnish a certificate of compliance stating that the pipe being supplied conforms with these special provisions. The certificate of compliance shall include test reports for tensile, chemical, and nondestructive tests. Samples for testing shall be taken from the base metal, steel, coil or from the manufactured or fabricated pipe. The certificate of compliance shall be in English with English units.

Shop welds is defined as pipe piles welds that are made at a manufacture or fabrication facility and that are made prior to furnishing the certificate of compliance.

Field welds is defined as pipe pile welds that are made after the certificate of compliance has been furnished by the manufacturer or fabricator.

Steel piles shall not be joined by welded lap 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. Steel pipe pile splices that are made at a permanent

manufacture or fabrication facility, and that are made prior to furnishing the Certificate of Compliance shall be complete penetration welds. Steel pipe pile splices that are made in the field shall be complete joint penetration groove welds.

Ends of steel pipe piling to be spliced that have been damaged during driving shall be removed to a sound and uniform section conforming to the tolerances for diameter, edge alignment and roundness required to meet the steel pile splice welding requirements. Pipe ends shall be field cut using automated guided cutting equipment. Manual flame cutting shall not be used.

Handling devices may be attached to steel pipe piling. Welds attaching these devices shall be aligned parallel to the horizontal axis of the pile and shall conform to the requirements of "Field Welding" specified herein. Permanent bolted connections shall be corrosion resistant. Prior to making attachments, the Contractor shall submit a plan to the Engineer that includes the locations, handling and fitting device details and connection details. Attachments shall not be made to the steel pipe piling until the plan is approved in writing by the Engineer. The Engineer shall have 7 calendar days to review the plan. 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 plan, 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.

Each length of steel pipe piling shall be marked in conformance with the requirements of ASTM Designation: A 252 and also with end match markings as required by the Contractor.

All steel pipe piling ends damaged during driving or installation shall be removed to a sound and uniform section conforming to the dimensions and tolerances specified.

Welding bar stock to micropiling steel pipe shall conform to the details shown on the plans.

Manufactured Steel Pipe.--Manufactured steel pipe is defined as pipe that is produced at a facility where an electricfusion welder, electric resistance welder, or seamless pipe operation is used in conformance with ASTM Designations: A 252, A 53, A 135, A 139, API 5L, or AWWA C200; where this steel pipe can have lengths at least 30 feet long without a circumferential splice; and where this manufacturing can be done on a daily basis.

Manufactured steel pipe used for steel pipe piling shall conform to the following requirements:

1. Piles shall be of the nominal diameter and the nominal wall thickness as the pipe piles shown on the plans unless otherwise specified in the special provisions.
2. The outside circumference of the steel pipe piling end shall not vary by more than 0.375-inch from that corresponding to the diameter shown on the plans.
2. The maximum allowable variation in edge alignment for adjacent steel pipe pile ends to be weleded shall be 0.1875 times the wall thickness, but not more than 0.063-inch.
3. Steel pipe pile straightness shall conform to the requirements of API 5L, Section 7.6, "Straightness."
4. Welds made at a permanent manufacturing facility shall be made by either an automatic fusion weld or an electric resistance weld process.
5. Twenty-five percent of each longitudinal, circumferential and spiral weld made at a permanent manufacturing facility shall receive nondestructive testing (NDT) by either radiographic, radioscopic, real time imaging systems or ultra sonic methods that are in conformance with the requirements of AWS D1.1 or API Specification 5L. Records of this testing shall be made available to the Engineer upon request. The acceptance and repair criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional NDT shall be performed. The additional NDT shall be made on both sides of the repair for a length equal to 10% of the length of the pipe outside circumference. After the additional NDT is performed, and if more repairs are required that have a cumulative length equal to or more than 10% of the length of the pipe outside circumference, then the entire splice weld shall receive NDT.
6. The carbon equivalency (CE) as defined in AWS D 1.1, Section X15.1 shall not exceed 0.45.
7. The sulfur content shall not exceed 0.05%.

Fabricated Steel Pipe.--Fabricated steel pipe is defined as pipe produced at a facility where a variety of steel fabrication including roll forming and welding steel plate into pipe is performed, where this pipe is at least 3/4-inch in wall thickness, where this pipe is produced in conformance with API 2B, and where this fabrication can be done on a daily basis.

Fabricated steel pipe used for steel pipe piling shall conform to API 2B and the following requirements:

1. API site license and API monogram are not required.
2. Weld filler metal shall conform to the requirements of AWS D1.5 for the welding of ASTM Designation: A 709, Grade 50 steel, except that the qualification, pretest and verification test requirements need not be conducted provided that certified test reports are provided for the consumables to be used.

3. Twenty-five percent of each longitudinal and circumferential weld made at a permanent fabrication facility shall receive NDT by either radiographic, radioscopic, real time imaging systems or ultra sonic methods that are in conformance with the requirements of AWS D1.1 or API 5L. Records of this testing shall be made available to the Engineer upon request. The acceptance and repair criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional NDT shall be performed. The additional NDT shall be made on both sides of the repair for a length equal to 10% of the length of the pipe outside circumference. After the additional NDT is performed, and if more repairs are required that have a cumulative length equal to or more than 10% of the length of the pipe outside circumference, then the entire splice weld shall receive NDT.
4. Fabricated steel pipe piling shall conform to the physical and chemical requirements of ASTM 252, Grade 3 and the carbon, and sulfurs requirements for manufactured steel pipe.

Field Welding.--Field welding of steel piling is defined as welding performed after the certificate of compliance has been furnished by the manufacturer or fabricator and shall conform to the requirements of AWS D1.1, "Welding Quality Control," elsewhere in these special provisions, weld joint details shown on the plans and these following requirements:

1. Match marking of pipe ends at the manufacturing or fabrication facility is recommended for piling to ensure weld joint fit-up. Prior to positioning any 2 sections of steel pipe to be spliced by field welding, including those that have been match marked at the manufacturing or fabrication facility, the Contractor shall equalize the offsets of the pipe ends to be joined and match mark the pipe ends.
2. Welds made in the flat position or vertical position (where the longitudinal pipe axis is horizontal) shall be single-vee groove welds. Welds made in the horizontal position (where the longitudinal pipe axis is vertical) shall be single-bevel welds. Joint fit-ups shall conform to the requirements for tubular sections in AWS D1.1 and these special provisions.
3. The minimum thickness of the backing ring shall be 1/4-inch and the ring shall be continuous. Radiographic, magnetic particle or ultrasonic testing shall be used to assure soundness of the backing ring per requirements in AWS D1.1, Section 6. All splices in the backing ring shall be made by complete penetration welds. These welds shall be completed and inspected prior to final insertion into a pipe end. Attachment of backing rings to pipe ends shall be done using the minimum size and spacing of tack welds that will securely hold the backing ring in place. Tack welding shall be done in the root area of the weld splice. Cracked tack welds shall be removed and replaced prior to subsequent weld passes. The gap between the backing ring and the steel pipe piling wall shall be no greater than 1/16-inch. One localized portion of the splice, that is equal to or less than a length that is 20% of the outside circumference of the pipe, as determined by the Engineer, may be offset by a gap equal to or less than 1/4-inch provided that this localized portion is first seal welded using shielded metal arc E7016 or E7018 electrodes. The Contractor shall mark this localized portion so that it can be referenced during NDT. Backing rings shall have a minimum width of 1 1/2 times the thickness of the pile to be welded so that they will not interfere with the interpretation of the NDT.
4. For steel pipe with an outside diameter greater than 42 inches and with a wall thickness greater than one inch, the root opening tolerances may be increased to a maximum of 3/16-inch over the specified tolerances.
5. Weld filler metal shall conform to the requirements shown in Table 4-1 of AWS D1.5 for the welding of ASTM Designation: A 709, Grade 50 steel, except that the qualification, pretest and verification test requirements need not be conducted provided that certified test reports are provided for the consumables to be used.
6. For field welding, including attaching backing ring and making repairs, the preheat and interpass temperature shall be in accordance with AWS D1.1, Section 3.5 "Minimum Preheat and Interpass Temperature Requirements," with Table 3.2, Category C; and the minimum preheat and interpass temperature shall be 150° F, regardless of the pipe pile wall thickness or steel grade. In the event welding is disrupted, preheating to 150° F must occur before welding is resumed.
7. Welds shall not be water quenched. Welds shall be allowed to cool unassisted.
8. Splices made by field welding steel pipe piling shall receive NDT as follows:

   Radiographic testing (RT) shall be used for each field weld, including splices that are made onto a portion of the steel pipe piling that has been installed and any repair made to a splice weld. Testing shall be done at locations selected by the Engineer. The length of a splice weld, not including repairs, where RT is to be used, shall have a cumulative length that is equal to 25% of the pipe outside circumference. The Engineer may select several locations on a given splice for RT. The top cover pass shall be ground smooth at the locations to be tested. The acceptance criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional RT shall be performed. The additional RT shall be made on both sides of the

repair for a length equal to 10% of the length of the pipe outside circumference. After the additional RT is performed, and if more repairs are required that have a cumulative length equal to or more than 10% of the length of the pipe outside circumference, then the entire splice weld shall be radiographically tested.

At the option of the Contractor, ultrasonic testing may be substituted as the NDT method for splices made by field welding steel pipe piling, as follows:

Ultrasonic testing (UT) shall be used for each field weld, including splices that are made onto a portion of the steel pipe piling that has been installed and any repair made to a splice weld. Testing shall be done at locations selected by the Engineer. The length of a splice weld, not including repairs, where UT is to be used, shall have a cumulative length that is equal to 25% of the pipe outside circumference. The Engineer may select several locations on a given splice for UT. The acceptance criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional UT shall be performed. The additional UT shall be made on both sides of the repair for a length equal to 10% of the length of the pipe outside circumference. After the additional UT is performed, and if more repairs are required that have a cumulative length equal to or more than 10% of the length of the pipe outside circumference, then the entire splice weld shall be ultrasonically tested.

9. For steel pipe piling, including bar reinforcement in the piling, the Engineer shall be allowed 12 hours to review the "Welding Report," specified in "Welding Quality Control" of these special provisions, and respond in writing after all the required items have been received. No field welded steel pipe piling shall be installed, and no reinforcement in the piling shall be encased in concrete until the Engineer has approved the above requirements in writing. Should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.
10. At the Contractor's option, a steel pipe pile may be re-tapped to prevent pile set-up; however, the field welded splice shall remain at least 3 feet above the work platform until that splice is approved in writing by the Engineer.

Personnel performing NDT will be required to verify their qualifications prior to performing nondestructive testing for effected steel piles by both written and practical exams. Information regarding these exams is available at the Transportation Laboratory.

Full compensation for conforming to all of the requirements of “Steel Pipe Piling” shall be considered as included in the contract prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

Driving System Submittal--Prior to installing driven permanent steel casings for cast-in-drilled-hole concrete piling, the Contractor shall provide a driving system submittal, including driveability analysis, in accordance with 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	Piers Represented by Control Locations
28-0100	Bent 10	Bents 5-17
_____	Bent 18	Bents 1-4 and 18-29
_____	Bent 36	Bents 30-37

The driving system submittal shall contain an analysis showing that the proposed driving systems will install the steel casings to the bottom of steel casing elevation for cast-in-drilled-hole concrete piling. Driving systems shall generate sufficient energy to drive the steel casings with stresses not more than 95 percent of the specified yield strength of the steel casing. Submittals shall include the following:

1. Complete description of soil parameters used, including soil quake and damping coefficients, skin friction distribution, any assumptions made regarding the formation of soil plugs, any assumptions made regarding drilling through the center of open ended steel casings, and assumptions regarding set-up during welding and welding inspection operations at splices.
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 bottom of steel casing 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.

   When the driveability analysis hammers indicate that steel casing penetration rates are less than the penetration rates as specified in “Pile Driving” elsewhere in these Special Provision and the driving stresses will exceed 80% of the specified yield strength of the steel casing, the study shall include assumptions for drilling through the center of steel casings as specified elsewhere in these special provisions.
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 elsewhere 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 3 weeks to review a driving system submittal after a complete set has been received, as determined by the Engineer, and prior to installing steel casing. 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 as specified 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 3 weeks to review each revised and each new driving system submittal after a complete set has been received, as determined by the Engineer.

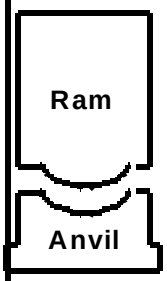
Approval of driving equipment shall not relieve the Contractor of his responsibility to drive steel casing free of damage to the specified penetration.

Full compensation for driving system submittals shall be considered as included in the contract price paid for piling of the types shown in the Engineer’s Estimate and no additional compensation will be allowed therefor.

CALIFORNIA DEPARTMENT OF TRANSPORTATION
OFFICE OF TRANSPORTATION LABORATORY

PILE AND DRIVING DATA FORM

Structure Name :_____ Contract No. :_____
_____ Project:_____
Structure No. :_____ Pile Driving Contractor or Subcontractor____
Dist./Co./Rte./P.M.:_____ _____
(Pile Driven By)



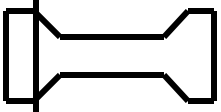
Hammer

Manufacturer:_____ Model:_____
Type:_____Serial No.:_____
Rated Energy:_____ at _____ Length of Stroke

Modifications: _____
_____
_____
_____
_____

Capblock (Hammer Cushion)

Material:_____
Thickness:_____ Area:_____
Modulus of Elasticity - E:_____ (P.S.I.)
Coefficient of Restitution - e:_____



Pile Cap

Helmet
Bonnet
Anvil Block
Drivehead

Weight:_____

Pile Cushion

Material:_____
Thickness:_____ Area: _____
Modulus of Elasticity - E:_____ (P.S.I.)
Coefficient of Restitution - e:_____

Pile

Pile Type:_____
Length (In Leads):_____
Weight/ft.:_____Taper:_____
Wall Thickness:_____
Cross Sectional Area:_____ sq.in.
Design Pile Capacity:_____ (Tons)
Description of Splice:_____
_____
Tip Treatment Description:_____
_____

DISTRIBUTION
One Copy Each To:

Translab Geotechnical Engineering
Translab Engineering Geology
Resident Engineer

Note: If mandrel is used to drive the pile, attach separate manufacturer's detail sheet(s) including weight and dimensions.

Submitted By:_____ Date:_____

Phone No.:_____

CAST-IN-DRILLED-HOLE 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.

Cast-in-drilled-hole concrete piling shall consist of permanent steel casing driven to bedrock with drilled or cored bedrock sockets and reinforced concrete fill.

Materials.--Concrete filling for cast-in-drilled-hole concrete piles is designated by compressive strength and shall have a minimum 28-day compressive strength of 4000 pounds per square inch.

Concrete deposited under water shall contain mineral admixture in accordance with the provisions of Section 90-4, "Admixtures," of the Standard Specifications and these special provisions. Mineral admixture shall conform to the requirements of ASTM Designation: C618 Class F, except that the loss on ignition shall not exceed 4 percent. Concrete shall contain mineral admixture in an amount not less than 15 percent by weight of the amount of cement required to satisfy the specified minimum cement content.

Aggregate grading shall conform to the requirements of Section 90-3, "Aggregate Gradings," and these special provisions. The combined aggregate grading for the concrete below the specified construction joint as shown in the plans shall be the 1" Max. grading. The combined aggregate grading for the concrete above the specified construction joint shall be either the 1/2"maximum combined aggregate grading or the 3/8" maximum combined aggregate grading.

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 the concrete below the specified construction joint. The grading requirements for the 1/2" maximum coarse aggregate or the 3/8" maximum coarse aggregate are shown in the following table:

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
3/4"	100	100		
1/2"	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

The gradation proposed by the Contractor for the 1/2" x No. 4 primary aggregate or for the3/8" x No. 8 primary aggregate shall be within the following percentage passing limits:

Primary Aggregate Nominal Size	Sieve Size	Limits of Proposed Gradation
1/2" x No. 4	3/8"	40 - 78
3/8" x No. 8	3/8"	50 - 85

The combined aggregate grading for the 1/2” x No. 4 primary aggregate nominal size or for the 3/8” x No. 8 primary aggregate nominal size shall be within the following limits:

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	90 - 100
3/8-inch	55 - 86	55 - 86
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

The 1/2” x No. 4 and 3/8” x No. 8 aggregate gradations may require special mixing to meet grading requirements and may not be commercially available in some locations.

The fourth paragraph in Section 49-4.01, "Description," of the Standard Specifications shall not apply.

Cast-in-drilled-hole concrete piles shall be constructed so that the excavation methods and the concrete placement procedures shall provide for placing the concrete in a dewatered steel casing or depositing concrete under synthetic slurry or water slurry as noted elsewhere in these special provisions. The initial concrete lift to the height of the construction joint as shown on the plans shall be deposited under slurry. The final concrete lift shall be deposited without slurry after the steel casing has been dewatered.

The concrete filling for cast-in-drilled-hole concrete piles shall be dense and homogeneous. The methods used to place the concrete shall prevent segregation. Concrete placed in dewatered steel casings 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-drilled-hole concrete piles shall be vibrated according to the requirements in the following table. The nominal and maximum penetrations shown below shall be used in lieu of the penetrations listed in the table in Section 90-6.06, "Amount of Water and Penetration."

Cast-in-drilled-hole Concrete Piles	Pile Size	Concrete Penetration, Inches (Note 1)		Concrete Vibration Required
		Nominal	Maximum	
Dewatered Casing	All sizes	2 1/2 to 3 1/2	4 (Note 2)	Upper 15 feet of pile
Under Slurry	24" and larger in diameter	equal to or greater than 3 1/2	(Note 2)	(Note 3)

Note 1: Type F or Type G chemical admixtures may be required to achieve the specified penetration. When admixtures are used in accordance with the requirements in Section 90-4, "Admixtures," the penetration of the concrete will be measured after the admixture is added. Note 2: Concrete shall be proportioned to prevent excessive bleed water and segregation. Note 3: Concrete placed under slurry shall not be vibrated.

Section 51-1.10, "Concrete Deposited Under Water," shall not apply to cast-in-drilled-hole concrete piling. Concrete deposited under slurry shall contain not less than 658 pounds of cement per cubic yard.

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 2 weeks prior to constructing piling. The plan shall include complete description, details, and supporting calculations as listed below:

Requirements for all cast-in-drilled hole concrete piling:

1. Concrete mix design, certified test data, and trial batch reports.
2. Methods and equipment used for drilling and constructing bedrock sockets.
3. Methods and equipment for steel casing installation.
4. Placing, positioning and supporting bar reinforcement.
5. Methods and equipment for accurately determining the depth of concrete, including sounding methods for continuously monitoring the top of the concrete surface and for determining the embedment of the tip of the tremie during concrete placement, and the actual and theoretical volume placed.
6. Concrete batching, delivery, and placing systems with time schedules and capacities therefor.
7. Concrete placing rate calculations. When requested by the Engineer, calculations shall be based on the static head on the concrete and losses throughout the placing system, including anticipated head of slurry and concrete to be displaced.
8. Suppliers test reports on the physical and chemical properties of the slurry and any proposed slurry chemical additives including Material Safety Data Sheet.
9. Slurry testing equipment and procedures.
10. Removal and disposal of excavation, slurry, and contaminated concrete, including methods and rates of removal.
11. Slurry agitating, recirculating, and cleaning methods and equipment.
12. Support system for inspection pipes.

In addition to compressive strength requirements, the consistency and cohesiveness 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 a minimum of 4 cubic yards, batched and mixed with the same or similar equipment and procedures as planned for the permanent concrete piling. The test batch shall be produced and delivered to the job 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 accordance 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 the specified nominal penetration and a penetration of at least 2 inches after 4 hours. 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 accordance with Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," unless otherwise approved in writing by the Engineer.

Cast-in-drilled-hole concrete piling for each bent cap shall be constructed in accordance with the following procedure:

1. Drive permanent steel casing.--Permanent steel casings shall be driven to the elevation of the bottom of steel casing shown on the plans in accordance with the provisions in “Pile Driving” elsewhere in these special provisions. Casings shall be firmly seated into bedrock.
2. Clean out steel casings prior to constructing bedrock sockets.--Care shall be taken during cleanout of the steel casings to prevent disturbing the material surrounding the casing. Equipment or methods used for cleanout

shall not cause blow-ins, quick soil conditions, scouring, or caving around or below the tip of the steel casings. Air lifting shall not be used to clean out casings. Cleanout shall be performed under a full head of slurry equal to the external seawater level.

3. Construct bedrock sockets.--Care shall be taken during construction of the bedrock sockets to prevent disturbing the material surrounding the bottom of the steel casing. Equipment and methods used for constructing the bedrock socket shall not cause quick soil conditions, or cause scouring or caving around or below the bedrock socket. Bedrock sockets shall be constructed under a full head of synthetic slurry.

   After the rock sockets have been completed, the pile shall be constructed expeditiously in order to prevent deterioration of the surrounding foundation material in the presence of slurry. Rock sockets shall be free of any soil, rock, or other material deleterious to the bond between the rock and concrete prior to placing reinforcement and concrete.

4. Clean out steel casings after constructing bedrock sockets.--Care shall be taken during cleanout of the steel casings to prevent disturbing the material surrounding the casing. Equipment or methods used for cleanout shall not cause blow-ins, quick soil conditions, scouring, or caving around or below the tip of the steel casings. Air lifting shall not be used to clean out casings. Cleanout shall be performed under a full head of slurry equal to the external seawater level.

   After the steel casings have been cleaned out, the pile shall be constructed expeditiously in order to prevent deterioration of the surrounding foundation material. The steel casings shall be free of any soil, rock, or other material deleterious to the bond between the steel casing and concrete prior to placing reinforcement and concrete.

5. Place reinforcement below specified construction joint as shown on the plans.--Reinforcement shall be placed and secured symmetrically about the axis of the pile and shall be securely blocked to clear the sides of the steel casing and rock socket. If after placement of the reinforcement and prior to placing concrete caving occurs, or deteriorated foundation material accumulates on the bottom of the hole or drill cuttings settle out of the slurry, as determined by the Engineer, the reinforcement shall be removed and the bottom of the drilled hole recleaned.

   Install inspection pipes in accordance with the provisions for “Inspection Pipes” elsewhere in these special provisions.

6. Deposit concrete to height of specified construction joint.--Concrete deposited in first lift shall be placed under slurry by means of the tremie method. Concrete placement shall commence within a period of 24 hours after completing the construction of the bedrock sockets.

   Pile concrete at height of construction joint shall be free of contamination from slurry and residual foundation material, as approved by Engineer. It is anticipated that placement of concrete above the construction joint will be required to attain concrete free of contamination at the height of the construction joint. Air lifting to remove concrete contaminated by slurry and residual foundation material may be required.

7. Dewater casing.--After concrete deposited in first lift has reached a compressive strength of 2500 PSI, casing shall be dewatered and the concrete surface of the piling at the construction joint cleaned of surface laitance and other foreign material. Construction joint shall be flushed with water and allowed to dry to a surface dry condition prior to placing final lift of concrete.

   After the steel casings have been dewatered, measures shall be taken to prevent the inflow or collection of water in the steel casing. The steel casings shall be free of any soil, rock, or other material deleterious to the bond between the steel casing and concrete prior to placing reinforcement and concrete.

8. Place precast bent cap shell.

9. Place reinforcement above construction joint as shown on the plans.--Reinforcement shall be placed and secured symmetrically about the axis of the pile and shall be securely blocked to clear the sides of the steel casing. If after placement of the reinforcement and prior to placing concrete water inflow occurs, as determined by the Engineer, the casing shall be dewatered again.

   Install inspection pipes in accordance with the provisions for “Inspection Pipes” elsewhere in these special provisions.

10. Deposit final lift of concrete.--Final lift of concrete shall be deposited in dewatered steel casing without slurry to the top of the bottom slab of the precast bent cap shell.

Care shall be taken during construction of the cast-in-drilled-hole concrete piling for each bent cap. The Contractor shall have full responsibilitiy to maintain the stability of the foundation system during the entire construction process.

When slurry is used, the slurry level shall be maintained within one foot of the external sea level unless otherwise approved in writing by the Engineer.

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 2 hours between placing the first load of concrete and completion of placing the final load of concrete in each concrete lift of the pile, unless otherwise approved in writing by the Engineer. The concrete shall be placed with concrete pumps and a gravity fed 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 a tremie tube or tubes with diameters not less than 10 inches. Concrete pumps may be used to charge suitably sized funnels or hoppers to facilitate the transfer of concrete to the gravity fed tremie. No more than one tube shall be supplied from a single funnel or hopper.

Concrete may be delivered to the tremie hopper by pump, conveyor, or other means that will provide a continuous flow of concrete. Concrete pumps, conveyors, or other delivery systems shall not discharge concrete directly into the delivery tubes or steel casings.

When slurry is used, a fully operational standby concrete delivery equipment, adequate to complete the work in the time specified, shall be provided at the site during concrete placement.

Spillage of concrete into the slurry during concrete placing operations shall not be allowed. Delivery tubes shall be capped at the end of the tube with a water tight cap, or plugged above the slurry level with a good quality, tight fitting, non-collapsing moving plug that will expel the slurry from the tube as it is charged with concrete. The cap or plug shall be designed to be released as the tube is charged. The 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 pile, and then the embedment of the tip shall be maintained at least ten feet below the top surface of the concrete. The Contractor shall continuously monitor the top of concrete during concrete placement. 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, the tube charged with concrete, and the operation restarted by pushing the capped tube a minimum of 5 feet (or to the bottom of the pile, which ever is less) into the concrete and then reinitiating the flow of concrete.

The concrete delivery tube system shall remain fixed horizontally while concrete is flowing.

Pile concrete shall be free of contamination from slurry or residual foundation material.

It is anticipated that air lifting to remove concrete contaminated by slurry and residual foundation material will be required.

A log of the placing of the concrete in each cast-in-drilled-hole concrete pile 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 pile 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.

Temporary steel casings may be furnished and placed tight in the bedrock socket where necessary to prevent 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. The concrete in the temporary casing shall be maintained at a level at least 5 feet above the bottom of the temporary casing. Temporary 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 temporary casings shall not leave voids or cause contamination of the concrete with soil, water, slurry or other materials, or cause segregation of the concrete.

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.

Inspection Pipes.--Vertical inspection pipes shall be provided in all cast-in-drilled hole piles, except when the holes are dry.

Inspection pipes shall be Schedule 40 polyvinyl chloride pipe with an inside diameter of 2 inches and Schedule 40 black metal pipe with an inside diameter of 1 1/2 inches. Each inspection pipe shall be capped top and bottom and shall have watertight couplers to provide a clean, dry and unobstructed clear opening of 2 inches for polyvinyl chloride pipe and 1½ inches for black metal pipe from at least 2 feet above the work platform down to the specified pile tip elevation. It is anticipated that extension of the pile reinforcement, steel rods, templates, and bracing will be required to support the inspection pipes.

Polyvinyl chloride inspection pipes shall be placed around the pile, inside the 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. Steel inspection pipes shall be placed around the pile, outside the spiral or hoop reinforcement, at a uniform spacing not exceeding 2 feet 9 inches measured along the circle passing through the center of inspection pipes. Steel inspection pipes may be tied to spiral or hoop reinforcement. Inspection pipes shall be installed in straight alignment and securely fastened in place to prevent misalignment during installation of the reinforcement and placing concrete in the hole. Polyvinyl chloride and steel inspection pipe layouts shall be staggered respectively.

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 structural adequacy tests, each polyvinyl chloride 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. Each black metal inspection pipe shall be checked prior to testing by passing a 1-inch diameter, 8-inch long rigid cylinder through the complete length of the pipe. The Contractor shall replace each polyvinyl inspection pipe that the cylinder does not pass through with a 2-inch diameter hole cored through the concrete for the entire length of the pile. Cored holes shall be located approximately 9 inches inside the reinforcement, and coring shall not damage the pile reinforcement.

Cored holes shall be made with a split tube type core barrel. 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 as to location and made available for inspection by the Engineer.

Structural adequacy tests of the concrete will be made by the Engineer, without cost to the Contractor. Tests will include gamma ray. Tests may also include cross-hole sonic logging and other means of inspection selected by the Engineer. After requesting structural adequacy tests, the Contractor shall allow 3 weeks for the Engineer to conduct these tests. 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.

If the Engineer determines that the concrete for a given pile is structurally inadequate, then that pile will be rejected and all depositing of concrete 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 plan for repair, removal or replacement of the rejected piling. The plan shall include details for structural modifications as required. No extension of time or compensation will be made for the submittal and review of a mitigation plan for rejected piling.

All inspection pipes and cored holes shall be dewatered and filled with grout after tests are completed. Grout shall conform to the requirements 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.

SLURRY.--Slurry shall be either commercial quality synthetic slurry or water slurry, except when synthetic slurry is specifically required as noted elsewhere in these special provisons. Slurry shall conform to the requirements of these special provisions. Mineral slurry shall not be used.

Water used for slurry shall conform to the requirements in Section 90-2.03, "Water," of the Standard Specifications and these special provisions. Natural ground water and seawater in the temporary steel casings for micropiling and steel casing for cast-in-drilled-hole concrete piling may be used for mixing slurry.

Slurry shall not weaken the bond between the concrete and both the reinforcement and the foundation material at the sides of the excavation.

Slurry 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 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.

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.

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.

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.

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 Slurry

At the option of the Contractor, water may be used to replace synthetic slurry for cast-in-drilled-hole concrete piles when temporary casing extends below the permanent steel casinginto the bedrock socket so that the entire length of the pile is cased.

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.		

MICROPILING.-- Micropiling consisting of small diameter steel pipes grouted in place shall conform to the design requirements and layout shown on the plans and these special provisions.

General.--Attention is directed to "Test Borings," elsewhere in these special provisions.

Attention is directed to the Materials Information in the section entitled "Existing Highway Facilities," elsewhere in these special provisions, for existing pile driving records which may be used to estimate variations in the bedrock elevation.

The Contractor shall determine the drilling method, grouting procedure, length of bedrock embedment, and grouted hole diameter necessary to meet the performance acceptance criteria specified herein.

The Contractor shall provide hydraulic jack(s), wire line for attachment to an extensometer, and a load test frame and platform for testing micropiling as specified elsewhere in these special provisions.

Materials.—Temporary steel casing and steel pipe for micropiles shall conform to the details shown on the plans and the requirements found in "Steel Pipe Casing," and "Steel Pipe Piling," elsewhere in these special provisions.

Material for shear rings for micropiles shall conform to the requirements of ASTM Designation: A36. Shear rings shall be welded in conformance with AWS D1.1.

Grout shall be designated by compressive strength and shall have a minimum 28-day compressive strength of 6,000 pounds per square inch when tested in conformance with ASTM Designation: C942. Grout shall consist of portland cement, water, mineral admixture, and silica fume. The water content of the grout shall not be more than 4½ gallons per 94 pounds of cement.

Mineral admixture shall conform to the provisions in Section 90-4.02, "Admixtures," of the Standard Specifications and these special provisions. The grout shall contain mineral admixture in an amount not less than 15 percent by weight of the amount of cement, mineral admixture, and silica fume required to satisfy the specified compressive strength.

Silica fume shall conform to the provisions in "Admixtures," elsewhere in these special provisions. The grout shall contain silica fume in an amount not less than 4 percent by weight of the amount of cement, mineral admixture, and silica fume required to satisfy the specified compressive strength.

The quality of the grout shall be determined by the Engineer in accordance with California Test 541. The efflux time of a grout sample immediately after mixing shall not be less than 15 seconds and not more than 35 seconds.

Type F or Type G chemical admixture shall be used to achieve the specified fluidity and to disperse the admixtures. When admixtures are used in accordance with the provisions of Section 90-4, "Admixtures," of the Standard Specifications and these special provisions, the quality of the grout will be measured after the admixture is added.

Working Drawings--The Contractor shall submit complete project specific working drawings for the micropile system to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. All working drawings for micropiling shall be 22" x 34" in size. For initial review, 10 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to the

said Office for final approval and use during construction. Within 3 weeks after final approval of the working drawings, one set of the corrected prints on 60 pound (minimum) good quality bond paper, 22" x 34" in size, prepared by the Contractor shall be furnished to the Office of Structure Design, Documents Unit P.O. Box 942874, MS #9, Sacramento, CA 94274-0001 (1801 30th Street, Sacramento, CA 95816, Telephone (916)227-8252.

Working drawings for micropiling shall show 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 on each drawing and calculation sheet. The pile vendor company name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

Working drawings for micropiles shall contain all information required for the construction and quality control of the piling, including the following:

1. Information on headroom and space requirements for installation equipment that verify that the proposed equipment can perform at the site.
2. Step-by-step procedure describing all aspects of pile installation including personnel, testing, and equipment to assure quality control. This step-by-step procedure shall be shown on the working drawings in sufficient detail so that the Engineer can monitor the construction and quality of these micropiles.
3. Details for coring and drilling plumb holes into bedrock
4. Details for temporary water tight conduits for conveying drill cuttings and slurries above the water surface
5. Details of centralizers
6. Grout mix designs.
7. Details and procedures involved in testing components, including grout.
8. Details and procedures for constructing load test frames, making frame connections, connections to existing foundations, connections to test pile extensions, and other related equipment and components.
9. Temporary steel casing and pipe splice locations.
10. Details of equipment and operation for grouting. Details shall be included for monitoring grout quality, volume installed and pressure during installation.
11. Information on the minimum cure time and strength requirements of the pile system for test piles.
12. Required temporary steel casing and steel pipe lengths, and calculations substantiating required bedrock embedment lengths.

A supplement to the working drawings shall include the following:

Construction details, structural details, and load test results from at least three previous successful installations by the Contractor installing micropiles or rock embedded pipe piles under conditions similar to those required for this project. The installations shall be from three separate test sites.

The Contractor shall submit to the Engineer calculations, structural details, and construction details for the design of the load test frame, platform, and support system to be used for testing the micropiling at each pier where micropiling is to be installed. The test frame and access platform shall support at least 125 percent of the tension test load applied to the piles to be tested as shown on the plans. The vertical design load shall be adjusted for the weight of the test load frame and access platform, construction equipment loads, and the additional loads to be imposed by the testing operations. The construction equipment loads shall be the actual weight of the construction equipment but in no case shall the access platforms be designed for less than 25 pounds per square foot of the platform deck area. The design of the load test frame and access platform will not be approved unless it is based on the use of allowable stresses which are no greater than those described in Section 51-1.06A(2), “Design Stresses, Loadings, and Deflections,” of the Standard Specifications.

The Contractor shall provide the hydraulic jack(s) to provide the uplift force for the load test system. In supplement to the working drawings, the Contractor shall include the make, model, and specifications of the hydraulic jacking system. The hydraulic jack shall conform to ANSI B30.1, and shall be calibrated with the pump in accordance with ASTM D-3689-90 such that it can be used as a secondary load measurement device.

Pile load testing equipment and procedures shall be in general conformance with ASTM D-3689-90. The load test setup to be used shall be as described in section 4.3, “Load Applied to Pile by Hydraulic Jack(s) Acting Between Supported Test Beam(s) and a Reaction Frame Anchored to the Pile,” of ASTM D-3689-90.

The wire line to attach to the extensometer shall be a multi-strand, stainless steel wire rope with a 1/16-inch maximum diameter and a minimum 200 pound breaking strength. The top end of the wire rope shall be completed with an oval sleeve fitting.

The Contractor may use the existing structure as part of the load test frame and platform support. Any use of the existing structure for support and the loads imposed shall be shown on the test frame and access platform drawings. The Contractor shall verify by calculation the adequacy of the existing foundation for loads imposed by the proposed load test frames and platforms.

The design calculations shall show a summary of computed stresses in the existing foundation, load test frame and access platform, and the connections between the load test frame and access platform and existing structure. The design calculations shall include the effects of the load test jacks and test loading equipment. The design calculations shall include a lateral stiffness assessment and shall verify that the piling and proposed test loading equipment have sufficient lateral support for stability to withstand the imposed test loads.

The working drawings and supplement shall be stamped and signed by an engineer who is licensed as a Civil Engineer in the State of California. The Engineer will notify the Contractor in writing when the submitted working drawings and supplement have been determined to be complete. The Contractor shall allow the Engineer 6 weeks to review the working drawing submittal after a complete set has been received.

No micropile shall be installed until the Engineer has approved, in writing, the working drawing submittal for micropiling.

Should the Engineer fail to review the complete working drawing 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 working drawing submittal, an extension of time commensurate with the delay in completion of the work thus caused will be granted in accordance with Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Construction-- Vibratory hammers shall not be used to advance or remove the temporary steel casings. The temporary steel casings shall be removed after the grout placed into the annular space between the steel pipe and the rock socket has reached the top of bedrock elevation and prior to grout hardening.

A synthetic slurry shall be used for drilling and coring foundation material and placing micropile grout and shall conform to the requirements of “Slurry” elsewhere in these special provisions. Water shall not be used as slurry when constructing bedrock sockets.

To construct the rock sockets shown on the plans, an over-reaming tool may be required. Temporary support of the permanent steel casing may be required.

Micropiling holes drilled in foundation material may be drilled by either the rotary or percussion drilling method.

The holes drilled in the bedrock shall be of sufficient length to resist the specified loads, as shown on the plans.

Foreign material dislodged or drawn into the hole during construction of the micropiles shall be removed. All loose material existing at the bottom of the hole after drilling operations are complete shall be removed prior to placing grout.

Prior to cutting off the temporary steel casing the Contractor shall verify micro pile clearances in the bedrock socket in the presence of the Engineer by passing an 11.5 inch diameter rigid cylinder 2 feet long through the complete length of the micro pile. Should the cylinder be unable to pass freely through the hole during testing, the Contractor shall enlarge the bedrock socket by over reaming. All debris shall be removed form the bedrock socket.

Micropile steel pipe shall be clean and free of oil, grease, dirt, or other extraneous material, and shall be installed using centralizers to maintain a uniform clearance between the steel pipe and the temporary steel casing, and bedrock socket.

A positive means of support shall be provided for maintaining the position of the casing and reinforcement until the grout has set.

Micropile Grouting.—Grouting shall conform to the provisions of Section 50-1.09, “Bonding and Grouting,” of the Standard Specifications and these special provisions. The Contractor shall submit a grouting plan to the Engineer for approval at least 3 weeks prior to production grouting. The plans shall include complete descriptions, details, and supporting calculations for the following:

1. Grout mix design and type of materials used in the grout including certified test data and trial batch reports.
2. Grouting equipment, including capacity and relation to the grouting demand and working conditions as well as provisions for back-up equipment and spare parts.
3. Types and sizes of grout hoses, connections, and grout delivery systems.
4. Methods and equipment for placing, positioning, and supporting the steel pipe
5. Methods and equipment for accurately determining the depth of the grout and the volume of grout to be placed.
6. Procedures and schedules for grout batching, mixing, and pumping including provisions for handling slurry.
7. Grouting rate calculations, when requested by the Engineer. The calculations shall be based on the initial pump pressures or static head on the grout and losses throughout the placing system, including anticipated head of slurry to be displaced.
8. Contingency procedures for handling blockage of ducts or equipment breakdowns.
9. Estimated curing time for grout to achieve specified strength.

Grouting equipment shall be sufficient for completion of grouting of each pile in one continuous operation at the required rate. The grouting equipment shall be capable of producing uniformly mixed grout with adequate fluidity

The maximum grouting rate for micropiling shall not exceed 10 feet per minute.

Micropile Testing.—The Contractor shall incorporate provisions for State-furnished load cells and other State-furnished load testing apparatus into the design of the load test frame. Attention is directed to "State Furnished Materials," elsewhere in these special provisions.

Performance evaluation of micropile testing as shown on the plans and as specified in these special provisions will be by the Engineer. The tension loading tests will be made when the grout in the micropiles has developed the compressive strength shown on the plans.

The State will furnish the load cell for primary measurement of load, and the displacement transducers. The Contractor shall furnish labor and all other materials, tools, equipment, and incidentals as required to assist in the testing of the micropiles, including load test frames and platforms, jacks, wire lines, bearing plates, drills, and other test equipment.

The Contractor shall notify the Engineer in writing not less than 5 days in advance of installing the micropiles to be load tested.

The Contractor shall notify the Engineer in writing when the load test frame is complete in place and the grout has achieved the specified compressive strength. After written notification the Engineer will require not more than 1 week per each load test location to perform testing.

The Engineer will require not more than 2 weeks to review micropile performance test data and not more than 4 working days to review micropile proof test data for each load test location.

Should the Engineer fail to complete the micropile load tests and review the test results within these 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, an extension of time commensurate with the delay in completion of the work thus caused will be granted as provided in Section 8-1.09, "Right of Way Delays."

Performance And Proof Testing--Performance and proof load testing of micropiles shall conform to the requirements of these special provisions and the following:

The Engineer will conduct performance micropile tests consisting of tension load testing and proof micropile tests consisting of tension load testing. Performance tests will be used to evaluate the micropile tensile capacity. No compression testing of micropiles will be required. The Engineer may exceed the tension test loads shown on the plans but in no case will the Engineer test the performance test piles to more than 120 percent of the tension test loads shown on the plans. Proof tests will be used to ensure that the Contractor installs production micropiling with at least the same quality and methods that were used to install the performance test micropiles.

Performance test micropiles shall be installed with the same type of equipment that is to be used for installation of production micropiles.

The Contractor shall install a non-production test micropile for performance testing, constructed outside of an existing pier at the locations shown on the plans and in conformance with these special provisions and as approved by the Engineer.

If a performance test micropile fails to meet the specified acceptance criteria for testing, that pile will be rejected, and a replacement performance test micropile shall be constructed for re-testing at a location approved by the Engineer.

Performance test results shall be approved by the Engineer prior to installing production piling and performing proof testing for the remaining micropiles within the corresponding control locations shown on the plans.

The Engineer will conduct proof tests after the first micropile has been installed in a given pier. The Contractor shall not commence the drilling into the bedrock at the micropile location at that pier until the Engineer has approved the proof test of the first micropile. After successful proof testing of the first micropile, one additional micropile at a given pier will be randomly selected by the Engineer and proof tested.

The acceptance criterion for proof tension load testing of micropiles is as follows:

The pile shall sustain the first tension test load applied which is equal to the tension test loads shown on the plans with no more than the tabulated allowable maximum total vertical movement monitored at the location on the pile as shown on the plans.

If a production micropile that is proof tested fails to meet the above acceptance criteria for testing, then that pile will be rejected, and one additional micropile will be randomly selected for testing. If the subsequent pile selected fails to meet the acceptance criteria, then that pile will also be rejected and all the other micropiles in that same pier will be tested. Rejected micropiling shall be replaced at a location approved by the Engineer. The Contractor shall pay for any additional load testing. The Contractor shall submit to the Engineer for approval a plan for installing

additional micropiling that includes details for micropiling and footing modifications as required to provide the total micropiling support as shown on the plans. No extension of time or compensation will be made for the review of a plan for replacing or installing additional micropiling.

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.

Cast-in-drilled-hole concrete piling will be paid for as provided in Section 49-6.02, "Payment," of the Standard Specifications except that, reinforcement in such piling will be paid for as bar reinforcing steel (bridge) or bar reinforcing steel (epoxy-coated) (bridge) according to the limits as shown on the plans.

Full compensation for removing and replacing existing rip rap at Bent 1 of the concrete trestle replacement 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.

Full compensation for cleaning out the permanent steel casings prior to installing reinforcement and filling with concrete, for disposing of all materials inside the pile, slurry, depositing concrete under slurry, test batches, inspection pipes, filling inspection holes and pipes with grout, drilling oversize cast-in-drilled-hole concrete piling, filling cave-ins and oversize 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.

Micropiles will be measured and paid for by each, as shown on the plans.

Performance test micropiling will be paid for by each as micropiles.

The contract unit price paid for micropiling shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the micropiles, including temporary steel casings, seals, grout, shear rings, cutting tips, drill bits, pile anchorage, and disposing of materials resulting from pile installation, 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 Contractor shall furnish labor, materials, tools, equipment, and incidentals as required to assist the Engineer in the installation, operation and removal of State-furnished test equipment. Full compensation for said work and materials shall be considered as included in the contract unit price paid for micropiling shown on the plans and in the Engineer's Estimate and no additional compensation will be allowed therefor.

Full compensation for constructing load test frames and access platforms and furnishing all labor, materials, tools, equipment, and incidentals, including test jacks, wire lines, and bearing plates at pile load test sites, maintaining the load test frames and access platforms at the test site, for providing waterborne transport for test personnel and equipment to gain access to the load test frames and access platforms, and for completely restoring test sites shall be considered as included in the contract unit price paid for micropiling and no additional compensation will be allowed therefor.

No payment will be made for micropiles that are proof tested and fail to meet any of the specified testing requirements. No payment will be made for micropiles installed out of place or for imperfect micropiles, or for micropiles which are damaged during installation or after they are complete in place.

No payment will be made for additional concrete coring, concrete, reinforcement, or any other costs resulting from replacing rejected micropiles or for placing additional micropiling in piers and/or footings with piles that failed to meet the specified testing requirements.

Full compensation for conforming to all of the requirements of "Steel Pipe Piling" and "Steel Pipe Casing" elsewhere in these special provisions shall be considered as included in the contract prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

If a portion or all of the steel shells, pipe reinforcement, 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 piling of the types shown in the Engineer's Estimate and that have steel shell, pipe reinforcement, or steel pipe piling components will be reduced $5,000 for each manufacture or fabrication site located more than 300 air line miles from both Sacramento and Los Angeles and an additional $3,000 ($8,000 total) for each manufacture or fabrication site located more than 3,000 air line miles from both Sacramento and Los Angeles.

10-1B.06 PRESTRESSING CONCRETE

Prestressing concrete shall conform to the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications and these special provisions.

High strength threaded rods in transition bent caps shall conform to the provisions for high strength steel bars in Section 50-1.05, "Prestressing Steel," of the Standard Specifications. The 2" diameter core holes through reinforced concrete shaft at Pier 19, 57, 58, 59, 60 and 61, and the 5" diameter cored holes through reinforced concrete shaft at Pier 13 to Pier 18 shall conform to the provisions in "Core Concrete (2" 5")" elsewhere in these special provisions.

High strength rods inside the cored holes shall be bonded to the concrete by completely filling the entire void space between the hole and the high strength rods with grout. Bonding and grouting shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications.

Ducts inside the cored holes shall be bonded to the concrete by completely filling the entire void space between the hole and the duct with grout. Bonding and grouting shall conform to the provisions in section 50-1.09, "Bonding and Grouting," of the Standard Specifications.

The thirteenth paragraph in Section 50-1.05, “Prestressing Steel,” of the Standard Specifications is modified to read:

When acceptable prestressing steel for post-tensioning is installed in the ducts after completion of concrete curing, and if stressing and grouting are completed within 6 days after the installation of the prestressing steel, rust which may form during said 6 days will not be cause for rejection of the steel. Prestressing steel installed, tensioned and grouted in this manner, all within 6 days, will not required the use of a corrosion inhibitor in the duct following installation of the prestressing steel. Prestressing steel installed as above but not grouted within 6 days shall be subject to all the requirements in this section pertaining to corrosion protection and rejection because of rust.

The first paragraph in Section 50-1.02, "Drawings," of the Standard Specifications is amended to read:

The Contractor shall submit to the Office of Structure Design, 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, 4 sets shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to the said Office 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 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 come equipped with either: (1) 2 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 accurately reading dials 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, for grouting 2" and 5" holes and for pressure grouting the void space between the cored holes and the high strength rods, the void space between the cored holes and the ducts, and the void space inside the 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.

10-1B.07 PRESTRESSING VISCOUS DAMPING DEVICE BRACKETS

Prestressing at Pier 19 for the viscous damping device brackets shall conform to the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications and these special provisions.

Attention is directed to the sections entitled "Steel Structures," and "Clean and Paint Structural Steel," of these special provisions regarding priming of exposed bearing plates, couplers, and anchorage devices.

High strength steel bars shall be galvanized. Galvanizing shall conform to the provisions Section 75-1.05, “Galvanizing,” of the Standard Specifications

Working drawings for the prestressing shall include details for bearing plates, couplers, anchorage devices, connections and prestressing procedures.

Stressing for Pier 19 viscous damper bracket shall proceed simultaneously on both sides of the bracket. The elongation of the prestressing steel on one side of the bracket shall not exceed the elongation on the other side by more than one quarter inch at any time.

The contract lump sum price paid for prestressing viscous damping device brackets shall include full compensation for furnishing all labor, materials, except those listed under "Steel Structures," tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing the prestressing system, complete in place, including priming of the exposed high-strength steel bars, bearing plates and anchorage devices, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1B.08 CONCRETE STRUCTURES

Portland cement concrete structures shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Shotcrete shall not be used as a alternative construction method for reinforced concrete members unless otherwise specified.

The first sentence of the tenth paragraph in Section 51-1.05, “Forms,” of the Standard Specifications is amended to read:

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 such plywood.

The second paragraph in Section 51-1.22, "Measurement," of the Standards Specifications is amended to read:

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 91.015, "Final Pay Items," of the Standard Specifications, when the constructed height of said minor structure, including revisions by the Engineer, is within 0.5-foot of the vertical dimension shown on the plans.

When a scarified 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 abutment backwall joint protection in accordance with the details shown on the plans, the provisions in the Standard Specifications, and these special provisions.

Furnishing and installation of 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 protective board will not be required.

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
Spandrel Beams Retrofit	4
Pier 19	4
Pier 27	4
Pier 33	4
Pier 36	4
Pier 46	4
Pier 49	4
Pier 61	4

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

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:

Wind Pressure Value

Height Zone (Feet above ground)	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

The first 2 sentences of the sixth paragraph of Section 51-1.06A(1), "Design Loads," of the Standard Specifications are amended to read:

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 the applicable wind pressure value for each height zone. The wind impact area is the gross projected area of the falsework and any unrestrained portion of the permanent structure, excluding the areas between falsework bents or towers where diagonal bracing is not used.

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 .... $\frac{480{,}000}{(L/d)^2}$ 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 accordance 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 amended 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 licensed as a Civil Engineer in 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.

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 his 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 mechanically scarifying 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 structural concrete bridge footing, 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 precast bearing seats including high strength threaded rods at transition bent caps 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.

10-1B.09 PRECAST CONCRETE

Precast concrete assemblies of the type shown on the plans shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Attention is directed to "Order of Work, "Piling," and "Column and Shaft Casing," elsewhere in these specifications.

Precast Elements.--Concrete for precast concrete elements is designated by compressive strength.

Aggregate grading for precast concrete shall conform to the requirements of Section 90-3, "Aggregate Gradings," of the Standard Specifications and these special provisions. Aggregate grading shall conform to the requirements of 1/2" maximum combined aggregate grading as shown in the following table:

Percentage Passing Primary Aggregate Nominal Size				
	1/2”x No. 4			
Sieve Sizes	Operating Range	Contract Compli-ance		
3/4”	100	100		
1/2”	82 - 100	80 - 100		
3/8”	X ± 15	X ± 22		
No. 4	0 - 15	0 - 18		
No. 8	0 - 6	0 - 7		

The gradation proposed by the Contractor for the optional 1/2" x No. 4 primary aggregate shall be within the following percentage passing limits:

Primary Aggregate Nominal Size	Sieve Size	Limits of Proposed Gradation
1/2” x No. 4	3/8”	40 – 78

The combined aggregate grading for the 1/2" x No. 4 primary aggregate nominal size nominal size shall be within the following limits:

Grading Limits of Combined Aggregate		
	Percentage Passing	
Sieve Sizes	1/2” Maximum	
3/4-inch	100	
1/2-inch	90 – 100	
3/8-inch	55 – 86	
No. 4	45 – 63	
No. 8	35 – 49	
No. 16	25 – 37	
No. 30	15 – 25	
No. 50	5 – 15	
No. 100	1 – 8	
No. 200	0 – 4	

The optional 1/2” x No. 4 aggregate gradations may require special mixing to meet grading requirements and may not be commercially available in some locations.

Concrete for precast concrete elements shall contain mineral admixture and silica fume in accordance with the provisions of Section 90-4, "Admixtures," of the Standard Specifications and these special provisions.

Mineral admixture shall conform to the requirements of Section 90-4.02, "Materials," of the Standard Specifications. The concrete shall contain mineral admixture in an amount not less than 15 percent, by weight, of the amount of cement required to satisfy the specified minimum cement content.

Silica fume shall conform to the provisions in "Admixtures," elsewhere in these special provisions. The concrete shall contain silica fume in an amount not less than 6 percent, by weight, of the amount of cement required to satisfy the specified minimum cement content.

Precast concrete elements shall be cured in conformance with the requirements for piles with a class designation ending in C (corrosion resistance) in Section 90-7.05, "Curing Precast Prestressed Concrete Piles," of the Standard Specifications.

10-1B.09 PRECAST BENT CAP SHELLS

Precast bent cap shells shall conform to the provisions in Section 51, “Concrete Structures,” and Section 90, “Portland Cement Concrete,” of the Standard Specifications and these special provisions.

Concrete shall have a minimum 28-day compressive strength of 5500 pounds per square inch.

Concrete mix design and curing requirements for precast bent cap shells shall conform to the requirements for precast concrete in “Precast Concrete”, elsewhere in these special provisions, with the following exceptions:

Aggregate grading for precast bent cap shells shall conform to the requirements of Section 90-3, “Aggregate Gradings” of the Standard Specifications. The combined aggregate grading for the concrete shall be the 1” maximum grading.

Curing the precast bent cap shells shall conform to the requirements of Section 90-7.04 “Curing Precast Concrete Members” of the Standard Specifications except the steam curing shall not be used.

Structural concrete inside the precast bent cap shell shall conform to the provisions in "Concrete Structures" elsewhere in these special provisions and will be measured and paid for by the cubic yard as structural concrete, bridge.

Prestressing the bent cap shall conform to the provisions in "Prestressing Concrete" elsewhere in these special provisions and payment shall be considered as included in the contract lump sum price paid for prestressing cast-in-place concrete.

Precast concrete bent cap shells will be measured and paid for by the unit as furnish precast concrete bent cap shell and erect precast concrete bent cap shell as shown on the plans.

The contract unit price paid for furnish precast concrete bent cap shell shall include full compensation for furnishing all labor, materials (including reinforcing, high strength threaded rods with threaded pigtail inserts), tools, equipment, and incidentals, and for doing all work involved in constructing and furnishing precast concrete bent cap shell at the site of the work complete and ready for erection, 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 erect precast concrete bent cap shell shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in erecting precast concrete bent cap shells in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1B.10 PRECAST CONCRETE GIRDERS

The work specified in this section shall consist of the manufacture of precast concrete girders.

Precast concrete girders shall conform to the provisions in Section 51, "Concrete Structures," Section 50, "Prestressed Concrete" and Section 90, "Portland Cement Concrete," of the Standard Specifications and these special provisions.

The plans show 2 options for the fabrication and erection of the precast concrete girders. These options are the monolithic and segmental alternates as described below:

Monolithic Option.--Fabrication and erection of a complete span in a single precast, prestressed concrete girder. The prestressing is provided by a combination of pretensioning and post-tensioning.

Segmental Option.--Fabrication and erection of three girder segments, prestressed together to form a complete span. The prestressing is provided by a combination of pretensioning and post-tensioning.

Adjustments to accommodate girder deflections, which occur prior to the time the girder is placed, may include revisions in bearing seat elevations, but any such adjustments shall be limited by the following condition:

The profile grade and cross slope of the deck shall not be changed.

Girders with unanticipated girder deflection and which cannot comply with above condition will be rejected in accordance with the provisions in Section 6-1.04, "Defective Materials."

Adjustments to accommodate girder deflections will not be considered a change in dimensions. Full compensation for any increase in the cost of construction, including any increase in the quantity of 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.

SUBMITTALS.—The Contractor shall submit the following documents to the Engineer for approval prior to the start of the precast operations:

1. Fully and accurately dimensioned views showing the geometry of each girder or girder segment including projections, recesses, notches, openings and blockouts.
2. Complete details of the fabrication system to be used including the forms, foundation and geometry control.
3. Complete geometric layouts for each prestressing tendon. Tendon layout shall be accomplished so as to cause no curvature within the longitudinal limits of the trumpet component of a tendon anchorage device. Integrated shop drawings as described in item number 4 below shall not be submitted until these tendon layouts have been approved by the Engineer.
4. Fully integrated drawings showing reinforcing steel, pretensioning strands, post-tensioning duct, post-tensioning hardware, inserts, lifting devices and any other items to be embedded in a girder or girder segment. Details of mild steel reinforcing shall be clearly shown as to size, spacing and location including any anchorage reinforcing or end reinforcing not shown in the plans which may be required by the post-tensioning anchorage system or pretensioning strand pattern selected by the Contractor. Details of post-tensioning ducts shall clearly indicate the size, type, horizontal and vertical profiles, duct supports, grout pipes and concrete covers. The Contractor shall indicate on the shop drawings his method of marking and positioning ducts. The Contractor shall also submit to the Engineer, for approval, the method he proposes to use to align ducts passing between precast girders thru cast-in-place closure joints. Any drawing not showing all items to be embedded in the girder or girder segment concrete will be returned to the Contractor for resubmittal as a part of an integrated drawing. Prior to submittal, the Contractor shall review these drawings to determine the absence of reinforcement and tendon or embedment conflicts. Any unresolved conflicts shall be called to the attention of the Engineer before the time of submittal. Each girder or girder segment shall be assigned an erection mark indicating its location and order in the erection sequence. The Contractor shall be solely responsible for any and all effects of conflicts found during fabrication.
5. Casting curves shall be prepared in accordance with the casting and erection methods, schedule, loads, and material properties proposed by the Contractor. The casting curves shall be of sufficient accuracy to allow the determination of control point settings for accurately casting the girders or girder segments. The preparation of the casting curve shall recognize all deviations from straight line and deformations due to the final required alignment and due to dead load (including barrier load), erection loads, prestressing stresses including secondary moments, creep and shrinkage. Each casting curve submittal shall be accompanied by all information (loads, casting and erection schedules, material properties, etc.) considered in its development. In developing casting curves, deformations due to creep and shrinkage and the concrete modulus of elasticity shall be computed using the latest recommendations of CEB-FIP Model Code for Concrete structures. CEB-FIB stands for Comite Euro-International De Beton-Federation Internationale De La Preconstrainte.

The preparation of casting curves is dependent upon the erection sequence and the Contractor's schedule. Therefore, if the Contractor proposes a change to an erection procedure which has been previously approved, he shall develop a new casting curve in the same manner as required for the original casting curve. The Contractor shall include with submittal of a new casting curve his proposed method(s) and location(s) for transitioning between the current curve(s) in use and the submitted curve(s).

6. A manual for the casting and geometry control of the girders or girder segments (referred to as "Casting Manual") prepared by the Contractor or his Engineer in accordance with the information provided in these special provisions.

Working drawings shall be submitted in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications.

Submittals shall be sent to the Engineer sufficiently in advance of the start of the affected work to allow time for review by the Engineer and correction by the Contractor without delaying the work. The time to be provided for the Engineer's review of the above submittals for the precast concrete girders shall be 4 weeks.

CONTRACTOR'S ENGINEER.--For construction of the precast concrete girder, the Contractor shall provide a Civil Engineer registered in the State of California who has specific knowledge of and experience in the design and construction of precast concrete segmental bridges.

The Contractor shall submit which establishes, to the approval of the Engineer, that an employee or consulting engineer he proposes to designate as the Contractor's Engineer has the qualifications set out herein. No work requiring involvement of the Contractor's Engineer shall be started until the Engineer has reviewed this submittal, and responded with written acceptance of the proposed Contractor's Engineer for this project. A written acceptance or denial of the proposed Contractor's Engineer shall be provided within 10 working days of receiving the Contractor's submittal.

The Contractor's Engineer shall be responsible for carrying out all engineering services required to construct the bridge in accordance with the plans, Standard Specifications and these special provisions. He shall also be responsible for the monitoring of any engineering services developed by him during construction of the bridge.

CONCRETE.--Concrete shall have a minimum 28-day compressive strength of 5500 pounds per square inch. Compressive strength requirements shall conform to the provisions of Section 90-9, “Compressive Strength,” of the Standard Specifications.

Concrete mix design and curing requirements for precast concrete girders or girder segments shall conform to the requirements for precast concrete in “Precast Concrete”, elsewhere in these special provisions, with the following exceptions:

Aggregate grading for precast concrete girders or girder segments shall conform to the requirements of Section 90-3, “Aggregate Gradings,” of the Standard Specifications. The combined aggregate grading for the concrete shall be the 1” maximum grading.

Curing the precast concrete girders or girder segments shall conform to the requirements of Section 90-7.04, “Curing Precast Concrete Members,” of the Standard Specifications except the steam curing shall not be used.

Completed roadway surfaces of the precast concrete girders or girder segments shall be finished in conformance with the provisions in Section 51-1.17, “Finishing Bridge Decks,” of the Standard Specifications.

Placing concrete for the precast concrete girders or girder segments shall be a continuous operation. Construction joints in the girders or girder segments shall not be allowed.

In addition to samples made for 28-day compressive strength tests, samples and testing for compressive strength on each precast girder or girder segment and field closure joint, shall be made by the Contractor to ensure adequate strength of these components at various stages of their manufacture and assembly. The Contractor shall make test cylinders from concrete used to cast the structural component, in accordance with the applicable California Test methods, cured in the same manner as the structural components to ensure adequate compressive strength has been achieved in accordance with the plan requirements for the following conditions:

1. Prior to prestressing transverse tendons before form removal.
2. Prior to placing a component into position in the structure and/or stressing of prestressing tendons if the component is less the 28 days old.

The test specimens for precast girders or girder segments shall be stored in or on the girder or girder segment, in a condition representative of the curing conditions that the girder or girder segment is exposed to. The specimen shall be tested just prior to prestressing transverse tendons before form removal.

GEOMETRY CONTROL--Before commencing the casting operation, the Contractor shall submit to the Engineer, for approval, his proposed method of geometry controls for the casting operation. This submittal shall be in the form of a "Casting Manual" and shall include, but not be limited to, the following information: a detailed narrative of the geometry control theory, a detailed narrative of the step-by-step geometry control procedure, detailed calculation forms, and a set of sample calculations. This submittal shall include all measuring equipment, procedures, the locations of the control points to be established on each girder or girder segment and the qualifications of personnel who will carry out geometry control. The Contractor's personnel responsible for carrying out geometry control activities during casting of concrete girders or girder segments and during erection of these girders or girder segments into the bridge shall possess the skills and prior experience in the specific type of work necessary to effectively control the final geometry of the bridge. Only personnel whose qualifications have been reviewed shall be assigned to carry out geometry control activities.

The casting manual shall cover all geometry control operations necessary for casting and shall be in agreement with the Contractor's chosen methods of casting and erection, including erection survey, elevation and alignment control. Casting shall not commence without the Engineer's approval of the geometry control method.

Instruments used in the casting yard for horizontal geometry control shall be mounted on a permanent platform independent of any other structure. Instruments used in the casting yard for vertical geometry control of girders or girder segments shall be mounted on a sturdy tripod set on top of the girders or girder segments being surveyed. Provision shall be made to protect instruments from construction activities and to minimize the effects of wind and temperature variations on the accuracy of readings.

A minimum of 2 permanent horizontal control points shall be established on line with the instrument mounting point. Permanent bench marks shall be established at locations where they will not be disturbed by construction activities. The horizontal control points and bench marks shall be located so as to be continuously visible from the instrument's location.

Prior to beginning casting operations, horizontal and elevation control points shall be established on the fixed bulkheads. The alignment, elevations and shape of the fixed bulkhead shall be checked by taking readings on these control points each time the geometry of adjoining girders or girder segments is checked.

Immediately after casting of a girder or girder segment is completed, the length of the girder or girder segment along the line of each web shall be measured and recorded and references for horizontal and vertical control shall be established as follows:

1. Horizontal Control - A wire stirrup on the horizontal control line at both ends of the girder or girder segment. A line not more than 0.001 feet in width shall be scribed in a permanent manner into each stirrup. Wire stirrups shall be stainless steel.

2. Vertical Control - A flat head bolt, with a pin hole in the head, approximately flush with the surface of the concrete over each web at both ends of the girder or girder segment. Bolts shall be stainless steel.

After a girder segment is cast, and before separation of adjoining segments, the positions of the 2 adjoining girder segments shall be checked from established control points. If the positions are not as required, corrections to the geometry shall be made in the next girder segment cast utilizing the established control points.

EMBEDDED ITEMS.--Reinforcing steel shall not be cut or removed to permit proper alignment of tendon ducts or other embedded items. Any bar that cannot be fabricated to clear a prestressing tendon shall be replaced by additional bars with adequate lap lengths using a method approved by the Engineer. In the plane of the steel parallel to the nearest surface of concrete, bars shall not vary from plan placement by more than 1/2 inch, or 1/12 of the spacing between bars, whichever is less. In the plane of the steel perpendicular to the nearest surface of concrete, bars shall not vary from plan placement by more than 1/4 inch. The top and bottom clear cover of reinforcing steel shall be within 1/4 inch of the clear cover limits dimensioned on the plans. The end and edge clear cover of the reinforcing steel shall be within one inch of the clear cover limits dimensioned on the plans. The minimum concrete cover shown on the plans shall be maintained with the placement tolerances listed above allowing for increased concrete cover only.

Embedded ducts for tendons shall be positioned accurately (within 1/4 inch) in respect to their vertical, linear and transverse position within each girder or girder segment. Positive methods shall be utilized to assure that ducts will not be displaced during casting. Ducts which act to change the alignment of tendons shall be marked so that proper positioning is assured prior to casting and can be verified after casting.

Lifting devices incorporated in superstructure girders or girder segments shall be adequate to distribute the handling and erection stresses so as to not damage the girder or girder segment.

The anchoring devices for transverse top slab prestressing shall be recessed so that the ends of the prestressing steel and all parts of anchoring devices will be at least 3 inches inside the end surface of the girder or girder segment. Following post-tensioning, the recesses shall be filled with concrete conforming to the requirements for the girder and finished flush.

Transverse prestressing anchors shall be placed into the form before the concrete is cast. Temporary blockout for anchors shall not be allowed.

TOLERANCES--The following tolerances shall apply to the fabrication of girders or girder segments:

Width of Web	+ 0.25 inches
Depth of Top Slab	+ 0.1875 inches
Overall Depth of Girder or Girder Segment	+ 0.1875 inches
Overall Width of Girder or Girder Segment	+ 0.25 inches
Length of Girder or Girder Segment	+ 0.375 inches
Diaphragm Dimensions	+ 0.375 inches
Ends (deviation from a plane per 20 feet width or depth)	+ 0.25 inches per 20 feet not to exceed 0.5 inches
Flat Surface (deviation from a plane at any location)	+ 0.025 inches per foot not to exceed a total of 0.25 inches

Dimensions from girder or girder segment to girder or girder segment shall be adjusted so as to compensate for any deviations within a single girder or girder segment so that the overall dimensions of the completed structure will conform to the dimensions shown on the plans.

10-1B.11 PRECAST CONCRETE GIRDER CONSTRUCTION

The work specified in this section shall consist of the storage, transport and the erection of precast concrete girders into the completed structure.

The plans show 2 options for the fabrication and erection of the precast concrete girders. These options are the monolithic and segmental alternates as described below:

Monolithic Option --Fabrication and erection of a complete span in a single precast, prestressed concrete girder. The prestressing is provided by a combination of pretensioning and post-tensioning.

Segmental Option --Fabrication and erection of 3 girder segments, prestressed together to form a complete span. The prestressing is provided by a combination of pretensioning and post-tensioning.

Precast concrete girders are defined as either monolithic girders or segmental girder segments.

SUBMITTALS—The Contractor shall submit the following documents to the Engineer for approval prior to the start of any transport or erection operations:

1. Complete details of handling, storing and transporting girders or girder segments. These details shall include, for each type of girder or girder segment, the method of lifting (location of any inserts, configuration of lifting devices, etc.) and the method of supporting girders or girder segments during storage and transportation, the planned route for transporting the girders or girder segments and the axle loads for the segment hauler. Details shall also provided of any planned transportation of girders or girder segments by water. The details shall be accompanied by calculations prepared under the direction of, and signed and sealed by, a Civil Engineer registered in the State of California indicating that the forces imposed on a girder or girder segment during lifting, storage and transportation will not adversely affect the structural adequacy of the girder or girder segment.

2. A detailed step-by-step procedure for erection of girders or girder segments, prestressing, etc., including the sequence in which these items are to be erected and a table of theoretical elevations and alignment of the geometry control points established during casting of each girder or girder segment computed at each stage of erection. Stages for which theoretical positions of control points are to be computed shall include the girder or girder segment in place prior to applying prestressing and the girder or girder segment with prestressing applied.

The theoretical position shall be computed taking into consideration:

a. The effect of as-cast geometry established from surveys during casting of girders or girder segments.
b. Effects of construction dead and live load.
c. Effects of prestressing.
d. Effects of creep and shrinkage. Deformation due to creep and shrinkage and the concrete modulus of elasticity shall be computed using the latest recommendations of CEB-FIB Model Code for Concrete Structures. CEB-FIB stands for Comite Euro-International De Beton-Federation Internationale De La Preconstrainte.
e. Effect of the final profile of the roadway as shown in the plans.

The procedure shall also include a method for measuring and recording the elevations and alignment of all control points at each stage of erection.

The Contractor shall submit a revised erection procedure at any time that he proposes to deviate from the sequence of schedule of erection contained in an approved erection procedure under which he is operating.

3. Complete details covering equipment to be used to handle girders or girder segments and incorporate them into the structure, erection methods to be used, the sequence of erection, all loads to be imposed on any portion of the permanent structure by the erection equipment and details covering the procedure for load testing of erection equipment.

4. Calculations prepared under the direction of, and signed and sealed by, a Civil Engineer registered in the state of California which show that any loads imposed on the permanent structure by the erection equipment will not adversely affect the structural adequacy of the permanent structure, nor exceed allowed stresses during the construction process.

5. A manual for the detailed step by step erection of the girders or girder segments (referred to as "Erection Manual") including all intermediate procedures relating to any erection equipment, falsework, movement of equipment, support jacking, stressing of temporary prestressing if used for epoxy joining of segments, closure operations including any partial stressing across the closure during concrete curing, location and size of shim blocks, main prestressing tendon sequences, stressing loads and elongations, erection elevations, the field survey and alignment control methods to be employed for setting the initial and subsequent girders or girder segments and any other relevant operations.

Working drawings shall be submitted in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications.

Submittals shall be sent to the Engineer sufficiently in advance of the start of the affected work to allow time for review by the Engineer and correction by the Contractor without delaying the work. The time to be provided for the Engineer's review of the above submittals for the precast concrete girders shall be 4 weeks.

EQUIPMENT.--

GENERAL.--Design calculations prepared under the direction of, and signed and sealed by, a Civil Engineer registered in the State of California shall be submitted for any erection equipment, falsework, and other temporary construction which may be required to accomplish the work.

Prior to use of any equipment which is fabricated for the specific purpose of erecting any portion of the work included in this contract, the Contractor shall demonstrate by a full scale load test that this equipment is adequate for its intended use on this project.

Observation of load testing of erection trusses or erection equipment or review of design drawings and calculations covering erection trusses or erection equipment by the Engineer shall not be construed as any assumption by the Engineer of responsibility for means, methods, techniques, sequences or procedures of construction, nor on safety precautions or to a safety program thereto.

BRACKETS SUPPORTING TRUSS.--If an erection truss is to be supported by any part of a pier, in designing support brackets, a lateral force equal to not less than ten percent of the weight of the truss plus the weight of girders or girder segments to be placed on the truss shall be applied longitudinally. Also, these brackets must have a secondary means of vertical support which does not rely on friction between the support and the pier.

LOAD TESTING TRUSS.--Prior to using an erection truss on the project, the Contractor shall demonstrate the capability of the truss to perform as intended by a full scale load test. The load test procedure shall include:

1. Constructing 2 temporary piers approximately the size and shape of the upper portion of the permanent piers which are to be constructed on the project. The elevation of the top of these temporary piers shall be such that when the erection truss is assembled to them it will be only a sufficient distance above the ground to allow any necessary working space beneath it. The temporary piers may be constructed on foundations for the permanent structure. Alternately, the Contractor may use the completed substructure for the first span to be erected to support the truss during the load test.
2. Assembling the truss supported on the piers in the same manner and using the same supporting devices (beams, brackets, etc.) as will be used on the project.
3. Load the truss with the girder segments as will be used for the permanent work plus an additional load equal to 25 percent of the weight of the girder segments.
4. Measurement of vertical displacement at midspan and horizontal movement at support points. The Engineer will determine acceptable limits of truss movement.

The Contractor shall give written notice to the Engineer at least 72 hours in advance of the time at which loading of the truss is to be accomplished.

PRECAST GIRDER OR GIRDER SEGMENT HANDLING, STORAGE, AND SHIPMENT.--

GENERAL.--Care shall be exercised in the handling of girders or girder segments to prevent damage to them. Handling shall be done only by using the devices shown on the approved shop drawings for this purpose. Lifting devices incorporated into any girder or girder segment shall be adequate to distribute the handling and erection stresses so as not to damage the girder or girder segment.

The Contractor shall inspect each girder or girder segment visually for evidence of damage or defect before, during and after critical operations and as often as necessary to ensure adequate quality control. The Contractor shall immediately bring all such evidence of damage or defect to the attention of the Engineer. The extent and frequency of inspection by the Engineer for quality assurance is the Engineer's prerogative. Girders or girder segments may be inspected at any time during construction as deemed necessary by the Engineer to monitor compliance with this specification.

Girders or girder segments shall be stored level in the deck upright position and shall be firmly supported on a four point bearing system under the webs at the locations shown on the shop drawings. The bearing points shall be placed at locations that prevent any relative distortion of the webs under the self-weight of the element. The storage area of the girders or girder segments shall be of suitable stability to prevent differential settlement of the girder or girder segment supports which results in an unstable storage condition during the entire period of storage.

Vertically stacking girders or girder segments will not be allowed.

Prior to shipment, each girder or girder segment shall be inspected for damage. The faces of all match cast joints shall be thoroughly cleaned of laitance, bond breaking compound and any other foreign material by wire brushing or light sandblasting. During transport, firm support at the bearing locations noted above for support during storage shall be provided and the girders or girder segments shall be fully secured against shifting. Upon arrival at the erection site, each girder or girder segment shall again be inspected.

If any damage has occurred during shipment, the Contractor shall immediately notify the Engineer. Erection of such damaged girders or girder segments into the structure shall not proceed without authorization from the Engineer.

DAMAGED OR DEFECTIVE GIRDERS OR GIRDER SEGMENTS.--Isolated defects are defects or damage which occur randomly and infrequently, as determined by the Engineer.

Recurring defects are defects or damages of the same general type and nature, which continue to occur in the same general location of the girders or girder segments at an unacceptable frequency, as determined by the Engineer.

As a minimum, the first 2 girders or first 6 girder segments cast and the first 2 girders or first 6 girder segments erected will be jointly inspected by the Engineer, the Contractor and the Contractor's Engineer after casting, after moving to storage from the casting machine, and before and after erection. Role of Contractor's Engineer is defined in "Precast Concrete Girders" of these special provisions. All girder or girder segment defects shall be identified and categorized during this inspection. The Contractor and Contractor's Engineer shall examine the defects and propose to the Engineer, in writing:

1. The measures that the Contractor shall take to prevent recurring defects in future girders or girder segments.
2. The method of repair of all defects discovered as a result of the inspection as required herein.

The time to be provided for the Engineer's review of the above submittal shall be 10 working days.

If recurring defects continue following implementation of the Contractor's preventive measures, or as detected at any time during the construction, the Engineer will instruct the Contractor, in writing, to cease operations producing such defective girders or girder segments. The Contractor and Contractor's Engineer shall examine the defects and propose to the Engineer, in writing: (1) the measures the Contractor shall take to prevent recurring defects in future girders or girder segments, and (2) the method of repair of all defects discovered as a result of the inspection as required herein.

The Engineer will determine what constitutes damage or defect, whether the damage or defect is isolated or recurring, and will categorize the damage or defects. Three categories of defects are recognized by the Engineer for this purpose:

1. Cosmetic: Cosmetic defects or damages are those which do not affect the ability of the girder or girder segment to resist construction or service loads or reduce the life expectancy of the structure. This category of defect includes a superficial discontinuity such as cracks, small spalls or honeycombed areas, or any defect that does not extend beyond the centerline of any reinforcing steel, or to any elements of the prestressing system.

Cosmetic defects of other types and causes may also be designated by the Engineer.

Repair of cosmetic defects shall be made in such a manner that the aesthetics of the girders or girder segments is restored.

2. Structural: This category of defect shall include any defect which will impair the ability of the girder or girder segment to adequately resist construction or service loads or reduce the life expectancy of the structure. Any defect or damage which extends beyond the centerline of any reinforcing steel or into any element of the prestressing system or occurs in the deck portion of the girder or girder segment is considered a structural defect.

Examples of such defects include cracks, large spalls and honeycombed areas, major segregation or breakage of concrete; however, structural defects of other types and causes may be designated by the Engineer.

The Contractor's Engineer shall be responsible for construction load analysis and service load analyses. Calculations shall be submitted to Engineer for approval. The time to be provided for the Engineer's review shall be 10 working days.

Repair of structural defects shall be such that the aesthetics and structural integrity of the girder or girder segment shall be completely restored to a condition to be expected had the defect or damage not occurred.

3. Rejectable: A rejectable defect is any defect or damage, as determined by the Engineer, which will impair the ability of the girder or girder segment to adequately resist service loads or construction loads, or will reduce the life expectancy of the structure and which cannot be successfully repaired such that the structural integrity is completely restored. Any girder or girder segment with a rejectable defect will be deemed unacceptable and shall be removed from the work and replaced at no additional cost.

Damaged or defective girders or girder segments may also be rejected by the Engineer for the following reasons:

a. Failure of the Contractor to execute the repair according to the Contractor's Engineer's approved procedure.

b. Rejection of the proposed repair procedure or repair by the Engineer.

c. Failure of the Contractor to provide the required certification or demonstration that the repair was successful and that the defect no longer exists.

Girders or girder segments with cosmetic or structural defects will not be paid for until the repair procedure is complete and the girder or girder segment is accepted by Engineer.

REPAIRS.—All cosmetic repairs shall be made following procedures prepared by the Contractor, submitted in writing to and approved by the Engineer. The Contractor's repair procedure shall identify those areas required to be repaired prior to prestressing, and those that must be repaired after prestressing.

Structural repairs shall be made following procedures prepared by the Contractor. The repair procedure shall be signed and sealed by the Contractor's Engineer, shall be submitted in writing to the Engineer, and shall include the following minimum information:

1. A detailed description and sketch of the defect.
2. The magnitude and type of the most critical construction loading and service life condition to which the defective area will be subjected.
3. Detailed reinforcement requirements, material types, surface treatments, curing methods and general repair procedures proposed. The procedure shall clearly indicate those areas required to be repaired before erection, and those areas to be repaired after erection.
4. The specific nondestructive testing method and procedure by which the Contractor shall demonstrate to the Engineer that the defect no longer exists and the girder or girder segment has been restored to a condition to be expected had the defect or damage not occurred.

Cosmetic and structural repairs shall be finished in accordance with the provisions in Section 51-1.18B, “Class 1 Surface Finish,” of the Standard Specifications.

The time to be provided for the Engineer’s review of repair procedures shall be 10 working days.

Repairs to the shear keys along the webs shall be made after the girders or girder segments have been erected. When 20 percent or more of the shear keys in a web have been damaged such that they cannot effectively transfer the shear across the joint, as determined by the Engineer, then the damaged shear keys shall be repaired after the girders or girder segments have been erected and initially stressed together with no more than 10 percent of the final prestressing force applied across the joint. After the repair has been completed and concrete has obtained a minimum compressive strength of 2500 PSI, the final prestressing force may be applied across the joint.

ERECTION.--The Contractor shall be solely responsible for design, fabrication, assembly and operation of all equipment to be used for handling and erecting girders or girder segments.

Erection of girders or girder segments shall not begin until the required working drawings and calculations have been reviewed and approved by the Engineer. No extra payment will be made to the Contractor for any cost incurred in modifying the permanent structure due to temporary loadings induced by the Contractor's handling and erection equipment or his erection scheme.

Elevations and alignment of girders or girder segments shall be carefully measured at each stage of erection with instruments capable of providing the degree of accuracy necessary to assure that erection tolerances will be met. Any deviation from the table of elevations and alignment prepared by the Contractor shall be corrected so as to prevent accumulation of deviations using a method submitted by the Contractor and approved by the Engineer.

Precast girders or girder segments shall not be erected until they have reached the age of 14 days after casting and have obtained the minimum specified concrete strength in the plans.

Erection of girder segments will be permitted only when the temperatures within 2 feet of the mating surfaces are between 40 F and 105 F. Upon approval of the Engineer, an artificial environment may be provided to maintain the temperature within the permissible limits by creating an enclosure heated by circulating warm air or by radiant heaters. Localized heating shall be avoided and the heat shall be provided in a manner that prevents surface temperatures greater than 95 F during the epoxy hardening period. Direct flame heating of concrete will not be permitted.

The following tolerances shall apply to erection of girders or girder segments:

1. The horizontal and vertical position of girders or girder segments at sections over bearings shall be within 1/4 inch of the longitudinal alignment, grade and cross-slope required by the approved erection plans. The longitudinal slope shall not vary more than 0.005 feet in 10 feet from that required by the approved erection plans. These tolerances are for relative location of control points not absolute location.
2. The difference in roadway elevation at the connection of 2 adjacent girders or girder segments (measured perpendicular to the deck surface) and across closure joints shall be no greater than 1/8 inch. If the Contractor fails to meet the tolerance, he shall grind the deck surface to meet the tolerance and re-groove the deck. All corrective work shall be at the Contractor's expense.
3. The maximum differential between the outside face of adjacent girders or girder segments in the erected position shall not exceed 3/16 inch.

Dimensions from girder or girder segment to girder or girder segment shall be adjusted so as to compensate for any deviations within a single girder or girder segment so that the overall dimensions of the completed structure will conform to the dimensions shown on the plans such that the accumulated maximum error should not exceed 1/1000 of the span

length for either vertical profile and/or horizontal alignment. Deviations exceeding the erection tolerances listed above which are discovered during the casting operation shall be identified by after-cast surveys at the casting site before the match-cast girder segments are separated. Corrections for these deviations shall be submitted to the Engineer prior to casting the next girder or girder segment.

CLOSURE JOINTS.--Concrete for closure joints shall comply with the same specifications and criteria as the concrete in the precast concrete girders. Concrete for the closure joints shall reach the minimum required strengths as follows:

1. Prior to stressing longitudinal continuity prestressing: 2500 pounds per square inch.
2. Prior to opening completed four span unit to traffic: 4000 pounds per square inch.
3. Minimum 28-day compressive strength: 5500 pounds per square inch.

Formwork shall be adequately supported to take all loads applied and they shall not be removed until the concrete in the joints has reached its required strength and longitudinal tendons have been stressed.

Prior to placement of closure joint concrete, there shall be no relative movement of adjacent precast elements during the casting of the closure joint and stressing of the continuity prestressing. This shall be accomplished by placing shims in the top slab of the closure joint and stressing 2 of the 4 continuity tendons (symmetrical about the centerline girder) to 15% of the final specified tendon force as shown in the plans.

The contract unit price paid for erect precast prestressed concrete girder shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals (including preparation of required submittals, handling, storage and shipment of precast concrete girders) and for doing all the work involved in erecting precast concrete girders in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1B.12 EPOXY JOINING OF PRECAST CONCRETE GIRDER SEGMENTS

This work shall consist of furnishing, mixing and applying a two component epoxy bonding system to the match cast faces of joints between precast concrete girder segments through which embedded prestressing tendons pass in accordance with details shown in the plans and requirements of these special provisions. The work covered by this section shall also include temporary prestressing across a joint, if required, by provisions contained elsewhere in this specification.

In its workable state, the epoxy bonding agent must provide lubrication along the keys as the precast concrete girder segments are brought together. In its hardened state, the epoxy bonding agent must provide a watertight seal between the precast concrete girder segments. The hardened epoxy bonding agent is not a stress carrying component, however, it must provide a friction mechanism to transfer shearing stresses across the joint at the shear keys. This friction mechanism shall be established prior to removing the support of the erection truss from girder segments in a span.

EPOXY MATERIAL.--

GENERAL.--Epoxy bonding agents for match-cast joints between precast girder segments shall be thermosetting 100 percent solid compositions that do not contain solvent or any non-reactive organic ingredient except for pigments required for coloring. Epoxy bonding agents shall be of two components, a resin and a hardener. The two components shall be distinctly pigmented, so that mixing produces a third color similar to the concrete in the girder segments.

Epoxy bonding agents shall be insensitive to damp conditions during application and, after curing, shall exhibit high bonding strength to cured concrete, good water resistance, low creep characteristics and tensile strength greater than the concrete.

The components shall be packaged in two parts in sealed containers, pre-proportioned in the proper reacting ratio, ready for combining and mixing in accordance with the manufacturer's instructions. Each container shall bear a label designating the manufacturer's name, the type component (resin or hardener), the range of substrate (surface of concrete) temperature over which application is suitable, the date of formulation, the shelf life of the material and the manufacturer's Lot number. Material from containers which are damaged or have been previously opened shall not be used. Combining of epoxy bonding agent components from bulk supplies will not be permitted. Only full buckets of components will be mixed immediately after opening.

Instructions shall be furnished by the manufacturer for the safe storage, handling, mixing and application of the material. The Contractor shall furnish to the Engineer samples of the material for testing, upon request, and certified reports of tests performed by an independent laboratory approved by the Engineer.

An epoxy bonding agent shall be formulated to provide application temperature ranges which are suitable for erection of girder segments with substrate temperatures between 40 F and 115 F. There shall be a minimum of two, and preferably three, formulations dividing the overall range into equal subranges which overlap by 5 F.

PHYSICAL REQUIREMENTS.--Epoxy bonding agents proportioned as designated by the manufacturer and mixed in accordance with the manufacturer's recommendations, as modified herein for a specific test, shall meet the physical requirements set out below. The components of the epoxy bonding agent shall be conditioned to the temperature at which testing is to be done prior to mixing the test specimen.

1. Consistency

This property determines the application workability of the epoxy bonding agent.

Mixed epoxy bonding shall be tested and conform to the prescribed consistency in accordance with ASTM C881-87 at the maximum temperature of the temperature range for the formulation being tested.

2. Gel Time

This property is the period of time during which the epoxy bonding agent will remain workable in the mixing container and must be applied to the match cast joint surfaces.

The mixed epoxy bonding agent shall be tested and conform to the prescribed gel time in accordance with ASTM C 881-87 at the maximum temperature of the temperature range for the formulation being tested.

3. Contact Time

This property is the allowable workable period of time between mixing of the components of the epoxy bonding agent and the application of a minimum of 40 PSI compression over the cross section of the joining girder segments.

The contact time of the epoxy bonding agent shall be 60 Minutes, Minimum.

The test procedure for determining contact time shall be in accordance with the test procedure used for determining the compressive and shear strength of the cured epoxy bonding agent modified as follows:

a. Soaking of the concrete specimens prior to application of the epoxy bonding agent shall be for 24 hours in water which is at the maximum temperature of the application temperature range for the formulation being tested.

b. Joining of the sloped surfaces shall be delayed for 60 Minutes, measured from the time the epoxy was mixed.

c. During the delay period between mixing of the epoxy and joining of the sloped surfaces, the specimens shall be uncovered and maintained at the maximum temperature of the application range for the formulation being tested.

d. The joined specimen shall be cured at the maximum temperature of the application range for the formulation being tested.

e. The formulation of epoxy bonding agent being tested will be acceptable if the specimen when tested sustains 1,000 PSI at 48 Hours.

4. Compressive Yield Strength

This property is the compressive yield strength of the epoxy bonding agent at various ages. Comparison of this property between batches is an indication of the level of quality control achieved in manufacturing the material.

The required compressive yield strength of the epoxy bonding agent shall be, determined in accordance with ASTM C 881-87 with the following modifications:

a. The epoxy bonding agent shall be poured into the mold for forming specimens within ten minutes after the beginning of mixing of the components.

b. The physical requirements are 2,000 PSI at 24 Hours and 7,000 PSI at 48 Hours.

5. Bond Strength

This property is the strength of the epoxy bonding agent as it bonds with concrete.

This bond strength property shall be determined in accordance with and conform to ASTM C881-87 which references ASTM C882 with the following modifications.

a. The test cylinder of mortar shall have a compressive strength of at least 6,000 PSI at seven days age.

b. The specimens shall be conditioned by soaking in water which is at the minimum temperature of the application temperature range for the formulation being tested. The required strength of ASTM C881-87 shall be modified to 1,000 PSI at 48 Hours.

6. Heat Deflection of Epoxy Bonding Agent

This property is the temperature at which an arbitrary deflection occurs under arbitrary testing conditions in the cured epoxy bonding agent. It is a screening test to establish performance of the epoxy bonding agent throughout the temperature range at which a particular formulation may be applied.

It shall be tested and satisfy the requirements in accordance with ASTM C881-87.

CONSTRUCTION REQUIREMENTS.--

GENERAL.--An epoxy bonding agent meeting the requirements of this specification shall be applied to joining surfaces of all precast concrete girder segments through which embedded prestressing ducts pass. The epoxy bonding agent shall be applied only when the substrate temperature of both surfaces to be joined is between 40° F and 105° F.

The formulation of epoxy bonding agent used shall have an application temperature range as previously defined in the Epoxy Material section which conforms to the substrate temperature of the surfaces to be joined. If the surfaces have different substrate temperatures, the formulation for the higher temperature shall be used.

The Contractor shall plan his erection and prestressing operations such that for the particular formulation of epoxy bonding agent being used, the time elapsing between initial mixing of the components for the first batch of epoxy bonding agent and application of a minimum of 40 PSI compression over the entire joint of precast concrete girder segments shall not exceed 70 percent of the contact time. Prior to beginning erection, the Contractor shall submit to the Engineer for review, details covering how compliance with this time limit will be achieved during erection of girder segments.

The compressive force across a joint (contact pressure) may be accomplished through temporary prestressing or permanent prestressing. The specified contact pressure shall be continuously maintained across a joint.

The work of mixing, handling and applying the epoxy bonding agent shall be under the direct supervision of a person who has experience in the use of this material. The Engineer may require the Contractor to arrange for a technical representative of the manufacturer to be at the site as an advisor at the beginning of this operation.

The Contractor shall ensure that all personnel who will be working with the epoxy bonding agent are thoroughly familiar with the safety precautions necessary when handling this material.

CLEANING OF SURFACES TO BE JOINED.--The surfaces to which the epoxy bonding agent are to be applied shall be free from oil, form release agent, laitance or any other material that would prevent the epoxy bonding agent from bonding to the concrete surface. These detrimental materials, shall be removed by light sandblasting or high pressure water blasting with a minimum pressure of 5,000 PSI.

The surfaces shall have no free moisture on them at the time the epoxy bonding agent is applied. Free moisture will be considered to be present if a rag, after being wiped over the surface, becomes damp.

MIXING EPOXY BONDING AGENT.--Only epoxy bonding agent components from full containers opened immediately prior to being combined and for which the shelf life indicated on the containers has not expired shall be used during erection. Each container of a component shall be thoroughly mixed prior to combining of the components.

The two components of the epoxy bonding agent shall be combined and thoroughly mixed in a mechanical mixer in strict accordance with the manufacturer's recommendations.

Mixing of the epoxy bonding agent shall be scheduled so that the material in a batch is applied to the face of the joint within 20 minutes after the components are combined, unless suitably demonstrated to be workable.

APPLYING EPOXY BONDING AGENT.--The epoxy bonding agent shall be uniformly applied to a nominal thickness of 1/16 inch in accordance with the manufacturer's recommendations with a spatula or by hand. The material shall be applied to only one of the faces to be joined except that material shall be applied to both faces in the vicinity of prestressing ducts. No material shall be placed within 1/2 inch of a prestressing duct except, regardless of spacing, a bead of epoxy bonding agent shall be applied between all adjacent prestressing ducts.

No epoxy bonding agent from a batch shall be used for which the time since combining of components has exceeded 20 minutes.

After the concrete girder segments have been joined and the specified contact pressure applied a discernable bead line of epoxy bonding agent must be apparent along the entire exposed edges of a joint. All excess epoxy bonding agent shall be cleaned from visible surfaces of the concrete segment in such a way as to not damage or stain the concrete surface. Excess epoxy squeezed from the joint shall be captured and not allowed to free-fall from the structure.

Immediately after concrete girder segments are joined, a swab shall be passed through each empty prestressing duct to smooth out any epoxy bonding agent in the duct.

ARTIFICIAL HEATING.--If the Contractor elects to erect girder segments in cold weather when the substrate temperature of the joint surfaces of concrete girder segments is below 40 F, he may provide an artificial environment to increase the substrate temperature subject to the following restrictions.

1. The artificial environment shall be created by an enclosure surrounding the joint through which warm air is circulated.

2. The temperature of the concrete shall be raised to at least 40 F to a depth of approximately three inches beneath the surface to be joined.

3. Localized heating shall be prevented and the temperature of the substrate shall not exceed 105 F at any point on the surface of a joint.

4. The temperature of substrate surfaces shall be maintained between 40 F and 105 F for at least 24 hours after joining of the surfaces for normal-set epoxy and 72 hours for slow-set epoxy.

The Contractor may propose, for review by the Engineer, an optional method of raising and maintaining the substrate temperature of the joint surfaces. Any optional method shall meet the restrictions set out above. The Engineer will base his approval of an optional method on it accomplishing an environment suitable for the epoxy bonding agent to perform satisfactorily.

FAILURE TO COMPLY WITH TIME LIMITS.--If the time limit between mixing of the epoxy bonding agent and application of contract pressure to a joint is exceeded, the concrete girder segments shall be moved apart and all epoxy bonding agent shall be removed from both faces of the joint. If solvent is used to remove the epoxy bonding agent, reapplication of the epoxy bonding agent to the joint surfaces shall not be done for at least 24 hours.

RECORD OF JOINTING.--

The Contractor shall record and make available to the Engineer the following information:

1. Weather condition.
2. Air temperature at the site on an hourly basis.
3. Lot number for the epoxy bonding agent components.
4. Temperature of the concrete on the surface of each concrete segment when application of epoxy bonding agent was started.
5. Time of mixing the first batch of epoxy bonding agent applied to the joint.
6. Time of applying the specified contact pressure to the joint.
7. Date of joining girder segments with epoxy.

Full compensation for the work of epoxy jointing precast concrete girder segments, including any temporary prestressing to achieve contact pressure across joints, shall be considered as included in the contract price paid per unit for the erect precast prestressed concrete girder.

10-1B.13 PRECAST CONCRETE DECK

Concrete shall have a minimum 28-day compressive strength of 5500 pounds per square inch.

Concrete mix design and curing requirements for precast concrete decks shall conform to the requirements for precast concrete in "Precast Concrete", elsewhere in these special provisions, with the following exceptions:

Aggregate grading for precast concrete decks shall conform to the requirements of Section 90-3, "Aggregate Gradings," of the Standard Specifications. The combined aggregate grading for the concrete shall be the 1" maximum grading.

Curing the precast concrete decks shall conform to the requirements of Section 90-7.04 "Curing Precast Concrete Members," of the Standard Specifications except the steam curing shall not be used.

Completed roadway surfaces of the precast concrete decks shall be finished in conformance with the provisions in Section 51-1.17, “Finishing Bridge Decks,” of the Standard Specifications.

Forms for providing the circular voids in the slabs shall be watertight and shall be constructed of an approved material that will resist breakage or deformation during the placing of the concrete and will not materially increase the dead load of the span. Said forms shall be properly supported and tied and shall remain in correct position at all times during the placing of the concrete.

After the concrete slabs are in final position, the anchor dowel holes shall be filled with magnesium phosphate concrete. Magnesium phosphate concrete shall conform to Section 83-2.02D(1) of the Standard Specifications.

Full compensation for furnishing and placing magnesium phosphate concrete shall be considered as included in the contract price paid per square foot for furnish precast concrete deck and no additional compensation will be allowed therefor.

10-1B.14 PRECAST CONCRETE PANEL

Precast reinforced concrete panel of the type shown on the plans shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Attention is directed to "Core Concrete" elsewhere in these special provisions.

The Contractor shall design precast concrete panels for all the loads during lifting, handling, and installation. Each precast concrete panel shall be marked to indicate its final location in the structure and the date of fabrication. Identification marks shall correspond to the placing plans.

Concrete mix design and curing requirements for precast concrete panels shall conform to the requirements for precast concrete in “Precast Concrete,” elsewhere in these special provisions.

Grout and grouting procedures for filling various regular spaces between precast panels and other structure elements as shown on the plans shall conform to the provisions for grout found in “Column and Shaft Casing” elsewhere in these special provisions.

Grouting and procedures for grouting high strength rods in ducts and cored holes shall conform to the requirements for bonding and grouting in Section 51, “Prestressing,” of the Standard Specifications and these special provisions.

Welded headed bar reinforcement shall conform to the section entitled “Welded Headed Bar Reinforcement” elsewhere in these special provisions.

Concrete Coatings.--Concrete coatings shall be applied to precast concrete panels elements within the limits shown on the plans. Concrete coating shall conform to these special provisions. The following concrete coating systems may be used:

PRODUCT	MANUFACTURER
MC-Ferrox A or equal	Wasser High Tech Coatings 8041 South 228th Bldg. #103 (206) 850 2967
POLYQuik or equal	Williamette Valley Company 660 McKinley Street Eugene, OR 97402 (541) 484-9621
TC-300 or equal	Thane Coat 12725 Royal Drive Stafford, TX 77477 (281) 565-7001

Alternative coating of equal quality may submit to Engineer for approval. Concrete coatings shall be used in conformance with the manufacturer's recommendations and these special provisions.

The color of the concrete coating shall match the color of the precast concrete elements.

A manufacturer's representative, as approved by the Engineer, shall provide technical assistance for the use of their product. The representative shall be present at the location of the mixing and application of concrete coating and shall remain at the location until released by the Engineer.

Coating shall be applied at least 30 days after fabrication of precast elements. At least 48 hours prior to application of coating, the entire concrete surface to be coated shall be blasted to a sand paper texture. Bugholes with a maximum dimension greater than 0.5 inch shall be sacked with epoxy mortar. Cracking with a crack width greater than 0.01 inch and less than 0.03 inch shall be repaired by applying high capillary, low viscosity epoxy over the crack prior to coating. Cracking with a crack width greater than 0.03 inch shall be repaired in conformance with the manufacturer’s recommendations.

The coating shall be applied in accordance with the manufacturers recommendations and with adherence to the requirements of National Association of Corrosion Engineers recommendation RP-0892 for concrete coatings as applicable. The Contractor shall submit to the Engineer for approval the coating properties including adhesion to concrete, chemical resistance to seawater, ultraviolet resistance, and abrasion resistance, and application procedures 35 working days prior to use.

An erection frame with at least four (4) lifting points shall be used to lift the precast segments. The lifting force shall be vertical without inducing significant lateral loads in the precast panels.

Submittals.--The Contractor shall submit the following documents to the Engineer for approval at least 6 weeks prior to the start of the precast operations:

1. Shop drawings showing precast segments layouts, reinforcement, forming and fabrication details, unit identification marks, support methods, lifting methods, transport and interchange handling methods, detailed erection sequences and design loadings, joint seals and detail design of joints with adjacent materials. Shop drawings shall conform to the requirements of Section 5-1.02, “Plans and Drawings,” of the Standard Specifications. Shop drawings shall be prepared under the direction of a Civil Engineer registered in the State of California.

2. Precast concrete and grout mix designs prepared by the Contractors shall meet all the requirements in these special provisions.

3. Erection plan for the segments of the precast concrete panels, including an inspection program, plans and working drawings of erection frames, calculations for erection frames and for temporary support bracing. Drawings and calculations shall be stamped and signed by a Civil Engineer registered in the State of California.

The Contractor shall submit the erection plan at least 8 weeks prior to installation.

Damage caused during transporting and handling shall be reported to the Engineer. The damage shall be repaired prior to final installation, unless approved by the Engineer in writing.

Precast concrete components shall not be shipped from the casting yard to the site until the cylinder tests show that the concrete has attained the required 28-day strength and required coatings have been applied.

The Contractor shall be responsible for lifting and transporting precast concrete components. Damaged members shall be replaced or repaired at the Contractor’s cost.

Surfaces of existing pier to be in contact with grout shall be cleaned to achieve results that are in conformance with the requirements of Section 51-1.13, "Bonding," of the Standard Specifications prior to placing grout.

Matching halves of precast concrete panels shall be connected prior to installing the next vertical precast panel.

Horizontal contact bearing surfaces of adjacent precast panels shall be match cast as shown on the plans. Horizontal contact surfaces shall be epoxy bonded during erection as shown on the plans.

Adjacent precast concrete jackets shall be coated with epoxy bonding agent and tied together with vertical high strength rods as shown on the plan.

The epoxy adhesive shall be furnished and applied in conformance with the provisions of Section 95, "Epoxy," of the Standard Specifications. The adhesive shall be worked onto the surfaces with stiff brushes, or equal.

Manufacturer's pot life for epoxy shall conform to the requirements shown on the plans.

Precast concrete panels shall be tied together above water before the epoxy adhesive begins to set and within the time limit required for the type of epoxy used as shown on the plans.

Surface preparation shall be performed prior to placing the adhesive. The joints shall be cleaned free of all loose and deleterious material by thorough brooming and by compressed air jetting. The joints shall be surface dry and the ambient temperature shall be 50° F or above, when the adhesive is applied.

Cored holes shall conform to the requirements for “Core Concrete” of the sizes shown on the plans elsewhere in these special provisions.

For constructing the cored holes which penetrate through the existing reinforced concrete diaphragms and the precast elements, the drill for drilling the holes through the precast concrete units and the existing reinforced concrete, shall be rigidly supported by a fixed or traveling frame affixed to the precast concrete or existing reinforced concrete, so that holes will be normal to the surfaces penetrated with a maximum deviation from straightness of not more than 1/8 inch.

The Contractor shall submit a grouting plan to the Engineer for approval at least 2 weeks prior to production grouting. The plan shall include complete description, details, and supporting calculations as listed below:

a. Grouting equipment, including capacity in relation to the grouting demand, working conditions as well as provisions for back-up equipment and spare parts.

b. Types and sizes of grout hoses and connections.

c. Methods and equipment for accurately determining the depth of the grout and the volume of the grout placed.

d. Grout batching, mixing, and pumping procedure including post grouting.

e. Grouting rate calculations. Calculations shall be based on the initial pump pressures or static head on the grout and losses throughout the placing system including anticipated head of water or slurry grout to be displaced.

f. Contingency procedures for handling blockage of ducts or equipment breakdown.

Grout seals shall be used to fill the gap between the pier diaphragm and precast jacket and seal off the edges of the annular spaces between the pier shafts and precast jackets as shown on the plans.

The Contractor shall limit the grouting rate to 6 cubic yards per hour, to minimize undulations and displacements of the surface of the precast jackets during grouting. At the Contractor’s option, a separate bracing system, high strength rods as shown on the plans, or other means may be employed to restrain the precast concrete elements during grouting. Except where shown on the plans, restraints shall not pass through the columns. The grout shall be allowed to set up prior to placing the next lift of grout, unless a bracing system is used. The maximum height of each lift of grout shall be 20 feet.

Precast jackets shall be positioned with spacers to center the units around the existing shafts and diaphragms at the location shown on the plans. Spacers may be secured by doweling to the inside of the precast concrete units.

Prior to all grouting a high pressure water jetting of sufficient volume shall be used to flush the ducts and rods so as to remove dirt, oil, and other foreign substances that may interfere with the grouting and bonding.

The grouting equipment shall use a gravity feed to the inlet pump. The storage hopper must be kept at least partially full at all times during the pumping operation to prevent air from being drawn into the prestressing tendon ducts.

The use of compressed air for pumping shall not be allowed.

The 3" cored holes shown on the plans through existing diaphragm shall be in accordance with "Core and Pressure Grout (1-1/2", 2", 3", 4")," elsewhere in these special provisions.

Full compensation for furnishing all labor, materials (including grout), tools, equipment and incidentals, and for doing all works involved in coring the holes, placing high strength rods in the holes, and pressure grouting the holes, including control of water for core drilling, as shown on the plans and in accordance with these special provisions shall be considered as included in the contract price paid for each panel for erect precast concrete panel and no additional payment will be made therefore.

Precast concrete panel will be measured and paid for by the assembled unit in the same manner specified for precast concrete members in Section 51-1.22, "Measurement," and Section 51-1.23, "Payment," of the Standard Specifications.

Full compensation for furnishing and placing epoxy on contact surfaces on precast panels, cleaning concrete surfaces, and grouting annular spaces, and furnishing, installing, and removing erection frames shall be included in the contract unit price paid for erect precast concrete panel of the type shown on the plans and no separate payment will be made therefor.

Full compensation for furnishing, installing, tying and grouting vertical and horizontal high strength rods in the precast concrete panel as shown on the plans and in accordance with these special provisions, shall be considered as included in the contract unit price paid for erect precast concrete panel and no additional payment will be made therefor.

Full compensation for application of concrete coatings shall be considered as included in the contract unit price paid for furnish precast concrete panel of the type shown on the plans and no separate payment will be made therefor.

Full compensation for repair of damages caused during transporting and handling shall be considered as included in the contract unit price for the erect precast concrete panel and no additional payment will be made therefor.

10-1B.15 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, and constructing new reinforced concrete approach slabs at structure approaches as shown on the plans and in accordance with these special provisions.

GENERAL.--The thickness shown on the plans for structure approach slabs is the minimum thickness. The thickness will vary depending on the thickness of the pavement and base materials removed.

Where pavement subsealing has been performed under existing approach slabs, the subsealing material shall be removed for its full depth. Where removal of cement treated base is required to construct the approach slab, the entire thickness of cement treated base shall be removed.

Voids between the new reinforced structure approach slab and the base material remaining in place that are caused by removal of subsealing material or cement treated base shall be filled, at the option of the Contractor, with aggregate base (approach slab) or structure approach slab concrete.

The Contractor shall establish a grade line for new approach slabs 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 then 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 being 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 traffic, the excavation shall be filled with a temporary roadway structural section as specified in this section, "Structure Approach Slabs (Type R)."

TEMPORARY ROADWAY STRUCTURAL SECTION.--The Contractor shall provide, at the job site, a sufficient standby quantity, as determined by the Engineer, of asphalt concrete and aggregate base 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)" in 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 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 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 accordance with Section 7-1.13 of the Standard Specifications except that removed aggregate base may be stockpiled at the job 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 accordance with said Section 7-1.13.

REMOVING PORTIONS OF EXISTING STRUCTURES.--Attention is directed to the section, "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. Such excavations shall be permanently or temporarily backfilled to conform to the grade of 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 accordance 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, and 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.

Bar reinforcement shall be epoxy-coated and shall conform to the provisions in Section 52-1.02B, "Epoxy-Coated Bar Reinforcement" 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.

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 accordance 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 conform to the requirements 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 accordance 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.

Bar reinforcement in drilled holes shall be bonded in accordance 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 accordance with the provisions for curing structures in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications. The minimum curing period as specified elsewhere 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. Any 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. Any 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. Any 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 accordance with the requirements for 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.

MEASUREMENT AND PAYMENT.--Structural concrete, approach slab (Type R) will be measured and paid for in accordance with the provisions in Sections 51-1.22, "Measurement," and 51-1.23, "Payment," of the Standard Specifications and these special provisions.

Full compensation for removing and disposing of portions of existing structures and pavement materials, and type AL joint 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.

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, 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 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 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.

10-1B.16 DRILL AND BOND DOWEL (EPOXY CARTRIDGE)

Drilling and bonding dowels with epoxy cartridges shall conform to the details shown on the plans and the requirements in these special provisions.

Reinforcing steel dowels shall conform to the provisions in "Epoxy-Coated Reinforcement" of these special provisions.

Threaded rods used as dowels shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications, except that galvanizing will not be required. The threaded rods shall be installed in accordance with these requirements for dowels specified herein.

The Contractor shall select an epoxy cartridge system which has passed the testing requirements of the International Conference of Building Officials (ICBO) document - AC58 and additional test requirements as specified in the Caltrans Augumention/Revisions to ICBO AC58. Testing shall be performed by an independent testing facility and the results will be reviewed and approved by the Transportation Laboratory. The Caltrans Augmentation/Revisions to ICBO AC58 document may be obtained by contacting the Transportation Laboratory, telephone: (916) 227-7000.

The epoxy cartridge system used shall be appropriate for the ambient concrete temperature and installation conditions at the time of installation in accordance with the manufacturer’s specifications.

Epoxy cartridges shall be accompanied by a Certificate of Compliance as provided in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall state that the material complies in all respects to the specifications and data submitted in obtaining approval.

Each epoxy cartridge shall be clearly and permanently marked with the manufacturer’s name, model number of the epoxy cartridge system, manufacturing date, and lot number. Each carton of epoxy cartridges shall contain the manufacturer’s recommended installation procedures, minimum cure time, and such warning or precautions concerning the contents as may be required by State or Federal Laws and Regulations.

The holes shall be drilled by methods that will not shatter or damage the concrete adjacent to the holes. If reinforcement is encountered during drilling, before specified depth is attained, the Engineer shall be notified. Unless the Engineer approves, in writing, coring through the reinforcement, the hole will be rejected and a new hole, in which reinforcement is not encountered, shall be drilled adjacent to the rejected hole to the depth shown on the plans.

The drilled holes shall be cleaned in accordance with the manufacturer’s instructions and shall be dry at the time of placing the epoxy cartridge bonding material and the steel dowels. The bonding material shall be a two-component epoxy system contained in a cartridge having two separate chambers and shall be inserted into the hole using a dispensing gun and replaceable mixing nozzle approved by the manufacturer. Unless otherwise specified, the depth of hole and the installation procedure shall be as recommended by the manufacturer. A copy of the manufacturer’s recommended installation procedure shall be provided to the Engineer 2 days prior to the start of work.

Immediately after inserting the dowels into the epoxy, the dowels shall be supported as necessary to prevent movement during curing and shall remain undisturbed until the epoxy has cured a minimum time as specified by the manufacturer. Dowels that are improperly bonded, as determined by the Engineer, will be rejected. Adjacent new holes shall be drilled, and new dowels shall be placed and securely bonded to the concrete. All work necessary to correct improperly bonded dowels shall be performed at the Contractor's expense.

Unless otherwise provided, reinforcing steel dowels and threaded rods to be bonded into drilled holes will be measured and paid for as bar reinforcing steel (epoxy coated) (bridge).

Unless otherwise provided, drilling and bonding dowels or threaded rods with epoxy cartridges will be measured and paid for by the unit as drill and bond dowel (epoxy cartridge). The number of units to be paid for will be determined from actual count of the completed units in place.

The contract unit price paid for drill and bond dowel (epoxy cartridge) shall include full compensation for furnishing all labor, materials (except reinforcing steel dowels), tools, equipment and incidentals, and for doing all work involved in drilling the holes and bonding dowels with epoxy cartridges, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1B.17 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 epoxy coated bar reinforcement in "Epoxy Coated Reinforcement" elsewhere in 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 (epoxy-coated).

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.

10-1B.18 CORE CONCRETE (2”, 5”)

Coring concrete shall consist of coring 2 inch diameter holes through reinforced concrete shaft at Pier 19, 57, 58, 59, 60 and 61, and coring 5 inch diameter holes through reinforced concrete shaft at Pier 13 to Pier 18, as shown on the plans and in conformance with the requirements in these special provisions.

Attention is directed to Section 50, "Prestressed Concrete" of the Standard specifications and to "Prestressing Concrete," elsewhere in these special provisions.

The holes shall be cored by methods that will not shatter or damage the concrete adjacent to the holes. Impact drilling of the holes will not be allowed. For Pier 13 through Pier 18 only, the existing longitudinal and confinement reinforcement for the shafts and columns shall be located on both sides of the existing structure along the length of the planned locations of the core hole prior to the commencement of the coring operations by a method approved by the Engineer. Should the planned locations of the core holes conflict with existing reinforcement, the core holes shall be adjusted to clear the existing reinforcement. The new core holes locations shall be subject to the Engineer’s approval. If reinforcement is still encountered during coring, it shall be cored through, unless otherwise directed by the Engineer.

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.

Attention is directed to "Non-Storm Water Discharges," elsewhere in the these special provisions. Water from core drilling operations shall not be permitted to fall on public traffic, to fall or flow into waterways, 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 with sizes as listed in the Engineer's Estimate. The cored concrete will be measured along the centerline of the hole.

The contract price paid per linear foot for core concrete with sizes as 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, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

10-1B.19 CORE AND PRESSURE GROUT (1-1/2”, 2”, 3”, 4”)

Coring and pressure grouting shall consist of coring 1-1/2”, 2”, 3”, 4”, diameter holes through reinforced concrete bridge members at piers A to 19, 61 to 78, and 71R to 77R, placing of bolts, rebar or high strength rods into the cored holes, and filling holes or ducts with non-shrink Portland cement grout as shown on the plans and in conformance with the requirements in these special provisions.

Rebar or high strength rods to be placed in the cored holes in hardened concrete shall conform to the provisions for bar reinforcement in “Reinforcement” or for high strength rods in “Miscellaneous Metal (Bridge)” elsewhere in these special provisions.

The holes shall be cored by methods that will not shatter or damage the concrete adjacent to the holes. Impact drilling of the holes will not be allowed. For Piers 71 to 77, and Piers 72R to 77R, the existing longitudinal and confinement

reinforcement for the shafts and columns, and for Piers 62 to 70 & 71R, the existing spandrel beam stirrups shall be located on both sides of the existing structure along the length of the planned locations of the core hole prior to the commencement of the coring operations by a method approved by the Engineer. Should the planned locations of the core holes conflict with existing reinforcement, the core holes shall be adjusted to clear the existing reinforcement. The new core holes locations shall be subject to the Engineer's approval. If reinforcement is still encountered during coring, it shall be cored through, unless otherwise directed by the Engineer.

Unless otherwise provided, rebar, high strength rods to be grouted into cored holes, and high strength rods to be used in the restrainer details will be paid for as bar reinforcing steel (epoxy coated), and miscellaneous metal (bridge) and miscellaneous metal (restrainer-rod type) respectively.

Attention is directed to Section "Core Concrete (2", 5") elsewhere in these special provisions for coring holes through reinforced concrete. For holes cored under water, chloride and sulfate contaminated water or sea water shall be allowed for core drilling operations. However, the chloride and sulfate content shall in no way exceed general consistencies of the surrounding Bay Area sea water.

Grout shall be a premixed package blend of non-shrink Portland cement which conforms to ASTM Designation: C1107, Grade B, and may contain graded silica sand and other non-corrosive additives including water reducing, plasticizing and time release expansion agents. The grout, when used in accordance with the manufacturer's recommendations, shall reach a minimum 5000 psi compressive strength at 28 days. Water shall comply with the provisions in Section 90-2.03, "Water."

Grout admixtures shall not contain more than 500 parts per million of chlorides as C1, when tested by California Test 422, and shall not contain more than 2500 parts per million of sulfates as SO4, when tested by California Test 417.

Grout for holes cored under water shall conform to the requirements of micropile grouting in "Micropiling" elsewhere in these special provision.

After dowel placement, both ends of the drilled hole containing the dowel shall be sealed using a quick set cement and metal plates. One end of the hole shall have a short vent tube and the other end a short injection feed tube. Alternative pressure grout methods when hole is open on both ends are allowed subject to Engineer's approval.

Prior to placing dowels, a long tube, whose length into the hole shall equal the full hole depth, shall be attached to the dowel. This tube shall be used as a grout injection tube if the hole orientation is horizontal or angled downward, or for a vent tube if the hole is oriented upward. The dowel shall be placed in the hole and fully supported. The void surrounding the dowel at the concrete surface shall be sealed with a rubber bushing or metal plate and rapid-set cement, and a short outer tube shall be positioned through the bushing or metal plate. This outer tube serves as the vent tube for holes angled downward or horizontal, or as an injection feed tube for holes oriented upward. Alternative pressure grout methods when hole is closed on one end and does not go completely through the concrete allowed subject to Engineer's approval.

The grout mixture shall be pumped through the appropriate tube with sufficient pressure so that the void surrounding the bar is completely filled with grout and finally flows smoothly from the vent tube. Grout pumping shall be continued for at least 11 seconds after a full flow of pure grout (with no signs of air, lumps or water or other impurities) begins to emerge from the vent tube.

For holes grouted above water, excess grout or waste water shall not be permitted to fall into any waterway or on public traffic, to flow across shoulders or lanes occupied by public traffic, or to flow into gutters or other drainage facilities.

Coring and pressure grouting will be measured and paid for by the linear foot as core and pressure grout concrete with sizes as 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 and pressure grout concrete with sizes as listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials (including non-shrink portland cement grout), tools, equipment, and incidentals, and for doing all work involved in coring the holes, placing bolts, rebar or high strength rods into the cored holes, and filling holes with non-shrink portland cement grout, including control of water from core drilling, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

10-1B.20 SEALING JOINTS

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.

MATERIALS.--Polyethylene rod stock shall be commercial quality, with a continuous, impervious, glazed surface, suitable for retaining the liquid sealant in the joint while hardening.

INSTALLATION.--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:

Shop splices and field splices shall have no visible offset of exterior surfaces, and shall show no evidence of bond failure.

10-1B.21 JOINT SEAL ASSEMBLIES (MAXIMUM MOVEMENT RATING, 4 INCHES)

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 accordance with the provisions in Sections 59-2, "Painting Structural Steel," and 91, "Paint," of the Standard Specifications and the following:

The inorganic zinc coating shall be tested for adhesion and cure. The locations of the tests will be determined by the Engineer. The sequence of the testing operations shall be determined by the Contractor. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to locate 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 cure will be checked by the Engineer. 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.

Finish coats will not be required on joint seal assemblies.

The sheet neoprene shall be installed at such time and in such manner that it 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:

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 Office of Structure Design, Documents Unit, P.O. Box 942874, Mail Stop 9, Sacramento, CA 94274-0001 (1801 30th Street, Sacramento, CA 95816), telephone (916) 227-8230, in accordance 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

drawings shall be submitted. After review, between 6 and 12 sets, 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 the particular joint seal assembly, as requested by the Engineer. Working drawings shall be either 11" x 17" or 22" x 34" in size and each drawing and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Post mile. The design firm's name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

Each shipment of joint seal materials shall be accompanied by a Certificate of Compliance as provided 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)

The elastomer portion of the assembly shall be installed in accordance with the manufacturer's recommendations at such time and in such a manner that it 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 any additional materials or work required because of the application of the optional cleaning and painting, or 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.

10-1B.22 SEISMIC ISOLATION JOINT AND EXPANSION JOINT ASSEMBLIES

Seismic isolation joint assemblies at Pier 19 and 61, and expansion joint assemblies at pier 27, 33, 36, 46 and 49 shall consist of structural steel grate bars, structural steel bracket assembly, joint curb and rail modification, supporting rails and support bars and shall conform to the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications and to these special provisions.

The Contractor shall submit complete working drawings for each joint assembly to the Office of Structure Design, Documents Unit, P.O. Box 942874, Mail Stop 9, Sacramento, CA 94274-0001 (1801 30th Street, Sacramento, CA 95816), telephone (916) 227-8230, in accordance 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 and structural steel from that shown on the plans. For initial review, 5 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to the said Office for final approval and use during construction.

The working drawings shall be supplemented with complete calculations for the particular joint assembly, when requested by the Engineer. Working drawings shall be either 11" x 17" or 22" x 34" in size and each drawing and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Post mile. The design firm's name, address, and

phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

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 60 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 Office of Structure Design, Documents Unit.

Each shipment of joint assembly materials shall be accompanied by a Certificate of Compliance as provided in Section 6-l.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 approval.

All metal parts of the joint assembly including welded studs, bolts, nuts and washers shall conform to the requirements in Section 55, “Steel Structures,” of the Standard Specifications and the section entitled “Steel Structures,” elsewhere in these special provisions.

Elastomeric pads shall conform to the requirements in Section 51-1.12H, "Elastomeric Bearing Pads," of the Standard Specifications and the section entitled “Elastomeric Bearing Pads,” elsewhere in these special provisions.

Elastomeric pads shall be bonded to steel plate washers with adhesive conforming to Federal Specification MMM-A-121.

Rapid setting concrete patches shall conform to the provisions in the section entitled "Rapid Setting Concrete Patches," elsewhere in these special provisions.

Where new metal surfaces of the joint assembly designated on the plans to be galvanized, galvanizing shall conform to the provisions in Sections 75-1.05, "Galvanizing," of the Standard Specifications.

When thread locking system is designated on the plan, the thread locking system shall conform to the requirements for thread locking system as specified in the section entitled “Miscellaneous Metal (Restrainer-Cable Type),” elsewhere in these special provisions.

At the Contractor's option, cleaning and painting of all new metal surfaces of the joint assembly, except stainless steel and anchorages embedded in concrete, may be substituted for galvanizing. Cleaning and painting shall be in accordance with the provisions in Sections 59-2, "Painting Structural Steel," and 91, "Paint," of the Standard Specifications and the following:

The surfaces to be cleaned and painted shall be dry blast cleaned in accordance with the provisions of Surface Preparation 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 not less than 1 1/2 mils as measured in accordance with ASTM Designation: D 4417.

All blast cleaned surfaces shall receive a single undercoat consisting of a waterborne inorganic zinc coating conforming to the provisions of AASHTO Designation M 300, Type II, except that the first 3 sentences of Section 4.7, "Primer Field Performance Requirement," and the entire Section 4.7.1 of the AASHTO Specification shall not apply. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory, (916) 227-7000.

The color of the inorganic zinc coating shall essentially match Federal Standard 595B No. 36373.

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to provisions of Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

Inorganic zinc coating shall not be applied when the atmospheric or surface temperature is less than 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, except the coating on contact surfaces of high-strength bolted connections may be applied in 1 application.

The total dry film thickness of all applications of inorganic zinc coating shall be not less than 4 mils or more than 8 mils, except that the total dry film thickness on contact surfaces of high-strength bolted connections shall be between one and 4 mils.

All 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 testing operations shall be determined by the Contractor. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to locate 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 no more than 6 locations per joint seal assembly in accordance with 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 cure will be checked by the Engineer. 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.

Finish coats will not be required on joint seal assemblies.

If the assembly consists of more than one component, the design of the assembly shall be such that the external components can be removed and reinstalled at any position, to permit the inspection of the internal components of the assembly.

Except for components in contact with the tires, the assembly and its components shall be designed to support the AASHTO HS20-44 loading with 100 percent impact. Each component in contact with the tires shall support a minimum of 80 percent of 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 maximum width of unsupported or yielding components or grooves in the roadway surface of the assembly, measured in the direction of vehicular traffic, shall be 3 inches.

The assembly shall have cast-in-place anchorage components forming a mechanical connection between the joint components and the existing concrete deck as shown on plans.

The bridge deck surface shall conform to the provisions in Section 51-1.17 "Finishing Bridge Deck," of the Standard Specifications prior to placing joint assemblies and anchorage.

The assembly shall be completely shop-assembled and 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 planned line and grade.

The maximum depth and width of the recess shall be such that the primary reinforcement to provide the necessary strength of the structural members is outside the recess. The maximum depth of the recess shall be as shown on plans. The maximum width of recess on each side of the expansion joint shall be as shown on plans.

The contract price paid per linear foot for seismic isolation joint assembly shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing the seismic joint assemblies, complete in place, including seismic isolation joint curb modification, rapid setting concrete patches and elastomeric bearing pads, as shown on the plans, as specified in these special provisions, and as directed by the Engineer

The contract price paid per linear foot for expansion joint assembly shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing the expansion joint assemblies, complete in place, including expansion joint curb modification, rapid setting concrete patches and elastomeric bearing pads, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

Full compensation for any additional materials or work required because of the application of the optional cleaning and painting shall be considered as included in the contract price paid per linear foot for the joint assembly involved, and no additional compensation will be allowed therefor.

10-1B.23 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 accordance 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 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.

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 any 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 any 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.

Retempering 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.

Modified high alumina based concrete and portland cement based concrete shall be cured in accordance 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, traffic shall not be permitted on the new concrete until at least one hour after final set.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the rapid setting concrete patches, including cleaning contact surfaces, 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 price paid per linear foot for the joint assembly involved, and no additional compensation will be allowed therefor.

10-1B.24 SEISMIC ISOLATION BEARINGS

Seismic isolation bearings shall be a lead core rubber bearing system, including sole plates, base plates and anchorage components. The seismic isolation bearings shall be designed, prototype tested, fabricated, proof tested and constructed as shown on the approved working drawings, the plans and as specified in these special provisions.

A lead core rubber bearing system shall be a elastomeric bearing system with a lead core(s). It shall consist of alternate layers of rubber and steel plates vulcanized together with one or more preformed hole(s) in the unit filled tight with a lead plug.

All seismic isolation bearings used in the work shall be from the same manufacturer.

The proposed seismic isolation bearing shall be selected from the following list:

SEISMIC ISOLATOR BEARING SYSTEMS	MANUFACTURER ADDRESS AND PHONE NUMBER
Lead Core/Rubber	DYNAMIC ISOLATION SYSTEM, INC. 3470 MT. DIABLO BLVD., SUITE A200 LAFAYETTE, CA 94549 Ph: (510) 283-1166 Fax: (510) 283-4307 SKELLERUP INDUSTRIES LTD. 124 MARSHALL STREET PRIVATE BAG 4736 CHRISTCHURCH, NEW ZEALAND Ph: 64-3-384-0471 Fax: 64-3-384- 0472 OILES CORPORATION KUBOTA & ASSOCIATES 106 STANLEY COURT HERCULES, CA. 94547 Ph: (510) 245-1234 Fax: (510) 245-1725

Attention is directed to the sections entitled “Order of Work,” and “Temporary Supports,” elsewhere in these special provisions.

Use of the seismic isolation bearings is contingent on approval of working drawings and successful completion of the seismic isolation prototype and proof tests. Development and approval of working drawings and any re-testing, if required, will be at the Contractor’s expense.

The seismic isolation bearings shall be compatible with the dimensional clearances and tolerances shown on the plans. Installation of the isolation bearings shall be compatible with the workspace shown on the plans. The Contractor shall determine the required steel plate thickness, subject to the dimensional constraints shown on the plans, concrete bearing pedestal height, bearing pedestal reinforcement and non-shrink grout pad thickness at each isolation bearing, and shall verify all dimensions required for installation of the seismic isolation bearings. The connecting plates and bolts shown on the plans shall be considered a minimum requirement. The Contractor shall check the connecting plate and bolts based on the isolator bearing system proposed for use and redesign the connecting plate and bolts, if necessary. In addition to varying plate, pedestal, and non-shrink grout pad shown on the plans, the bearing height, (H) as shown on the plans may be varied to accommodate installation. Installation of seismic isolator bearings shall not alter the final bridge profile grade.

WORKING DRAWINGS.--The Contractor shall submit complete working drawings for the seismic isolation bearings to the Engineer in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. For initial review, 6 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted for final approval and use during construction.

Working drawings shall be either 11" x 17" or 22" x 34" in size and each drawing and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Post mile. The manufacturer’s name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

The working drawings shall contain all information required for the proper manufacture and installation of the seismic isolation bearings, including details of connecting plates, adapter plates used for testing, concrete pedestals, grout pad thickness, and any required revisions or additions to new and existing structural steel, concrete reinforcement or other facilities. The working drawings shall be supplemented with a fully defined performance hysteresis loop and calculations for the particular bearing type. Each working drawing or calculation sheet shall be signed by an Engineer who is registered as a Civil Engineer in the State of California.

The working drawings and supplements as described below shall be submitted in 2 parts. The Contractor shall allow 6 weeks following the submittal of Part 1 for the Engineer’s review and approval. The Contractor shall not start

fabrication of prototype test specimens until the Engineer has reviewed and approved the submittal of Part 1. The Contractor shall allow 3 weeks following the submittal of Part 2 for the Engineer's review of the prototype test results. The Contractor shall not start proof testing until the Engineer has reviewed and approved the submittal of Part 2. The working drawings and supplements shall be submitted within the following time limits:

ITEMS	TIME LIMIT
PART 1: Working drawings,supplemental calculations, proof of 1 year satisfactory bearing system service, fabrication quality control program, descriptions of the prototype and bearing test programs. Draft maintenance and inspection manual(s)	Within ten weeks after contract approval.
PART 2: A certified copy of the results of all prototype tests. A full sized prototype specimen. Installation manual, inspection manual, and maintenance manuals	Within thirty weeks following approval of the seismic isolation bearing design and working drawings, and sufficiently in advance of the start of the work to allow time for review by the Engineer and correction by the Contractor of the working drawings and supplements without delaying the work.

Should the Engineer fail to review the complete working drawing 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 working drawing submittal, an extension of time commensurate with the delay in completion of the work thus caused will be granted in accordance with Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

PART 1: The working drawings shall contain all information required for the proper construction of the seismic isolation bearings, including any required revisions or additions to new and existing structural steel, concrete, reinforcement or other facilities to accommodate the seismic isolation bearings used in the work. The working drawings shall be supplemented with documentation of a fabrication quality control program and detailed descriptions of the prototype and proof bearing test programs. The working drawings shall list the components that will be permanently deformed during prototype or proof testing with calculations showing the anticipated stress in the components at each increment of the maximum lateral force or maximum lateral displacement. Each working drawing or calculation sheet shall be signed by an engineer who is registered as a Civil Engineer in the State of California. As a minimum, the fabrication quality control program procedures shall address the following items: incoming materials and storage; elastomer compound mixing; metals preparation; bearing build-up; and vulcanization. A draft copy of the maintenance and inspection manual shall be furnished to the Engineer.

PART 2: A certified copy of the results of all component material and bearing prototype tests, one full sized prototype bearing used for the prototype tests. An installation manual, an inspection manual, and maintenance manuals shall be furnished to the Engineer and shall supplement the working drawings.

Installation Manual - The Contractor shall submit 6 installation manuals for the seismic isolation bearings for review and approval by the Engineer prior to installation of the bearings. The installation manual shall include, but not be limited to, the following:

1. The method of installation of the isolators including installation sequence and setting diagrams.
2. The method of adjustment of the seismic isolation bearings for temperature changes as outlined in these Special Provisions.

3. Requirements for storage of the seismic isolation bearings and details of temporary support of the isolators for shipping and handling.

Inspection and Maintenance Manuals - The Contractor shall submit 6 inspection and maintenance manuals for the isolators for review and approval by the Engineer prior to completion of the project. The inspection and maintenance manual(s) shall include, but not be limited to, the following:

1. Inspection requirements for the isolation bearings, including the recommended frequency of inspection. The manual shall include the specific observations to be made, and the acceptable range of values.
2. Maintenance requirements for the bearings, including the recommended frequency of maintenance.
3. Contact and telephone number for maintenance questions.

Within 3 weeks after final working drawing approval, one set of good quality corrected prints on 60 pound (minimum) bond paper (22" x 34" in size) of all working drawings prepared by the Contractor for the seismic isolation bearings shall be furnished to the Engineer.

Working drawings shall include, but are not limited to, the following:

1. Information on space requirements for installation equipment.
2. Step-by-step procedure describing all aspects of seismic isolation bearing installation including materials specified for use in the seismic isolation bearing systems shall conform to the requirements in Section 55-3.19, "Bearings and Anchorages," of the Standard Specifications and these special provisions. When the Standard Specifications are not fully applicable, the section(s) shall be cited and the exceptions noted on the working drawings. If no applicable Standard Specification is available, ASTM or other industry standard specifications shall be referenced.
3. Full details of the seismic isolation bearing system, including material properties and dimensions of all bearing components.
4. Details for attaching the bearing system to the substructure, including grout, plates, anchor bolts, nuts, reinforced concrete pedestal heights and leveling procedure.
5. Details for attaching the bearing system to the superstructure, including all plates and fasteners.
6. Welding procedures and weldability analysis for all welded materials.
7. Non-shrink grout mix design(s).
8. Details of adapter plates needed for testing at SRMD.
9. Information on the initial vertical displacement and long-term vertical displacement under anticipated service loading, and design lateral displacement due to seismic loading.

Supplemental calculations to the working drawings shall include, but are not limited to, the following:

1. A proposed fully defined performance hysteresis loop for each bearing type.
2. Analysis using seismic isolation bearing design criteria shown on the plans, and elsewhere in these special provisions, for the design of the seismic isolation bearings. The analysis results shall include as a minimum, the anticipated energy dissipated per cycle (EDC) for each bearing, fully defined hysteresis loop for each bearing, initial bearing stiffness, bearing yield point, secondary bearing stiffness after yield, maximum design displacement, maximum design lateral force transmitted through each bearing, period of vibration, and anticipated maximum and minimum downward seismic bearing loads.
3. Complete calculations related to the design of seismic isolation bearing attachment to the substructure, including steel plate thickness, reinforced concrete pedestals, and non-shrink grout pad and fasteners. In addition, if modifications to the substructure are required to accommodate the seismic isolation bearing, the calculations shall verify the adequacy of existing or retrofit concrete adjacent to new anchor bolts.
4. Complete calculations related to the design of seismic isolation bearing attachment to the superstructure, including steel plate thickness and fasteners.

DESIGN REQUIREMENTS.--The isolation bearings shall comply with all applicable provisions of the American Association of State Highway and Transportation Officials (AASHTO) “Guide Specifications for Seismic Isolation Design,” June 1991. In the case of any conflict of requirements between the AASHTO Guide Specifications and this document, the requirements of these special provisions shall take precedence.

The seismic isolation bearings shall be designed by the Contractor to satisfy the seismic isolation bearing design criteria for the loading conditions, maximum lateral forcesand displacements, rotations, hysteretic behavior and performance criteria shown on the plans. The seismic isolation bearing design shall be confirmed by the certified

prototype test results for the bearings. In addition, if the plans or these special provisions indicate limiting parameters for a bearing system, the bearings shall conform to those parameters.

The seismic isolation bearings shall be capable of operating as specified for an ambient air temperature range of +25°F to +105°F. The seismic isolation bearings shall be designed to withstand any of the probable combinations of the following atmospheric elements: hail, smoke, ozone, rain, sleet, ice, fog, sunshine, sand, dust, and salt.

The steel laminates shall be covered at the sides of the bearing with a minimum thickness of 0.5-inch of the same elastomer as specified for the elastomeric bearing.

Stacking of individually laminated pads or cold bonding of individual laminated pads will not be permitted.

The ratio of bonded area to lead plug area in plan shall be equal to or greater than 9.0 for bearings type 1 and type 3, and equal to or greater than 7.3 for bearing type 2.

The minimum length, width or diameter of the part of the seismic isolation bearings that consists of alternate layers of rubber and steel plates vulcanized together (bonded dimension) shall be both:

1. greater than the height of the bearing.
2. greater than 1.5 times the maximum seismic lateral displacement shown on the plans.

The seismic isolation bearings shall have a minimum factor of safety of 3.0 against buckling under maximum dead plus live load at a lateral displacement of zero.

The seismic isolation bearings shall be stable at a lateral displacement equal to 1.2 times the maximum seismic lateral displacement shown on the plans under an axial load equal to the dead load plus seismic live load plus seismic overturning force shown on the plans.

A minimum overlap area (A_r) defined as the portion of the top bonded surface area overlapping the bottom bonded surface area when the bearing is displaced to the maximum lateral seismic displacement shown on the plans is required as follows:

1. For a compressive stress up to 1000 psi due to dead plus live load on the full bonded surface area (i.e. in the undeformed position), A_r must be greater than or equal to 25% of the full bonded surface area.
2. For a compressive stress greater than 1000 psi but not greater than 2000 psi due to dead plus live load on the full bonded surface area, A_r shall be equal to or greater than 50% of the full bonded surface area.
3. Compressive stresses above 2000 psi under dead plus live load are not permitted.

The shear strain of the elastomer in the bearings shall not exceed 175% at the maximum seismic lateral displacement (D_T) shown on the plans for the type 1 seismic isolation bearings, and 150% for the type 2 and type 3 seismic isolation bearings.

MATERIALS.--Top and bottom sole plates shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications except that galvanizing will not be required. At the Contractor's option, steel may conform to the requirements of ASTM Designation: A 570 or A 572.

Base plates shall conform to ASTM Designation: A709/A 709M, Grade 50.

The permissible tolerance in flatness for the base plates shall conform to Section 55-3.05 “Facing and Bearing Surfaces,” of the Standard Specifications.

The base plate shall be set level to a true level plane and shall not vary more than 1/16 inch from a straightedge placed in any direction across the area.

All new metal surfaces of the bearings exposed to the atmosphere in the completed work, except stainless steel and anchorages embedded in concrete, shall be cleaned and painted. Cleaning and painting shall be in accordance with the provisions in Sections 59-2, "Painting Structural Steel," and 91, "Paint," of the Standard Specifications and the section entitled “Clean and Paint Structural Steel,” elsewhere in these special provisions.

Finish coats will not be required on bearings.

Surfaces within the grip of high strength bolted connections shall be cleaned and painted before assembly in accordance with the requirements for bolted connections in "Steel Structures," of these special provisions.

Attachments of the seismic isolation bearing sole plate to the new truss shoe and the base plate shall be constructed as shown on the plans and shall conform to Section 55 “Steel Structures,” and the section entitled “Steel Structures,” elsewhere in these special provisions.

Non-shrink grout to be placed below base plates of the seismic isolation bearing shall conform to the requirements in the section entitled “Non-shrink Grout,” elsewhere in these special provisions.

The materials in the elastomeric bearings shall conform to the following requirements:

The alternate layers of rubber and steel plates vulcanized together shall conform to the provisions for steel-laminated elastomeric bearings in ASTM Designation D 4014. Elastomer shall be Type NR Grade 3, and the following:

TEST	ASTM TEST	REQUIRE-MENT
Tensile Strength [psi minimum]	D 412	2000
Elongation at Break (EB) [percent minimum]	D 412	500
Compression Set 22 hrs at 158 ^{o}F [percent maximum]	D 395 Method B	40
Rubber-to-Metal Tear Strength [lb/in minimum]	D 624 Die C	180
Ozone Resistance ozone partial pressure of 50 +/- 5 MPa, specimen at 20% strain, 100 hrs at 100 ^{o}F	specimen - D 518A test - D 1149	no cracks visible with a 7X lens

The nominal thickness for steel laminates shall be a minimum of 0.12-inch and shall not be galvanized.

The lead core shall be a minimum of 99 percent pure lead.

MANUFACTURING.—The Contractor shall notify the Engineer in writing at least 14 days prior to the start of the fabrication of the Seismic Isolation Bearings.

TESTING.—All seismic isolation bearings shall be prototype and proof tested to verify compliance with the physical parameters and energy requirements shown on the plans. All testing shall be performed at the "Seismic Response Modification Device Test System (SRMD)" on the University of California, San Diego campus, telephone (619) 534-4640. All prototype and proof testing will be paid for by the State, except for any re-testing. The ambient temperature of the testing facility and the test article shall be 70 degrees F. +/- 10 degrees for the duration of the test.

The Contractor shall notify the SRMD facility and Engineer, in writing, at least 21 days prior to the shipping of each type seismic isolation bearing(s) to be tested. All test shall be performed in the presence of the Engineer.

The Contractor shall coordinate with the SRMD facility for the design and manufacturing of the adapter plates to be used to attach the bearings to the test apparatus. After testing, all adapter plates will become the property of the State.

The Contractor shall coordinate the testing with the SRMD facility specifying the quantity of bearings needed at pre-set times to meet the construction schedules.

For each type of isolation bearing, the Contractor shall allow four weeks for the SRMD facility to perform the prototype testing.

For each bearing proof test, the Contractor shall allow one week for the SRMD facility to perform each proof test per device.

The hysteretic behavior of the specimens for the prototype and proof tests shall remain stable and the specimens shall show no signs of distress at all loading conditions. Anchorage components shall show no signs of distress.

Prototype and proof tested seismic isolation bearings shall be permanently marked on 2 of 4 sides; the markings shall consist of production lot number and serial number, bearing type, date of fabrication, design dead plus live load, self weight, maximum seismic lateral displacement (D_T), and contract number.

All prototype and proof tests shall be performed using continuous sinusoidal input at the period as shown on the plans for each device, or at a period as determined by the Engineer.

Unless otherwise determined by the Engineer, all testing shall follow the numerical sequences listed.

PROTOTYPE TESTING.--A complete series of prototype tests shall be performed on at least one full-sized specimen for each bearing type designated on the plans A complete series of prototype tests shall be performed on individual specimens. Prototype test specimens shall not be used in the finished work and shall become the property of the State.

A complete series of prototype tests shall be performed in each of 2 directions, which are at 0° and 90° relative to the primary axis of the seismic isolation bearings for circular bearings, and at 0°and 45° relative to the primary axis of the seismic isolation bearings for square bearings.

Prototype tests 1, 2 and 3 shall be performed on seismic isolation bearings at a vertical load equal to the dead load plus seismic live load shown on the plans. For all prototype tests and for each cycle of test, the time, axial load, axial displacement, shear force and shear displacement of the prototype specimen(s) shall be continuously recorded.

Prototype Test 1. Twenty fully reversed continuous sinusoidal cycles of loading at the maximum non-seismic lateral force shown on the plans.

Prototype Test 2. Four fully reversed continuous sinusoidal cycles of loading at each of the following increments of the maximum seismic lateral displacement (D_T) shown on the plans: 1.0, 0.25, 0.50, 0.75, and 1.0.

Prototype Test 3. Fifteen fully reversed continuous sinusoidal cycles of loading to a displacement equal to the maximum seismic lateral displacement(D_T) shown on the plans. The test shall be started from a displacement equal to the maximum thermal displacement as shown on the plans one hour after loading the device to the maximum thermal displacement.

Prototype Test 4. Three fully reversed continuous sinusoidal cycles of loading at 1.2 times the maximum seismic lateral displacement (D_T) shown on the plans at a vertical load of dead load plus seismic live load plus seismic overturning force shown on the plans. And, 3 fully reversed continuous sinusoidal cycles of loading at 1.2 times the maximum seismic lateral displacement (D_T) shown on the plans at a load case of dead load minus seismic overturning force as shown on the plans.

Prototype Test 5. Each prototype bearing shall be tested for vertical compression stiffness at the loads of 0.3 and 1.1 times the maximum dead load plus maximum live load combination at the minimum imposed rotation shown on the plans.

The prototype tests results shall satisfy the following criteria:

1. The displacement produced by the force specified in Prototype Test 1 shall be less than or equal to the maximum non-seismic displacement due to maximum non-seismic lateral force as shown on the plans.

2. The load-displacement plots of Prototype Tests 1, 2 3, and 4 shall have a positive incremental lateral stiffness (lateral load divided by displacement).

3. At each displacement increment specified in Prototype Test 2, there shall be less than ±10 percent change from the average value of effective stiffness (K_{eff}) of the given test specimen over the required last 3 cycles of test. The energy dissipated per cycle (EDC), for each cycle in Prototype Test 2 for the first series of testing at 1.0 times the maximum seismic lateral displacement (D_T) as shown on plans shall be equal to or greater than the value of EDC_{min} shown on the plans. The average K_{eff} for the last 3 cycles in Prototype Test 2 for the first series of testing at 1.0 times the maximum seismic displacement (D_T) as shown on plans shall be within 10% of the value of K_{eff} as shown on plans.

4. The energy dissipated per cycle (EDC) for each cycle of Prototype Test 3 shall be equal to or greater than 90% of the value of EDC_{min} shown on plans.

5. Prototype specimens shall remain stable and without splits, fractures or lack of rubber to steel bond under all loading and displacement conditions.

6. For Prototype Test 5, the measured vertical compression stiffness shall be equal to or greater than the minimum vertical compression stiffness value shown on the plans.

7. Bearings shall be inspected for uniformity of rubber layer thickness, lack of parallelism of the internal steel plates and surface cracking in accordance with ASTM D4014 Sections 9.1.3.1 and 9.1.3.2. Variations in the location of steel plates in excess of 1/8-inch shall be cause for rejection.

If a seismic isolation bearing that is prototype tested fails to meet any of the acceptance criteria for testing as determined by the Engineer, then that seismic isolation bearing will be rejected and the Contractor shall modify the design and submit revised working drawings including these modifications and prototype test another seismic isolation bearing. Seismic isolation bearing prototype testing operations shall not begin until the Engineer has approved the revised working drawings in writing. No extension of time or compensation will be made for modifying working drawings or supplemental calculations, for resubmittal and review of working drawings and supplemental calculations, for rejection of a seismic isolation bearing, and for designing and testing additional seismic isolation bearings.

After successful prototype testing, a full sized prototype specimen shall be used by the Contractor to deliver to the State as directed by the Engineer.

PROOF TESTING.--Prior to installation, all seismic isolation bearings shall be proof tested as follows:

Proof Test 1. Proof compression test: A one hour sustained proof load test on each production bearing shall be required. The compressive load for the test shall be 1.5 times the sum of maximum dead load plus maximum live load combination.

Proof Test 2. Proof vertical compression stiffness test: Each production bearing shall be tested for vertical compression stiffness at the load of 0.3 and 1.1 times the maximum dead load plus maximum live load combination at the minimum imposed rotation shown on the plans.

Proof Test 3. Proof combined compression and shear test: Each production bearings shall be tested at a vertical load of 1.0 times the total of dead load plus seismic live load shown on the plans and 4 full reversed continuous sinusoidal cycles of loading at 1.0 times the maximum seismic lateral displacement(D_T) shown on the plans. For each cycle of test, the time, axial load, axial displacement, shear force, shear displacement, and hysteretic behavior of the prototype specimen(s) shall be continuously recorded. Proof Test 3. shall be performed in each of 2 directions, which are at 0° and 90° relative to the primary axis of the seismic isolation bearings for circular bearings, and at 0°and 45° relative to the primary axis of the seismic isolation bearings for square bearings.

The proof tests results shall satisfy the following criteria:

1. Proof tested seismic isolation bearings shall remain stable and without splits, fractures or lack of rubber to steel bond at all loading conditions.
2. Bearings shall be inspected for uniformity of rubber layer thickness, lack of parallelism of the internal steel plates and surface cracking in accordance with ASTM D4014 Sections 9.1.3.1 and 9.1.3.2. Variations in the location of steel plates in excess of 1/8-inch shall be cause for rejection.
3. The measured vertical compression stiffness shall be equal to or greater than the minimum value shown on the plans.
4. The maximum lateral force at 1.0 times the maximum lateral displacement (D_T) shall be within ± 10 percent of the value F_{max} shown on the plans.
5. The averaged (K_{eff}) for the last 3 cycles shall be within 10% of the value of (K_{eff}) shown on the plans.
6. The energy dissipated per cycle (EDC) shall be equal to or greater than the value of EDC_{min} shown on the plans.

If a seismic isolation bearing that is proof tested fails to meet any of the acceptance criteria for testing as determined by the Engineer, then that seismic isolation bearing will be rejected. No extension of time or compensation will be made for re-testing additional seismic isolation bearings due to rejection of a seismic isolation bearing.

TEST SUBMITTALS.--At the completion of prototype or proof testing, and within fourteen days, the Contractor shall submit to the Engineer six (6) copies of the complete test results for the seismic isolation bearings tested. Data for each test shall list key personnel, test equipment, type of seismic isolation bearing, location of tests, complete record of load, displacement, hysteretic behavior and period of load application for each cycle of test. Tests results shall be certified correct and signed by the testing laboratory personnel who conducted the tests and interpreted the test results.

A qualified representative of the manufacturer shall be present during installation for the first of each type of seismic isolation bearing as shown on the plans, and shall be available for consultation during the remaining installations.

No seismic isolation bearing shall be installed until the Engineer has determined that the Contractor has successfully completed and has approved, in writing, the working drawings, the prototype testing and the proof testing for the seismic isolation bearing to be used.

Seismic isolation bearings shall be assembled at the factory and suitable temporary assembly ties shall be provided so that the entire assembly is shipped as a unit and remains intact when uncrated and installed. Seismic isolation bearings shall be delivered to the SRMD facility and to the job site in protective packaging for freight and handling purposes. Any damaged or scratched seismic isolation bearings shall be replaced by new seismic isolation bearings of the same type as determined by the Engineer. The manufacturer shall provide written handling, lifting and installation instructions for the seismic isolation devices.

The manufacturer shall provide the Engineer with a Certificate of Compliance in accordance with the provisions of Section 6-1.07, “Certificates of Compliance,” of the Standard Specifications. The certificate shall certify that the seismic isolation bearings conform to the pre-qualified design and material requirements, and were manufactured in accordance with the approved fabrication quality control program. The certification shall be supported by a copy of the results of all prototype and proof tests performed on the bearings and bearing materials.

MEASUREMENT AND PAYMENT.--Seismic isolation bearings will be measured and paid for by the unit as seismic isolation bearings. The quantity of seismic isolation bearings will be determined from actual count of the bearings in place in the completed work.

The contract unit price paid for seismic isolation bearings shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, shipment to and from the testing facility, storage of all seismic isolation bearings and for doing all the work involved in developing working drawings and calculations for designing, fabricating, furnishing, any re-testing, if required, and installing the seismic isolation bearings, complete in place, including having the manufacturer present during installation and available for consultation, top and bottom sole plates, base plates, mortar pads, drilling and bonding high strength threaded rods as anchorage into the existing piers, placing non-shrink grout below base plates, and the attachment of the seismic isolation bearings to the new truss shoes, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The cost of any special mounting plates or adapter plates to accommodate the SRMD test rig will be borne by the Contractor

Full compensation for modifications to the bridge structure or other existing facilities made necessary by the use of a particular seismic isolation bearing, shall be considered as included in the contract price paid per unit for seismic isolation bearings and no separate payment will be made therefor.

Full compensation for providing installation manual, inspection manual, and maintenance manuals shall be considered as included in the contract price paid per unit for seismic isolation bearings and no separate payment will be made therefor.

No payment will be made for seismic isolation bearings which fail to meet any of the acceptance criteria.

If a portion or all of seismic isolation bearings are manufactured at a site more than 100 miles from Sacramento additional shop inspection expenses will be sustained by the State. Payment to the Contractor for seismic isolation bearings will be reduced by $5,000 for each manufacturing site located more than 100 miles from Sacramento, or in the case of each manufacturing site located more than 1,000 miles from Sacramento, payment will be reduced by $8,000.

10-1B.25 NON-SHRINK GROUT

Non-shrink grout shall consist of portland cement, fine aggregate, water and admixture, and shall conform to the provisions in Section 50-1.09, “Bonding and Grouting,” of the Standard Specifications and these special provisions.

The grout will not be required to pass through a screen with a 0.07-inch maximum clear opening.

Fine aggregate shall conform to the provisions in Section 90-2. “Materials,” and Section 90-3, “Aggregate Gradings,” of the Standard Specifications.

The cement content of the grout shall not be less than 846 pounds per cubic yard of grout.

The non-shrink grout shall conform to the requirements of ASTM Designation: C1107, and the following requirements:

Property	Requirement	ASTM Test Designation
Shrinkage	0.0%	C 827
Expansion	0.0% min., 4.0% max.	C 827
3 day compressive strength	4000 psi. min.	C 109
28 day compressive strength	7000 psi. min.	C 109

Prepackage non-shrink grout materials may be used when approved in writing by the Engineer.

Prior using prepackage non-shrink grout material, the Contractor shall submit to the Engineer his proposed sources of the materials together with test data from an independent testing laboratory meeting the above requirements. A minimum of 45 pounds of the material shall be submitted to the Engineer for testing. The Contractor shall allow 45 days for the testing.

Cleaning the contact surfaces of existing concrete shall be accomplished by abrasive blast cleaning the concrete and any 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. Steel contact surfaces shall be cleaned by methods approved by the Engineer to remove all rust, paint, grease, or other foreign materials. Immediately prior to placing the non-shrink grout, the surfaces shall be recleaned by sweeping and pressure jetting, or by other approved means, as necessary to remove any debris which has accumulated during construction or after abrasive blast cleaning. The surface temperature of the areas to be covered shall be between 45° F. and 90° F. when the non-shrink grout is placed. Methods proposed to heat said surfaces are subject to approval by the Engineer. The condition of the concrete contact surface shall be saturated surface-dry when the non-shrink grout is placed.

Forms shall be nonabsorbent and shall conform to the requirements of Section 51-1.05, "Forms," of the Standard Specifications.

Non-shrink grout shall be cured in accordance with the requirements in Section 90-7.03, "Curing Structures," of the Standard Specifications.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing non-shrink gout, 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 price paid for the seismic isolation bearing involved, and no additional compensation will be allowed therefor.

10-1B.26 DRILL AND BOND ANCHOR BOLTS

Drilling and bonding anchor bolts 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.

High strength threaded rods shall conform to ASTM Designation: A354 Grade BD.

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. The rejected hole shall be repaired by the Contractor, at his expense, to the satisfaction of the Engineer.

Full compensation for furnishing all labor, materials, 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 high strength threaded rod, 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 unit price paid for the seismic isolation bearing, and no additional compensation will be allowed therefor.

10-1B.27 VISCOUS DAMPING DEVICES

Viscous damping devices consisting of viscous energy dissipating dampers, all with two end connection pins, shall be designed, prototype tested, fabricated, proof tested and constructed as shown on the approved working drawings, plans and as provided in these special provisions.

All viscous damping devices used in the work shall be from the same manufacturer.

Viscous damping devices will not be considered for approval unless it can meet one of the following prequalification requirements:

1. The viscous damping device manufacturer selected by the Contractor must be on the list of prequalified suppliers as determined by the California Department of Transportation. The list can be obtained from the toll bridge retrofit program duty senior at District 04 office, Tel (510) 286-5549, Fax: (510) 286-4563.
2. The viscous damping device manufacturer selected by the Contractor must have satisfactorily completed an independent testing program identical to the Caltrans large scale testing program at ETEC no later than 30 days before bid opening. Information on the type of testing required and documentation submittal requirements can be found in the document entitled “A Test Plan for the Characterization and Qualification of Highway Bridge Seismic Isolator and Damping Devices” dated February 23, 1995, and can be obtained from the toll bridge retrofit program duty senior at District 04 office, Tel (510) 286-5549, Fax: (510) 286-4563.

In addition to the above mentioned requirements, the viscous damping device will not be considered for approval unless it can be proven that the viscous damping device selected by the Contractor has had at least eighteen months of satisfactory in-situ service in a structure prior to the advertising date of the contract.

In addition to the above requirements, the manufacturer of the viscous damping devices shall provide to the State a 25 year warranty against defects in design, materials and workmanship.

Attention is directed to the sections entitled “Order of Work,” elsewhere in these special provisions.

Use of the viscous damping device is contingent on approval of working drawings and successful performance of the viscous damping device under prototype and proof testing. Development and approval of working drawings and re-testing, if required, will be at the Contractor’s expense.

Installation of the viscous damping devices shall be compatible with the dimensional clearances and tolerances shown on the plans.

WORKING DRAWINGS.--The Contractor shall submit complete working drawings for the viscous damping device to the Engineer in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. For initial review, 6 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted for final approval and use during construction.

Working drawings shall be either 11" x 17" or 22" x 34" in size and each drawing and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the

contract plans, and District-County-Route-Post mile. The manufacturer's name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

The working drawings shall contain all information required for the proper construction of the viscous damping devices, including any required revisions or additions to concrete, reinforcement, structural steel or other facilities. The working drawings shall be supplemented with a fabrication quality control program, detailed descriptions of the prototype and proof test programs, installation manual, inspection and maintenance manual, and a certified copy of the results of all prototype tests performed on the damping devices and device materials. The working drawings shall be supplemented with calculations for the device and supplemental restraint design for the particular installation. The working drawings shall include a list of all of the materials and components to be used in the damping device for which test results or certificates shall be supplied. The working drawings shall include a complete list of all ASTM or other standards that shall be adhered to in the fabrication of the damping device. If standards other than ASTM are used the Contractor shall submit a copy of those standards along with their ASTM equivalents. The working drawings shall list the components that will be permanently deformed during prototype or proof testing with calculations showing the anticipated stress in the components at each increment of the maximum axial force or maximum axial displacement. An engineer who is registered as a Civil or Mechanical Engineer in the State of California shall sign each working drawing or calculation sheet.

The working drawings and supplements shall be submitted in two parts. The Contractor shall allow 6 weeks following the submittal of Part 1 for the Engineer's review of the workings drawings and supplements. The Contractor shall not start fabrication of prototype test specimens until the Engineer has reviewed and approved the submittal of Part 1. The Contractor shall allow 3 weeks following the submittal of Part 2 for the Engineer's review and approval of the prototype test results. The Contractor shall not start proof testing until the Engineer has reviewed and approved the submittal of Part 2. The working drawings and supplements shall be submitted within the following time limits:

ITEMS	TIME LIMIT
PART 1: Working drawings, calculations for each viscous damping device design, proof of eighteen months satisfactory viscous damping device service and a fabrication quality control program. Draft installation, maintenance and inspection manual(s).	Within twelve weeks after contract approval.
PART 2: A certified copy of the results of all prototype tests, an installation manual, an inspection and a maintenance manual.	Within thirty-four weeks following approval of the viscous damping devices design and working drawings, and sufficiently in advance of the start of the work to allow time for review by the Engineer and correction by the Contractor of the working drawings and supplements without delaying the work.

Installation Manual - The Contractor shall submit 6 installation manuals for the dampers for review and approval by the Engineer prior to installation of the bearings. The installation manual shall include, but not be limited to, the following:

1. The method of installation of the dampers including installation sequence and setting diagrams.
2. The method of adjustment of the dampers for temperature changes as outlined in these Special Provisions, and for errors in positioning of the damper brackets.
3. Requirements for storage of the dampers and details of temporary support of the dampers for shipping and handling.

4. Temporary and permanent attachment of the dampers to the bridge; including the installation and securing in place of the pins connecting the dampers to the damper brackets shown on the plans.
5. The damping devices shall be designed and constructed so that installation, removal, or replacement if necessary, shall be a simple process not requiring any special tools or methods. The installation manual shall include a complete step-by-step procedure describing the installation and the removal or replacement of an existing damping device. A draft copy of this shall be included in the working drawings.

Inspection and Maintenance Manuals - The Contractor shall submit 6 inspection and maintenance manuals for the dampers for review and approval by the Engineer prior to completion of the project. The inspection and maintenance manual(s) shall include, but not be limited to, the following:

1. Complete step-by-step inspection procedures for the dampers, including the recommended frequency of inspection. The manual shall include the specific observations to be made, and the acceptable range of values.
2. Complete step-by-step maintenance requirements for the dampers, including the recommended frequency of maintenance.
3. Contact and telephone number for maintenance questions.
4. Complete instructions for checking fluid level and adding fluid to each type of damping device in-situ shall be submitted for approval with the working drawings.
5. The inspection and maintenance manual shall include a separate section detailing recommended post-earthquake inspection and maintenance. Complete instructions for installing replacement parts, if any, of the supplemental restraint shall be included, along with the material specifications, fabrication details and sources or suppliers for the replacement parts.

Within 3 weeks after working drawing approval, one set of the corrected good quality prints on 60 pound (minimum) bond paper (22" x 34" in size) of all working drawings prepared by the Contractor for viscous damping device shall be furnished to the Engineer.

Tests results shall be certified correct and signed by the testing laboratory personnel who conducted the tests and interpreted the test results.

Should the Engineer fail to review the complete working drawing 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 working drawing submittal, an extension of time commensurate with the delay in completion of the work thus caused will be granted in accordance with Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

DESIGN REQUIREMENTS.--

The design of the viscous damping devices shall conform to the following requirements:

The Contractor shall verify the connecting plate and pin layouts for bearing and block shear adequacy of the assembly based on the damper system proposed for use. The calculations shall consider out-of plane bending due to the spherical bearing assembly. Keeper devices shall be addressed along with items noted on the plans. Complete calculations showing the damping devices can satisfy these requirements shall be included in the working drawings.

The viscous damping devices shall be designed by the Contractor to satisfy the design criteria as shown on the plans. The certified prototype and proof test results for the damping devices shall confirm the performance of the viscous damping devices. In addition, if the plans or these special provisions indicate limiting parameters for a damping devices, the damping devices shall conform to those parameters.

The damping devices shall be designed for the total stroke length as shown on the plans plus 2 inches.

The damping devices shall be designed to provide for a length adjustment of ±0.25 inch. The manufacture shall ensure that it is possible to make static adjustments of the piston rod relative to the main cylinder of the damping device during installation. Slotted bolt holes shall not be used to provide said tolerance.

The end attachments of the damping device shall be designed to accommodate a minimum 5-degree transverse rotation without damage to the device. The damping devices shall be designed to operate under full loads within the articulated limits specified.

The overall dimensions of the damping devices shall not exceed the dimensional constraints as shown on the plans.

The damping devices shall be capable of operating as specified for an ambient air temperature range of +20°F to +105°F. The damping devices shall be designed to withstand any of the probable combinations of the following atmospheric elements: hail, smoke, ozone, rain, sleet, ice, fog, sunshine, sand, dust, and salt.

The damping devices shall be capable of resisting at least two times their own weight applied laterally in the fully extended position. Complete calculations showing the damping devices can satisfy this requirement shall be included in the working drawings.

The damping devices shall be capable of resisting at least 1.2 times their designated force axially in both the fully extended and fully compressed positions. Complete calculations showing the damping devices can satisfy this requirement shall be included in the working drawings.

The damping devices shall be designed to withstand 150 percent of the internal pressure developed in the damping device at the design velocity shown on the plans.

The damping devices shall be designed to accommodate a dynamic leakage level that in no way will effect their performance. Under non-operating conditions, static seals shall not leak externally.

Non fluid filled cavities of the damping devices shall be sealed against external contamination and moisture. The exposed length of piston rod shall be protected from contamination at all times and at any position within the damper.

The design of the viscous damping devices at Pier 19 shall conform to the following additional requirements:

A mechanical restraint shall be provided on each truss chord for each group of four dampers and it shall be designed to withstand the fuse force (F_{fuse}) within the maximum allowable fuse displacement (D_{fuse}) as shown on plans. The (F_{fuse}) load shall be distributed equivalently and simultaneously to each damper or provide a supplemental bracket that will fuse in such a manner not to cause instability to the system of four dampers or to an individual damper. The fuse force shall be 275 kips per damper. The mechanical restraint shall shear within +/- 10% of (F_{fuse}). The portion of (F_{fuse}) distributed to each damper shall vary by no more than +/- 10% for each device. At the moment of shearing of the mechanical restraint, only the viscous force shall be acting. No friction restraints shall be allowed. Complete calculations showing the mechanical restraint can satisfy this requirement shall be included in the working drawings.

The design of the two end connection pins shall be in accordance with the AASHTO LRFD Bridge Design Specifications. Complete calculations showing the pins can satisfy this requirement shall be included in the working drawings.

MATERIALS.--All materials used in the manufacture of the damping device unit shall be subject to the Engineer's approval. The manufacturer shall be required to substantiate the suitability of materials by furnishing samples or certified test data or both for all materials so designated on the approved work drawings.

Unless suitably protected against electrolytic corrosion, dissimilar materials as defined in MIL-STD-889B shall not be used in contact with each other. Dissimilar metal joints shall not be permitted without a non-metallic separator or gasket of at least 0.1 inch thickness. The use of aluminum, aluminum alloys, magnesium alloys, and beryllium alloys is prohibited.

All materials and components of the damping devices subject to deterioration or corrosion when exposed to the environment shall be protected by means of protective coating acceptable for the application. These methods shall include, but not be limited to, coating, plating and painting. The use of any protective coating that will crack, chip or scale with age shall not be permitted.

All castings shall conform to the provisions in ASTM Designation: A747 except for parts such as covers, handles, and similar items, whose failure would not affect the structural integrity or performance characteristics of the damping device. Castings for covers, handles and similar items shall conform to the provisions in ASTM Designation: A27, Class 2.

If the manufacturer selects painting, all new metal surfaces of the damping devices exposed to the atmosphere in the completed work, except stainless and galvanized steel, shall be cleaned and painted. Cleaning and painting shall be in accordance with the provisions in Sections 59-2, "Painting Structural Steel," and 91, "Paint," of the Standard Specifications and the section entitled "Clean and Paint Structural Steel," elsewhere in these special provisions.

Surfaces within the grip of high strength bolted connections shall be cleaned and painted before assembly in accordance with the requirements for bolted connections in "Steel Structures," of these special provisions.

Only those materials that are non-nutrient to fungus shall be used in the dampers.

Pressure boundary structural welds are not permitted. All welds shall conform to AWS D1.5. Weld joints shall be of the AWS D1.5 pre-qualified type. Weld filler metal shall be of the low-hydrogen type.

Operating fluid used in the dampers shall be non-toxic, non-flammable, and cosmetically inert silicone in accordance with the provisions in Federal Specification: VV-D-1078 (B). Petrochemical fluids shall not be used.

All non-metallic packing, seals, wipers or gaskets shall be manufactured from non-age sensitive materials.

Base metal for piston rods shall be stainless steel.

MANUFACTURING.-- The Contractor shall notify the Engineer, in writing, at least 14 days prior to the start of damping device fabrication.

TESTING.--The prototype and proof damping device tests shall consist of continuous cyclic dynamic tests. All viscous dampers shall be prototype and proof tested to verify compliance with the physical parameters and energy

requirements shown on the plans. All testing, except as provided for elsewhere in these special provisions, shall be performed at the "Seismic Response Modification Device Test System (SRMD)" on the University of California, San Diego campus, telephone (619) 534-4640. The ambient temperature of the testing facility and the test article shall be 70 degrees F +/- 10 degrees at the start of the test.

The Contractor shall notify the SRMD facility and the Engineer, in writing at least 21 days prior to shipment of each type of viscous damping device to be tested. All tests shall be performed in the presence of the Engineer.

The Contractor shall coordinate with the SRMD facility for the design and manufacturing of the adapter brackets to be used to attach the dampers to the test apparatus. After testing, all adapter brackets will become the property of the State.

The Contractor shall coordinate the testing with the SRMD facility specifying the quantity of dampers needed at pre-set times to meet the construction schedules.

For each cycle of test the load, displacement, temperature and hysteretic behavior of the prototype specimen shall be continuously recorded. The temperature of the dampers shall be monitored continuously for all tests. The dampers shall be monitored at a minimum of two locations which best represent the internal fluid temperature. Monitoring shall begin a minimum of 2 minutes prior to testing and shall continue a minimum of 15 minutes after testing, or as determined by the Engineer.

For each viscous damper required, the Contractor shall allow 3 weeks for the SRMD facility to perform the prototype testing.

For each viscous damper proof test, the Contractor shall allow 5 days for the SRMD facility to perform each proof test per device.

The hysteretic behavior of the specimens for the prototype and proof tests shall remain stable and the specimens shall show no signs of distress at all loading conditions.

Viscous dampers shall perform within the criteria shown on the plans and as specified elsewhere in these special provisions in both compression and tension.

All devices of the same type shall display dynamic characteristics within 5% of each other for both the Prototype and Proof Test devices.

Any breakaway or yielding wind-resistant components that are permanently deformed during testing shall be replaced with identical components before the damping device is installed in the structure.

The prototype specimens shall include any breakaway components, if these are to be used as part of the damping device system. Where a supplemental restraint is required, this test shall be performed on a damper complete with the restraint mechanism unless otherwise determined by the Engineer.

All prototype and proof tested damping devices shall be permanently marked on one (1) side. The markings shall consist of production lot number, serial number, date of fabrication, damping device design force, design rated velocity, range of stroke, self weight and contract number.

Unless otherwise determined by the Engineer, all testing shall follow the numerical sequences listed.

PROTOTYPE TESTS.-- For each viscous damper type shown on the plans, two full-scale prototype dampers shall be manufactured and tested in accordance with these special provisions. A complete series of prototype tests shall be performed on individual specimen.

The prototype tests shall be performed on damping devices as follows:

Prototype Test 1. One fully reversed cycles at slow speed from zero displacement to maximum displacement in compression, then to the maximum displacement in tension, and then back to zero displacement.

Prototype Test 2. Five continuous fully reversed cycles of sinusoidal loading to achieve peak velocity and reach the value of test displacement at each of the following increments of the design rated velocity: 0.25, 0.50, 0.75, and 1.0. The minimum value of test displacement shall be plus and minus 12.0 inches.

Prototype Test 3. Three continuous fully reversed cycles of sinusoidal loading through the full stroke of the damping device, and to achieve the peak velocity at the design rated velocity as shown on the plans.

Prototype Test 4. Two prototype dampers(225 Kips) tested shall be tested continuously for wind loads with a +/- 2 inch stroke at a 2.5 second period for 200 sinusoidal cycles. Tests may be terminated when the temperature of the damper has reached the manufacturer's maximum recommended temperature and the device will be rejected.

The prototype test results shall satisfy the following conditions:

The displacement capacity results from Prototype Test 1 shall be greater than or equal to the total stroke as shown on the plans.

All resisting force (F) values from Prototype Test 2 shall be within +/-8% of the "Design Criteria" formulae shown on the plans for the first cycle for each increment of the design rated velocity.

The value of all resisting force (F) values from Prototype Test 2 for each increment of the design rated velocity, and each of the last four cycles shall be within 15% of the "Design Criteria" formula shown on the plans.

For the first 1.0 times the design rated velocity cycle in Prototype Test 2, and for the first cycle in Prototype Test 3, the value of energy dissipated per cycle (EDC) shall not be less than the EDC_{min} value shown on the plans.

Damper test results shall display a first cycle peak resisting force for Test 3 within +/- 8% of the "designated force" as shown on the plans. The peak force from the third cycle shall not drop more than 15% from the peak force of the first cycle for Test 3.

There shall be no visible leakage or signs of physical deterioration, in the judgment of the Engineer, observed during or after these Prototype Tests.

The Contractor may incorporate the prototype damper into the structure at the approval of the Engineer.

If a viscous damping device that is prototype tested fails to meet any of the acceptance criteria for testing, as determined by the Engineer, then that viscous damping device will be rejected and the Contractor shall modify the design and submit revised working drawings including these modifications and prototype test another viscous damping device. Viscous damping device prototype testing operations shall not begin until the Engineer has approved the revised working drawings in writing. No extension of time or compensation will be made for modifying working drawings or supplemental calculations, for resubmittal and review of working drawings and supplemental calculations, for rejection of a viscous damping device, and for designing and testing additional viscous damping devices.

PROOF (PRODUCTION) TESTS.--Prior to installation, each damping device shall be proof tested in the presence of the Engineer, as follows:

Proof Test 1. Proof Pressure Test. An internal pressure equal to 125 percent of the operating pressure at the design rated velocity shall be applied to each damping device and maintained for a minimum of 120 seconds without a pressure drop. Proof Test 1. Will be performed by the manufacturer at their facility prior to shipment.

Proof Test 2. Stroke Verification Test. One fully reversed cycle at slow speed from zero displacement to maximum displacement in compression, then to the maximum displacement in tension, and then back to zero displacement.

Proof Test 3. Full Velocity and Stroke Test. Three continuous fully reversed cycles of sinusoidal loading through the total stroke of the damping device, and to achieve peak design velocity at the design rated velocity as shown on the plans

The proof test results shall satisfy the following conditions:

There shall be no visible leakage or signs of physical deterioration, in the judgment of the Engineer, observed during or after these Proof tests.

The displacement capacity results from Proof Test 2 shall be greater than or equal to the total stroke shown on the plans.

Damper test results shall display a first cycle peak resisting force for Proof Test 3 within +/-8% of the "Designed Force" as shown on the plans. The peak force from the third cycle shall not drop more than 15% from the peak force of the first cycle for Proof Test 3.

For the first cycle in Proof Test 3, the value of Energy Dissipated per Cycle (EDC) shall not be less than the EDC_{min} value shown on the plans.

If a proof test damping device fails to comply with these specifications, it shall be rejected and replaced, at no cost to the State.

If a viscous damping device that is proof tested fails to meet any of the acceptance criteria for testing as determined by the Engineer, then that viscous damping device will be rejected. No extension of time or compensation will be made for re-testing additional viscous damping devices due to rejection of a viscous damping device.

TEST SUBMITTALS.--Within fourteen days of the completion of the prototype test program and the proof test program, the Contractor shall submit to the Engineer 6 copies of the complete test results for the damping devices tested. Data for each test shall list key personnel, test loading equipment, type of damping device, location of test, and a complete record of axial load and axial displacement, temperature and velocity for each cycle of each test.

Tests results shall be certified correct and signed by the testing laboratory personnel who conducted the tests and interpreted the test results.

No viscous damping devices shall be installed until the Engineer has determined that the Contractor has successfully completed and has approved, in writing, the working drawings, the prototype testing and the proof testing for the viscous damping devices to be used.

Damping devices shall be delivered to the SRMD facility and to the job site in protective packaging for freight and handling purposes. New damping devices of the same type as determined by the Engineer shall replace any damaged or scratched damping devices. The manufacturer shall provide written handling, lifting and installation instructions for the damping devices.

The Contractor shall have a qualified representative of the manufacturer present during installation of the first two viscous damping devices (225 Kips), and the first two viscous damping devices (Pier 19), and shall have the representative available for consultation during the remaining installations.

The manufacturer shall provide the Engineer with a Certificate of Compliance in accordance with the provisions of Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall certify that the damping devices conform to the pre-qualified design and material requirements, and were manufactured in accordance with the approved fabrication quality control program. The certification shall be supported by a copy of the results of all prototype and proof (production) tests performed on the damping devices and device materials.

MEASUREMENT AND PAYMENT

Viscous damping devices will be measured and paid for by the unit. The quantity of viscous damping devices will be determined from actual count in place in the completed work.

The contract unit price paid for viscous damping device shall include full compensation for furnishing all labor, materials (including pins and spherical bearings), tools (including devices needed to connect the damper brackets as shown on the plans), equipment and incidentals, and for doing all the work involved in constructing the viscous damping device complete in place, including the shipment to and from the test facility, storage of the viscous damping device, developing working drawings and calculations for designing and fabricating, furnishing re-tests, if required and providing a qualified representative of the manufacturer for consultation, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for any breakaway or yielding/restraining components required, and modifications to the structure or other facilities made necessary by the use of a particular damper, shall be considered as included in the contract unit price paid for the viscous damping device involved and no additional compensation will be allowed therefore.

Full compensation for providing installation manual, inspection manual, and maintenance manuals shall be considered as included in the contract unit prices paid for various viscous damping device items and no additional compensation will be allowed therefore.

The cost of any special mounting brackets to accommodate the SRMD test rig will be borne by the Contractor.

The Contractor shall be responsible for all costs associated with manufacturing, shipping, storing and testing. If any re-testing is required, payment to the Contractor for the viscous damping device involved shall be reduced by $5,400 for any prototype re-tested, and by $1,800 for each proof re-tested.

Full compensation for modifications to the bridge structure or other existing facilities made necessary by the use of a particular viscous damping device shall be considered as included in the contract unit price paid for viscous damping device involved and no additional compensation will be allowed therefore.

No payment will be made for viscous damping devices that fail to meet any of the acceptance criteria.

If a portion or all of the viscous damping devices are manufactured more than 100 miles from Sacramento, additional shop inspection expenses will be sustained by the State. Payment to the Contractor for viscous damping device will be reduced $5,000 for each manufacturing facility located more than 100 miles from Sacramento, California or, in the case of each manufacturing facility located more than 1,000 miles from Sacramento, California, payment will be reduced $9,000.

10-1B.28 CLEAN CONCRETE

Surfaces of existing concrete shafts and diaphragms shall be cleaned of marine growth and other deleterious material prior to the installation of steel shaft casings and precast concrete shaft jackets. The work to be performed shall be in conformance with these special provisions and as directed by the Engineer.

Acceptable methods for cleaning may include hand cleaning, and light blast cleaning for above water areas and high pressure water blasting for under water areas, a combination of these methods, or other methods approved by the Engineer.

Hand Cleaning. - Wire brushes, either hand or powered, power grinders, or sandpaper shall be used to remove smoke, soot, oil, and deleterious material not firmly bonded to the concrete surfaces.

Light Blast Cleaning. - Abrasives used for blast cleaning shall be either clean dry sand or mineral grit, at the option of the Contractor, and shall be of a grading suitable to produce satisfactory results. The use of other abrasives will not be permitted unless authorized in writing by the Engineer. Unwashed beach sand containing salt or excessive amounts of silt will not be allowed.

High pressure water blasting - Water pressure from high pressure water blasting methods shall not exceed 10,000 psi as measured from the tip of the spray delivery instrument. The minimum distance between the tip of the spray delivery instrument and the surface to be cleaned shall be three inches. The minimum angle of water delivery of the spray tip device shall be 25 degrees. The maximum consumption rate of the high pressure water blasting shall be two and a half gallons of water per minute.

Concrete surfaces to be blast cleaned shall be cleaned by light whip blast.

Attention is directed to the regulations for abrasive blasting operations adopted by the State Air Resources Board, Subchapter 6 in Chapter 1, of Part III of Title 17, California Code of Regulations.

When blast cleaning is being performed near machinery, all journals, motors and moving parts shall be sealed against entry of abrasive dust before blast cleaning begins.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in cleaning concrete shall be considered as included in the contract prices paid for the items of work involved and no separate payment will be made therefor.

10-1B.29 REINFORCEMENT

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

Attention is directed to "Welding Quality Control" elsewhere in these special provisions.

The first paragraph of Section 52-1.02A, "Bar Reinforcement," of the Standard Specifications is amended as follows:

Reinforcing bars shall be low-alloy steel deformed bars conforming to the specifications of ASTM Designation: A 706/A 706M, except that deformed or plain billet-steel bars conforming to 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 52-1.02D, "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 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. One mechanical lap splice unit per splice shall be used.

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. All 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 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 replaced with the following:

52-1.08B Butt Welded Splices.—All 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.

Only the joint details and dimensions as shown in Figure 3.2, “Direct Butt Joints,” of AWS D1.4-92, 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 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.

All 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:

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 replaced with the following:

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 replaced with the following:

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 lab. 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 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 with the deformation pattern 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 replaced with the following:

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.

All 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 three 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. Development on the jobsite 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.

10-1B.30 EPOXY-COATED REINFORCEMENT

Epoxy-coated reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

Section 52-1.02B, "Epoxy-coated Bar Reinforcement," of the Standard Specifications is replaced with the following:

52-1.02B Epoxy-coated Prefabricated Reinforcement.—Bar reinforcement to be epoxy-coated shall conform to the ASTM Designation and grade required or permitted by Section 52-1.02A, "Bar Reinforcement," for the location or type of structure involved. The coated bar reinforcement shall conform to the provisions of ASTM Designation: A 934/A 934M except as provided herein.

Wire reinforcement to be epoxy-coated shall conform to the ASTM Designation and grade required or permitted by Section 52-1.02D, "Reinforcing Wire and Plain Bars," for the location or type of structure involved. The coated wire reinforcement shall conform to the provisions for Class A, Type 2 coating of ASTM Designation: A 884/A 884M except as provided herein.

Appendices X1 and X2, "Guidelines For Job-Site Practices," of ASTM Designation: A 884/A 884M and A 934/A 934M, respectively, shall apply except as provided herein. The term "shall" shall replace the term "should" in these appendices. Section X1.2 of Appendix X1 and Section X2.2 of Appendix X2 shall not apply.

All coatings shall be purple or gray in color.

Except for field welding of butt splices, all welding of reinforcement shall be complete prior to epoxy coating the reinforcement.

Bending of epoxy-coated reinforcement after the coating has been applied will not be allowed.

When any portion of a reinforcing bar or wire requires epoxy coating, the entire bar or wire shall be coated; except, when the bar or wire is spliced outside of the limits of epoxy coating shown on the plans, epoxy coating will not be required on the portion of bar or wire beyond the splice.

Within areas where epoxy-coated reinforcement is required, tie wire and bar chairs or other metallic devices used to secure or support the reinforcement shall be plastic-coated or epoxy-coated to prevent corrosion of the devices or damage to the coated reinforcement.

Prior to coating, the Contractor shall furnish to the Transportation Laboratory a representative 4-ounce sample from each batch of epoxy coating material to be used. Each sample shall be packaged in an airtight container identified with the manufacturer's name and batch number.

Two 30-inch long samples of coated bar or wire reinforcement from each size and from each load shipped to the jobsite shall be furnished to the Engineer for testing. These samples shall be representative of the material furnished. These samples, as well as any additional random samples taken by the Engineer, may be tested for specification compliance. Additional sampling, and all tests performed by the Engineer, may be performed at any location deemed appropriate by the Engineer. Failure of any sample to meet the requirements of the specifications will be cause for rejection.

If any bar tested for coating thickness or for adhesion of coating fails to meet the requirements for coated bars in Section 9 of ASTM Designation: A 934/A 934M, 2 retests on random samples taken from bars represented by the failed test will be conducted for each failed test. If the results of both retests meet the specified requirements, the coated bars represented by the samples may be certified as meeting the test requirements.

If any wire reinforcement tested for coating thickness or for flexibility fails to meet the requirements for coated wire in Section 8 of ASTM Designation: A 884/A 884M, 2 retests on random samples taken from wire represented by the failed test will be conducted for each failed test. If the results of both retests meet the specified requirements, the coated wire represented by the samples may be certified as meeting the test requirements.

Epoxy-coated reinforcement shall be covered with an opaque polyethylene sheeting or other suitable protective material to protect the reinforcement from exposure to sunlight, salt spray and weather. For stacked bundles, the protective covering shall be draped around the perimeter of the stack. The covering shall be adequately secured; however, it should allow for air circulation around the reinforcement to prevent condensation under the covering. Epoxy-coated reinforcement shall not be stored within 1000 feet of ocean or tidal water for more than 2 months.

All visible damage to coatings caused by shipping, handling or installation shall be repaired as required for repairing coating damaged prior to shipment as specified in ASTM Designation: A 934/A 934M for bar reinforcement or ASTM Designation: A 884/A 884M for wire reinforcement. When the extent of coating damage prior to repair exceeds 2 percent of the bar or wire surface area in any one foot length, repair of the bar or wire will not be allowed and the coated bar or wire will be rejected.

The patching material and process shall be suitable for field application. The patching material shall be prequalified as required for the coating material and shall be either identified on the container as a material compatible with the reinforcement coating, or shall be accompanied by a Certificate of Compliance certifying that the material is

compatible with the reinforcement coating. Damaged areas shall be patched in accordance with the patching material manufacturer's recommendations.

Except for lap splices, all splices for epoxy-coated reinforcement shall be coated with a corrosion protection covering that is on the Department's list of approved products. The covering shall be installed in accordance with the manufacturer's recommendations and as directed by the Engineer. The list is available from the Office of Materials Engineering and Testing Services, 5900 Folsom Boulevard, Sacramento, CA 95819, telephone (916) 227-7000.

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

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," shall be furnished for each shipment of epoxy-coated bar or wire reinforcement certifying that the coated bars or wire conform to the requirements of ASTM Designation: A 934/A 934M for bars or A 884/A 884M for wire and Section 52-1.02B, "Epoxy-coated Bar Reinforcement." Said Certificate of Compliance shall include all the certifications specified in ASTM Designation: A 934/A 934M for bars or ASTM Designation: A 884/A 884M for wire and a statement that the coating material has been prequalified by acceptance testing performed by the Valley Forge Laboratories, Inc., Devon, Pennsylvania.

All bar reinforcement shall be epoxy coated with the exception of the precast concrete panel and portion of the bar reinforcement in the cast-in-drilled hole concrete pilings as shown on the plans.

Rusted or corroded existing reinforcing steel shall be sandblasted clean, butt welded to new reinforcing steel if applicable, then epoxy coated including portion of the new bar where epoxy coating is damaged during welding operations. If mechanical butt splicing of existing reinforcing steel to new epoxy coated rebar is used, the existing reinforcing steel shall be sandblasted clean and epoxy coated prior to mechanical butt splicing.

MEASUREMENT AND PAYMENT.--Measurement and payment for reinforcement in structures shall conform to the provisions in Sections 52-1.10, "Measurement," and 52-1.11, "Payment," of the Standard Specifications and these special provisions.

Full compensation for the Contractor's Quality Control Manager, Quality Control Plan, daily production log, and developing, modifying and fulfilling the requirements of the Quality Control Plan, shall be considered as included in the contract price paid per pound for the types and classes of bar reinforcing steel shown on the plans and no additional compensation will be allowed therefore.

Full compensation for sandblasting clean rusted or corroded existing reinforcing steel, butt welding or mechanical butt splicing of new epoxy coated bar reinforcement to existing reinforcing steel, and epoxy coating cleaned and welded portions of the existing reinforcing steel shall be considered as included in the contract price paid per pound for bar reinforcing steel (epoxy coated) and no separate payment will be made therefor.

10-1B.31 WELDED HEADED BAR REINFORCEMENT

Welded headed bar reinforcement, consisting of furnishing and friction welding heads onto one or both ends of bar reinforcement, shall conform to the details shown on the plans, the provisions of Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

GENERAL.--Prior to performing any manufacturing, the Contractor shall submit to the Engineer the manufacturer's Quality Control Manual (QCM) for the fabrication of welded headed bar reinforcement. As a minimum, the manual shall include the following:

1) The pre-production procedures for the qualification of materials and equipment;
2) The methods and frequencies for performing all quality control procedures during production;
3) The calibration procedures and calibration frequency for all equipment;
4) A system for the identification and tracking of all welds. The system shall have provisions for permanently identifying each weld and the parameters used to perform it;
5) The welding procedure specification (WPS); and
6) A system for marking welded headed bar reinforcement.

A daily production log for the manufacture of welded headed bar reinforcement shall be kept by the manufacturer for each day of production. The log shall clearly indicate the production lot numbers, the heats of bar material and head material used in the manufacture of each production lot, the number of bars in each production lot, welding records, including tracking and production parameters for all welds, and results of all tests performed. A test report shall be furnished by the manufacturer containing, on a per heat basis, the chemical analysis of the bar and of the head material,

including all elements represented in the carbon equivalent formula in ASTM Designation: A 706, in addition to phosphorus and sulfur.

A production lot of welded headed bar reinforcement is defined as 150 reinforcing bars, or fraction thereof, of the same bar size, with welded heads produced from bar material of a single heat number and head material of a single heat number. A new production lot shall be started if the heat number of either the bar material or the head material changes before the maximum production lot size of 150 is reached.

The daily production log shall be submitted in writing to the Engineer within 7 calendar days following the manufacture of any welded headed bar reinforcement.

The manufacturer shall furnish certificates of compliance to the Engineer in accordance with the provisions in Section 6-1.07, "Certificates of Compliance," for all material used in the manufacture of welded headed bar reinforcement.

MATERIALS AND MANUFACTURE.–All bar reinforcement to be used in the fabrication of welded headed bar reinforcement shall conform to "Reinforcement" elsewhere in these special provisions.

Heads to be used in the fabrication of welded headed bar reinforcement shall be forge formed or cut from plate into a round, elliptical, or rectangular shape. The chemical composition of the heads shall conform to the requirements in ASTM Designation: A 29, A 36, A 108 Grade 1018, A 304, A 572, or A 706. Forging of heads shall conform to the requirements in ASTM Designation: A 788. Heads cut from plate shall conform to the provisions of Section 55, "Steel Structures," of the Standard Specifications.

Welding, welder qualifications, and inspection of welding shall conform to the requirements for friction welding in ANSI/AWS C6.1.

All welding shall be performed at an established and permanent fabrication facility.

All equipment used to perform friction welding shall be fitted with an effective in-process monitoring system to record essential production parameters that describe the process of welding the head onto the bar reinforcement. As a minimum, the parameters to be recorded shall include friction welding force, forge force, rotational speed, friction upset distance and time, forge upset distance and time, and other elements of the production process. The data from this in-process monitoring shall be recorded and preserved by the manufacturer and shall be provided to the Engineer upon request.

Heads shall be formed or cut from properly identified heats of mold cast or strand cast steel using the open-hearth, basic oxygen or electric-furnace process. Nominal head dimensions to be used for standard bar sizes shall conform to the following:

Nominal Head Dimensions			
Standard Bar Designation No.	Min. thickness in.	Min. cross-sectional area in.^{2}	Min. width in
3	0.375	1.1	0.75
4	0.4375	2.0	0.87
5	0.500	3.1	1.00
6	0.5625	4.4	1.38
7	0.625	6.0	1.46
8	0.625	7.9	1.57
9	0.6875	10.0	1.69
10	0.750	12.7	2.00
11	0.8125	15.0	2.17
14	1.250	22.5	2.56
18	1.625	40.0	3.15
Notes: (1) These head dimensions are based on concrete compressive strength of 4300 psi. (2) The head thickness shall be measured parallel to the reinforcing bar longitudinal axis, and the head width shall be measured perpendicular to the reinforcing bar axis. (3) The cross-sectional area of the head shall be the projected area measured perpendicular to the axis of the bar.			

The Contractor may request, in writing, to use alternative head dimensions to those specified herein. The alternative head dimensions shall be designed using the concrete compressive strength shown on the plans. Alternative head dimensions will not be considered for approval unless it can be proven by the Contractor that the alternative heads have been successfully produced and have had at least 2 years of satisfactory service in conditions similar to this application.

The Contractor shall furnish, at the Contractor's expense, documentation satisfactory to the Engineer that the alternative head dimensions are suitable for the intended application. The documentation shall include, but not be limited to, calculations and test reports showing the following:

1) The alternative head is capable of resisting the nominal tensile strength of the reinforcing bar when the bar reinforcement with welded head is embedded in concrete; and
2) Shear or bending forces do not cause premature failure of the alternative head or crushing failure of the concrete under the alternative head.

Quality Control (QC) is the responsibility of the Contractor. As a minimum, the Contractor shall perform inspection and testing prior to welding, during welding and after welding and as necessary to ensure that materials and workmanship conform to the requirements of the specifications.

All equipment and materials for performing all pre-production and production testing shall be furnished by the Contractor at the Contractor's expense. All testing shall be 1) performed at the manufacturer's plant or at an approved laboratory, 2) performed in the presence of the Engineer, unless otherwise directed in writing, and 3) performed at the Contractor's expense.

TENSILE TEST CRITERIA.--Tensile testing of the welded headed bar reinforcement shall be performed in accordance with the requirements described in ASTM Designation: A 370.

Tensile test specimens shall be the full cross-section of the bar as rolled with a head attached to one end of the reinforcing bar. A specimen with a head welded to one end shall be placed in the testing machine with the head supported by a steel plate or other fixture to prevent movement and bending of the head. The fixture shall be placed concentrically with the longitudinal axis of the reinforcing bar directly against the flat inner surface of the head. The fixture shall provide clearance between the head support and the head-to-bar connection. Provisions shall be made for clearance between the support and any weld or forming material on the reinforcing bar-to-head connection. The free end of the bar, without a head attached, shall be gripped by the test machine.

All tensile test specimens for welded headed bar reinforcement shall conform to the following requirements:

1) The tensile strength, yield strength and elongation shall conform to the requirements in Table 2, "Tensile Requirements," in ASTM Designation: A 706;
2) At rupture, there shall be no observed partial or total fracture of the head, the head-to-bar connection or the reinforcing bar within one bar diameter of the head-to-bar connection; and
3) At rupture, there shall be visible signs of necking in the reinforcing bar, at a minimum distance of one bar diameter away from the head-to-bar connection.

PRE-PRODUCTION TESTING.-- Successful test results from 6 specimens taken from each combination of reinforcing bar size, head size, and head material specification, grade or type to be used in the work shall be furnished by the Contractor prior to production. Three tensile tests and 3 bend tests shall be performed with the specimens.

Tensile tests shall conform to the requirements of "Tensile Test Criteria" of this section.

The bend tests shall be performed in accordance with the requirements described in ASTM Designation: A706, except that the test specimen shall be bent around a test mandrel to an angle of at least 90-degrees.

The mandrel shall be placed so as to directly bend the welded region. The mandrel dimensions for bend testing shall conform to the requirements for mandrel (pin) diameters in ASTM Designation: A 706. The centerline of the bend test mandrel shall be placed at the intersection of the reinforcing bar and the weld.

Bend test specimens shall be the full cross-section of the bar as rolled with a head attached to one end of the reinforcing bar. For welded heads directly attached to the end of the reinforcing bar where the head interferes with placement of the bend test mandrel, sufficient head material and any excess material associated with the welding process shall be removed along one edge of the reinforcing bar to provide a flat surface on the specimen for the bend mandrel. For welded headed bar reinforcement where the head does not interfere with the positioning of the bend test mandrel, no specimen preparation shall be performed.

All welded headed bar reinforcement bend test specimens shall conform to the following requirements:

1) There shall be no observed partial or total fracture of the head, the head-to-bar connection or the bar within one bar diameter of the head-to-bar connection; and
2) There shall be no cracking on the outside of the bent portion.

PRODUCTION TESTING.--Production testing shall be performed using samples that have been randomly selected by the Engineer from each production lot of welded headed bar reinforcement which is ready for shipment to the job site. The Engineer shall be notified in writing at least 7 days prior to conducting any tests.

A minimum of 3 samples of welded headed bar reinforcement from each production lot shall be tested. One tensile test shall be conducted on each sample.

Tensile tests shall conform to the requirements of "Tensile Test Criteria" of this section.

Should the requirements for tensile tests not be met for all test specimens, the production lot represented by these samples 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 acceptable to the Engineer that the strength and quality of the welded headed bar reinforcement in the work is acceptable.

All welded headed bar reinforcement of each bar size from each production lot to be shipped to the site shall be tagged in such a manner that each such production lot can be accurately identified at the job site. All unidentified welded headed bar reinforcement received at the job site will be rejected.

From each production lot of welded headed bar reinforcement shipped to the job site, the Contractor shall furnish to the Engineer, at the Contractor's expense, 3 reinforcing bars with welded heads randomly selected by the Engineer. If requested by the Engineer, the Contractor shall cut these bars into lengths specified by the Engineer. The Contractor shall furnish, at the Contractor's expense, an adapter to be used by the Engineer for testing.

MARKING.--All welded headed bar reinforcement shall be identified by a distinguishing set of marks legibly stamped onto the flat outer side of the head, away from the bar, to denote the following:

1) Point of Origin--Letter or symbol established as the manufacturer's designation.
2) Type of Welded Headed Reinforcing Bar--Letter T indicating that the welded headed bar reinforcement was produced to this specification.

MEASUREMENT AND PAYMENT.--Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing heads and friction welding heads to bar reinforcement, including conforming to all testing requirements, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer shall be included in the contract unit price paid for furnish precast concrete panel of the type shown on the plans and no separate payment will be made therefor.

10-1B.32 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 shaft casings in the same manner as provided for waterproofing concrete surfaces.

The exposed surfaces of the membrane waterproofing applied to steel shaft casings 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.

10-1B.33 STEEL STRUCTURES

Construction of steel structures shall conform to the provisions in Section 55, "Steel Structures," of the Standard Specifications and these special provisions.

GENERAL

All manufacturing processes for steel fastener and high strength steel fastener assemblies 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 such steel material shall be considered a manufacturing process subject to these 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 fastener and high strength steel fastener assemblies. 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 exceptions allowed herein.

The steel structure retrofit consists, in general, of new cover plates for truss members lacing bars replacement, new gusset plates, new sway bracing, new mid-height strut members, new base plates, new floor beams, new truss shoes, new truss shoe pins, new high strength bolts, nuts and washers, new high strength threaded rods, nuts and washers, stud connectors to be attached to existing steel, new lower lateral bracing, lock up beam assemblies, mounting brackets for viscous damping devices, new restrainer beams at the hinge, truss modification at Piers 19, 55, 57 to 60 and 61, scaffold guide rails at Piers 27, 30 and 44, new end diaphragm and new truss vertical members.

Attention is directed to "Welding Quality Control" of these special provisions.

The first paragraph in Section 55-1.02, "Drawings," of the Standard Specifications is amended to read:

> **55-1.02 Drawings.—**The Contractor shall submit working drawings for structural steel to the Office of Structure Design (OSD) for approval in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings." For initial review, 6 sets of the drawings shall be submitted for highway bridges and 10 sets shall be submitted for railroad bridges. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to the (OSD) for final approval and for use during construction.

Paragraphs 7 through 9 of Section 55-1.02, "Drawings," of the Standard Specifications are 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.
>
> 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 on the upper left side of each page 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.
>
> For railroad bridges, in addition to the reduced prints of the working drawings, the Contractor shall furnish to the Engineer one set of working drawings consisting of either ink tracings on cloth, ink tracings on polyester base drafting film, silver sensitized cloth duplicate tracings, or silver sensitized polyester based reproduction films with matte surface on both sides.

Steel for members, shown on the plans as fracture critical members, shall conform to the requirements of ANSI/AASHTO/AWS D1.5, Section 12, "AASHTO/AWS Fracture Control Plan (FCP) for Non-Redundant Members." Charpy V-notch (CVN) impact values for fracture critical members shall conform to the requirements for Zone 2.

FIELD MEASUREMENTS.-- The Contractor shall verify all controlling field dimensions required for attachment of new work to the existing structure and for proper and adequate fabrication and installation of the work. Exact measurements are the Contractor's responsibility and the Contractor shall be solely responsible for the correct fit of all new construction. Copies of all field measurements shall be furnished to the Engineer.

The Contractor shall, at his expense, make the necessary changes in dimensions of the work to meet existing conditions.

Where necessary to verify accuracy of dimensions, the Contractor may remove a maximum of 2 but not more than one-half the number of existing rivets in any connection and replace such rivets with bolts. Where such a location is designated for rivet removal and replacement with a permanent bolt on the plans, removal shall be in accordance with the section entitled "Remove and Replace Existing Rivets" elsewhere in these special provisions.

ERECTION AND CONNECTIONS TO EXISTING STRUCTURE.--The Contractor shall determine the actual location of the existing rivets that are required to be removed. Original contract plans and working details of the existing structure are available to the Contractor as stated in "Existing Highway Facilities" elsewhere in these special provisions.

Attention is directed to Section 55-1.05, “Drawings”, of the Standard Specifications regarding the Contractor shall submit working drawings showing the sequence of shop and field assembly and erection to the Engineer for approval.

Wing plate at sub truss vertical for truss modification at Pier 55 and 57 to 60 shall be removed according to the construction phasing as shown on the plans. The removed wing plate shall become the property of the State, and shall be cleaned, packaged and delivered to a location designated by the Engineer.

For existing lacing bars and perforated plates replacement work, the Contractor shall follow erection procedures as shown on the plans.

Where shown on the plans, stud connectors to be attached to existing structure. The procedure used shall conform to the section entitled "Install Stud Connector," elsewhere in these special provisions.

Where shown on the plans, rivets in the existing structure shall be removed and the holes shall be used for making connections to new steel. The procedure shall conform to the section entitled "Rivet Removal and Hole Reaming" elsewhere in these special provisions.

Where shown on the plans, holes shall be drilled in the existing steel for making connections to new steel. The procedure used shall conform to the section entitled "Field Drilling Bolt Holes" elsewhere in these special provisions.

At the end of each day’s work and at other times when construction operations are suspended for any reason, all bolts occupying holes formerly occupied by rivets shall be in place and tightened. No holes shall be left without a bolt or rod when the work stops.

Where shown on the plans, rivets in the existing structure shall be removed without replacement by a high strength bolt. The procedure used shall conform to "Rivet Removal and Hole Reaming" elsewhere in these special provisions. The holes shall be caulked. Caulking shall conform to the provisions in Section 59-2.12, “Painting,” of the Standard Specifications and these special provisions.

Holes in the new parts shall be sub-punched or sub-reamed 1/4 inch and field reamed to fit existing holes.

Holes which must be enlarged to permit easy entry of bolts shall be reamed, burning will not be permitted. Poor matching of holes shall be cause for rejection. Where reamed holes exceed the bolt diameter by more than 1/8 inch, the next larger size bolt or rod shall be installed at the Contractor's expense.

Existing structural steel, where new structural steel is to be connected, shall be cleaned and painted in accordance with “Clean and Paint Structural Steel” of these special provisions.

Areas of existing structural steel damaged by the Contractor's operations shall be cleaned and painted in accordance with "Clean and Paint Structural Steel," of these special provisions at the Contractor’s expense.

Attention is directed to the provisions in Section 55-3.15, “Pin Connections,” of the Standard Specification, and details shown on the plans for the replacement of the existing pins from the existing truss shoes.

When truss shoes or truss jacking plates are shown on the plans to be placed level, the level plane, which shall not vary more than 1/16 inch from a straightedge placed in any direction across the area.

The first sentence of the second paragraph in Section 55-1.03, "Inspection," of the Standard Specifications is amended to read:

> The Contractor shall furnish to the Engineer a copy of mill orders, certified mill test reports, a Certificate of Compliance for all fabricated structural steel to be used in the work, other than steel which is to be used under the provisions in Section 55-2.07, "Unidentified Stock Material, " and other reports or certificates required by the specifications.

MATERIALS

The first paragraph, including the material table, in Section 55-2.01, "Description," of the Standard Specifications is amended to read:

55-2.01 Description.—The various materials shall conform to the specifications of ASTM as listed in the following tabulation with certain modifications and additions as specified:

MATERIAL	SPECIFICATION
Structural steel	ASTM Designation: A 709/A 709M, Grade 36 [250] or A 36/A 36M[a]
High strength low alloy columbium vanadium steel	ASTM Designation: A 709/A 709M, Grade 50 [345] or A 572/A 572M, Grade 50 [345][a]
High strength low alloy structural steel	ASTM Designation: A 709/A 709M, Grade 50W [345 W] or A 588/A 588M[a]
High-yield strength, quenched and tempered alloy steel plate suitable for welding	ASTM Designation: A 709/A 709M, Grade 100 [690] and Grade 100W [690W] or A 514/A 514M[a]
Steel fasteners for general applications:	
Bolts and studs which include threaded rods and nonheaded anchor bolts	ASTM Designation: A 307 or AASHTO Designation: M 314, Grade 36 or 55
Nuts	ASTM Designation: A 563 including Appendix X1[b,c]
Washers	ASTM Designation: F 844
High strength steel fasteners:	
Bolts for structural steel joints	ASTM Designation: A 325 or A 325M
Bolts and studs which include nonheaded anchor bolts, for general applications	ASTM Designation: A 449
High strength threaded rods	ASTM Designation: A354 Grade BD.
Nuts	ASTM Designation: A 563 including Appendix X1[b] or

	A 563M including Appendix X1[b,c]
Washers	ASTM Designation: F 436 or F 436M
Direct tension indicators	ASTM Designation: F 959 or F 959M, zinc coated
Carbon steel for forgings, pins and rollers	ASTM Designation: A 668/A 668M, Class K
Alloy steel for forgings	ASTM Designation: A 668/A 668M, Class G
Pin nuts	ASTM Designation: A 36/A 36M
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
Carbon steel structural tubing	ASTM Designation: A 500, Grade B or A 501
Steel pipe (Hydrostatic testing will not apply)	ASTM Designation: A 139, Grade E
Stud connectors	ASTM Designation: A 108 Grade 1015, 1018 or 1020

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

(b) Nuts made and marked in accordance with the requirements of ASTM Designation: A 194/A 194M, Grade 2H are an acceptable substitution for heavy hex nuts complying with ASTM Designation: A 563, Grade DH. This substitution is permitted, provided that the zinc coating, overtapping, lubrication, rotational capacity requirements and testing of the substituted nuts meet the same requirements as specified for the A 563 nuts, including all supplementary requirements. Proof load testing and stresses required for ASTM A 194 zinc-coated nuts shall be the same as required for ASTM A 194 plain uncoated nuts.

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

The second paragraph in Section 55-2.01, "Description," of the Standard Specifications is deleted.

The fifth paragraph in Section 55-2.01, "Description," of the Standard Specifications is amended to read:

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

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

55-2.02 Structural Steel.—Unless otherwise specified or shown on the plans, all structural steel plates, shapes and bars shall conform to ASTM Designation: A 709/A 709M, Grade 50.

Stainless steel plate for the lock-up beam assembly shall conform to ASTM Designation: A176

All filler plates, spacer plates, bevel shim plates and shim plates shall conform to ASTM Designation: A36. At the Contractor's option, all filler plates, spacer plates, bevel shim plates and shim plates may conform to ASTM Designation: A 709/A 709M, Grade 50, and shall subject to the approval by the Engineer.

All 1/4" or less thick filler plates, spacer plates, bevel shim plates and shim plates shall be galvanized. Galvanizing shall conform to the provision Section 75-1.05, "Galvanizing," of the Standard Specifications.

All truss shoe pins shall conform to ASTM Designation: A668/ A668M, Class K and Section 55-3.15 "Pin Connection," of the Standard Specification.

Threads for truss shoe pins shall be 6 UN Class 2A/2B and shall conform to ANSI B18.

High-strength fastener assemblies, and other bolts attached to structural steel with nuts and washers shall be zinc-coated.

Check Testing.—Structural steel shall conform to the designated ASTM Standard and the check testing requirements of this section.

Check samples shall be furnished for each heat of maximum thickness of:

Tension flanges and webs of fracture critical members.

Steel plates, shapes or bars containing check samples shall be furnished from the mill with extra length in order to provide for removal of material for check samples at the point of fabrication. Check samples may be cut from either end of the designated plate, shape or bar.

At the option of the Contractor, check samples may be removed at the rolling mill rather than at the point of fabrication. The sample will be removed from the mill plate that will be stripped by the fabricator to produce the designated plate and may be taken from any location within that plate. The mill plate from which samples are removed shall be marked with the same identifying numbers as are used on the samples. If the Contractor requests that samples be removed at the rolling mill, the Contractor will be charged for the cost of providing State inspection at the mill to witness the removal of samples, as provided in "Measurement and Payment" of these special provisions.

Unless otherwise directed, material for check samples shall be removed by the Contractor in the presence of the Engineer. Check samples for plates wider than 24 inches shall be 14 inches wide and 18 inches long with the long dimension transverse to the direction of rolling. Check samples for all other products shall be 18 inches long, taken in the direction of rolling, and the width shall be the product width. Check samples shall be removed and delivered to the Engineer before the material is fabricated into components and preferably when it is still being prepared for fabrication. The direction of rolling, heat numbers, and plate numbers shall be marked on the samples with paint or other indelible marking material or may be steel stamped in one corner of the plate.

Unless otherwise directed, check samples shall be delivered to the Transportation Laboratory at the Contractor's expense. The check samples will be tested by the Transportation Laboratory for compliance with the requirements specified in ASTM and these special provisions. Check sample test results will be reported to the Contractor within 2 weeks working days of delivery to the Transportation Laboratory. In the event several samples are submitted on the same day, an additional day will be added for each 2 samples submitted. The test report will be made for the group of samples.

The results of the tensile and impact tests shall not vary more than 5 percent below specified minimum or 5 percent above specified maximum requirements except that if the initial check test results vary more than 5 percent but not more than 10 percent from the specified requirements, a re-test may be performed on another sample from the same heat and thickness. The results of the re-test shall not vary more than 5 percent from the original specified requirements. If the

results of check tests exceed these permissible variations, all material planned for use from the heat represented by said check samples shall be subject to rejection.

FABRICATION

The first paragraph of Section 55-3.05, "Facing and Bearing Surfaces," of the Standard Specifications is amended to read:

55-3.05 Faying (Contact) and Bearing Surfaces.—Surfaces of bearing and base plates and other metal bearing surfaces that are to come in contact with each other or with ground concrete surfaces or with asbestos sheet packing shall be flat to within 1/32 inch tolerance in 12 inches and to within 1/16 inch tolerance overall. Surfaces of bearing and base plates and other metal bearing surfaces that are to come in contact with preformed fabric pads, elastomeric bearing pads or portland cement mortar shall be flat to within 1/8 inch tolerance in 12 inches and to within 3/16 inch tolerance overall.

Paragraphs 1 through 5, excluding Section 55-3.14A, of Section 55-3.14, "Bolted Connections," of the Standard Specifications are amended to read:

55-3.14 Bolted Connections.—Bolted connections in structural steel joints, unless otherwise shown on the plans or specified in the special provisions, shall be made with high-strength steel fastener assemblies. These fastener assemblies shall consist of either 1) a high-strength steel bolt, nut and hardened washer, or 2) a tension control bolt, nut and hardened washerA direct tension indicator (DTI).may be used with the high-strength bolt, nut and hardened washer assembly.

Bolted connections using fastener assemblies shall conform to the "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts," (RCSC Specification) approved by the Research Council on Structural Connections of the Engineering Foundation, and the provisions of these special provisions.

When reference is made to the RCSC Specification, the "Allowable Stress Design" version shall be used when allowable stress design is shown on the plans and the "Load and Resistance Factor Design" version shall be used when load factored design or load and resistance factor design is shown on the plans.

All connections made with fastener assemblies shall be tensioned and inspected after tensioning, whether classified as a slip critical or bearing type connection, unless otherwise designated on the plans.

The hardened washer shall be installed under the nut or bolt head, whichever is the element turned in tightening. Nuts shall be located, wherever practicable, on the side of the member that will not be visible from the traveled way. Nuts for bolts that will be partially embedded in concrete shall be located on the side of the member that will be encased in concrete.

Each length and diameter of fastener assemblies used in any one joint of a high-strength bolted connection shall be from the same rotational capacity lot. The Contractor shall keep a record of which rotational capacity lots are used in each joint.

The Contractor shall provide, calibrate and maintain all equipment and tools necessary for the preliminary testing, installation and inspection of all fasteners.

Bolt tension measuring devices and torque wrenches shall be calibrated within one year prior to first being used on the job, and a minimum of once each year thereafter. This calibration shall be done by a qualified independent laboratory or authorized warranty repair and calibration center recognized by the tool manufacturer. Bolt tension measuring devices shall be calibrated, to within one percent of the actual tension value, with a minimum of 4 verification readings evenly spaced over a range of 20 to 80 percent of full scale. Torque wrenches shall have either a dial gage or digital read-out. Torque wrenches shall be calibrated, to within 2 percent of the actual torque value, with a minimum of 4 verification readings evenly spaced over a range of 20 to 100 percent of full scale. All test equipment used for certification and calibration standards shall be traceable to the National Institute of Standards and Technology.

Prior to the use of bolt tension measuring devices or torque wrenches, the Contractor shall furnish to the Engineer certificates of calibration with plots of verification readings for each device or wrench.

In addition to the submittals required in Section 55-1.03, "Inspection," of the Standard Specifications, the Contractor shall furnish certified test reports of tests on fastener components and fastener assemblies performed prior to shipment to the job-site. Certified test reports for fastener components and fastener assemblies shall be furnished to the Engineer prior to use of the fastener assembly. The certified test reports shall include the rotational capacity lot numbers for fastener assemblies supplied and test reports specified in the "Certification," "Report," "Number of Tests and Retests," and "Certification and Test Report" sections in the appropriate ASTM specifications for the fastener components.

For all bolted connections, the contact surfaces shall be cleaned and coated before assembly in conformance with the provisions for cleaning and painting structural steel in the special provisions.

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

55-3.14B Installation.—If water soluble lubricants are used on nuts, fastener installation will not be permitted when surface moisture is present at high-strength bolted connection. The Engineer may require the Contractor to perform additional installation tension tests and rotational capacity tests before fastener installation and tensioning is performed at any high-strength bolted connection during inclement weather.

Bolts shall be tightened to the required tension by use of a tension control bolt installation wrench, a pneumatic or hydraulic wrench, a calibrated manual torque wrench, the turn-of-nut method, or by using mechanically zinc coated direct tension indicators. The pneumatic or hydraulic wrench shall have an adjustable control unit that can be set to positively shut off at the desired torque.

The threaded ends of fastener assemblies projecting past the outer face of the nut (thread stickout), where first full formed threads are present, shall be at least flush with, but not extend more than 1/4 inch beyond, the outer face of the nut. A maximum of one hardened washer, in addition to the single washer required under the turned element, may be installed under the non-turning element of the fastener assembly. The thread stickout of studs, rods and anchor bolts, shall be at least 1/8 inch, and there shall be a minimum of 3 full threads located within the grip of the connection. In addition, a minimum of 3 full threads shall be located between the bearing surfaces of the bolt head and nut. The total stickout shall not be excessive.

Larger bolts, having diameters up to 1/4-inch greater than the diameter of the bolt shown on the plans, may be used if approved by the Engineer provided that spacing and edge distance requirements for the larger bolt are met and the net section is adequate.

When direct tension indicators are used, one DTI shall be installed under each bolt head with the DTI protrusions contacting the bearing surface of the bolt head. To tension the bolt, the bolt head shall be held stationary and the nut turned. Unless otherwise specified, manufacturer's installation procedures shall be followed. Each bolt shall be tensioned in at least 2 tightening stages until at least 50% of the gaps on each DTI are greater than zero and less than 0.005 inch. Complete crushing of all DTI protrusions (0 gaps) is not permitted on any given DTI and will be cause for rejection.

Unless otherwise specified, manufacturer's installation procedures for tension control bolts shall be followed.

The same head orientation shall be used within any one high-strength bolted connection.

55-3.14C Rotational Capacity Testing Prior to Shipment to Job Site.—Rotational capacity tests on fastener assemblies shall be performed as specified in the special provisions.

55-3.14D Installation Tension Testing and Rotational Capacity Testing After Arrival to Job Site.—Installation tension tests and rotational capacity tests on fastener assemblies shall be performed as specified in the special provisions.

55-3.14E Inspection.—For all types of fastener assemblies, at least 10%, but no fewer than 2 bolts in each high-strength bolted connection shall be inspected after tensioning in conformance with the requirements of Section 9, "Inspection," of the RCSC Specification. The inspection of a completed joint shall be performed within 48 hours after all fasteners in this joint have been tensioned. The Contractor shall be responsible for determining the job inspecting torque as specified in Section 9(b), "Arbitration Inspection," of the RCSC Specification. A separate inspecting torque shall be determined and used for each different rotational capacity lot of fasteners. The procedure described for determining arbitration torque in steps 1 through 9 of the "Arbitration of Disputes Inspection Torque Method-Short Bolts," section of the "Structural Bolting Handbook," published by the Steel Structures Technology Center, Incorporated shall replace Section 9(b)(2) of the RCSC Specification for determining the job inspecting torque for short bolts. Bolt tension shall be checked at locations selected by the Engineer. Work required to perform such inspection shall be done by the Contractor in the presence of the Engineer and in such a manner that the Engineer can read the torque wrench gage or access the DTI gaps during inspection.

Rotational Capacity Testing Prior to Shipment to Job Site.—Rotational capacity tests shall be performed on all lots of high-strength fastener assemblies prior to shipment to the job site. Galvanized assemblies shall be tested as galvanized. One hardened washer shall be used under each nut for all tests.

Each combination of bolt production lot, nut lot and washer lot shall be tested as an assembly.

A rotational capacity lot number shall be assigned to each combination of lots tested. Each shipping unit of fastener assemblies shall be plainly marked with the rotational capacity lot number.

Two fastener assemblies from each rotational capacity lot shall be tested.

The following equipment, procedure and acceptance criteria shall be used to perform rotational capacity tests on, and determine acceptance of long bolts. Fasteners are considered to be long bolts when full nut thread engagement when installed in a bolt tension measuring device.

Long Bolt Test Equipment:

1. Calibrated bolt tension measuring device with adequate tension capacity for the bolts being tested.
2. Calibrated dial or digital torque wrench. A torque multiplier may be required for large diameter bolts.
3. Spacer washers or bushings. When spacer washers or bushings are required, they shall have the same inside diameter and equal or larger outside diameter as the hardened washers conforming to the requirements of ASTM Designation: F436.
4. Steel beam or member, such as a girder flange or cross frame, to which the bolt tension measuring device will be attached. The device shall be accessible from the ground.

Long Bolt Test Procedure:

1. Measure the bolt length. The bolt length is defined as the distance from the end of the threaded portion of the shank to the underside of the bolt head.
2. Install the nut on the bolt so that 3 to 5 full threads of the bolt are located between the bearing face of the nut and the underside of the bolt head. Measure and record the thread stickout of the bolt. Thread stickout is determined by measuring the distance from the outer face of the nut to the end of the threaded portion of the shank.
3. Insert the bolt into the bolt tension measuring device and install the required number of washers, and any additional spacers as needed, directly beneath the nut to produce the thread stickout measured in Step 2.
4. Tighten the nut using a hand wrench to a snug-tight condition. The snug tension shall not be less than the Table A value but may exceed the Table A value by a maximum of 2 kips.

Table A

High Strength Fastener Assembly Tension Values to Approximate Snug-Tight Condition	
Bolt Diameter (inch)	Snug Tension (kips)
1/2	1
5/8	2
3/4	3
7/8	4
1	5
1 1/8	6
1 1/4	7
1 3/8	9
1 1/2	10

5. Match-mark the assembly by placing mark on one corner of the nut, and a heavy reference start line on the face plate of the bolt tension measuring device which aligns with the mark on the nut. Place an additional mark on the outside of the socket that overlays the mark on the nut corner. It will be visible while turning the nut. Make an additional mark on the face plate, either 2/3 of a turn, one turn, or 1 1/3 turn clockwise from the heavy reference start line, depending on the bolt length being tested as shown in Table B.

Table B

Required Nut Rotation for Rotational Capacity Tests[a,b]	
Bolt Length (measured in Step 1)	Required Rotation (turn)
4 bolt diameters or less	2/3
Greater than 4 bolt diameters but no more than 8 bolt diameters	1
Greater than 8 bolt diameters, but not more than 12 bolt diameters[c]	1 1/3

(a) Nut rotation is relative to bolt, regardless of the element (nut or bolt) being turned. For bolts installed by 1/2 turn and less, the tolerance shall be plus or minus 30 degrees; for bolts installed by 2/3 turn and more, the tolerance shall be plus or minus 45 degrees.
(b) Applicable only to connections in which all material within grip of the bolt is steel.
(c) When bolt lengths exceed 12 diameters, the required rotation shall be determined by actual tests in a suitable tension device simulating the actual conditions.

6. Turn the nut to achieve the applicable minimum bolt tension value listed in Table C. After reaching this tension, record the moving torque, in foot-pounds, required to turn the nut, and also record the corresponding bolt tension value in pounds. Torque shall be measured with the nut in motion. Calculate the value, T(in ft-lbs), where T=[(the measured tension in pounds) x (the bolt diameter in inches) / 48 in/ft].

Table C

Minimum Tension Values for Fastener Assemblies	
Bolt Diameter (inch)	Minimum Tension (kips)
1/2	12
5/8	19
3/4	28
7/8	39
1	51
1 1/8	56
1 1/4	71
1 3/8	85
1 1/2	103

7. Turn the nut further to increase bolt tension until the rotation listed in Table B is reached. The rotation is measured from the heavy reference line made on the face plate after the bolt was snug-tight. Record this bolt tension.
8. Loosen and remove the nut and examine the threads on both the nut and bolt.

Long Bolt Acceptance Criteria:

An assembly shall pass the following requirements to be acceptable: 1) the measured moving torque (Step 6) shall be less than or equal to the calculated value, T (Step 6), 2) the bolt tension measured in Step 7 shall be greater than or equal to the applicable turn test tension value listed in Table D, 3) the nut shall be able to be removed from the bolt without signs of thread stripping or galling after the required rotation in

Step 7 has been achieved, 4) the bolt does not shear from torsion or fail during the test and 5) the assembly does not seize before the final rotation in Step 7 is reached. Elongation of the bolt in the threaded region between the bearing face of the nut and the underside of the bolt head is expected and will not be considered a failure. Both fastener assemblies tested from one rotational capacity lot shall pass for the rotational capacity lot to be acceptable.

Table D

Turn Test Tension Values	
Bolt Diameter (inch)	Turn Test Tension (kips)
1/2	14
5/8	22
3/4	32
7/8	45
1	59
1 1/8	64
1 1/4	82
1 3/8	98
1 1/2	118

The following equipment, procedure and acceptance criteria shall be used to perform rotational capacity tests on and determine acceptance of short bolts. Fasteners are considered to be short bolts when full nut thread engagement cannot be achieved when installed in a bolt tension measuring device.

Short Bolt Test Equipment:

1. Calibrated dial or digital torque wrench. A torque multiplier may be required for large diameter bolts.
2. Spud wrench or equivalent.
3. Spacer washers or bushings. When spacer washers or bushings are required, they shall have the same inside diameter and equal or larger outside diameter as the washers may also be required. appropriate hardened washers conforming to the requirements of ASTM Designation: F436
4. Steel plate or girder with a hole to install bolt. The hole size shall be 1/16 inch greater than the nominal diameter of the bolt to be tested. The grip length, including any plates, washers, and additional spacers as needed, shall provide the proper number of threads within the grip, as required in Step 2 below.

Short Bolt Test Procedure:

1. Measure the bolt length. The bolt length is defined as the distance from the end of the threaded portion of the shank to the underside of the bolt head.
2. Install the nut on the bolt so that 3 to 5 full threads of the bolt are located between the bearing face of the nut and the underside of the bolt head. Measure and record the thread stickout of the bolt. Thread stickout is determined by measuring the distance from the outer face of the nut to the end of the threaded portion of the shank.
3. Install the bolt into a hole on the plate or girder and install the required number of washers, and any additional spacers as needed, between the bearing face of the nut and the underside of the bolt head to produce the thread stickout measured in Step 2.
4. Tighten the nut using a hand wrench to a snug-tight condition. The snug condition shall be the full manual effort applied to the end of a 12-inch long wrench. This applied torque shall not exceed 20% of the maximum allowable torque in Table E.

Table E

Maximum Allowable Torque for Fastener Assemblies	
Bolt Diameter (inch)	Torque (ft-lbs)
1/2	145
5/8	285
3/4	500
7/8	820
1	1220
1 1/8	1500
1 1/4	2130
1 3/8	2800
1 1/2	3700

5. Match-mark the assembly by placing aligning marks, one on a corner of the nut, a radial line across the flat on the end of the bolt, and a heavy reference start line on the steel plate or girder. Place an additional mark on the outside of the socket that overlays the mark on the nut corner. It will be visible while turning the nut. Make 2 additional small marks on the steel plate or girder, one 1/3 of a turn and one 2/3 of a turn clockwise from the heavy reference start line on the steel plate or girder.
6. Using the torque wrench, tighten the nut to the rotation value listed in Table F. The rotation is measured from the heavy reference line described in Step 5 made after the bolt was snug-tight. A second wrench shall be used to prevent rotation of the bolt head during tightening. Measure and record the moving torque after this rotation has been reached. The torque shall be measured with the nut in motion.

Table F

Nut Rotation Required for Turn-of-Nut Installation (a,b)	
Bolt Length (measured in Step 1)	Required Rotation (turn)
4 bolt diameters or less	1/3
(a) Nut rotation is relative to bolt, regardless of the element (nut or bolt) being turned. For bolts installed by 1/2 turn and less, the tolerance shall be plus or minus 30 degrees. (b) Applicable only to connections in which all material within grip of the bolt is steel.	

7. Tighten the nut further to the 2/3 turn mark as indicated in Table G. The rotation is measured from the heavy reference line made on the plate or girder when the bolt was snug-tight. Verify that the radial line on the bolt end is still in alignment with the start line.

Table G

Required Nut Rotation for Rotational Capacity Test	
Bolt Length (measured in Step 1)	Required Rotation (turn)
4 bolt diameters or less	2/3

8. Loosen and remove the nut and examine the threads on both the nut and bolt.

Short Bolt Acceptance Criteria:

An assembly shall pass the following requirements to be acceptable: 1) the measured moving torque from Step 6 shall be less than or equal to the maximum allowable torque from Table E, 2) the nut shall be able to be removed from the bolt without signs of thread stripping or galling after the required rotation in Step 7 has been achieved, 3) the bolt does not shear from torsion or fail during the test and 4) the assembly does

not seize before the final rotation in Step 7 is reached. Elongation of the bolt in the threaded region between the bearing face of the nut and the underside of the bolt head will not be considered a failure. Both fastener assemblies tested from one rotational capacity lot shall pass for the rotational capacity lot to be acceptable.

Installation Tension Testing and Rotational Capacity Testing After Arrival to Job Site.—Installation tension tests and rotational capacity tests on high strength fastener assemblies shall be performed by the Contractor prior to acceptance or installation, and after arrival of the fastener assemblies to the job-site. The installation tension tests and rotational capacity tests shall be performed at the job-site, in the presence of the Engineer, on each rotational capacity lot of fastener assemblies.

Bolts connections using high strength rod shall conform to the provisions in Section 55-3.14 “Bolted Connections,” of the Standard Specification and these special provisions.

Installation tension tests shall be performed on 3 representative fastener assemblies in conformance with Section 8, "Installation and Tightening," of the RCSC Specification. For short bolts, Section 8(d), "Joint Assembly and Tightening of Slip-Critical and Direct Tension Connections," of the RCSC Specification shall be replaced by the "Pre-Installation Testing Procedures," of the "Structural Bolting Handbook," published by the Steel Structures Technology Center, Incorporated.

The rotational capacity tests shall be performed in conformance with the requirements for rotational capacity tests in "Rotational Capacity Testing Prior to Shipment to Job Site" of these specifications.

At the Contractor’s expense, additional installation tension tests, tests required to determine job inspecting torque and rotational capacity tests shall be performed by the Contractor on each rotational capacity lot, in the presence of the Engineer, if 1) any fastener is not used within 3 months after arrival on the jobsite, 2) fasteners are improperly handled, stored, or subjected to inclement weather prior to final tightening, 3) significant changes are noted in original surface condition of threads, washers or nut lubricant or 4) the Contractor's required inspection is not performed within 48 hours after all fasteners in a joint have been tensioned.

Failure of a job-site installation tension test or a rotational capacity test will be cause for rejection of unused fasteners which are part of the rotational capacity lot.

When DTIs are used, installation verification tests shall be performed in conformance with appendix section X1.4 of ASTM Designation: F959, except that bolts shall be initially tensioned to a value 5 percent greater than the minimum required bolt tension.

Surface Preparation.—For all bolted connections the 1) new, 2) surfaces of outside members within the grip under bolt heads, nuts and washers and 3) inside surfaces of bolt holes shall be cleaned and coated before assembly in conformance with the provisions for cleaning and painting structural steel of these special provisions.

Sealing.—The perimeter around all DTI gaps shall be completely sealed with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II. The sealant shall be gray in color and have a minimum thickness of 1/16 inch. If painting is required, the sealing compound shall be applied prior to painting.

When zinc-coated fasteners are used, the sheared end of each tension control bolt shall be completely sealed with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II. The sealant shall be gray in color and shall have a minimum thickness of 1/16 inch. The sealant shall be applied to a clean sheared surface on the same day that the splined end is sheared off.

Threads of all fasteners shall be excluded from the shear plane.

Holes for high strength rod shall conform to the provisions in Section 55-3.14A “Bolt Holes,” of the Standard Specification.

When thread locking system is designated on the plan, the thread locking system shall conform to the requirements for thread locking system as specified in the section entitled “Miscellaneous Metal (Restrainer-Cable Type),” elsewhere in these special provisions.

All truss shoes as designated on the plans shall be stress relieved by heat treating. Heat treating shall conform to the provisions of AWS D1.5, Subsection 4.4, and the following requirements:

Stress relieving shall be done for a minimum of 4 hours plus 30 minutes for each additional inch over 2 inches of maximum metal thickness at 1,000 to 1,200 degrees Fahrenheit.

The maximum cooling rate shall not exceed 300 degrees Fahrenheit per hour.

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

The extent of nondestructive testing on welds shall be in accordance with the requirements in ANSI/AASHTO/AWS D1.5, Subsection 6.7.

The first paragraph of Section 6.7, "Nondestructive Testing," of the ANSI/AASHTO/AWS D1.5 is amended to read:

Nondestructive testing in addition to visual shall be performed by the Contractor to comply with this specification. Welds backing bars shall be removed prior to performing any nondestructive test. Testing of base metal in accordance with 3.2; preparation of base metal; production welds, weld repair; WPS qualification test weldments; and welder, welding operator, and tack welder qualification test weldments are included. Cost of this nondestructive testing shall be considered incidental to the structural steel fabrication or erection or both, and no separate payment will be made.

Section 6.7.1, "Nondestructive Testing," of the ANSI/AASHTO/AWS D1.5 is amended to read:

Complete joint penetration groove welds in main members shall be QC tested by nondestructive testing. Unless otherwise specified, radiographic testing shall be used for examination of complete joint penetration groove welds in butt joints subject to calculated tension or reversal of stress. All complete joint penetration groove welds in T- and corner joints shall be tested by ultrasonic testing. When required, testing of complete joint penetration groove welds in butt joints in compression or shear may be done by RT or UT.

Section 6.7.1.2 "Nondestructive Testing," of the ANSI/AASHTO/AWS D1.5 is amended to read:

Radiographic testing of welds shall be performed in accordance with the following frequency requirements:

1. 100% of each joint subject to calculated tension or reversal of stress, except on welds in vertical butt joints in beams or girder webs, as follows:

   a. 1/6 of the web depth beginning at the point, or points of, maximum tension, and
   b. 25% of the remainder of the web depth need be tested.
   c. If unacceptable discontinuities are found in item (a) or (b) above, the remainder of the weld shall be ultrasonically tested.

2. In addition radiographic tests required in items (a, b and c) above, 25% of these same joints, in material in excess of 1/2 inch (13mm) shall be tested.
3. 25% of each joint subject to compression or shear, or, at the Contractor's option, 25% of the total joints subject to compression or shear. When the latter is selected, the tested joints shall be distributed throughout the work and shall total at least 25% of the compression or shear weld length.

   a. If unacceptable discontinuities are found in spot testing, the entire length shall be tested
   b. If unacceptable discontinuities are found in 20% or more of the compression or shear joints in a "lot", all compression and shear joints in that "lot shall be tested for their full length.
   c. A "lot" is defined as those tension or compression/shear joints, or both, which were welded in accordance with the same approved WPS and nondestructively tested as a group.

4. Longitudinal butt joints in beam or girder webs shall be subject to the inspection criteria of 6.7.2.
5. The requirements for radiographic and ultrasonic testing shall apply equally to shop and field welds.

The first paragraph of Section 6.7.2 "Nondestructive Testing," of the ANSI/AASHTO/AWS D1.5 is amended to read:

Unless otherwise specified, fillet welds and partial penetration groove welds joining primary components of main members shall be QC tested by magnetic particle method in accordance with the following:

Control of Distortion and shrinkage due to welding shall be in accordance with the requirements in ANSI/AASHTO/AWS D1.5, Section 3.4.

The permissible tolerance in straightness of welded structural members, regardless of cross section, shall not exceed to the requirements in ANSI/AASHTO/AWS D1.5, Section 3.5.1.2.

The permissible tolerance in flatness of welded structural members except for truss shoes and truss jacking plates shall not exceed 3/16 inch in a length of 2 feet.

The permissible tolerance in flatness for truss shoes at Pier 55, 57, 58, 59 and 60, and the truss jacking plates at Pier 19 and 61, shall conform to Section 55-3.05 "Facing and Bearing Surfaces," of the Standard Specifications.

The flat side of all butt welded joints shall not deviate from flatness by more than 3/16 inch in a length of 2 feet centered over the weld joint.

Welded structural members which cannot comply with the above permissible tolerance will be rejected in accordance with the provisions in Section 6-1.04, "Defective Materials."

Backing for welds that are subject to computed stress which are left in place in the completed structure shall be a single length. Backing shall be of the same material as the structural steel being welded. Single lengths of backing shall be obtained by using a continuous strip, or may consist of lengths of backing joined by full penetration butt welds. Butt welds in the backing material shall be subject to the same kind and frequency of testing as specified for the type of joint in the material being joined. Butt welds in backing material shall be ground flush as necessary to obtain proper inspection and for proper fit-up in the weld joint with which the backing is to be used.

MEASUREMENT AND PAYMENT.--Measurement and payment for steel structures shall conform to the provisions in Sections 55-4.01, "Measurement," and 55-4.02, "Payment," of the Standard Specifications and these special provisions.

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

> If a portion or all of the welded structural steel is fabricated more than 300 air line miles from both Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. Whereas it is and will be impracticable and extremely difficult to ascertain and determine the actual increase in such expenses, it is agreed that payment to the Contractor for furnishing said structural steel from each fabrication site located more than 300 air line miles from both Sacramento and Los Angeles will be reduced $5,000 or by an amount computed at $0.020 per pound of structural steel fabricated, whichever is greater, or in the case of each fabrication site located more than 3,000 air line miles from both Sacramento and Los Angeles, payment will be reduced $8,000 or by $0.036 per pound of structural steel fabricated, whichever is greater.

If a portion or all of check samples are removed at a mill more than 300 air line miles from both Sacramento and Los Angeles, shop inspection expenses will be sustained by the State which are in addition to expenses incurred for fabrication site inspection. Payment to the Contractor for furnishing structural steel will be reduced $2,000 for each mill located more than 300 air lines miles from both Sacramento and Los Angeles.

The materials used in the mounting brackets for the viscous damping devices, scaffold guide rails, filler plates, spacer plates, shim plates, stainless steel plates, high strength fasteners used in the field drilled holes and the rivets remove and replacement works, the steel pins used in the enlarged truss shoe pin holes, the additional materials used in backing for welds will be measured and paid for by the pound as furnish structural steel (bridge).

Full compensation for removing the wing plate at sub truss vertical for truss modification at Pier 55 and 57 to 60, including cleaning, packaging and delivering to a location designated by the Engineer, shall be considered as included in the contract price paid per pound for erect structural steel (bridge), and no additional compensation will be allowed therefor.

Full compensation for modifying existing steel members for retrofitting and curb and rail modification during truss vertical retrofitting, shall be considered as included in the contract price paid per pound for erect structural steel (bridge), and no additional compensation will be allowed therefor.

The installation of new high strength fasteners into the field drilled holes and the existing rivet replacement holes, the installation of new pins into the enlarged truss shoe pin holes, the installation of the mounting brackets for the viscous damping devices, and the installation of scaffold guide rail shall be measured and paid for as erect structural steel (bridge).

10-1B.34 INSTALL STUD CONNECTORS

Installing stud connectors shall consist of coring through reinforced concrete deck, roughening the sides of the cored holes, placing stud connectors, and filling cored holes with rapid setting concrete patches, as shown on the plans and in conformance with the requirements in these special provisions.

Attention is directed to "Core Concrete (2", 5")" elsewhere in these special provisions for coring through reinforced concrete deck.

All concrete and steel surfaces to be in contact with the rapid setting concrete shall be cleaned of all rust, oil, grease, or any loose or foreign material which reduces bond between the rapid setting concrete and concrete surface or bar. The cored hole shall be thoroughly cleaned, flushed with water, and allowed to dry to a surface-dry condition immediately prior to grouting.

Concrete corings through the bridge deck slab shall be performed when traffic is stopped on the structure in conformance with section “Maintaining Traffic” elsewhere in these special provisions. The cored holes in the deck shall be roughened to 1/8 inch amplitude by abrasive blast or by other approved means. The holes shall be patched with rapid setting concrete patches immediately after the work is complete inside the core holes.

Attention is directed to Section “Rapid Setting Concrete Patches” elsewhere in these special provisions for filling cored holes with rapid setting concrete patches.

Attention is directed to AWS Section 7.4, “Workmanship”, for preparation requirements of surfaces to receive shear stud connectors. Installing stud connectors to the tops of the existing steel members shall conform to the requirements in Section 55, “Steel Structures,” of the Standard Specifications and these special provisions.

The contract unit price paid for install stud connectors shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in coring through reinforced concrete deck, roughening the sides of the cored holes, furnishing and placing stud connectors, and filling cored holes with rapid setting concrete patches, as shown on the plans, and as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1B.35 COLUMN AND SHAFT CASINGS

Column and shaft 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" and "Clean Concrete" elsewhere in 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 and shaft casings.

Structural steel for column and shaft casings shall conform to ASTM Designation: A36/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 according to ASTM Designation: D 3575, Test B. Polyethylene shall be bonded using a suitable waterproof adhesive applied to the entire contact surface.

Drain extension pipe shall conform to the provisions for drainage piping in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

The spaces to be occupied by the column and shaft 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 accordance with the provisions in Section 7-1.13 of the Standard Specifications.

CLEAN AND PAINT STRUCTURAL STEEL.--All new metal surfaces, except where galvanized, shall be cleaned and painted in accordance 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 and shaft casing surfaces in contact with grout shall not be considered embedded in concrete.

Column and shaft 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 accordance with the provisions 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 accordance with ASTM Designation: D 4417.

PAINTING.--All blast cleaned surfaces shall receive a single undercoat, and exposed surfaces shall receive a single undercoat and a final coat. The single undercoat and final coat shall consist of a waterborne inorganic zinc coating conforming to the provisions of AASHTO Designation M 300, Type II, except that the first 3 sentences of Section 4.7, "Primer Field Performance Requirement," and the entire Section 4.7.1 of the AASHTO Specification shall not apply. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory, (916) 227-7000.

The color of the final coat of inorganic zinc coating shall closely match Federal Standard 595B No. 36373.

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to the provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

Inorganic zinc coating shall not be applied when the atmospheric or surface temperature is less than 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.

Except as approved by the Engineer, a minimum curing time of 72 hours shall be allowed between application of inorganic zinc coating and pressure rinsing with fresh water.

All exposed areas of inorganic zinc coating, where finish coats are specified, shall be thoroughly rinsed with a pressure system using fresh water and 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 inorganic zinc coating shall be tested for adhesion and cure. The locations of the tests will be determined by the Engineer. The sequence of the testing operations shall be determined by the Contractor. The testing for adhesion and cure will be performed no sooner than 72 hours after application of the single undercoat of inorganic zinc coating. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to locate 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 and shaft in accordance with 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 cure will be checked by the Engineer. 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.

The final coat of inorganic zinc coating shall be applied after testing for adhesion, testing for cure, and completion of all operations that may damage the steel surface, including correction of skips and holidays, or areas of non-uniform appearance.

The area to receive the final coat of inorganic zinc coating shall be lightly roughened by abrasive blasting using an abrasive no larger than 30 mesh. Abrasive blasting shall remove no more than 0.5 mil of inorganic zinc. The surface to be lightly roughened shall be free from moisture, dust, grease or any deleterious material. The undercoated areas of the under surfaces of bottom flanges shall be protected from abrasive blast cleaning operations.

The final coat of inorganic zinc coating shall be applied to the required dry film thickness in one uniform application within 24 hours after light roughening. The dry film thickness of the final coat of inorganic zinc coating shall be not less than 1 mil nor more than 3 mils.

The total dry film thickness of all applications of the single undercoat and final coat of inorganic zinc coating shall be not less than 5 mils nor more than 11 mils.

Finish coats will not be required.

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 requirements 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 and shaft. The grout shall harden prior to placing the next lift of grout, unless a bracing system is used.

Suitable external grout injection valves shall be installed for filling of the casings and bumper boxes. 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 column, shaft or diaphragm.

Casings shall be sealed at the bottom and sides where necessary. Grout shall be pumped into the casing such that the grout head is maintained uniformly around the column, shaft or diaphragm 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 Section 51-1.135, "Mortar," of the Standard Specifications.

Casings shall be positioned with spacers to center the casing around the existing column or shaft at the location shown on the plans. Spacers may be welded to the inside of the casing.

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 and shaft casings will be measured and paid for in accordance 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 and shaft 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 and shaft casings filled with grout, complete in place, including bumper boxes, cover plates, stiffeners, bolts, nuts, washers, stud connectors, cleaning and painting of casings, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1B.36 CLEAN AND PAINT STRUCTURAL STEEL

Exposed new metal surfaces and connections to existing steel, 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.

No extension of contract time will be granted as a result of temperature or humidity which exceeds the limits for cleaning or painting designated herein, except as approved by the Engineer.

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 nozzle shall have a maximum fan tip angle of 30.

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 second paragraph in Section 59-2.01, "General," of the Standard Specifications is amended to read:

All exposed surfaces of structural steel and other metals, including inside surfaces of bolt holes when required, except galvanized or metalized surfaces, shall be cleaned and painted.

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

Contact surfaces of stiffeners, railings, or built up members, or any open seam exceeding 6 mils in width that would retain moisture shall be caulked with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II, or other approved material. The sealing compound shall be applied no sooner than 72 hours after the last application of undercoat. The sealing compound shall be allowed to cure as recommended by the manufacturer prior to rinsing and application of the first finish coat. When no finish coats are applied, the sealing compound shall be gray in color.

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 in conformance with the requirement of Steel Structure Painting Council Specification SSPC-PA2.

The existing paint systems consist of materials listed in "Existing Highway Facilities" of these special provisions.

CLEANING.--Exposed new metal surfaces and areas of connections to existing steel, except where galvanized, shall be dry blast cleaned and dry spot blast cleaned, respectively, in conformance with the provisions 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 requirement of with ASTM Designation: D 4417.

The areas of connections to existing steel to be dry spot blast cleaned shall consist of, as a minimum: (1) new and existing contact surfaces and existing member surfaces under bolt heads, nuts or washers of high-strength bolted connections, (2) exposed bare surfaces of existing steel remaining after trimming, cutting, drilling or reaming and (3) areas of existing steel within a 4-inch radius measured in any direction from the of point of application of heat for welding or flame cutting.

Abrasives used for blast cleaning existing steel shall in conformance to the requirements of Abrasive Specification No. 1, “Mineral and Slag Abrasives,” of the Steel Structures Painting Council and shall not contain hazardous material. Silica sand abrasives, if used, shall be Class A 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, except for silica sand.

The inside surfaces of bolt holes shall be cleaned in conformance with the provisions of Surface Preparation Specification No. 1, "Solvent Cleaning," of the Steel Structures Painting Council, and visible rust shall be removed.

At the main spans vertical member retrofitting where stiffeners and cover plates are added to existing steel members without the removal of any existing steel, the existing steel area below the stiffeners and cover plates need not be dry blast cleaned but shall be steam cleaned in accordance with Section 59-2.05, “Steam Cleaning,” of the Standard Specifications.

PAINTING.--Blast cleaned surfaces shall receive a single undercoat consisting of a waterborne inorganic zinc coating conforming to the provisions of AASHTO Designation M 300, Type II, except that: 1) the first 3 sentences of Section 4.7, "Primer Field Performance Requirement," and the entire Section 4.7.1 shall not apply, and 2) zinc dust shall be

Type II in conformance with ASTM Designation: D520. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory.

The inside surfaces of bolt holes shall be painted with one application of a zinc rich primer (organic vehicle type).

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

Inorganic zinc coating shall not be applied when the atmospheric or surface temperature is less than 45° F nor more than 85° F nor when the relative humidity exceeds 85 percent.

The single undercoat of inorganic zinc coating shall be applied to the required dry film thickness in 2 or more applications within 4 hours after blast cleaning.

All areas where mudcracking occurs in the inorganic zinc coating shall be blast cleaned and repainted 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 pressure rinsing with fresh water.

All exposed area of inorganic zinc coating shall be thoroughly rinsed with a pressure system using fresh water and 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 inorganic zinc coating shall be tested for adhesion and cure. The locations of the tests will be determined by the Engineer. The sequence of the testing operations shall be determined by the Contractor. The testing for adhesion and cure will be performed no sooner than 72 hours after application of the single undercoat of inorganic zinc coating. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to locate 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 no more than 6 locations per member in accordance with 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 cure will be checked by the Engineer. 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.

All exposed area of inorganic zinc coating shall receive a minimum of 2 finish coats of an exterior grade latex paint supplied by the manufacturer of the inorganic zinc coating.

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 according 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. 34272. 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 the existing paint color. 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.

MEASUREMENT AND PAYMENT.--The contract price paid per square foot for spot blast clean and paint undercoat shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in spot blast cleaning and painting undercoat on the existing surfaces 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 clean and paint structural steel shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in cleaning and painting the exposed surfaces of the new structural steel and finish coat on undercoated areas of existing metal, complete in place, including rinsing with a pressure system, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1B.37 TRAVELING MAINTENANCE SCAFFOLDS

Traveling maintenance scaffold work to be done consists, in general, of furnishing and installing steel structures, dimension lumber, plywood decking, cleaning and painting structural steel, and demonstrating the operation of the lower deck 7 traveling maintenance scaffolds and installing signs on 3 existing traveling maintenance scaffolds, including the lowering of existing railing supporting the traveling maintenance scaffolds, as shown on the plans and in conformance with the requirements of the Standard Specifications and these special provisions. Appurtenances of the traveling maintenance platforms include mechanical components (pneumatic motors and brakes and hand-operated extendible decks) and perimeter safety netting.

Attention is directed to Section "Order of Work" of these special provisions regarding the timing of the traveling maintenance scaffolds.

10-1B.37A STEEL STRUCTURES

Construction of steel structures for traveling maintenance scaffolds and structural steel (rail lowering) shall conform to the provisions in "Steel Structures," elsewhere in these special provisions and the requirements specified in this section.

The structural steel work for the lower deck traveling maintenance scaffolds consists, in general, of constructing new scaffolds from structural shapes and plates.

Structural steel rolled shapes used in W8x21 girders shall conform to the Charpy V-notch impact values specified for steel plate in Section 55-2, "Materials," of the Standard Specifications.

High-strength structural steel bolts, or equivalent fasteners, and other bolts attached to structural steel, with nuts and washers shall be galvanized by mechanically deposited coating.

FABRICATION.--The first subparagraph of the third paragraph in Section 55-3.14, "Bolted Connections," of the Standard Specifications is amended to read:

> Contact surfaces of all high-strength bolted connections shall be cleaned and coated with waterborne inorganic zinc coating before assembly in accordance with the provisions for cleaning and painting structural steel in the special provisions. The total thickness of coating on each surface shall be between one and 4 mils and may be applied in one application.

Tension control bolts shall be used in high-strength bolted connections. Other bolts conforming to ASTM Designation: A 325 may be used where the use of tension control bolts is not practical because of location, length or size and when approved by the Engineer. Direct tension indicators shall not be used unless otherwise specified.

Tension control bolts shall conform to the requirements for other equivalent fasteners or fastener assemblies as specified in the fifth paragraph of Section 55-3.14 of the Standard Specifications. Tension control bolts shall have a splined end extending beyond the threaded portion of the bolt that shears off when the specified bolt tension is attained. During installation, the torque required to turn the nut on the tension control bolt shall be counterbalanced by the torsion shear resistance of the splined end of the bolt. The bolt head type and head location shall be consistent within a joint.

The sheared ends of tension control bolts shall be completely sealed with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II. The sealant shall be gray in color and shall have a minimum thickness of 50 mils. The sealant shall be applied to a clean sheared surface on the same day that the splined end is sheared off.

Dimensional details and workmanship for welded joints in tubular and pipe connections shall conform to the provisions in Part C, Structural Details; Part D, Special Provision for Welding Tubular Joints; and Part E, Workmanship, in Section 10 of AWS D1.1.

10-1B.37B DIMENSION LUMBER

Dimension lumber consisting of 2" x 12" scaffold planking, 2" x 4" toe boards, and 2" x 6" toeboards bolted to steel supports shall be constructed in conformance with the details shown on the plans and the provisions in Section 57, "Timber Structures," of the Standard Specifications and these special provisions.

Dimension lumber for 2" x 12" scaffold planking shall be untreated Douglas fir Select Structural or better. Lumber for toeboards shall be No. 2 or better.

Steel surfaces that will be covered by timber shall be painted the full number of applications prior to placing timber. Painting of timber plank will not be required.

All lumber used shall be nominal sized and dressed S4S unless otherwise specified in these special provisions.

All lumber used shall be preservative treated. Treatment shall conform to the provisions in Section 58, "Preservative Treatment of Lumber Timber and Piling," of the Standard Specifications.

10-1B.37C PLYWOOD DECKING

Construction panels shall comply with Voluntary Product Standard PS1, "U. S. Product Standard for Construction and Industrial Plywood" or American Plywood Association (APA), "Performance Standards and Policies for Structural Use Panels."

Plywood and construction panels shall be Marine Grade Group 1 unless otherwise noted.

Each construction panel shall be factory marked with APA or other trademark evidencing compliance with grade requirements.

Construction panels shall be attached to the framing as shown on the plans and these special provisions.

Plywood decking shall be attached to the framing system and shall be continuous over 2 or more supports. Panels shall be installed with the long dimension across the supports, with end joints staggered 4 feet. Joints

between shall be centered above steel joists and shall be either tongue and groove jointed or connected with shear attachments.

10-1B.37D CLEAN AND PAINT STRUCTURAL STEEL

All exposed new metal surfaces for the traveling maintenance scaffolds, except where galvanized, shall be cleaned and painted in accordance with the provisions in Sections 59-2, "Painting Structural Steel," and 91, "Paint," of the Standard Specifications and these special provisions.

Cleaning and painting of existing traveling maintenance scaffolds is not required.

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

> At contact surfaces of stiffeners, railings, or built up members, any open seam exceeding 6 mils in width that would retain moisture shall be caulked with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II, or other approved material. The sealing compound shall be applied after the last application of undercoat. When no finish coats are applied, the sealing compound shall be grey in color.

Contact surfaces of high strength bolted connections shall be cleaned and painted before assembly in accordance with the requirements for bolted connections in "Steel Structures," of these special provisions.

CLEANING.--All exposed new metal surfaces shall be dry blast cleaned in accordance with the provisions 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 accordance with ASTM Designation: D 4417. Rollers, air motors, brakes, extender drives, and other mechanical equipment shall be protected in place before blast cleaning.

PAINTING.--All blast cleaned surfaces shall receive a single undercoat and 2 finish coats.

The single undercoat shall consist of a waterborne inorganic zinc coating conforming to the provisions of AASHTO Designation M 300, Type II, except that the first 3 sentences of Section 4.7, "Primer Field Performance Requirement," and the entire Section 4.7.1 of the AASHTO Specification shall not apply. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory, Telephone No. (916) 227-7000.

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to the provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

Inorganic zinc coating shall not be applied when the atmospheric or surface temperature is less than 45° F. nor more than 100° F. nor when the relative humidity exceeds 85 percent.

The single undercoat of inorganic zinc coating shall be applied to the required dry film thickness in 2 or more applications within 4 hours after blast cleaning.

The total dry film thickness of all applications of inorganic zinc coating, where finish coats are specified, shall be not less than 4 mils nor more than 8 mils.

All areas where mudcracking occurs in the inorganic zinc coating shall be blast cleaned and repainted 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 pressure rinsing with fresh water.

All exposed areas of inorganic zinc coating shall be thoroughly rinsed with a pressure system using fresh water and 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 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. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to locate 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 no more than 6 locations per span on each traveling scaffold in accordance with 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 cure will be checked by the Engineer. 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.

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 25°C, 50% RH, 100-µm 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 according to ASTM Designation: G 53 using FS 40 UV-B bulbs for a minimum of 38 cycles. The cycle shall be 4 hours of ultraviolet (UV) exposure at 60° C. and 4 hours of condensate exposure at 40° C.

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 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 the existing paint color of the bridge. 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.

10-1B.37E MECHANICAL COMPONENTS

Mechanical components consists of the pneumatic power equipment, brakes, controls, hoses, and piping required to provide operational maintenance platforms as shown on the plans and in accordance with the Standard Specifications and these special provisions.

EQUIPMENT.--

GENERAL.--All equipment shall be manufactured from material that is resistant to deterioration or corrosion in a marine environment or shall have protective coating to provide such resistance. Seals and gasket materials shall be suitable for air or non-corrosive gases and shall be resistant to deterioration in a marine environment and hydrocarbons (petroleum or vehicle exhaust).

All equipment shall be capable of operating in a temperature range of 20° F. to 200 ^{o} F. and shall be rated for operation in a pressure range of 25 psig to 150 psig.

All equipment shall be standard commercial products currently being manufactured. Equipment, parts, and technical assistance shall be normally obtainable from the manufacturers or their representatives within 5 calendar days after requesting such parts or assistance.

All bolts shall be secured by cotter-pins to prevent loosening due to vibration.

CODES.--All work, including equipment, materials and installation, shall conform to California Administrative Code, Title 8, Division of Industrial Safety (DIS).

PRODUCTS.--

AIR MOTORS.--The air motors, for the traveler trolley air motor driven trolleys shall be 4 cylinder, reversible, radial piston-type having renewable and interchangeable cylinders and shall have remote control valve chest. Crank pin and connecting rods shall be drop forged construction. Bearings and shafting shall have dust shields.

Starting, reversing, and stopping of the scaffold shall be accomplished by means of a remotely operated throttle valve. When the air pressure supplied at the throttle valve inlet port of the air motor is 90 psig or greater, the air motors shall be capable of propelling the truss-web scaffold at a speed of not less than 60 ft/min.

TRAVELER TROLLEY ASSEMBLY.--The traveler trolley assembly, including 4 drive wheels that carry the scaffold, shall be air motor driven trolleys and shall be installed in accordance with the details shown on the plans and as specified herein.

The drive wheels shall be connected to the air motor by means of a geared speed reducing power train.

The trolley wheel axle frame shall be of high strength malleable iron and the wheels shall be of dense gray cast iron with ball bearings of high grade chrome alloy steel. Dust seals shall be provided for the bearing assembly.

The drive wheel shall be suitable for operation on the lower flange of standard 7" x 15.3 lb. "S" beams.

The rated operating capacity of the trolley assembly shall be as shown on the plans and shall be Man-Rated for 3 tons in accordance with Cal-OSHA requirements.

SAFETY NET TROLLEYS.--Safety net trolleys shall be hook-on type and rated as shown on plans. Trolleys shall have malleable iron frame and ductile iron or steel wheels with tapered threads and shall be equipped with thrust ball bearings in hardened races and with dust seals. Trolley wheels shall be suitable for operation on the lower flange of standard 7" x 15.3 lb. "S" beams and shall be Man-Rated for 2 tons in accordance with Cal-OSHA requirements.

TRAVELER BRAKE ASSEMBLY.--The traveler brake assembly for carrying the safety parking brake system shall conform to the requirements for the air motor driven trolley assembly as specified herein.

SAFETY PARKING BRAKE SYSTEM.--The brakes shall be an air-released and spring-actuated cylinder. The brake assembly shall conform to the details shown on the plans.

The position of the fabric lined brake shoe shall be controlled by means of an operating cylinder having a bore of approximately 6 inches in diameter and a single acting spring loaded piston.

The spring brake actuator shall have an internal spring rated at 1000 pounds at 2.5-inch stroke and 1600 pounds at 0-inch stroke when engaged on the rail. Zero stroke is the fully compressed position.

The brake shall release, permitting movement of the scaffold when the pressure in the operating cylinder is 70 psig or more.

Under a condition of zero air gage pressure, the safety parking brake shall be in the "ON" condition preventing movement of the scaffold.

WHISTLE VALVES.--Whistle valves shall be a 2-way, lever operated normally closed poppet valve. The valve shall have brass or cast iron body and 3/8 inch N.P.T. ports, and when supplied with 100 psig inlet air the valve shall be rated for a flow capacity of 90 SCFM and shall be suitable for 150 psig minimum working pressure.

FOOT VALVES.--Foot valve shall be 3-way, disk or rotor type with a foot operator and spring return. When activated, the valve shall pressurize the control system and release the brake. When deactivated, the spring shall move the valve to the position that vents the control system and apply the brake. The valve shall be 3/4 inch size with cast iron or approved equal body. The flow capacity shall match that of the air trolley motors.

THROTTLE REMOTE CONTROL VALVES.--The throttle remote control valve shall be a lever operated, 4-way, 3 position, disk or rotor type valve. Valve shall have either cast iron or approved equal body and 3/4" N.P.T. ports and, when supplied with 100 psig inlet air, the valve shall be rated for a flow capacity of 300 SCFM and shall be rated for 150 psig, minimum, working pressure.

AIR PIPING.--Piping for air lines shall be Schedule 40, galvanized steel pipe conforming to ASTM Designation: A 53.

Fittings for galvanized steel pipe shall be extra heavy type, galvanized, banded, cast or malleable iron.

BALL VALVES.--Ball valves shall be 150 pound class, bronze body with bronze trim and stainless steel ball.

AIR OUTLETS.--Air outlets shall match the existing outlets on the bridge.

WHISTLES.--Whistles shall have 1 1/2 inches bell diameter and shall produce 100 dB minimum, tone, at 100 psig supplied air. Whistle shall have metal body.

HOSES.--Hoses shall have a rubber core, 2 synthetic body plys, and a weather and abrasion-resistant cover. Hose shall have a minimum working pressure of 300 psi. All clamps, couplings, quick couplings and other hardware used in conjunction with the hose shall be made of stainless steel. Interconnecting hose located on the traveler used to connect hard piping to the air driven trolleys and valves shall be 3/4-inch diameter. Traveler supply air hoses shall be 1-inch and be suspended every 80 feet from the traveler rail using a two wheel trolley sized to fit the existing traveler rail. Each traveler shall be supplied with 400 linear feet of 1-inch hose.

AIR MUFFLERS.--Air mufflers shall be provided on each traveler air driven trolley and shall be sized to pass the entire flow of the motor while not causing excessive back pressure. The sizing of the muffler shall reduce exhaust noise levels so as to not exceed Cal-OSHA levels as required for this application.

SUPPORTS.--Supports shall be commercially manufactured items, Grinnel, Unistrut, or equal. All supports and support components shall be rated to cover all loading conditions and shall be made of galvanized steel.

FILTER-LUBRICATOR.--The filter-lubricator elements shall be similar in size and appearance and shall be supplied by the same manufacturer. A manual drain shall be provided at the low point of the oil storage bowl.

The control and supply air for scaffold operation and braking shall be filtered and lubricated as recommended by the manufacturers of the various components.

The filter shall have a 5-micron rating and shall be rated for 130 SCFM minimum at 90 psig with a 5 psi pressure drop.

The discharge of the filter element shall be connected to the inlet of the lubricating element.

Port sizes for both elements shall be the line size. Locate filters as shown on the drawings. The units shall fit within the depth of the traveler.

PRESSURE GAUGES.--Pressure gauges shall be 2-inch minimum diameter, dial type, with 2 percent accuracy, and 1/4 inch or 1/8 inch N.P.T. back port, and shall be fitted to the control panel as shown on the pans. Pressure gauge shall have a range of 0 - 200 psi.

DRIVE SHAFT.--Drive shaft shall be manufactured of 1040 grade steel to the size shown on the plans. The tolerance for the diameter of the one-inch diameter end of the shaft shall be +.002-inch. The tolerance for the diameter of the 3/4-inch diameter end of the shaft shall be +0.0 - .0005-inch.

SPUR GEAR AND RACK.--Spur gear and rack shall be of the sizes shown on the plans, made from hardened steel with involute tooth form. Spur gear shall have a protruding hub on one side.

PILLOW BLOCK BEARINGS.--Pillow blocks shall have a nickel plated, iron body housing, non-metallic ball bearing cage, grease fitting and locking collar with two set screws. The ball bearing shall be rated for a life of 30,000 hours with a load of 500 pounds at 50 revolutions per minute. Ball bearings shall be equipped with grease seals.

METAL WHEELS FOR DECK EXTENSION MECHANISM--Metal wheels shall be sized as shown on the plans. Wheels shall be made of cast iron or semi steel and shall include a grease lubricated ball or roller bearing. The

capacity of the wheels shall be as shown on the plans where the capacity is given. The minimum capacity of any metal wheel shall be 500 pounds.

POLYURETHANE WHEELS FOR DECK EXTENSION.--Polyurethane wheels shall be sized as shown on the plans. Wheel hubs shall be made of cast iron or semi steel and shall include a grease lubricated ball or roller bearing. The 3 1/4" diameter x 4" rollers shall have a minimum load rating of 1500 pounds and the 4" diameter x 2" wheels shall have a minimum load rating of 1000 pounds.

LUBRICANTS.--All bearings shall be lubricated with lithium grease. Spur gear and rack shall be lubricated with State furnished lubricant (Union HD8000). Rack and spur gear shall be completely lubricated to prevent corrosion.

OPERATION.--When the scaffold distribution piping is connected to the bridge air system (125 psig) a single operator shall be able to operate the scaffold by depressing the foot valve and moving the hand throttling valves from the neutral position.

When the foot valve is depressed air shall be transmitted to release the brake and provide air to the throttle valve.

Moving the hand control of the throttle valves to the proper port alignment shall allow air to flow to the motors.

When the throttle control handle is returned to the neutral position, air supply to the motors shall be cut off and the motors shall stop.

When the foot valve is released air flow to the brake and throttle valve shall be cut off, causing the spring loaded brake to set, the throttle valve to become inoperative, and the air pressure to the brake to be vented. The foot valve is a dead man safety control which causes the brake to set whenever the pedal is released.

EXECUTION.--

INSTALLING PIPING.--Piping shall be installed in accordance with the requirements in the latest edition of the Uniform Plumbing Code with additional requirements specified. Piping shall be located so as to not interfere with the bridge structure and pose a tripping hazard.

CUTTING PIPE--All pipe shall be cut straight and true and the ends shall be reamed to the full inside diameter of the pipe after cutting.

All pipe shall be cut by a power hacksaw, a circular cutting machine using an abrasive wheel, or in a square-end saw vise by means of a hand saw. The pipe shall be reamed after cutting and rough edges or burrs removed so that a smooth and unobstructed flow will be obtained.

DAMAGED PIPING.--Pipe that is cracked or otherwise damaged shall be removed from the work.

PIPE JOINTS AND CONNECTIONS.--Joints in threaded steel pipe shall be made with a pipe joint compound that is non-hardening and non-corrosive, placed on the pipe and not in the fittings.

The use of thread cement or caulking of threaded joints will not be permitted. Threaded joints shall be made tight. Long screw or other packed joints will not be permitted. Any leaky joints shall be remade with new material.

CLEANING AND CLOSING OF PIPE--The interior of all pipe shall be cleaned before installation. All openings shall be capped or plugged as soon as the pipelines are installed to prevent the entrance of any materials. The caps or plugs shall remain in place until their removal is necessary for completion of the installation. All completed systems shall be flushed or blown out.

SECURING PIPE--Pipe shall be held in place by iron hangers, supports, pipe rests, anchors, sway braces, guides or other special hangers. Material for hangers and piping shall be compatible with piping. Allowances shall be made for expansion and contraction.

Horizontal and vertical piping shall be securely supported and braced to prevent swaying, sagging or flexing of joints.

CONTROL VALVES.--All control valves shall be installed as shown on the plans and according to manufacturer's recommendations.

TESTING AND ADJUSTING SYSTEMS.--

PRE-TEST REQUIREMENTS.--Before starting or operating systems, the Contractor shall flush and clean equipment and check for proper installation, lubrication and servicing.

GENERAL REQUIREMENTS.--The Contractor shall test and start up mechanical systems upon project completion as hereinafter specified.

The Contractor shall follow the equipment manufacturer's break-in procedure for all equipment before full load testing.

Final adjustments and balancing of the systems shall be performed so they will operate as specified.

The Contractor shall replace or revise any equipment, systems, or work so they will operate as specified.

Particular care shall be used in lubricating bearings to not overfill with lubricant and to not blow out the seals.

The Contractor shall repair, or replace with new equipment, any equipment damaged during shipment, after delivery, during installation, and during testing.

The Contractor shall perform tests throughout the period of installing the pipe to insure the lines are airtight and the final pressure testing can be conducted without delay.

For final pressure testing, all piping, fittings, valves and hoses shall be pressure tested as one unit. The system shall be pressurized to 150 psi with air and allowed to stand for 2 hours. No measurable pressure drop shall occur during this time. If any pressure drop is observed all leaks shall be identified and repaired. The test shall then be repeated until a successful test is obtained.

OPERATIONAL TEST.--Each traveler shall successfully travel the full distance of the span forward and backward for 2 complete cycles, at a full speed of 60 feet per minute. During each operational cycle, the traveler braking system shall be exercised from full speed operation in both directions, and the deadman brake function shall be demonstrated. Adjustments shall be made to provide a maximum of 60 feet per minute forward and backward velocity and to provide smooth deceleration when coming to a stop. At the end of each span, a complete parking stop shall be demonstrated. Documentation shall be provided to substantiate the test was performed.

PROJECT COMPLETION TESTS.--The Engineer shall be notified, in writing, at least 3 days in advance of starting these tests.

Upon completion of mechanical work and pre-test requirements, or at such time prior to completion as determined by the Engineer, the Contractor shall operate and test installed mechanical systems and include at least one 8-hour day to demonstrate satisfactory overall operation. Testing shall be in accordance with the operational test described herein.

Portable fire extinguishers shall conform to NFPA 10-90, and shall be UL listed, charged and ready for service. Extinguishers shall be pressurized stainless-steel shell cylinders activated by top squeeze handle, shall be rated for use on A, B, and C class fires, and shall have a minimum capacity of 20 pounds. Mounting bracket shall be stainless steel.

10-1B.37F MISCELLANEOUS METAL

Miscellaneous metal used for the traveling maintenance scaffolds shall conform to the provisions in Section "Miscellaneous Metal (Bridge)" elsewhere in these special provisions and the requirements specified in this section.

Miscellaneous metal for the traveling maintenance scaffolds shall consist of the miscellaneous bridge metal items listed in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications, and the following:

Safety Net Hardware
Cable Railing

Cable shall be wire rope with a minimum diameter of 1/2 inch, and a minimum breaking strength of at least 7,400 pounds. Cable wire rope, swaged fittings, rope thimbles, open sockets, and cable clamps shall be stainless steel, type 304.

Turnbuckles, U-bolts, and chain shackles shall be commercial quality. Turnbuckles shall have jaw or eye ends.

The cables shall be tensioned to provide taut railings between supports.

10-1B.37G SAFETY NET SYSTEMS

Safety net systems shall conform to the provisions for miscellaneous bridge metal in Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

Safety nets and their installations shall be capable of absorbing an impact force equal to that produced by the drop test specified in these special provisions. Drop test shall include the net, frame and hanger system.

Safety nets and safety net installations shall be drop-tested on each traveler after initial installation and before Contractor demonstrates the operation of the travelers. The drop-test shall consist of a 400 pound bag of sand 30 plus or minus 2 inches in diameter dropped into the net from the highest walking/working surface at which employees

are exposed to fall hazards, but not from less than 42 inches above that level. Nets exhibiting any damage due to this test may be rejected by the Engineer.

Materials, equipment, or tools which have fallen into the safety nets during Contractor's operations shall be removed as soon as possible from the net.

The maximum size of each safety net mesh opening shall not exceed 36 square inches nor be longer than 6 inches on any side. The opening, measured center-to-center of mesh ropes or webbing, shall not be longer than 6 inches. All mesh crossings shall be secured to prevent enlargement of the mesh opening.

Each safety net (or section of it) shall have a border rope for webbing with a minimum breaking strength of 5,000 pounds.

Connections between safety net panels shall be as strong as integral net components and shall be spaced not more than 6 inches apart.

Each safety net shall be resistant to degradation from ultraviolet light, ozone, and petrochemicals.

Member cross-sectional dimensions shown on the plans for the net framing, hangers, and connections are minimum. Contractor shall verify all sizes, connections, and details and modify them as required to resist the drop test.

10-1B.37H SIGNS

Signs shall conform to the details shown on the plans and these special provisions.

Contractor shall supply all sign panels and fastening hardware.

Any chipping or bending of sign panels shall be considered as sufficient cause to require replacement of panels at the Contractor's expense.

MEASUREMENT AND PAYMENT.--Traveling maintenance scaffolds will be measured and paid for by the unit from actual count erected.

The contract unit price paid for traveling maintenance scaffold shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in furnishing and erecting the travelers, complete in place, including steel structures (except for structural steel (rail lowering)), dimension lumber, plywood decking, cleaning and painting structural steel, mechanical components, miscellaneous metal, safety net systems, sign, and testing, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Measurement and payment for furnish structural steel (rail lowering) and erect structural steel (rail lowering) shall conform to the provisions in Sections 55-4.01, "Measurement," and 55-4.02, "Payment," of the Standard Specifications and these special provisions.

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

If a portion or all of the welded structural steel for traveling maintenance scaffolds or structural steel (rail lowering) is fabricated more than 300 air line miles from both Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. Whereas it is and will be impracticable and extremely difficult to ascertain and determine the actual increase in such expenses, it is agreed that payment to the Contractor for furnish structural steel (rail lowering) or traveling maintenance scaffold, whichever is applicable, for furnishing said structural steel from each fabrication site located more than 300 air line miles from both Sacramento and Los Angeles will be reduced $5,000 or by an amount computed at $0.020 per pound of structural steel fabricated, whichever is greater, or in the case of each fabrication site located more than 3,000 air line miles from both Sacramento and Los Angeles, payment for furnish structural steel (rail lowering) or traveling maintenance scaffold, whichever is applicable, will be reduced $8,000 or by $0.036 per pound of structural steel fabricated, whichever is greater.

If a portion or all of check samples are removed at a mill more than 300 air line miles from both Sacramento and Los Angeles, shop inspection expenses will be sustained by the State which are in addition to expenses incurred for fabrication site inspection. Payment to the Contractor for furnishing structural steel (rail lowering) or traveling maintenance scaffold, whichever is applicable, will be reduced $2,000 for each mill located more than 300 air lines miles from both Sacramento and Los Angeles.

10-1B.38 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 "Field Welding Quality Control" elsewhere in these special provisions.

Miscellaneous metal (bridge) shall consist of the miscellaneous bridge metal items listed in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications, and the following:

Bumper shear key assemblies.
Bumper bracket assemblies.
High strength rods for core and pressure grout (unless included in another item of work).
Plates for end diaphragm retrofit.
Brackets, plates and plate restrainers for hinge retrofit.
Plates and studs embedded in new concrete shear keys and spandrel beams.
Outside bumpers, angles plates and brackets for end diaphragm retrofit at piers 72 to 78 and 78R (except otherwise stated elsewhere in these special provisions).
Utility hangers.

The high strength rods shall conform to the requirements of ASTM Designations: A722, including all supplementary requirements. Nuts for threaded bar shall be from the same manufacturer of said bar and shall be capable of developing the full capacity of the bar. High strength bolts shall conform to the requirement of ASTM Designation: A325. Steel angle and plate shall conform to the requirement of ASTM Designation: A709, Grade 36.

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.

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 the ferrule loop type.
All metal parts of anchorage devices shall be fabricated from stainless steel conforming to the requirements of ASTM Designation: A 276, Type 304 or 316.

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, or miscellaneous metal (restrainer) are designated as final pay items in the Engineer's Estimate.

10-1B.39 MISCELLANEOUS METAL (RESTRAINER-CABLE TYPE)

Miscellaneous metal (restrainer-cable type) shall conform to the provisions for bridge joint restrainer units in Section 75-1.035, "Bridge Joint Restrainer Units," of the Standard Specifications and these special provisions.

Loose dirt and dust shall be washed from existing contact surfaces of high strength bolted connections without disturbing the existing paint. Full compensation for washing loose dirt and dust from existing contact surfaces of high strength bolted connections will be considered as included in the contract price paid for the item of work requiring the washing and no separate payment will be made therefor.

Cleaning and painting of existing contact surfaces of high strength bolted connections that contain rust, loose paint or other foreign substances, except loose dirt and dust, will be considered as extra work as specified in Section 4-1.03D, "Extra Work," of the Standard Specifications. Cost of repair of damage to existing paint caused by the Contractor's operations shall be borne by the Contractor.

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 will 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.

The cable yield indicator shall be machined from hot-rolled bars of steel conforming to AISI Designation: C 1035 and shall be annealed, suitable for cold swaging. The heat number and manufacturer's identifying mark shall be stamped on the end surface of each cable yield indicator. The wall thickness of the reduced section of the cable yield indicator shall be machined by the Contractor so that the indicator yields at a load between 36.0 kips and 38.0 kips when tested in compression along the major axis at a test speed not to exceed one half inch per minute. Two certified copies of the mill test and heat treating reports of each heat of bars used for cable yield indicators shall be furnished to the Engineer.

The disc springs shall be made from steel conforming to ASTM Designation: A 684/A 684M, Grade 1075. Galvanizing of the disc springs will not be required. The disc springs shall be cleaned and painted with a paint recommended by the manufacturer and color coded as shown on the plans.

The seventh subparagraph of the fourth paragraph of Section 75-1.035, “Bridge Joint Restrainer Units,” of the Standard Specifications is amended to read:

The following materials shall be furnished to the Engineer at the manufacturer’s plant:

1. One sample cable assembly, consisting of a cable properly fitted with swaged fitting and right hand thread stud at both ends, 3 feet in total length, for each 200 cable assemblies or fraction thereof produced.
2. One turnbuckle fitted with an 8-inch stud at each end for each 200 turnbuckles or fraction thereof produced.
3. One percent of the cable yield indicators, but no fewer than 8, produced from each mill heat.
4. Two disc springs of each size produced from each mill heat.

The Contractor shall notify the Engineer, in writing, 2 days prior to tightening and setting of cable restrainer units.

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.

Miscellaneous metal (restrainer-cable 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.

Unless otherwise specified elsewhere, full compensation for removing existing cable assemblies will be considered as included in the contract price paid per pound for miscellaneous metal (restrainer-cable type) and no separate payment will be made therefor.

10-1B.40 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 requirements in Section 75-1.035, "Bridge Joint Restrainer Units," of the Standard Specifications and in these special provisions.

Rod assemblies shall conform to the materials and sampling requirements 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.

Neoprene pad shall conform to Paragraph 4 of Section 51-1.14 “waterstops” of the Standard Specifications

All new metal surfaces of restrainer-rod type units shall be cleaned and painted in accordance with the provisions in Sections 59-2, "Painting Structural Steel," and 91, "Paint," of the Standard Specifications and the following:

The surfaces to be cleaned and painted shall be dry blast cleaned in accordance with the provisions of Surface Preparation 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 not less than 1.5 mils as measured in accordance with ASTM Designation: D 4417.

All blast cleaned surfaces shall receive a single undercoat consisting of a waterborne inorganic zinc coating conforming to the provisions of AASHTO Designation M 300, Type II, except that the first 3 sentences of Section 4.7, "Primer Field Performance Requirement," and the entire Section 4.7.1 of the AASHTO Specification shall not apply. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory, (916) 227-7000.

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to the provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

Inorganic zinc coating shall not be applied with 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 inorganic zinc coating shall be not less than 4 mils nor more than 8 mils.

All areas where mudcracking occurs in the inorganic zinc coating shall be blast cleaned and repainted with inorganic zinc coating to the specified thickness.

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 not less than 100 percent of the specified ultimate tensile strength of the steel rod.

The Contractor shall be responsible for determining the required lengths of the rod assemblies.

The rod assemblies shall be shipped as a complete unit including anchorage device and coupler.

Bearing plates shall conform to the requirements of ASTM Designation: A 36.

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 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.

10-1B.41 CONCRETE BARRIER (TYPE 27 MODIFIED)

Concrete barriers (Type 27 Modified) shall conform to the provisions in Section, "Concrete Barrier," elsewhere in these special provisions.

SECTION 10-2. (BLANK)

SECTION 10-3. ELECTRICAL WORK

SECTION 10-3A. SEISMIC MONITORING SYSTEM WORK

10-3A.01 SCOPE

This work shall consist of installing the seismic monitoring system in accordance with the details shown on the plans, the provisions in Section 86, “Signals, Lighting and Electrical Systems” of the Standard Specifications, the provisions in Chapter 6, “Specifications for Cabinet Models 332, 334 and 336”, of the Traffic Signal Control Equipment Specifications, the Standard Plans and these special provisions.

Electrical work shall include furnishing all labor, materials, equipment and services required to construct and install the complete seismic monitoring system shown on the plans.

System layouts are generally diagrammatic and location of equipment is approximate. Exact routing of conduits and other facilities and location of equipment is to be governed by structural conditions and other obstructions, and shall be coordinated with the work of other trades. Equipment requiring maintenance and inspection shall be located where it is readily accessible for the performance of such maintenance and inspection.

Related work.--Earthwork, foundations, sheet metal, painting, mechanical and such other work incidental to and necessary for the proper installation and operation of the seismic monitoring system work shall be done in accordance with the requirements specified for similar work in these special provisions.

Order of work.--The Contractor shall first install the seismic monitoring casing, construct the free field, mount the seismic sensor enclosures, install the recorder cabinets and the complete conduit system.

The Contractor shall pull all the sensor cables (without any splices) from each seismic sensor enclosure to the respective seismic recorder location as shown on the plans. In addition, the Contractor shall pull in the interconnecting cables (without any splices) from each seismic recorder location to the next seismic recorder location as shown on the plans.

The Contractor shall insure that electrical power and telephone service is present at each of the recorder locations where applicable.

The Contractor shall notify the Engineer in writing at least 14 working days in advance when the Contractor wants The State Division of Mines and Geology (DMG) to install and test their equipment and sensors as specified elsewhere in these special provisions.

10-3A.02 STATE FURNISHED MATERIALS

Attention is directed to Section 8-1.01, “State Furnished Materials”, of the Standard Specifications.

The following materials will be furnished to the Contractor:

FBA pigtails
Seismic sensor mounting plates
Down hole sensor alignment devices

The Contractor shall notify the Engineer in writing not less than 20 working days in advance when the Contractor wants the DMG to deliver the State Furnished material to the Contractor.

State furnished and installed material.--The following materials shall be furnished and installed by State forces:

Down hole seismic sensors and cable to surface
Seismic sensors on bridge and at free field
Seismic recorders
Seismic casing at West Maintenance Yard

State furnished and installed material installation.--After all Contractor supplied equipment, conduit and cable has been installed, the DMG shall be given access to the down holes (on and off the bridge) and free field sites and to all seismic sensor enclosures and seismic recorder locations on the bridge to install and adjust the sensors and recorders of the seismic monitoring system. Access shall include transportation of equipment on the job site, movement of stored materials or parked vehicles, traffic control, manlifts, boats, scaffolding, etc., where necessary. Access is for the purpose of installation, operational testing and to perform any necessary system troubleshooting and repair. The estimates below are for the actual work at the locations and exclude transit time to the work locations and the set-up times of any lifts, scaffolds, etc. Some of the work can be accomplished simultaneously and the DMG will meet with the Engineer and the Contractor at the job site to work out a mutually agreeable schedule.

1. Seismic recorder locations (5 Total):

   a) The DMG will require access to the recorder cabinets prior to their installation for the purpose of measuring and preparing to mount the recorders into the cabinets.
   b) The DMG will need approximately 3 days access per recorder location to install and wire the recorders.
   c) The DMG will require access to each recorder location during the installation and testing of the seismic sensors wired to that specific recorder location.
   d) The DMG will need approximately 3 days access per recorder location during the final system testing and any necessary troubleshooting and repair.

2. Bridge seismic sensor enclosure locations (32 Total):

   a) The DMG will require approximately 30 minutes access time at each enclosure on a minimum of 2 occasions (installation and operational testing) to accomplish their work.

3. Down hole and Free field locations on land (3 Total) plus down hole locations on piers 26, 39, and 48:

   a) The DMG will require approximately 1/2 day access time at each down hole and free field location plus 2 additional days for wiring and testing.

10-3A.03 SUBMITTALS

Product data.--A list of materials and equipment to be installed, manufacturer's descriptive data, and such other data as may be requested by the Engineer shall be submitted for approval.

Manufacturer's descriptive data shall include complete description, performance data and installation instructions for the materials and equipment specified herein.

Manufacturer's descriptive data shall be submitted for the following:

Sensor cable
Interconnecting cable
Phone cable
Cable support (strain relief)
Seismic sensor enclosures
Junction box and splice box
Free field man hole

Down hole junction box
Down hole access box
Pull box
Recorder cabinet
Expansion fittings

10-3A.04 CONDUITS AND FITTINGS

Conduit shall conform to Section 86-2.05 “Conduit” in the Standard Specifications and these special provisions. The conduit material specified for Type 2 in Section 86-2.05A, “Material”, of the Standard Specifications is amended to read:

2. Hot-dip galvanized rigid steel conduit conforming to 1 above and coated with polyvinyl chloride or polyethylene. The exterior thermoplastic coating shall have a minimum thickness of 35 mils. The interior of the conduit and fittings shall be coated with a urethane lining.

Electrical metallic tubing shall be formed of cold rolled strip steel, electrical resistance welded continuously along the longitudinal seam with zinc coating outside and enamel or lacquer coating inside. Couplings shall be electroplated, rain and concrete tight, gland compression type, steel body couplings with malleable iron nuts. Connectors shall be electroplated, rain and concrete tight, gland compression type, steel body connectors with male hub, malleable iron nut and insulated plastic throat.

Conduit imbedded in or installed on concrete shall be Type 2.

Conduit attached to steel structures shall be Type 1 except where shown as Type 4.

Underground conduit shall be Type 2 or Type 4. Where Type 4 is used, the wall or foundation penetration and the adjacent conduit bend in the soil shall be Type 2 conduit.

Conduit inside the maintenance station or toll plaza basement shall be EMT or Type 1.

Couplings shall be electroplated, rain and concrete tight, gland compression type, steel body couplings with malleable iron nuts.

Connectors shall be electroplated, rain and concrete tight, gland compression type, steel body connectors with male hub, malleable iron nut and insulated plastic throat.

Type 1 conduit shall be used unless otherwise shown on the plans or specified in these special provisions.

Type 4 conduit shall be used where shown on the plans.

Conduit trade sizes are shown on the plans. No deviation from the conduit size shown on the plans will be permitted without written permission from the Engineer.

A conduit not yet terminated in a box shall have the end protected by installing a coupling and a plug wrench tight.

Type 3 conduit bends of 30 degrees or greater shall be factory-made long radius sweeps. Bends less than 30 degrees shall be made using an approved heat box.

Locations of conduit runs shall be planned in advance of the installation and coordinated with the seismic retrofit work in the same areas and shall not unnecessarily cross other conduits or pipe, nor block access to mechanical or electrical equipment.

Where practical, conduits shall be installed in groups in parallel, vertical or horizontal runs and at elevations that avoid unnecessary offsets.

Exposed conduit shall be installed parallel and at right angles to the building or bridge lines.

All raceway systems shall be secured to the building or bridge structures using specified fasteners, clamps and hangers.

Single conduit runs shall be supported by using one hole pipe clamps. Where run horizontally on walls in damp or wet locations, conduit shall be installed with "clamp backs" to space conduit off the surface.

Raceways of different types shall be joined using approved couplings or transition fittings.

Expansion/Deflection couplings (fittings) shall be installed where conduit crosses expansion joint and as shown on the plans.

All floor and wall penetrations shall be sealed water-tight.

Conduit terminations.--Type 1 conduits shall be securely fastened to cabinets and boxes using 2 locknuts and specified insulating metallic bushing. Electrical metallic tubing shall be securely fastened to cabinets, boxes and gutters using specified connectors. Conduit terminations at exposed weatherproof enclosures and cast outlet boxes shall be made watertight using specified hubs.

Type 3 conduits shall be terminated inside the underground pull boxes with an approved conduit bushings or fittings. All conduits shall enter the pull box at an angle of 45 degrees or more.

All future conduits terminated in underground pull boxes or exposed indoor and outdoor shall be provided with watertight conduit plugs.

10-3A.05 CABLES AND CONDUCTORS

Sensor cable.--Sensor cable shall be eight (8) tinned copper, insulated conductors (4 twisted shielded pairs with individual drain wires), AWG #22 (7 x 30 stranded) with insulation 0.007 inch thick. Cable shall have an overall aluminum-polyester shield, AWG #22 stranded tinned copper drain wires, an outer jacket 0.009 inch thick and an overall nominal outside diameter of 0.3 inch or less. Cable shall be instrument cable, NEC rated CLP2 plenum cable rated for 150 degrees C. Cable shall have a color code as specified below:

Color Code: 1st pair - red, black; 2nd pair - white, brown; 3rd pair - blue, violet; 4th pair - yellow, orange

Sensor cable shall be United Wire and Cable Co., Inc.; Consolidated Wire and Cable; or equal.
Spare cable shall be the same as sensor cable.

Interconnecting cable.—Interconnecting cable shall be eight (8) tinned copper, insulated conductors (4 twisted pairs), AWG #24 (7 x 32 stranded) with insulation 0.007 inch thick and an overall aluminum-polyester shield. Cable shall have an overall tinned copper braid shield (90% coverage), an AWG #24 stranded tinned copper drain wire, an outer jacket 0.009 inch thick and an overall nominal outside diameter of 0.35 inch or less. Cable shall be EIA RS-485 Applications cable, NEC rated CL2P plenum cable rated for 150 degrees C. Cable shall have a color code as specified below:

Color Code: 1st pair-White/Blue Stripe, Blue/White Stripe; 2nd pair-White/Orange Stripe, Orange/White Stripe; 3rd pair-White/Green Stripe, Green/White Stripe, 4th pair-White/Brown Stripe, Brown/White Stripe.

Interconnecting cable shall be United Wire and Cable Co., Inc.; Consolidated Wire and Cable; or equal.

Phone cable.--Phone cable shall be two (2) twisted shielded conductor pairs, minimum AWG #20 tinned copper, polyethylene insulated, with a foil aluminum-polyester shield, drain wire and chrome PVC jacket rated for 300 Volts.

Conductors.--Conductors shall conform to Section 86-2.08 “Conductors” in the Standard Specifications and these special provisions.

Wire connections and devices.--Wire connections and devices shall be pressure or compression type, except that connectors for No. 10 AWG and smaller conductors in dry locations may be preinsulated spring-pressure type.

Cable support.--Cable support shall be wedging plug type suitable for the number, size and types of cables to be supported in a vertical conduit run. Body of plug shall be malleable iron and plug shall be of one piece construction suitable for mounting in the junction box or as shown on the plans.

Conductor and cable installation.--Conductors shall not be installed in conduit until all work of any nature that may cause injury is completed. Care shall be taken in pulling conductors that insulation is not damaged. An approved non-petroleum base and insulating type pulling compound shall be used as needed.

All cables shall be installed and tested in accordance with manufacturer's recommendations.

Unless otherwise shown on the plans, provide 16 inches of slack at each outlet and device, expansion/deflection fittings, connection or as shown on the plans. If the outlet or device is not at the end of a run of wire, connection shall be made with correctly colored pigtails tapped to the runs with splices as specified herein.

All pressure type connectors and lugs shall be retightened after the initial set.

Sensor and interconnecting cables installation.--Sensor and interconnecting cables shall be installed continuous without any splices. One sensor cable shall be installed for each seismic sensor channel and one interconnecting cable shall be installed between seismic recorder locations.

Conductor identification.--The neutral and equipment grounding conductors shall be identified as follows:

Neutral conductor shall have a white or natural gray insulation except that conductors No. 4 and larger may be identified by distinctive white marker such as paint or white tape at each termination.

Equipment grounding conductor shall be insulated have green insulation over its entire length except that conductors No. 4 and larger may be permanently identified by distinctive green markers such as paint or green tape over its entire exposed insulation.

Feeder and branch circuit ungrounded conductors shall be color coded by continuously colored insulation, except conductors No. 6 AWG or larger may be color coded by colored tape at each connection and where accessible. Ungrounded conductor color coding shall be as follows:

SYSTEM	COLOR CODE
120V-Single phase	Black, white

Branch conductor shall be identified by its panelboard and circuit number. Identification shall be made with one of the following:

1. Adhesive backed paper or cloth wrap-around markers with clear, heat shrinkable tubing sealed over either type of marker.
2. Self-laminating wrap around type, printable, transparent, permanent heat bonding type thermoplastic film markers.
3. Pre-printed, white, heat-shrinkable tubing.

Seismic and interconnect cables identification.--All cables shall be identified at each termination. Each seismic cable shall be marked with the channel number or letter as shown on the plans. Identification shall be made with one of the methods specified under "Conductor Identification".

10-3A.06 ELECTRICAL BOXES

Outlet, device, pull and junction boxes.--Unless otherwise shown or specified, boxes on the bridge shall be cast metal boxes. Minimum size of outlet, receptacle, switch or junction boxes shall be 4-inch square by 1 1/2-inch deep.

Cast metal boxes shall be cast iron boxes with threaded hubs and shall be of the size and configuration best suited to the application shown on the plans.

Seismic sensor enclosure.--Seismic sensor enclosure except type 10 shall be a NEMA Type 4X, 14”x12”x6”D 14 gauge stainless steel continuous hinge enclosure. A 1/8” diameter drain hole shall be drilled into the lowest point of the box. A ground stud (#10-32) shall be installed on one inside corner of the cover. A nameplate with the inscription “SEISMIC SENSOR ENCLOSURE ##” shall b e installed on the cover. “##” shall refer to the enclosure number shown on the plans. Enclosure shall be Hoffman, Catalog No. A-1412CHNFSS6; Circle AW, Catalog No. 14126-4XSCHC (both enclosures without upper and lower mounting flanges); or equal.

Seismic sensor enclosure Type 10.--Seismic sensor enclosure (Type 10) shall be a NEMA Type 6, 12”x12”x6”D cast iron box with cast iron cover. Cover shall be marked “SEISMIC” with 1/4” high capital letters. Cast mounting lugs shall be attached on 2 opposite sides, minimum of 2 lugs each side. One each bossed, drilled and tapped (NPT) hole to accept one inch conduit connector centered between mounting lugs on one side only. One each mounting button drilled and tapped for 1/4” x 20 located in the center (± 1/8”) of the inside bottom of the box. Finish shall be hot dip galvanized. The enclosure shall be O-Z Gedney, Catalog No. YF-121206-SUB with one mounting button, Catalog No. 1MBT, mounting lugs, Catalog No. 4ML1816, and one hole, Catalog No. BDT100; Crouse-Hinds, Catalog No. WCB121208-1-000G (except box shall be 6” deep); or equal.

Downhole access box.--Downhole access box shall be the same as Type 10 except 8 inches deep with conduit hub as shown and with the bottom drilled to mount as shown on the plans.

Downhole splice box.--Downhole splice box shall be the same as Type 10 except with conduit hubs as shown on the plans.

Curb junction box.--Curb junction box shall be a NEMA Type 4, 16”x14”x6”D 14 gauge steel box with continuous hinge cover and mounting flanges, Hoffman Catalog No. A-1614CHNF, Circle AW Catalog No. 1614SCHC, or equal.

No unused openings shall be left in any box. Knockout seals shall be installed as required to close openings.

Junction boxes shall be installed at the locations and elevations and details shown on the plans or specified herein. Adjustments to locations may be made as required by structural conditions and to suit coordination requirements of other trades.

Underground pull boxes.--Pull boxes shall be traffic-rated and conform to Section 86-2.06 "Pull Boxes" in the Standard Specifications and these special provisions.

Free field box shall be a 4'x4'x2'D electrical pull box with steel checker plate cover as shown on the plans.

Down hole junction box.--Down hole junction box(mounted inside the freefield manhole) shall be the same as seismic sensor enclosure (Type 10) except the box size shall be 14"x8"x6"D. Cast mounting lugs shall be attached on 8" sides, minimum of 2 lugs each side. One each bossed, drilled and tapped (NPT) hole to accept 2 inch conduit connector centered between mounting lugs on one side only. One each bossed, drilled and tapped (NPT) hole to accept a one inch water tight strain relief connector per down hole cable as required. These holes are to be centered between the lid and the bottom along a 14" side of the box. The box shall be O-Z Gedney, Catalog No. YF-140806-SUB with mounting lugs, Catalog No. 4ML1816, one hole, Catalog No. BDT200, and appropriate number of holes for down hole cables, Catalog No. BDT100; Crouse-Hinds, Catalog No. WCB120806-3-0000G0( )00 (except box shall be 14" long); or equal.

Manhole.--Manhole shall be 4'x4' (inside dimensions) x2' deep with 6 inch thick walls, bottom and top. The manhole shall be precast or cast-in-place concrete designed for H-20-44 bridge loading. A 3' square hole shall be cut out or formed within the bottom of the manhole. The frame and cover shall be cast iron and cover shall have provisions for hold down bolts. Bolts shall be included. Conduits terminating inside the manhole shall end with bushings specified elsewhere in these special provisions. A cable pulling iron shall be installed in the wall opposite each conduit entrance. Manhole cover shall be marked "SEISMIC".

Manhole installation.--The top of the manhole shall be flush with the finished surface in paved areas and 2 inches above the finished grade in unpaved areas. Where conduits enter the manhole, the space around the conduits shall be grouted tightly or cast in the wall.

Down hole box.--Down hole box shall be high density reinforced concrete box having an inside diameter of 14 inches minimum. The box shall be designed for installation in heavy traffic areas. Box cover shall be cast iron. Box cover shall be marked "SEISMIC".

Down hole box installation.--The top of the down hole shall be flush with the finished surface in paved areas and 2 inches above the finished grade in unpaved areas. Where conduits enter the down hole, the space around the conduits shall be grouted tightly or cast in the wall.

Recorder cabinet.--Recorder cabinets shall conform to Section 2 "Housing Requirements" in Chapter 6, "Specifications for Cabinet Models 332, 334 and 336", of the Traffic Signal Control Equipment Specifications with the following exceptions:

Paragraph 6.2.1 is amended to read:

The housing shall include, but not be limited to, the following:

Enclosure	Hinges and Door Catches
Doors	Gasketing, to isolate the cabinet from any steel
Latches/Locks	Cage supports

Paragraph 6.2.4 is amended to read:

The housing ventilation including intake, exhaust and filtration are as follows:

Paragraphs 6.2.4.3 and 6.2.4.4 shall be deleted.

In addition, the police panel and cabinet cage are not required.

Cabinet shipping requirements - The cabinet shall be delivered mounted on a plywood shipping pallet. The pallet shall be bolted to the cabinet base. The cabinet shall be enclosed in a slipcover cardboard packing shell. The housing doors shall be blocked to prevent movement during transportation.

All bolts, nuts, washers, screws (size 8 or larger), hinges and hinge pins shall be stainless steel unless otherwise specified.

10-3A.07 RECEPTACLES AND SWITCHES

Duplex receptacles.--Duplex receptacles shall be NEMA Type 5-15R, Ground Fault Circuit Interrupter (GFCI), 3-wire, 15-ampere, 125-volt AC, specification grade receptacle suitable for wiring with stranded conductors.

Disconnect switches**.--**Disconnect switches shall be 15-ampere, single pole, 120-volt AC, circuit breaker mounted inside a NEMA 1 enclosure with provision for grounding. Enclosure shall be sized to accommodate a terminal block for neutral conductors. Provide a suitable single barrel lug for the line side of the switch to accept the # 6 stranded wire. A nameplate with the inscription "POWER DISCONNECT" shall be installed on the cover.

10-3A.08 MISCELLANEOUS MATERIALS

Seismic sensor casing.--The downhole casing at the west maintenance yard will be furnished and installed by Caltrans.

The downhole sensor casing at Piers 26 and 39 shall be a 4-inch schedule 40 galvanized steel pipe where imbedded in grout and elsewhere shall be schedule 40 Type 316 stainless steel. The sensor casing shall be centered in an 8-inch pipe attached to the precast jacket assembly. The pipe, fittings, clamps and hardware shall be type 316 stainless steel. The annular space between the 4-inch and 8-inch pipes shall be grouted. The grout shall consist of Portland cement and water. Portland cement shall conform to Section 90-2.01, "Portland Cement" of the Standard Specifications. Water shall conform to Section 90-2.03, "water" of the Standard Specifications. Water content shall be not more than 5 gallons per 94 pounds of cement.

The downhole casing at Pier 48 shall be a 4-inch Schedule 40 pipe. The sensor casing shall extend up through the CISS or CIDH pile, through an empty 12-inch pipe and through a 6-inch pipe in the fender cap. The 12-inch and 6-inch pipes and CISS and CIDH piles are specified elsewhere in the Special Provisions. The sensor casing pipe, fittings and hardware below the 12-inch pipe shall conform to Section 74.2.04, "Pipe, Joints and Fittings" of the Standard Specifications, and above the concrete in the pile shall be Type 316 stainless steel. The sensor casing shall be centered in the 12-inch pipe within the concrete.

Prior placement of sensor casing, the sensor alignment device furnished by DMG shall be installed. Each sensor casing shall be positioned as shown on the plans and blocked to prevent damage during concrete placement. Failure of the sensor package to pass freely down the casing by gravity shall be cause for rejection of a sensor casing. The Contractor shall replace a rejected casing by core drilling to the specified depth and installing and grouting a replacement sensor casing with alignment device, all at the Contractor's expense.

Pull ropes.--Pull ropes shall be nylon or polypropylene with a minimum tensile strength of 500 pounds.

Electrical supporting devices.--Electrical supporting devices shall be one hole conduit clamps with clamp backs, hot-dipped galvanized, malleable cast iron. Beam clamps supporting conduit in box girders shall be malleable iron.

Enclosure mounting materials.--Plates, tubular steel, threaded rods and hardware shall be steel conforming to section 75.103, "Miscellaneous Bridge Metal", of the Standard Specifications.

Ground rod(s).--Ground rod(s) shall be a 3/4 inch (minimum) galvanized or copper clad steel rod, 8 feet long.

Ground rod(s) installation.--The ground rod(s) shall be driven vertically until the top is 6 inches above the surrounding surface. When vertical penetration of the ground rod cannot be obtained, an equivalent horizontal grounding system, approved by the Engineer, shall be installed.

Telephone outlet boxes.--Telephone outlet boxes shall be 4inch square boxes and plates with modular type telephone outlet suitable for ISDN phone lines.

Nameplates.--Nameplates shall be laminated phenolic plastic with white core and black front and back. Nameplate inscription shall be in 1/4" high capitals letters etched through the outer layer of the nameplate material.

Equipment identification.--Equipment shall be identified with nameplates fastened with self-tapping, cadmium-plated screws or nickel-plated bolts.

10-3A.09 TESTING

Functional testing.--After all the seismic sensors and recorders have been installed and connected by the DMG, the seismic monitoring system shall be tested by the DMG to insure that the system functions properly. The Contractor shall

make necessary repairs and replacements at his expense if the source of the problem is determined to be part of the Contractor's scope of work.

10-3A.10 TELEPHONE SERVICE

Scope.--This work shall consist of furnishing and installing an Integrated Service Digital Network (ISDN) telephone service in accordance with the requirements of the serving utilities, the details shown on the plans and these special provisions.

Utility connection.--The Contractor shall make all arrangements and obtain all permits and licenses required for the extension of and connection to each utility service applicable to this project, shall furnish all labor and materials necessary for such extensions which are not performed or provided by the utility, and shall furnish and install any intermediate equipment required by the serving utilities.

Upon written request by the Contractor, the State will pay all utility permits, licenses, connection charges, and excess length charges directly to the utility. Such request shall be submitted not less than 15 days before service connections are required.

The costs incurred by the Contractor for the extension of utilities beyond the limits shown on the plans, and in furnishing and installing any intermediate equipment required by the serving utilities, will be paid for as an ordered change as provided for elsewhere in these special provisions.

Full compensation for any costs incurred by the Contractor to obtain the permits and licenses shall be considered as included in the contract lump sum price paid for seismic monitoring work and no additional compensation will be allowed therefor.

Installation details.--The Contractor shall submit complete service installation details to the serving utilities for approval. Prior to submitting installation details to the serving utility, the Contractor shall have submit said drawings as specified elsewhere in these special provisions to be reviewed and stamped "APPROVED" by the Engineer. Submittals shall be approved by the serving utility prior to commencing work.

Installation of service equipment shall be in accordance with the requirements of the serving utilities as shown on the approved installation details.

10-3A.11 MEASUREMENT AND PAYMENT

Seismic monitoring system shall be paid for on the basis of a lump sum price.

The contract lump sum price paid for seismic monitoring system shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals (except state furnished materials and labor), and for doing all the work involved in furnishing and installing the seismic monitoring system, complete in place, including transportation and storage of state furnished materials, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

SECTION 10-3B. MODIFY SEISMIC RETROFIT ELECTRICAL SYSTEM

10-3B.01 GENERAL

Modifying seismic retrofit electrical system shall be performed in accordance with the details shown on the plans, the applicable provisions of Section 86, "Signal, Lighting, and Electrical Systems," of the Standard Specifications, and these special provisions.

SCOPE.--Modify seismic retrofit electrical system work shall consist of furnishing all labor, materials, tools, equipment, and incidentals to completely relocate, temporarily install and reinstall certain electrical equipment at Substations 2 and 3 at the base of Piers 34 and 48 of the bridge to allow for modifications to the electrical rooms due to the seismic upgrade. Existing electrical equipment to be relocated shall include, as a minimum, but not be limited to; the convertible breaker and control panels, battery racks, battery chargers, heaters, telephone, fire alarm thermostats, and miscellaneous switches and receptacles.

The work shall also include furnishing and installing temporary wood, including removal and disposal when no longer required, plastic dust control barrier complete with access doors and air handling system to prevent dust from entering all electrical equipment within the electrical rooms during construction. The air handling system shall provide both pressurization and exhaust for the electrical rooms. The doors shall allow access to the various work areas.

In addition, the work shall include the relocation, temporary installation and reinstallation of the fog horn, navigation head lights and fender lights, and miscellaneous cables and/or electrical equipment and appurtenances, as needed, to perform concrete and steel tower work on Piers 33, 34, 35, 36, 37, 46,47, 48 and 49.

RULES AND REGULATIONS.--All work performed and materials installed shall conform to the National Electrical Code; the California Administrative Codes, Title 24, Part 3, "Basic Electrical Regulations," and Title 8, Chapter 4, "Electrical Safety Orders", National Fire Protection Association Standard NFPA-20; and all state and local codes, ordinances, and regulations.

SUBMITTALS.--The Contractor shall submit for approval a complete list of equipment and catalog cuts which he proposes to install and such other data as may be required by the Engineer.

INTENT OF DRAWINGS.--Electrical plan drawings are diagrammatic and show only general locations of equipment, devices, and raceways, unless specifically dimensioned. The Contractor shall be responsible for a complete cabling and raceway system, provide as a minimum what is shown on the Drawings, and provide additional cable, splices, raceway, fittings, boxes, conduit and other appurtenant devices needed to fit the equipment size and/ or configuration as supplied to make a complete and operating system subject to the approval of the Engineer.

In general, where the background on the drawings has been screened or shown lighter by contrast, the area screened or shown lighter by contrast is existing or other than electrical, unless otherwise noted. Work to be done under Electrical System is shown heavier by contrast.

TESTING.—After electrical work is complete for each system, it shall be tested continuously for a minimum of 7 days to demonstrate system functions properly. The Contractor shall perform an operational check on each system and/or subsystem. The scope of this shall include:

1. Temporary and Permanent Locations Convertible Breaker and Control Panels: Check for proper operation after reinstallation.
2. Temporary and Permanent Locations Battery Racks and Chargers: Check for proper operation after reinstallation.
3. Temporary and Permanent Locations Heaters, Telephones, Fire Alarm Thermostats, Miscellaneous Switches and Receptacles: Check for proper operation after reinstallation.
4. Temporary and Permanent Locations Foghorns, Aids to Navigation (head and fender lights), and Miscellaneous Cables and Appurtenances: Check for proper operation after reinstallation.

The Contractor shall submit a procedure for review and acceptance then notify Engineer 72 hours prior to testing and demonstrate proper operations of each electrical system. The Contractor shall make necessary repairs, adjustments, replacement and retests at his expense.

IDENTIFICATION.--Equipment shall be identified with nameplates fastened with self-tapping, Type 316 stainless steel screws or Type 316 stainless steel bolts.

Nameplates shall be made from laminated-phenolic plastic with white core and black front and back. Height of lettering shall be 1/4 inch, and inscriptions shall be the designation shown on the plans. Switches, two position or more, except "ON-OFF" switches, shall have a factory legend plate indicating its position.

10-3B.02 MAINTAINING EXISTING ELECTRICAL SYSTEMS

Maintaining existing electrical systems shall conform to the provisions in Section 86-1.05, "Maintaining Existing and Temporary Electrical Systems," of the Standard Specifications and these special provisions.

Temporary systems must be in place and operational prior to disconnection of existing facilities. Short-term shutdowns will be allowed as specified herein, to accomplish transitions from existing to temporary and temporary to permanent conditions.

Lighting, call box and supervisory cabling shutdowns shall be done only during daylight hours. Cable or conduit modification shutdowns shall be limited to 2 hours each maximum during daylight hours on weekends only with no fog conditions present or forecasted.

The Contractor shall notify the Engineer at least 72 hours prior to interruption to any service for the purpose of making or breaking electrical connections. The Contractor shall also notify the United States Coast Guard 72 hours prior to shutting Substations 2 and 3 Panel which feed the bridge Main Span Radar Beacons, Navigational Lights and Fog Horns.

ELECTRICAL SYSTEM OPERATION.--The Richmond-San Rafael Bridge is powered by two main 4.16-kV feeds from PG&E: one from the Richmond side and one from the San Rafael side. There are four main substations designated as No. 1 through No. 4 from San Rafael to Richmond. Substation Nos. 1 and 4 are located on the San Rafael and Richmond sides, respectively. Substation Nos. 2 and 3 are located in concrete enclosed rooms at the bases of Piers 34 and 48, respectively.

The 4.16-kV system is set up in a loop configuration such that each substation can be fed from either direction for high reliability. Under normal operation, Substation Nos. 1 and 2 will be fed from the San Rafael side and Substation Nos.

3 and 4 will be fed from the Richmond side. In the event of a power failure from either side, a given substation shall be refed from the side that is in operation.

When the Trestle Section work is underway, Substation No. 1 will be fed from the San Rafael side while Substation Nos. 2, 3, and 4 will be fed from the Richmond side since the 5 kV cable at the Trestle bridge section will be out of service during this period.

10-3B.03 PRODUCTS AND EXECUTION

RACEWAYS.--The conduit material specified for Type 2 in Section 86-2.05A, "Material," of the Standard Specifications is amended to read:

2. Hot-dip galvanized rigid steel conduit conforming to 1 above and coated with polyvinyl chloride or polyethylene. The exterior thermoplastic coating shall have a minimum thickness of 35 mils. The interior shell of the conduit shall be coated with a urethane lining.

Conduit use shall conform to the provisions in Section 86-2.05B, "Use," of the Standard Specifications and these Special Provisions.

Temporary exposed conduit in electrical rooms shall be Type 1.

Permanent exposed conduits in electrical rooms shall be Type 1.

Permanent exposed conduit in and around the bridge and open to salt air shall be Type 2 as specified in Section "Raceways" in these special provisions.

Permanent conduit embedded in concrete shall be Type 2 as specified in Section "Raceways" in these special provisions.

PULLBOXES.--The sixth paragraph in Section 86-2.06A, "Materials," of the Standard Specifications is amended to read:

Pullboxes and covers for installation in or on structures shall be of the sizes and details shown on the plans. Permanently installed boxes, covers, and screws shall be manufactured of 316 stainless steel. Temporary pullboxes shall be sized per code and shall be surface-mounted NEMA 3R painted steel. Where pullboxes involve the connection of larger multiconductor cables to smaller ones, provide terminal blocks of the size, type, and quantity for the application. See Section "Terminal Blocks (0 to 600 Volts)" elsewhere in these special provisions.

MISCELLANEOUS METAL.--Unistruts, clamps, fasteners, bolts, screws, nuts, threaded rods, and anchor bolts shall be Type 316 stainless steel conforming to the requirements in ASTM Designation: F 593 or F 738 M. Washers shall be Type 316 stainless steel conforming to the requirements in ASTM Designation A 240 and ANSI B 18.22M.

CONDUCTORS.--Conductors shall conform to the provision of Section 86-2.08, "Conductors" of the Standard Specifications and these special provisions:

Conductors shall be as follows:

1. TYPE 1: Not Used.

2. TYPE 2: Not Used.

3. TYPE 3: Not Used.

4. TYPE 4: Not Used.

5. TYPE 5: Not Used.

6. TYPE 6: Not Used.

7. TYPE 7: 600 VOLT - INDIVIDUAL CONDUCTORS AND TYPE SO CORD FOR POWER AND CONTROL WIRE.--Provide individual or cabled conductors of 600-volt class wiring which is UL listed and labeled and meets all of the following:

A. Single Conductors 600-Volt Class:

(1) Conforms to applicable requirement of NEMA WC3, WC5 and WC7.

(2) Stranded copper conductors.
(3) Use insulation type THHN/THWN except for sizes No. 6 and larger use XHHW insulation.

B. For flexible cords and cables, provide UL listed and labeled cables as follows:

(1) Stranded copper conductors.
(2) Type SOW-A/50 with ethylene propylene rubber insulation in accordance with UL 62.
(3) Conform to physical and minimum thickness requirements of NEMA WC8.

8. USE: For the given applications shown, use the following types of cable:

A. For temporary or permanent 480/277-volt and 208/120-volt power wiring inside electrical rooms, use: 600-volt, single conductor, Type 7A.
B. For permanent 120-volt power wiring for navigation lights, fog horn systems, etc., use: 600-volt, single conductor, Type 7A.
C. For temporary 120-volt power wiring for navigation lights, fog horn systems, etc., use: 600-volt, multiple conductor, Type 7B.

TEMPORARY FENDER LIGHTING.--Temporary fender lighting assemblies shall be furnished and installed and later removed when no longer required at the location shown on the plans at piers 34, 35, 47 and 48. Temporary fender lighting assemblies shall have the same intensity and rated visibility range as the existing fender lighting assemblies.

When no longer required for the work as determined by the Engineer, temporary fender lighting assemblies shall be removed. Removed facilities shall become the property of the Contractor and shall be disposed of outside the right of way.

10-3B.04 REMOVING, REINSTALLING OR SALVAGING ELECTRICAL EQUIPMENT

All materials removed which are not designated to be salvaged or reinstalled shall become the property of the Contractor and shall be disposed of outside the highway right of way in accordance with Section 7-1.13 of the Standard Specifications.

10-3B.05 MEASUREMENT AND PAYMENT

The contract lump sum price paid for modify seismic retrofit electrical system shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in modifying seismic retrofit electrical system, including modification of existing electrical system, testing, furnishing and installing temporary fender lighting (including removal and disposal when no longer required), and earthwork, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions and as directed by the Engineer.

SECTION 10-3C. MISCELLANEOUS ELECTRICAL WORK

10-3C.01 GENERAL

The miscellanous electrical work described in this section shall be performed in accordance with the details shown on the plans, the applicable provisions of Section 86, "Signal, Lighting, and Electrical Systems," of the Standard Specifications, and these special provisions.

TRESTLE SECTION.--Electrical work shall consist of; furnishing and installing new 4.16-kV power wiring for the electrical system; 480/277-volt lighting and wiring for the stage construction and permanent lighting system; relocating existing call boxes and associated communication and power wiring to their temporary and ultimate locations; RTU (Remote Telemetry Unit) communication wiring and miscellaneous other wiring and raceway systems; and furnishing and installing telephone conduits and expansion couplings; to completely install the lighting and electric system facilities at the new bridge structure trestle section and associated appurtenances.

The electrical work shall also include the demolition of existing electrical facilities and equipment on the existing trestle structure and the provision of electric service (backup power system), stage construction lighting, temporary call boxes, and RTU wiring. When no longer required on the Trestle section, the lighting standards and luminaires used in the stage construction lighting shall be removed, salvaged and reinstalled at the locations shown on the plans.

EAST/WEST APPROACH SECTIONS.--Electrical work shall consist of relocating existing call boxes on the east and west approaches from existing steel barriers to the temporary railing (Type K) during construction, and reinstalling them back to their original locations on the existing barriers when construction is complete. The work shall also include the modification of existing lighting system and the furnishing and installing temporary call box metal brackets on the

temporary railing (Type K); plug connectors; temporary wiring; traffic cable protector ramps; and miscellaneous other appurtenances to completely remove, install, and reinstall call boxes in accordance with the details shown on the plans.

MAIN SPAN SUPERSTRUCTURE SECTION.--Electrical work shall consist of relocating existing call boxes on the main span superstructure, both sides and upper and lower levels of the bridge decks, from existing concrete barriers to the temporary railing (Type K) during construction, and reinstalling them back to their original locations on the existing barriers when construction is complete. The work shall also include the furnishing and installing of call box metal brackets for temporary railing (Type K), plug connectors, temporary wiring, traffic cable protector ramps, and miscellaneous other appurtenances to completely remove, install, and reinstall call boxes.

The electrical system modification work shall also include the installation of new drop loop cables at Piers 19 and 61. These new drop loop cables shall be installed to account for the new seismic roadway expansion joints to be installed at the connection point between the east and west approaches and the main span superstructure.

RULES AND REGULATIONS.--All work performed and materials installed shall conform to the National Electrical Code; the California Administrative Codes, Title 24, Part 3, "Basic Electrical Regulations," and Title 8, Chapter 4, "Electrical Safety Orders", National Fire Protection Association Standard NFPA-20; and all state and local codes, ordinances, and regulations.

SUBMITTALS.--The Contractor shall submit for approval a complete list of equipment and catalog cuts which he proposes to install and such other data as may be required by the Engineer.

INTENT OF DRAWINGS .--Electrical plan drawings are diagrammatic and show only general locations of equipment, devices, and raceways, unless specifically dimensioned. The Contractor shall be responsible for a complete cabling and raceway system, provide as a minimum what is shown on the Drawings, and provide additional cable, splices, raceway, supports, fittings, boxes and other appurtenant devices needed to fit the equipment size and/ or configuration as supplied to make a complete and operating system subject to the approval of the Engineer.

In general, where the background on drawings has been screened or shown lighter by contrast, the area screened or shown lighter by contrast is existing or other than electrical, unless otherwise noted. Work to be done under Electrical Work is shown heavier by contrast.

In addition, drawings shown on the plans as "Stage Construction" or specifically called "Temporary Construction" are intended for use as temporary facilities. All other facilities shown are intended as permanent installation.

TESTING.—After electrical work is complete for each system, it shall be tested continuously for a minimum of 7 days to demonstrate system functions properly. The Contractor shall perform an operational check on each system and/or subsystem. The scope of this shall include:

1. Temporary Generators - Automatic operation check.
2. Lighting (Stage Construction) and Permanent Lighting-Operate each light after installation and after drop loop cables are installed.
3. Temporary and Permanent Call Boxes-Operate each call box after reinstallation and after drop loop cables are installed.
4. Permanent 5kv Power System-Check for normal operation after medium voltage cable is replaced on trestle and after drop loop cables are installed.
5. Permanent communications system-Check for normal operation after temporary and permanent cables are installed and after drop loop cables are installed.

The Contractor shall submit a procedure for review and acceptance then notify Engineer 72 hours prior to testing and demonstrate proper operations of each electrical system. The Contractor shall make necessary repairs, adjustments, replacement and retests at his expense.

IDENTIFICATION.--Equipment shall be identified with nameplates fastened with self-tapping, Type 316 stainless steel screws or Type 316 stainless steel bolts.

Nameplates shall be made from laminated-phenolic plastic with white core and black front and back. Height of lettering shall be 1/4 inch, and inscriptions shall be the designation shown on the plans. Switches, two position or more, except "ON-OFF" switches, shall have a factory legend plate indicating its position. Transfer switches shall have the load served indicated at each switch position with nameplates described above.

10-3C.02 MAINTAINING EXISTING ELECTRICAL SYSTEMS

Maintaining existing electrical systems shall conform to the provisions in Section 86-1.05, "Maintaining Existing and Temporary Electrical Systems," of the Standard Specifications and these special provisions.

Temporary systems and/or supports must be in place and operational prior to disconnection of existing facilities. Permanent systems must be in place and operational prior to disconnection of temporary systems. Call boxes shall not be transferred to a temporary or permanent location until new call box appurtenances are installed and ready for the call box units. Short-term shutdowns will be allowed as specified herein, to accomplish transitions from existing to temporary and temporary to permanent conditions. Where lighting circuits are to be removed, lighting electrical wiring shall be removed to the nearest pullbox.

Lighting, call box and supervisory cabling shutdowns shall be done only during daylight hours. This does not apply to closed roadways which are being worked on at night. Generator system tie-ins to substation panels and call box shutdowns shall be limited to 1 hour maximum, drop loop cable and relay testing shutdowns shall be limited to 2 hours maximum during daylight hours on weekends only with no fog conditions present or forecasted.

The Contractor shall notify the Engineer at least 72 hours prior to interruption to any service for the purpose of making or breaking electrical connections. The Contractor shall also notify the United States Coast Guard 72 hours prior to shutting Substations 2 and 3 Panel which feed the bridge Main Span Radar Beacons and Navigational Lights.

For power failures, portable generators shall be furnished and installed at each substation. Attention is directed to Sections "Electrical System Operation" and "Portable Emergency Generators" of these special provisions.

10-3C.03 ELECTRICAL SYSTEM OPERATION

The Richmond-San Rafael Bridge is powered by two main 4.16-kV feeds from PG&E: one from the Richmond side and one from the San Rafael side. There are four main substations designated as No. 1 through No. 4 from San Rafael to Richmond. Substation Nos. 1 and 4 are located on the San Rafael and Richmond sides, respectively. Substation Nos. 2 and 3 are located in concrete enclosed rooms at the bases of Piers 34 and 48, respectively.

The 4.16-kV system is set up in a loop configuration such that each substation can be fed from either direction for high reliability. Under normal operation, Substation Nos. 1 and 2 will be fed from the San Rafael side and Substation Nos. 3 and 4 will be fed from the Richmond side. In the event of a power failure from either side, a given substation shall be refed from the side that is in operation.

During construction, before the trestle cables are disconnected, the Contractor shall arrange to have Substation Nos. 2, 3, and 4 fed from Richmond and Substation No. 1 fed from San Rafael, thus keeping all substations energized with this configuration. When the old trestle cables are disconnected, the loop will be broken and there will be no backup power feed in the event of a power failure, so backup generators shall be provided by the Contractor. These generators shall back feed the substations in the event of a power loss situation and shall be available in a standby mode until needed to run. See the "Temporary Backup Power System One Line Diagram" shown on the plans and Section "Portable Emergency Generators" of these special provisions. Similarly, before the drop loop cables are disconnected, the Contractor shall arrange the effected substation(s) to be refed from the other direction or fed by way of emergency generators as specified in this section.

10-3C.04 PORTABLE EMERGENCY GENERATORS

The Contractor shall furnish and install during construction, 4 emergency generator systems; one system to be located at each of the 4 bridge substations as follows:

Substation	Location	Generator Size
No. 1	San Rafael Side	200 kW
No. 2	Pier 34 Base	150 kW
No. 3	Pier 48 Base	150 kW
No. 4	Richmond Side	300 kW

The first order of work for the electrical work shall be to furnish and install 4 portable backup power generator systems prior to performing any electrical work. The Contractor shall provide the Engineer with a statement from the supplier that the order for said equipment has been received and accepted and showing the date of delivery. Upon arrival at the site, the generators shall then be installed.

The generators shall supply backup power to the substation secondary panels at two voltages 480/277 volts, 3 phase, and 208/120 volts, 3 phase. This shall be provided along with a system of automatic transfer switches, circuit breakers, transformers, cables and temporary mounting board as part of the equipment. See “Temporary Backup Power System One Line Diagram” shown on the plans.

During construction, the generator, the normal source transformers and the substation panels shall be wired to the transfer switches with temporary wiring by the Contractor. When construction is complete, the generator systems shall become the property of the Contractor and shall be removed and the panels shall be rewired back to their original configuration by the Contractor. Upon power failure, after a 30-second delay, the transfer switch starts the generator.

When the generator comes up to voltage and frequency, the transfer switch shall transfer to the generator supply. Return to normal shall be manually initiated. Automatic transfer switches shall be ASCO, Russ Electric, Cutler Hammer or equal. Circuit breakers and transformers shall be GE, Cutler Hammer, Square "D", or equal.

The generators shall be available at all times in a standby mode and shall be provided with sufficient cabling to allow connections to the substation panels. The Contractor shall have on-call, 24 hours a day, a minimum of one person to come to the site within an hour and verify engine generators have properly re-energized each downed substation panel. The Contractor shall be equipped at all times, with a motorized water craft ready to transport personnel to Substation Nos. 2 and 3, which are located at main pier bases 34 and 48, respectively. The cost of the motorized water craft shall be the Contractor's responsibility.

The Contractor shall monitor each generator, while in operation and maintain fully its fuel supply. When the PG&E power recovers and stabilizes, the Contractor shall return each substation back to normal power and reset the generator back to standby status.

Each generator shall be equipped with a 4-hour day tank capacity and a 3-day supply of diesel fuel (at full power output), complete with fuel piping and containment provisions. While any generator is running, there shall be a full-time, 24 hour per day person(s) at the site for monitoring and tending all running generators. This person(s) shall remain on site until the last generator is shut down and relegated to standby service. The fuel shall be maintained and replenished by the Contractor at the Contractor's expense after each operation.

10-3C.05 ELECTRICAL SYSTEMS ANALYSIS

SCOPE.--The Contractor shall engage a firm, regularly experienced in electrical system analysis, to provide a short circuit and coordination study for the bridge's electrical power system. The work shall include the entire power system, from both utility 12 kV sources, down to the 120-volt level. The short circuit study shall include a minimum of 3 cases as follows:

Case 1: Substation Nos. 1, 2, 3 and 4 fed from the San Rafael PG&E source.
Case 2: Substation Nos. 1, 2, 3 and 4 fed from the Richmond PG&E source.
Case 3: Substation Nos. 1 and 2 fed from the San Rafael PG&E source and Substation Nos. 3 and 4 fed from the Richmond PG&E source.

The coordination study shall include all relays, breakers and fuses, etc. presently connected to the system and a tabulation of recommended system and settings changes. When approved by the Engineer, the Contractor shall implement the recommended setting changes.

REFERENCES.--The following is an additional list of standards which may be referenced in this section:

Institute of Electrical and Electronics Engineers, Inc. (IEEE):

a. 242, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems.
b. 399, Recommended Practice for Industrial and Commercial Power System Analysis.

American National Standards Institute (ANSI): C57.12.00, Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.

SUBMITTALS.--Shop Drawings: Provide six copies of study in hard cover, three-ring binders, to include:

Short circuit study.
Protective Device Coordination Study: Submit within 90 days after approval of the short circuit study.

QUALITY ASSURANCE.--Short circuit and protective device coordination studies shall be prepared by a professional electrical engineer registered in the State of California, in accordance with IEEE 242 and IEEE 399.

SEQUENCING AND SCHEDULING.--An initial, complete short circuit study must be submitted and reviewed before Engineer will approve the coordination study.

An initial, complete protective device coordination study must be submitted with 90 days after approval of initial short circuit study.

The short circuit and protective device coordination studies shall be updated prior to Project Substantial Completion. Utilize characteristics of as-installed equipment and materials.

GENERAL.--Equipment and component titles used in the studies shall be identical to the equipment and component titles shown on the plans.

Perform studies using digital computer.

Perform complete fault calculations for each existing and ultimate source combination.

Source combination may include present and future power company supply circuits, large motors, or generators.

Utilize proposed and existing data for the study obtained from available documents and as taken in the field.

Existing equipment shall include fault contribution of existing motors in the study and obtain required existing equipment data.

Device coordination time-current curves for medium and low voltage distribution system(s).

Individual protective device time-current characteristics on transparencies.

SHORT CIRCUIT STUDY.--

General:

1. Use cable impedances based on copper conductors.
2. Use bus impedances based on copper or aluminum bus bars as existing.
3. Use cable and bus resistances calculated at 25 degrees C.
4. Use medium voltage cable reactances based on use of typical dimensions of shielded cables with 133 percent insulation levels.
5. Use 600-volt cable reactances based on use of typical dimensions of conductors installed.
6. Use transformer impedances 92.5 percent of "nominal" impedance based on tolerances specified in ANSI C57.12.00.

Provide:

1. Calculation methods and assumptions.
2. Selected base per unit quantities.
3. One-line diagrams.
4. Source impedance data, including electric utility system and motor fault contribution characteristics.
5. Impedance diagrams.
6. Zero sequence impedance diagrams.
7. Typical calculation.
8. Tabulations of calculated quantities.
9. Results, conclusions, and recommendations.

Calculate short circuit interrupting and momentary (when applicable) duties for an assumed three-phase bolted fault at each:

1. Electric utility's supply termination points.
2. Main switchgear.
3. Unit substation primary and secondary terminals.
4. Low voltage switchgear and switchboards.
5. Motor control centers.
6. All branch circuit panelboards.
7. Other significant locations throughout the system.
8. Future load contributions as shown on one-line diagram.

Provide bolted line-to-ground fault current study for areas as defined for three-phase bolted fault short circuit study.

Provide bolted line-to-line fault current study for areas as defined for three-phase bolted fault short circuit study.

Verify the following:

1. Equipment and protective devices are applied within their ratings.
2. Adequacy of switchgear, switchboard, motor control centers, and panelboard bus bars to withstand short circuit stresses.
3. Cable and busway sizes for ability to withstand short circuit heating, besides normal load currents.

PROTECTIVE DEVICE COORDINATION STUDY.--Proposed protective device coordination time-current curves for distribution system, graphically displayed on conventional log-log curve sheets.

Each curve sheet to have title and one-line diagram that applies to specific portion of system associated with time-current curves on that sheet.

Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which device is exposed.

Identify device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.

Plot Characteristics on Curve Sheets:

1. Electric utility's relays.
2. Electric utility's fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
3. Medium voltage equipment relays.
4. Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
5. Low voltage equipment circuit breaker trip devices, including manufacturers tolerance bands.
6. Pertinent transformer full-load currents at 100 and 600 percent.
7. Transformer magnetizing inrush currents.
8. Transformer damage curves.
9. ANSI transformer withstand parameters.
10. Significant symmetrical and asymmetrical fault currents.
11. Ground fault protective device settings.
12. Other system load protective devices for largest branch circuit and feeder circuit breaker in each motor control center.

Primary Protective Device Settings for Delta-Wye Connected Transformer:

1. Secondary Line-to-Ground Fault Protection: Primary protective device operating band within the transformer's characteristics curve, including a point equal to 58 percent of ANSI C57.12.00 withstand point.
2. Secondary Line-To-Line Faults: 16 percent current margin between primary protective device and associated secondary device characteristic curves.

Separate medium voltage relay characteristics curves from curves for other devices by at least 0.4-second time margin.

TABULATIONS.--

General Data:

1. Short circuit reactances of rotating machines.
2. Cable and conduit material data.
3. Bus data
4. Transformer data.
5. Circuit resistance and reactance values.

Short Circuit Data:

1. Fault impedances.
2. X to R ratios.
3. Asymmetry factors.
4. Motor contributions.
5. Short circuit kVA.
6. Symmetrical and asymmetrical fault currents.

Recommended Protective Device Settings:

1. Relays:

a. Current tap.
b. Time dial.
c. Instantaneous pickup.

2. Circuit Breakers:

a. Adjustable pickup.

b. Adjustable time-current characteristic.
c. Adjustable instantaneous pickup.

STUDY ANALYSES.--Written Summary:

1. Scope of studies performed.
2. Explanation of bus and branch numbering system.
3. Prevailing conditions.
4. Selected equipment deficiencies.
5. Results of short circuit and coordination studies.
6. Comments or suggestions.

Suggest changes and additions to equipment rating and/or characteristics.
Notify Engineer in writing of existing circuit protective devices improperly rated for new fault conditions.

IMPLEMENTATION.--Adjust relay and protective device settings according to values established by coordination study.

Make minor modifications to equipment as required to accomplish conformance with the short circuit and protective device coordination studies.

Notify the Engineer in writing of any required major equipment modifications.

TESTING.--Upon completion of the implementation portion of the electrical systems analysis, inspect and test all relays on the medium voltage system for proper condition and operation in accordance with NETA (National Electrical Testing Association) Standards. The work shall include all relays on the medium voltage system including both those newly adjusted, as well as those which had no setting change.

The work shall be done by an independent testing company regularly engaged in testing and inspecting of electrical equipment and systems. The work shall be supervised by an Engineer certified by NICET (National Institute of Certified Engineering Technologists) and shall be performed by technicians certified by NICET or NETA.

The specific work on each relay shall include:

A. Visual and Mechanical Inspection:
   1. Visually Check Each Relay For:
      a. Tight cover gasket and proper seal.
      b. Unbroken cover glass.
      c. Condition of spiral spring and contacts.
      d. Disc clearance.
      e. Condition of case shorting contacts if present.
   2. Mechanically Check Each Relay For:
      a. Freedom of movement.
      b. Proper travel and alignment.
   3. Verify That Each Relay:
      a. Complies with Contract Documents and application.
      b. Is set in accordance with recommended settings.

B. Electrical Tests:
   1. Insulation resistance test on each circuit to frame except for solid state devices.
   2. Tests on Nominal Recommended Setting For:
      a. Pickup parameters on each operating element.
      b. Timing at three points on time-current curve.
      c. Pickup target and seal-in units.
      d. Special tests as required to check operation of restraint, directional, and other elements in accordance with manufacturer's instruction manual.
   3. Phase angle and magnitude contribution tests on differential and directional relays after energization to vectorially verify proper polarity and connections.
   4. Current Injection Tests:
      a. Secondary injection for current flow of 1 ampere.

Arrange sequence and scheduling as follows:

A. Perform inspection and electrical tests after cabling system has been installed.

B. Perform tests with apparatus de-energized whenever feasible.
C. Inspection and electrical tests on energized equipment are to be:
   1. Scheduled with Engineer prior to de-energization.
   2. Minimized to avoid extended period of interruption to the operating bridge equipment.
D. Notify Engineer at least 72 hours prior to performing tests on energized electrical equipment.
E. Only a 2-hour shutdown will be allowed on each switchgear for testing and no more than one switchgear may be taken out of service at any given time.
F. For Substation Nos. 2 and 3 which have temporary backup power, arrange to have the generators providing 480- and 208-volt power during the outage of their respective upstream switchgears.

Submit the following items for review and acceptance:

A. Administrative Submittals: Submit 30 days prior to performing inspections or tests:
   1. Schedule for performing inspection and tests.
   2. List of references to be used for each test.
   3. Sample copy of equipment and materials inspection form(s).
   4. Sample copy of individual device test form.
B. Quality Control Submittals: Submit within 30 days after completion of test:
   1. Test or inspection reports and certificates for each electrical item tested.
C. Contract Closeout Submittals:
   1. Provide Operation and Maintenance Manual containing all approved test data.

10-3C.06 PRODUCTS AND EXECUTION

RACEWAYS.--The conduit material specified for Type 2 in Section 86-2.05A, "Material," of the Standard Specifications is amended to read:

2. Hot-dip galvanized rigid steel conduit conforming to 1 above and coated with polyvinyl chloride or polyethylene. The exterior thermoplastic coating shall have a minimum thickness of 35 mils. The interior shell of the conduit shall be coated with a 2 mil thick urethane lining.

Conduit use shall conform to the provisions in Section 86-2.05B, "Use," of the Standard Specifications and these Special Provisions.

Temporary exposed conduit in electrical rooms shall be Type 1.

Permanent exposed conduits in electrical rooms shall be Type 1.

Permanent exposed conduit in and around the bridge and open to salt air shall be Type 2 as specified in Section "Raceways" in these special provisions.

Permanent conduit embedded in concrete shall be Type 2 as specified in Section "Raceways" in these special provisions.

Where conduits are designated on the plans to be concrete encased, concrete encasement material shall conform to Section 90-10, “Minor Concrete,” of the Standard Specifications, and shall contain not less than 470 pounds of cement per cubic yard.

CONDUIT EXPANSION JOINTS.--Conduit expansion shall be provided where shown or required and shall be sized for the size of conduit to which it connects. The expansion joint shall be provided complete with grounding bonding jumper. Expansion joints shall be suitable for connection to rigid steel conduit, shall be of weatherproof construction, shall be made of malleable iron alloy, and shall be UL listed and labeled. Conduit expansion joints shall be Crouse Hinds Model XJ, Appleton Model XJ, Oz Gedney Model AX, or equal.

PULLBOXES.--Pullboxes and covers for installation in or on structures shall be of the sizes and details shown on the plans. Permanently installed boxes, covers, and screws shall be NEMA 4 and shall be manufactured of 316 stainless steel. Temporary pullboxes shall be sized per code and shall be surface-mounted NEMA 3R painted steel. Where pullboxes involve the connection of larger multiconductor cables to smaller ones, provide terminal blocks of the size, type, and quantity for the application. Attention is directed to Section "Terminal Blocks (0 to 600 Volts)" elsewhere in these special provisions.

TEMPORARY CABLE PROTECTORS.--The Contractor shall provide safe and adequate cable protectors which have the necessary rigidity and support for the load imposed.

Temporary cable protectors shall be, at the option of the Contractor, either wood, or metal, or other rigid material from good commercial quality materials suitable for the purpose intended, mounted and anchored temporarily on the bridge deck as shown on the plans.

The Contractor shall submit working drawings to the Engineer for review, showing the type of material and anchoring methods to be used prior to fabrication and construction of temporary cable protectors.

The temporary cable protectors shall be maintained in good repair and sound until no longer required.

When no longer required, temporary cable protectors shall become the Contractor's property and shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

TEMPORARY CALL BOX SUPPORTS.--Miscellaneous iron and steel for temporary supports on call boxes shall conform to the provisions in Section 75-1.02, "Miscellaneous Iron and Steel," of the Standard Specifications.

When no longer required, temporary call box supports shall become the Contractor's property and shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

TERMINAL BLOCKS (0 to 600 VOLTS).--Terminal Blocks (0 to 600 Volts) shall be rated meeting the following:

A. UL 486E and UL 1059.
B. Size components to allow insertion of necessary wire sizes.
C. Capable of termination of all power and/or control circuits entering or leaving equipment, panels, or boxes.
D. Screw clamp compression, dead front barrier type, with current bar providing direct contact with wire between the compression screw and yoke.
E. Yoke, current bar, and clamping screw of high strength and high conductivity metal.
F. Yoke shall guide all strands of wire into terminal.
G. Current bar shall ensure vibration-proof connection.
H. Terminals:

(1) Capable of wire connections without special preparation other than stripping.
(2) Capable of jumper installation with no loss of terminal or rail space.
(3) Individual, rail mounted, secured to side or back of terminal box as appropriate.

I. Marking system allowing use of preprinted or field-marked tags.
J. Manufacturers:

(1) Weidmuller.
(2) Ideal.
(3) Electrovert.
(4) Or equal.

CONDUCTORS.--Conductors shall conform to the provisions in Section 86-2.08, "Conductors," of the Standard Specifications and these special provisions.

Conductors shall be as follows:

1. TYPE 1: 5-kV - 3 CONDUCTOR METAL CLAD POWER CABLES.--For this cable type, reuse a portion of the existing 5kV Kerrite cable which to be removed and salvaged from the existing Bridge Trestle Section utility tray. The remaining portion of the salvaged Kerrite cable shall be hauled and stockpiled as specified in Section "Removing, Reinstalling or Salvaging Electrical Equipment" of these special provisions.

1A. TYPE 1A: 5-kV - SINGLE CONDUCTOR POWER CABLES.--Provide single conductor shielded power cables Type MV-90, rated 5,000 volts, insulated with 133% ethylene propylene rubber (EPR) dielectric, 115 mils, shielded with a 5-mil copper tape shielded helically applied and covered with a PVC jacket. The cable shall be UL listed and labeled.

The cable shall be suitable for use on services and feeders, indoors and outdoors, in wet or dry locations, as open runs of cable, or as cable in conduit. The cable shall be UL listed as sunlight resistant and for cable tray use. In addition, the cable shall meet the following:

A. General:

(1) Cables shall meet or exceed all recognized industry standards (UL, NEC, ICEA, NEMA).

(2) 90C continuous operating temperature in dry location.
130C emergency rating.
250C short circuit rating.
(3) Shall not propagate flame.
(4) Sunlight resistant jacket.
(5) Resistance to treeing.
(6) Resistance to moisture.
(7) Resistance to oils, acids, and alkalies.
(8) Excellent corona resistance.

B. Conductors: #4/0 AWG Annealed stranded uncoated copper.

C. Strand Screen: Extruded EPR semiconducting conductor stress relief strand screen and shall meet or exceed electrical and physical requirements of ICEA S-68-516 and UL 1072.

D. Insulation: EPR shall meet or exceed electrical and physical requirements of ICEA S-68-516 and UL 1072.

E. Insulation Screen: Extruded semiconductor EPR applied directly over the insulation. Shall meet or exceed electrical and physical properties of ICEA S-68-516 and AEIC CS6 and UL1072.

F Shield: 5-mil bare copper tape helically applied.

G. Phase Identification: Colored tape over insulation (black, red and blue).

H. Jacket: Black PVC, a sunlight resistant jacket in accordance with UL 1072.

(1) UL listed as Type MC and for use in cable tray.

I. Factory Tests: Each single conductor shall be tested in accordance with AEIC (Association of Edison Illuminating Company) standards and Certified Test Reports shall be supplied for all tests.

J. Warranty: Cable shall carry a two-year warranty after installation.

K. Manufacturers: Okonite, Kerrite, Cablec or equal.

2. TYPE 2: 600 VOLT - 2, 3 AND 4 CONDUCTOR METAL CLAD POWER CABLE.--Provide 2, 3 and 4 conductor cable insulated with cross linked polyethylene enclosed in a continuously welded impervious corrugated aluminum sheath and covered with a PVC jacket. The cable shall be UL listed and labeled.

The cable shall be suitable for use on services and feeders, indoors and outdoors, in wet or dry locations, as open runs of cable, in cable tray, direct buried, or as aerial cable on a messenger. The cable shall be UL listed as sunlight resistant and for cable tray use. In addition, the cable shall meet the following:

A. General:

(1) Cables shall meet or exceed all recognized industry standards (UL, NEC, ICEA, NEMA).
(2) 90C continuous operating temperature in dry location.
130C emergency rating.
250C short circuit rating.
(3) Shall not propagate flame.
(4) Sunlight resistant jacket.
(5) Complete pre-packaged, color-coded, factory-tested wiring system.

B. Conductors: Annealed uncoated copper Class B stranded per ASTM B-8. Conductor sizes shall be as shown on the plans.

C. Insulation: XHHW-2 type cross-linked polyethylene.

D. Phase Identification: The insulated control cable sizes #14 - #6 AWG shall be color coded using ICEA Method 1. The color code shall be in accordance with ICEA Standard S-73-532, Appendix E. Power cable sizes #4 AWG and larger shall be numerically color coded using ICEA Method 3.

E. Grounding Conductor: Uncoated copper Class B stranded per ASTM B-8 and sized in accordance with UL 1072. Ground conductors shall be as shown on the plans.

F. Assembly: Cabled with ground wire, filler in the interstices, binder tape overall.

G. Sheath: Close-fitting, impervious, continuously welded, corrugated aluminum per UL 1072, shall exceed grounding conductor requirements of NEC 250-95.

H. Jacket: When specified, black PVC, a sunlight resistant jacket in accordance with UL 1072.

(1) UL listed as Type MC and for use in cable tray.

I. Factory Tests: Each single conductor shall be tested in accordance with ICEA S-66-524, and certified Test Reports shall be supplied for all tests.
J. Warranty: Cable shall carry a two-year warranty after installation.
K. Manufacturers: Okonite, Cablec or equal.

3. TYPE 3: 300 VOLT - MULTIPLE TWISTED PAIRS WITH COMMON SHIELD METAL CLAD INSTRUMENTATION CABLE.--Provide 50 pair and 4 pair metal clad instrumentation cable Type PLTC multiple twisted pairs with a common overall shield.

The cable shall be 300 volt type with 105C temperature rating. The cable shall be UL listed and labeled. In addition, the cable shall meet the following:

A. General:

(1) Cables shall meet or exceed all recognized industry standards (UL, NEC, ICEA, NEMA).
(2) 105C temperature rating.
(3) Shall not propagate flame.
(4) Sunlight resistant jacket.
(5) Complete pre-packaged, color-coded, factory-tested wiring system.

B. Conductors: #20 AWG for 50-pair cable, #18 AWG for 4-pair cable. Bare soft annealed copper, Class B, 7-strand concentric per ASTM B-8.
C. Insulation: Flame-retardant PVC per UL Subject 13, 15 mils nominal thickness, 105C temperature rating.
D. Conductor Identification: Pigmented black and white in pairs, white conductor numerically printed for group identification.
E. Communication Wire: 22 AWG, 7-strand, bare copper conductor, 15 mils nominal flame-retardant PVC insulation, 105C temperature rating.
F. Assembly: Pairs assembled with 1 1/2-inch - 2 1/2-inch left-hand lay. Flame-retardant, non-wicking fillers included where required to provide a round cable.
G. Cable Sheath: 2.35 mil blue double faced aluminum/synthetic polymer backed tape overlapped to provide 100% coverage, and a 7-strand tinned copper drain wire, same size as conductor.
H. Inner Jacket: Black, flame-retardant PVC per UL Subject 13. A rip cord is laid longitudinally under the jacket to facilitate removal.
I. Sheath: A close-fitting impervious, continuously welded and corrugated aluminum sheath provides complete protection against moisture, liquids, and gases, shall have excellent mechanical strength and shall provide equipment grounding through the sheath.
J. Outer Jacket: Black, flame-retardant PVC per UL Subject 13. UL listed Type PLTC (Power-Limited Tray Cable) and Power-Limited Circuit Cable for use in Class II or III circuits in accordance with Article 725 of the National Electrical Code.
K. Factory Tests: Provide certified standard factory tests for each cable reel length.
L. Warranty: Cable shall carry a two-year warranty after installation.
M. Manufacturers: Okonite, Cablec or equal.

4. TYPE 4: 600 VOLT - 3 AND 4 CONDUCTOR AERIAL POWER CABLE.--Provide 600-volt multiple conductor aerial power cable complete with steel messenger and associated binder tape.

The messenger shall be steel and shall be sized for the weight of the cable and the maximum span shown on the Drawings.

Messenger size shall be determined on the span between supports, a normal string tension of no more than 30% of its minimum breaking strength at 60F, a sag of 1.5 to 2.5% of span length and the loading district where the cable will be installed (see National Electrical/Safety Code, ANSI C2, Section 250).

The messenger shall be applied parallel to the cable axis. The messenger shall extend at least 5 feet beyond each end of the cable for use in installation. When specified, a longer tail can be provided on the drum of the reel to facilitate installation.

A binder strap shall be applied over the cabled conductors and messenger with a right hand lay. The strap shall be applied with the appropriate tension. The binder strap shall be covered with a nominal .040" wall of PVC.

The cable shall be 600-volt type with 90C EPR (ethylene propylene rubber) insulated conductors, a ground wire and a PCV jacket. The cable shall be UL listed and labeled and shall meet all of the following requirements:

A. General:

(1) Cables shall meet or exceed all recognized industry standards (UL, NEC, ICEA, NEMA).

(2) 90C temperature rating.
(3) Shall not propagate flame.
(4) Sunlight resistant jacket.
(5) Complete pre-packaged, color-coded, factory-tested wiring system.

B. Conductors: Coated copper per ASTM B-33 or B-189, Class B stranded per ASTM B-8. Conductor sizes shall be as shown on Drawings.

C. Insulation: FR-EPR shall meet or exceed requirements of UL 1581 and ICEA S-68-516 Type II insulation.

D. Color Coding: Base colors and tracers based upon ICEA Method 1, K-2. For sizes #8 AWG and larger, black conductors with surface printing of numbers per ICEA S-68-516 Method 4.

E. Assembly: Conductors cabled in accordance with UL 1277 using fillers, as required, with a cable tape overall.

F. Overall Jacket: PVC shall comply with UL 1277. The PVC compound shall meet or exceed the requirements of UL 1581. Cables shall pass the Vertical Tray Flame Test requirements of UL 1277 for Type TC Power and Cable Tray Cable.

G. Factory Test: Provide certified standard factory tests for each cable reel length.

H. Warranty: Cable shall carry a two-year warranty after installation.

I. Manufacturers: Okonite, Cablec or equal.

5. TYPE 5: 300 VOLT - MULTIPLE TWISTED PAIRS WITH COMMON OVERALL SHIELD INSTRUMENTATION AERIAL CABLE.--Provide 300-volt aerial instrumentation cable complete with steel messenger and associated wrapping. The cable shall be as specified for Type 6 cable specified herein.

The messenger shall be steel and shall be sized for the weight of the cable and the maximum span shown on the Drawings. Messenger size shall be determined on the span between supports, a normal string tension of no more than 30% of its minimum breaking strength at 60F, a sag of 1.5 to 2.5% of span length and the loading district where the cable will be installed (see National Electrical/Safety Code, ANSI C2, Section 250).

The messenger shall be applied parallel to the cable axis. The messenger shall extend at least 5 feet beyond each end of the cable for use in installation. When specified, a longer tail can be provided on the drum of the reel to facilitate installation.

A binder strap shall be applied over the cabled conductors and messenger with a right hand lay. The strap shall be applied with the appropriate tension. The binder strap shall be covered with a nominal .040" wall of PVC.

6. TYPE 6: 300 VOLT - MULTIPLE TWISTED PAIRS WITH A COMMON SHIELD TRAY TYPE INSTRUMENTATION CABLE.--Provide 4 pair tray type instrumentation cable Type PLTC multiple twisted pairs with a common overall shield.

The cable shall be 300-volt type with 105C temperature rating. The cable shall be UL listed and labeled. In addition, the cable shall meet the following:

A. General:

(1) Cables shall meet or exceed all recognized industry standards (UL, NEC, ICEA, NEMA).
(2) 105C temperature rating.
(3) Shall not propagate flame.
(4) Sunlight resistant jacket.
(5) Complete pre-packaged, color-coded, factory-tested wiring system.

B. Conductors: #18 AWG Bare soft annealed copper, Class B, 7-strand concentric per ASTM B-8.

C. Insulation: Flame-retardant PVC per UL Subject 13, 15 mils nominal thickness, 105C temperature rating.

D. Conductor Identification: Pigmented black and white in pairs, white conductor numerically printed for group identification.

E. Communication Wire: 22 AWG, 7-strand, bare copper conductor, 15 mils nominal flame-retardant PVC insulation, 105C temperature rating.

F. Assembly: Pairs assembled with 1 1/2-inch - 2 1/2-inch left-hand lay. Flame-retardant, non-wicking fillers included where required to provide a round cable.

G. Cable Sheath: 2.35 mil blue double faced aluminum/synthetic polymer backed tape overlapped to provide 100% coverage, and a 7-strand tinned copper drain wire, same size as conductor.

H. Jacket: Black, flame-retardant PVC per UL Subject 13. A rip cord is laid longitudinally under the jacket to facilitate removal. UL listed Type PLTC (Power-Limited Tray Cable) and Power-Limited Circuit Cable for use in Class II or III circuits in accordance with Article 725 of the National Electrical Code.

I. Warranty: Cable shall carry a two-year warranty after installation.

J. Manufacturers: Okonite, Alpha or equal.

7. TYPE 7A and TYPE 7B: 600 VOLT - INDIVIDUAL CONDUCTORS AND TYPE SO CORD FOR POWER AND CONTROL WIRE.--Provide individual or cabled conductors of 600-volt class wiring which is UL listed and labeled and meets all of the following:

TYPE 7A.--Single Conductors 600-Volt Class:

(1) Conforms to applicable requirement of NEMA WC3, WC5 and WC7.
(2) Stranded copper conductors.
(3) Use insulation type THHN/THWN except for sizes No. 6 and larger use XHHW insulation.

TYPE 7B.--For flexible cords and cables, provide UL listed and labeled cables as follows:

(1) Stranded copper conductors.
(2) Type SOW-A/50 with ethylene propylene rubber insulation in accordance with UL 62.
(3) Conform to physical and minimum thickness requirements of NEMA WC8.

8. USE: For the given applications shown, use the following types of cable:

CABLE USE AT TRESTLE SECTION.--

A. For permanent medium voltage power feeds to substations, use: 5 kV, single conductor, Type 1A.

B. For permanent 480/277-volt roadway lighting circuits, use: 600 volt, single conductor, power cable, Type 7A. For taps from final splice box to luminaire, single conductor Type 7A may also be used.

C. For permanent 120-volt call box power circuits, use: 600 volt, single conductor, metal clad power cable, Type 7A. For taps from final splice box to call box, single conductor Type 7A may also be used.

D. For permanent call box communication circuits, use: 300 volt, multiple twisted pairs with common shield, instrumentation cable, Type 6.

E. For permanent RTU communication circuits, use: 300 volt, multiple twisted pairs with common shield, instrumentation cable, Type 6.

F. For temporary 480/277-volt roadway lighting, use: 600 volt, multiple conductor, aerial power cable, Type 4. For taps from aerial cable to luminaire, multiple conductor SO cord Type 7B may be used.

G. For temporary 120-volt call box power, use: 600 volt, multiple conductor, aerial power cable, Type 4. For taps from aerial cable to call box, multiple conductor SO cord Type 7B may be used.

H. For temporary call box communication circuits, use: 300 volt, multiple twisted pairs with common shield, aerial instrumentation cable, Type 5. For taps from aerial cable to call box, multiple twisted pair cable with a common shield Type 6 communication can be used.

I. For temporary RTU circuits, use: 300 volt, multiple twist pairs with common shield, aerial cable, Type 5.

J. For temporary generator wiring, use: 600 volt, single conductors, Type 7A.

CABLE USE AT EAST AND WEST APPROACH SECTIONS.--

A. For temporary 120-volt call box power, use either Type 7A or Type 7B cable.

B. For temporary call box communications circuits, use Type 6.

CABLE USE AT MAIN SPAN SUPERSTRUCTURE SECTION.--

A. For temporary 120-volt call box power, use either Type 7a or Type 7b cable.

B. For temporary call box communications circuits, use Type 6.

C. For permanent drop loop cables, use Type 1, Type 2, and Type 3.

CABLE INSTALLATION IN TRAY.--

A. Install wire and cable parallel and straight in tray.

B. Locate in groups, all wire and cable of same voltage having a common routing and destination; use cable ties, at maximum intervals of 8 feet.

C. Clamp cables prior to making end termination connections.

D. Protect cables in existing trays from damage where modification work is taking place.

FIELD TESTING.--After paragraph 86-2.14B(3), "Insulation Resistance", of the Standard Specifications, add the following paragraphs.

"86-2.14B(4), High Potential.--Perform a high potential test on each conductor of all medium voltage cables in accordance with NETA (National Electrical Testing Association) standards as follows:

A. High Potential dc Tests:

(1) In accordance with NEMA WC8 for EPR insulated conductors.
(2) Each conductor section tested with:

(a) Splices and terminations in-place but disconnected from equipment.
(b) Remaining conductors and shields grounded in accordance with IEEE 400.

(3) Apply maximum dc test voltage of 25 kV for 5 kV, 100 percent and 133 percent insulation conductor.
(4) Measure only the leakage current associated with conductor.
(5) Utilize guard ring or field reduction sphere to suppress corona at disconnected terminations."
(6) Maximum test voltage shall not exceed limits for terminators specified in IEEE 48 or manufacturer's specifications.
(7) Apply test voltage in a minimum of five equal increments until maximum acceptable test voltage is reached.

(a) Increments not to exc eed ac voltage rating of conductor.
(b) Record dc leakage current at each step after a constant stabilization time consistent with system charging current.

(8) Raise conductor to specified maximum test voltage and hold for 15 minutes, or as specified by conductor manufacturer. Record dc leakage current at 30 seconds and 1 minute and at 1-minute intervals, thereafter.
(9) Immediately following test, ground conductor for adequate time period to drain insulation stored charge.
(10) Test results evaluated on a pass/fail basis.

B. New Conductors Spliced to Existing Conductors:

(1) Prior to performing splices, high potential dc test new conductor sections.
(2) Splicing shall be done in accordance with cable manufacturer's recommendations.
(3) After splicing new conductors to existing conductors, disconnect the existing conductors and perform the following tests:

(a) Shield continuity test.
(b) Insulation resistance test.

(4) Never high potential test any existing cable."

10-3C.07 LIGHTING SYSTEM

Lighting system shall conform to Section 86-6, "Lighting" of the Standard Specifications and these special provisions.

10-3C.08 REMOVING, REINSTALLING OR SALVAGING ELECTRICAL EQUIPMENT

Existing lighting standards where shown on the plans to be removed, shall be removed and disposed of. Existing luminaires removed from existing lighting standards shall be salvaged and reinstalled as shown on the plans. The Contractor shall salvage approximately 3,000 feet of the existing Kerrite 5-kV cable shown on the plans to be removed before demolishing the Trestle cable tray. The Engineer will determine and designate which portion of the 5-kV cable run will be salvaged after the existing cable is exposed for inspection. Approximately 100 feet of the salvaged cable shall be reused as Type 1 cable for the Bridge Main Span Superstructure Section drop loops. It is anticipated that difficulty will be encountered in removing the cable tray covers. The Contractor is cautioned that special tools, equipment and extra labor may be required to accomplish the cable tray cover removal. Full compensation for all additional costs occasioned by existing field conditions shall be considered as included in the various contract items of work and no additional compensation will be allowed therefor.

Temporary lighting standards and luminaires at the Trestle section shall be removed, salvaged and reinstalled at the locations shown on the plans.

Existing 5-kV Kerrite cable to be salvaged, shall be packaged in boxes or spools and bundled on wood pallets and hauled to the Richmond-San Rafael Bridge Maintenance Yard adjacent to the Richmond-San Rafael Bridge Toll Plaza and stockpiled.

The Contractor shall provide equipment, as necessary, to safely unload and stockpile the material. A minimum of two working days notice shall be given prior to delivery.

10-3C.09 LIGHTING (STAGE CONSTRUCTION)

Temporary highway lighting at the locations shown on the plans shall consist of furnishing, installing, maintaining, and removing when no longer required, temporary highway lighting in accordance with the details shown on the plans, the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications, and these special provisions, and as directed by the Engineer.

The provisions in this section shall not relieve the Contractor from his 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.

Temporary highway lighting shall be installed in stages in accordance with the various stages of construction shown on the plans. Temporary highway lighting between Station C Line 240+00 and 242+00 shall be installed prior to the channelization of two-way traffic on a single deck of the existing bridge.

Existing highway lighting system shall not be removed or terminated until either the temporary or permanent lighting is installed and operational or when approved by the Engineer.

All materials and equipment for temporary highway lighting system including, but not limited to, lighting standards, luminaires, portable concrete pedestals, wood poles, conductors, anchors, pull boxes and hardware shall be furnished by the Contractor.

Lighting standards used in the Trestle section temporary highway lighting shall be new and shall conform to the requirements in Section "Lighting System" of these special provisions.

Portland cement concrete pedestal for temporary lighting shall be in accordance with the details shown on the plans and shall conform to the provisions in Section 86-2.03, “Foundations,” of the Standard Specifications and these special provisions.

Drilling and bonding dowels to attach portland cement concrete pedestal into concrete barrier (Type K) 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" elsewhere in these special provisions, except for payment.

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.

Full compensation for dowels, drilling holes, and bonding dowels shall be considered as included in the contract lump sum price for lighting (Stage Construction) and no separate payment will be made therefor.

Wood poles shall conform to the requirements in Section 86-2.12, "Wood Poles," of the Standard Specifications.

Materials and equipment to be used in temporary highway lighting at approximately Station C Line 240+00 and 242+00 shall be either new or used equipment suitable for the intended use.

Upon completion of the work wherein temporary highway lighting system has been installed, or when specifically ordered by the Engineer, all components of the temporary highway lighting system shall be removed and disposed of.

The temporary highway lighting standards and luminaires installed within the Trestle section shall be salvaged and relocated to its final location in accordance with the various stages of construction shown on the plans.

All other materials and equipment 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. Post holes shall be backfilled.

10-3C.10 COST BREAK-DOWN

The Contractor shall furnish to the Engineer cost break-downs for the following contract lump sum items of electrical work:

Lighting
Modify Electrical System Cables
Lighting (Stage Construction)
Communication Conduit System
Electric Service (Backup Power System)

The cost break-downs for lighting, modify electrical system cables, lighting (Stage Construction), communication conduit system and electric service (Backup Power System), shall be completed and furnished in the format shown in the sample of the cost break-downs included in this section. Unit descriptions of work shown in said sample 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 sample. The units and quantities given in the sample 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 all the work shown on the plans. Such 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 price paid for lighting, modify electrical system cables, lighting (Stage Construction), communication conduit system and electric service (Backup Power System) due to any 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 the cost break-downs for lighting, modify electrical system cables, lighting (Stage Construction), communication conduit system and electric service (Backup Power System) work shall be equal to the contract lump sum price bid for said work. Overhead and profit shall be included in each individual unit listed in the cost break-downs. The cost break-downs shall be submitted to the Engineer for approval within 15 working days after the contract has been approved. The cost break-downs shall be approved, in writing by the Engineer, before any partial payment for the items for lighting, modify electrical system cables, lighting (Stage Construction), communication conduit system and electric service (Backup Power 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 for lighting, modify electrical system cables, lighting (Stage Construction), communication conduit system and electric service (Backup Power 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 accordance with Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications.

LIGHTING COST BREAK-DOWN

Contract No. 04-0438U4

UNIT DESCRIPTION	UNIT	QUANTITY	VALUE/ UNIT	TOTAL LABOR	TOTAL AMOUNT
LIGHTING STANDARDS (35’)	EA				
3" PVC COATED RGS	LF				
1 1/2" PVC COATED RGS	LF				
1" PVC COATED RGS	LF				
PULL BOX NO. 9A	EA				
PULL BOX (18” X 12” X 6”)	EA				
CONDUCTORS #6 (TYPE 7A)	LF				
CONDUCTORS #3 (TYPE 7A)	LF				
CONDUCTORS #8 (TYPE 7A)	LF				
CONDUCTORS #10 (TYPE 7A)	LF				
CONDUCTORS #12 (TYPE 7A)	LF				
ELECTRICAL SYSTEM ANALYSIS	LUMP SUM				
SPLICING KITS	EA				
RELOCATE LIGHTING STANDARD FROM TEMPORARY LIGHTING LOCATION TO PERMANENT LOCATION	EA				
REMOVE EXISTING LIGHTING STANDARD AND SALVAGE AND REINSTALL EXISTING LUMINAIRES	EA				

TOTAL _____

MODIFY ELECTRICAL SYSTEM CABLES COST BREAK-DOWN
Contract No. 04-0438U4

UNIT DESCRIPTION	UNIT	QUANTITY	VALUE/ UNIT	TOTAL LABOR	TOTAL AMOUNT
CONDUCTORS - 50 PR #20 - (TYPE 3)	LF				
CONDUCTORS - 3/C #4/0 - (TYPE 1)	LF				
CONDUCTORS - #4/0 - (TYPE 1A)	LF				
CONDUCTORS - 3/C #2 - (TYPE 2)	LF				
CONDUCTORS - 4/C #6 - (TYPE 2)	LF				
SPLICING KIT FOR 50 PR #20	LF				
SPLICING KIT FOR 3/C #4/0, 1 #3G	LF				
SPLICING KIT FOR #4/0	LF				
SPLICING KIT FOR 3/C #2, 1 #8G	LF				
SPLICING KIT FOR 4/C #6, 1 #8G	LF				
SPLICING KIT FOR #4/0	LF				
ELECTRICAL SYSTEMS ANALYSIS	LUMP SUM				

TOTAL _____

LIGHTING (STAGE CONSTRUCTION) COST BREAK-DOWN

Contract No. 04-0438U4

UNIT DESCRIPTION	UNIT	QUANTITY	VALUE/ UNIT	TOTAL LABOR	TOTAL AMOUNT
40' WOOD POLES	EA				
REINSTALL SALVAGED LUMINAIRES	EA				
15' LUMINAIRE MAST ARM WITH TIE ROD	EA				
PORTLAND CEMENT CONCRETE PEDESTAL (ATTACHED TO CONCRETE BARRIER TYPE K)	EA				
PULL BOX (12" X 12" X 4")	EA				
CONDUCTORS - 4/C #6, 1 #8G (TYPE 4)	LF				
CONDUCTORS - 4/C #12 (TYPE 7B)	LF				
CONDUCTORS - 2C #6	LF				
1 1/2" CONDUIT RISER	LUMP SUM				
GROUND ROD	EA				
3/8", 7-STRAND MESSENGER STEEL WIRE	LF				

TOTAL _____

COMMUNICATION CONDUIT SYSTEM COST BREAK-DOWN
Contract No. 04-0438U4

UNIT DESCRIPTION	UNIT	QUANTITY	VALUE/ UNIT	TOTAL LABOR	TOTAL AMOUNT
4" PVC COATED RGS	LF				
4" EXPANSION FITTING	EA				
RELOCATE EXISTING CALL BOX TO TEMPORARY LOCATION	EA				
TEMPORARY CALL BOX SUPPORTS	EA				
PULL BOX NO. 9A	EA				
PULL BOX (12” X 12” X 8”)	EA				
PULL BOXES (6" X 6" X 4")	EA				
PULL BOX (12” X 12” X 4”)	EA				

2” PVC COATED RGS CONDUIT	LF				
1 1/2” PVC COATED RGS CONDUIT	LF				
EXPANSION FITTINGS 2"	EA				
EXPANSION FITTINGS 1 1/2"	EA				
CONDUCTORS #6 (TYPE 7A)	LF				
CONDUCTORS #12 (TYPE 7A)	LF				
CONDUCTORS 50 PR #20 (TYPE 6)	LF				
CONDUCTORS 1 PR #18 (TYPE 6)	LF				
CONDUCTORS 4 PR #18 (TYPE 6)	LF				
CONDUCTORS - 3C #2 (TYPE 4)	LF				
CONDUCTORS - 3C #12 (TYPE 7B)	LF				
CONDUCTORS - 4 PR #18 (TYPE 5)	LF				
CONDUCTORS - 1 PR #18 (TYPE 5)	LF				
SPLICING KITS	EA				
RELOCATE EXISTING CALL BOX FROM TEMPORARY LOCATION TO PERMANENT LOCATION	EA				

TOTAL _____

ELECTRIC SERVICE (BACKUP POWER SYSTEM) COST BREAK-DOWN

Contract No. 04-0438U4

UNIT DESCRIPTION	UNIT	QUANTITY	VALUE/ UNIT	TOTAL LABOR	TOTAL AMOUNT
AUTOMATIC TRANSFER SWITCHES 800 AMP	EA				
AUTOMATIC TRANSFER SWITCHES 400 AMP	EA				
AUTOMATIC TRANSFER SWITCHES 150 AMP	EA				
300KW, 3 POLE 480V GENERATORS	EA				
200KW, 3 POLE 480V GENERATORS	EA				
150KW, 3 POLE 480V GENERATORS	EA				
225 KVA TRANSFORMERS	EA				
112.5 KVA TRANSFORMERS	EA				
75 KVA TRANSFORMERS	EA				
800 AMP MOLDED BREAKERS	EA				
600 AMP MOLDED BREAKERS	EA				
400 AMP MOLDED BREAKERS	EA				
225 AMP MOLDED BREAKERS	EA				
CONDUCTORS 750 MCM - (TYPE 7A)	LF				
CONDUCTORS 750 MCM - (TYPE 7A)	LF				
CONDUCTORS 500 MCM - (TYPE 7A)	LF				
CONDUCTORS 350 MCM - (TYPE 7A)	LF				
CONDUCTORS 250 MCM - (TYPE 7A)	LF				
CONDUCTORS - #3/0 - (TYPE 7A)	LF				
CONDUCTORS - #2/0 - (TYPE 7A)	LF				
CONDUCTORS - #1/0 - (TYPE 7A)	LF				
CONDUCTORS - #2 - (TYPE 7A)	LF				

ELECTRIC SERVICE (BACKUP POWER SYSTEM) COST BREAK-DOWN (CONTINUED)

Contract No. 04-0438U4

UNIT DESCRIPTION	UNIT	QUANTITY	VALUE/ UNIT	TOTAL LABOR	TOTAL AMOUNT
CONDUCTORS - #3 - (TYPE 7A)	LF				
CONDUCTORS - #4 - (TYPE 7A)	LF				
CONDUCTORS - #6 - (TYPE 7A)	LF				
ELECTRICAL SYSTEMS ANALYSIS	LUMP SUM				

TOTAL _____

10-3C.11 PAYMENT

Electrical work will be paid on the basis of lump sum as follows:

Lighting
Modify Electrical System Cables
Lighting (Stage Construction)
Communication Conduit System
Electric Service (Backup Power System)

The contract lump sum prices paid for lighting, modify electrical system cables, lighting (Stage Construction), communication conduit system and electric service (Backup Power System), shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in lighting, modify electrical system cables, lighting (Stage Construction), communication conduit system and electric service (Backup Power System), 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 salvaging 5-kV cable shall be considered as included in the contract lump sum price paid for modify electrical system cables and no separate payment will be made therefor.

Full compensation for removal and disposal of existing lighting standards, including salvaging of existing luminaires shall be considered as included in the contract lump sum price paid for lighting and no separate payment will be made therefor.

Full compensation for electrical systems analysis shall be considered as included in the contract lump sum price paid for modify electrical system cables and no separate payment will be made therefor.

Full compensation for salvaging and relocating lighting standards and luminaires used for temporary highway lighting at the Trestle section shall be considered as included in the contract lump sum price paid for lighting and no additional compensation will be allowed therefor.

Full compensation for temporary call box supports and temporary cable protectors shall be considered as included in the contract lump sum price paid for communication conduit system and no separate payment will be made therefor.

SECTION 10-4. MECHANICAL WORK

10-4.01 GENERAL

The mechanical work consists of furnishing and installing temporary and permanent compressed air and pressurized water piping, including all valves, fittings, and appurtenances necessary for proper operation of said systems.

All other work incidental and necessary to the proper installation and operation of the mechanical work shall conform to the requirements for similar type work elsewhere in these special provisions.

MISCELLANEOUS.--In addition to the requirements of the plans and these special provisions, all work shall conform to the manufacturer's recommendations and instructions.

All major mechanical components shall be supplied by companies that have been in the production of the given type of equipment for not less than 10 years and have West Coast parts and service representatives. All similar mechanical items shall be from the same manufacturer.

All products used on the air or water systems shall have a pressure rating of 200 psi unless specified otherwise. All pipe and metal products used on the bridge structure shall be protected against corrosion as specified.

Steel gages shall be United States Standard.

CODES.--All work, including equipment, materials and installation, shall conform to California Administrative Code, Title 8, Chapter 4, Division of Industrial Safety (DIS), and to the National Fire Codes unless stated otherwise.

COORDINATION.--Mechanical work shall be coordinated with other work.

PROTECTION, CARE AND CLEANING.--Materials and equipment shall be protected against moisture, dirt and damage. Fixtures, piping, valves, fittings, accessories and appurtenances installed under this contract shall be cleaned. Piping to be tested with water shall be cleaned of foreign matter, drained and flushed. Air piping shall be blown out with compressed air.

EXISTING UTILITIES.--The Contractor shall verify the locations of all existing utilities in the construction area prior to the start of any work.

TESTING AND ADJUSTING SYSTEMS .--

PRE-TEST REQUIREMENTS.--Before starting or operating systems, the Contractor shall flush and clean piping and check for proper installation and alignment.

GENERAL REQUIREMENTS.--The Contractor shall test and start up the final piping system upon project completion as hereinafter specified.

The Contractor shall repair, or replace with new materials, any piping work damaged during shipment, after delivery, during installation, and during testing.

The Contractor shall perform tests throughout the period of installing the pipe to insure the lines are airtight and the testing can be conducted without delay. The test shall be conducted for a period of one hour at the design pressure.

PROJECT COMPLETION TESTS.--The Engineer shall be notified at least 3 days in advance of starting these tests. The State Fire Marshal (San Leandro District Office) shall be notified 3 days prior to any test involving the water system.

Upon completion of mechanical work and pre-test requirements, or at such time prior to completion as determined by the Engineer, the Contractor shall operate and test installed piping systems for at least 3 consecutive 8-hour days to demonstrate satisfactory overall operation.

The Contractor shall furnish, install and remove all apparatus necessary for performing the tests.

FUNCTIONAL TESTING.--

1. All items not specifically listed below shall be inspected, adjusted to operate properly, and functionally tested in operation.
2. Pressure shall be checked downstream of all pressure regulators to verify that the pressure is maintained at the pressure as listed in these special provisions.
3. All valves shall be operated to insure smooth operation. Air cocks shall be operated with the air system pressurized. Fire hydrant valves shall be operated with the jockey pump on automatic and the fire pumps off.
4. Piping systems shall be tested as follows:

A. Water Line Tests:

(1) Temporary Piping.--After each stage of installing temporary water piping, pipe shall be visually checked for leaks after the temporary piping is subjected to line pressure. No visible leaks shall be present. If leaks are visible, the Contractor shall repair all leaks and reinspect the piping until no leaks are visible.

(2) Permanent Piping.--Isolate the new lines from the existing lines by means of temporary caps at the connection points. Pressurize the new line to 230 psi after it has been completely filled with water (all valves shall be opened to bleed off air). The pressure shall be maintained for 4 hours while the amount of makeup water pumped into the line is accurately measured. The water line shall require less than 10 gallons of makeup water during the test. In addition, no visible leaks shall be present. If the water loss test fails, the Contractor shall find the leaks, correct same, and repeat the test until a satisfactory test is made.

B. Air Line Tests:

(1) Temporary Piping.--After each stage of installing temporary piping, pipe shall be checked for audible air leaks after the piping is subjected to line pressure. If audible leaks are detected, a soapy water solution shall be sprayed on the pipe to locate the leak. The Contractor shall repair all leaks and reinspect the piping until no leaks are detected.

(2) Permanent Piping.--Isolate the new lines from the existing lines by means of temporary caps at the connection points. The pipe to be tested shall be pressurized to 150 psi with the air compressor. The system shall then be left for 24 hours. The pressure shall not drop by more than 20 psi during this time. If the test fails, the Contractor shall find the leak, correct same, and repeat the test until a satisfactory test is made.

OPERATIONAL DATA.--The required data shall be accurately measured. The data shall be measured in the presence of the Engineer and shall be submitted for approval.

The following data shall be measured and tabulated:

a. Air quantities, CFM.
b. Water quantities, GPM.
c. Temperatures of air and water leaving and entering equipment.

d. Other data as required.

10-4.02 PIPE, FITTINGS AND VALVES

GENERAL.--

WORK SPECIFIED ELSEWHERE.--Attention is directed in Section “Trenching and Backfilling” of these special provisions for trenching and backfilling for pipes.

PIPE SIZES.--Sizes shown are nominal inside diameter unless otherwise noted. No change in the pipe size shown on the plans will be permitted except by written permission of the Engineer.

PIPE AND FITTING APPLICATIONS.--Compressed air and water pipe and fittings shall be galvanized steel pipe with mechanical pipe couplings.

PRODUCTS.--

PIPE AND FITTING CLASSES.--Pipe shall be galvanized Schedule 40, conforming to ASTM Designation: A53, Type B. Steel pipe fittings shall conform to ASTM Designation: A 105.

PIPE WRAPPING TAPE.--Wrapping tapes for steel pipe buried in ground shall be pressure sensitive polyvinyl chloride or polyethylene tape having nominal thickness of 20 mils. Primers shall be as recommended by the manufacturer.

PIPE FITTINGS.--

MECHANICAL PIPE COUPLINGS.--Mechanical pipe couplings shall be self-centering and shall engage and lock in place the grooved pipe and pipe fittings in a positive airtight couple. Fittings shall provide some degree of angular pipe deflection, contraction, and expansion.

Coupling housing clamps shall be fabricated in 2 or more parts of malleable iron castings to the specifications in ASTM Designation: A 47, Grade 32510. Housing clamps shall hold in place a molded synthetic rubber composition air sealing gasket designed so that internal pressure serves to increase the seal's air tightness. Couplings shall be coated with hot dip galvanizing.

The coupling assembly shall be securely held together by 2 or more trackhead, square or oval-neck, steel bolts. Bolts and nuts shall be heat treated carbon steel, hot dip galvanized and shall be in accordance with the specifications in ASTM Designation: A 183. Couplings shall be as UL listed for fire protection systems.

AIR COCKS.--Air cocks shall be bronze, with handles, 150 psi pressure rating, Lunkenheimer Fig. 1571, Crane No. 80E, or equal. Air cocks shall be the same size as the surrounding pipe.

AIR OUTLETS.--Air outlets shall be Chicago pneumatic No. C-15120Y, Dixon valve and coupling AB-12, or equal.

EXPANSION JOINT.--Expansion joint shall be a stainless steel bellows type with welding ends, suitable for potable water service at 30 to 110 degrees F. Axial traverse shall be a minimum of 1 1/2 inches for both 4-inch and 8-inch sizes. Model shall be Flexonics "controlled flexing type", Proco expansion joint, or equal. Expansion joints shall have a minimum 250-pound pressure rating and shall be installed with mechanical couplings.

BALL JOINTS.--Ball joints shall be sized as shown on the plans with a ductile iron casing and a 15 mil fusion bonded epoxy lining and coating. The joint shall have welded ends, rated for 350 psi, and allow at least 15 degrees of angular flex.

AIR HOSE.--Air hose for expansion loops shall be 4-inch diameter. Hose shall be rated for 200 psi working pressure. Minimum bend radius shall be 24 inches for 4-inch hose. Hose shall be constructed with a smooth rubber liner, multiple carcass with galvanized spring wire reinforcement and an abrasion resistant cover. Hose shall be covered with a 28 gage galvanized steel sheathing.

Hose couplings and fittings shall be as shown on the plans made of brass, bronze, or stainless steel.

MECHANICAL PIPE TAPS.--Mechanical pipe taps shall consist of a ductile or cast iron body, coated to prevent corrosion and an attachment body or strap which has a flat surface against the pipe. The body shall include a gasket around the tapped opening to provide a 100 percent leak proof seal. The mechanical tap shall be rated for use on steel pipe and shall have a 250 psi pressure rating.

VALVES.--Valves shall be of types specified, or equal, and full size of line in which installed, unless otherwise shown.

Valves shall be 250 pound class unless otherwise specified.

GATE VALVES.--Gate valves shall be iron body, wedge gate valves with bronze trim and non rising stem.

HOSE FAUCETS.--Hose faucets shall be compression type, angle pattern, tee handle, 3/4-inch hose end.

HYDRANT.--Hydrant shall be Potter-Roemer 4140 series, James Jones J-344H.P, Powhatan, or equal, as shown on plans, bronze, 300 psi working pressure, operating nut, lug type reducer and hose cap, and chain. Hydrant shall have 4 inches standard NPT threads on inlet and National Standard Hose Threads on 2 1/2" outlet. Lug type reducer shall have National Standard Hose Threads.

A total of 6 hydrant operating nut wrenches and 6 hose spanner wrenches or 6 of the combination type shall be provided. Wrench shall also remove cap.

PRESSURE REGULATOR VALVE.--The construction of the pressure regulator valve (PRV) shall be bronze body, bronze trim and screwed connection with a 300 pound pressure rating. It shall be a direct acting, spring loaded diaphragm type control valve with balanced single seat. It shall be completely self-contained and require no external sending lines or outside control medium. It shall have an adjustment range for the outlet pressure of approximately 20 to 60 pounds per square inch and shall be initially set for 25 psi or as shown on the plans. The valve shall normally be held close and will open and maintain the required downstream pressure when the set pressure is reached. The pressure regulator shall have a union inlet and an integral strainer with removable stainless steel screen and shall be rated for water and air service.

HANGER AND SUPPORTS.--Hangers and supports shall withstand all conditions of loading to which the piping and associated equipment may be subjected and within the manufacturer's load ratings.

Hangers and supports shall be sized to fit the outside diameter of pipe. All hanger members and components shall be hot-dipped galvanized.

BRIDGE PIPE SUPPORT COMPONENTS.--Premanufactured pipe support components shall be standard manufactured and shall be rated for standard or heavy duty service, and suitable for the application as shown on the plans. Steel members, concrete expansion devices and welds shall be in accordance with Section 75, "Miscellaneous Metal," of the Standard Specifications. All supports shall be of the types shown on the plans. Similar types of supports may be used if they are designed to support 2 times the maximum pipe loading and if working drawings are approved, in writing, by the Engineer.

OFFSET PIPE CLAMP.--Offset pipe clamp shall be a commercial standard offset pipe clamp, consisting of a two-piece galvanized steel strap assembly suitable for supporting piping away from a wall.

PIPE STRAP.--Pipe strap shall be a commercial standard strap, consisting of a one-piece galvanized steel bent plate, suitable for clamping piping to a wall or beam, and conforming to Manufacturers Standardization Society SP-69 (Type 26).

COATING OF PIPE AND APPURTENANCES .--Pipe, supports, and fittings shall be galvanized in accordance with the provisions in Section 75-1.05 of the Standard Specifications and these special provisions.

Ferrous surfaces of valves and other special appurtenances with moving parts and/or rubber gasketing shall be coated and lined with fusion bonded coating. The material shall be 100 percent solids epoxy or polyurethane that is fusion bonded to the metal surfaces. Surface preparation before coating shall be abrasive blast or centrifugal wheel blast (SP 10-91) or acid pickling (SP 8-91). For valves and other special appurtenances, material shall be applied in one or two coats, with the total dry film thickness of all applications being not less than 7 mils. For pipe and mechanical couplers at the west abutment, as indicated on the plans, coating and lining of black steel pipe shall be fusion epoxy bonded by the fluidized bed method, to 18 mils. dry film thickness. Field joints shall be touched up with an epoxy coating as recommended by the fusion epoxy manufacturer.

Field touchup of damaged galvanized surfaces shall be with zinc-rich primer in accordance with the provisions of Sections 59-2.13 and 91-1.04 of the Standard Specifications.

EXECUTION.--

INSTALLING PIPING.--Piping shall be installed in accordance with the requirements in the latest edition of the Uniform Plumbing Code with additional requirements specified.

CONCEALED AND EXPOSED PIPING.--Piping shall be exposed except in areas where it is below grade.

LAYOUT.--Piping shall be installed as shown on the plans. Piping shall not interfere with other work.
Water and air lines shall be installed generally level, free of traps and bends.

CONNECTIONS AT EXPANSION JOINTS.--Final joining of pipe to all expansion joints shall be performed only when the air temperature is between 50 degrees and 80 degrees F, in order to keep the pipe expansions and contractions within the design limits of the expansion joints. When the pipe is to be joined to the expansion joint, the pipe end shall be field trimmed, grooved, touch-up coated on cut ends, and then joined by mechanical coupling while the air temperature is within the range specified herein.

CUTTING PIPE.--All pipe shall be cut straight and true and the ends shall be reamed to the full inside diameter of the pipe after cutting.

All pipe shall be cut by a power hacksaw, a circular cutting machine using an abrasive wheel, or in a square-end saw vise by means of a hand saw. The pipe shall be reamed after cutting and rough edges or burrs removed so that a smooth and unobstructed flow will be obtained. Cut ends and damaged galvanizing shall be repaired as specified in "Coating Of Pipe And Appurtenances" of this section.

DAMAGED PIPING.--Pipe that is cracked or otherwise damaged shall be removed from the work.

PIPE JOINTS AND CONNECTIONS.--Joints in threaded steel pipe shall be made with a pipe joint compound that is nonhardening and noncorrosive, placed on the pipe and not in the fittings.

The use of thread cement or caulking of threaded joints will not be permitted. Threaded joints shall be made tight. Long screw or other packed joints will not be permitted. Any leaky joints shall be remade with new material.

CLEANING AND CLOSING OF PIPE.--The interior of all pipe shall be cleaned before installation. All openings shall be capped or plugged as soon as the pipelines are installed to prevent the entrance of any materials. The caps or plugs shall remain in place until their removal is necessary for completion of the installation. All completed systems shall be flushed or blown out.

WRAPPING AND COATING BURIED STEEL PIPE.--Steel pipe buried in the ground shall be wrapped or coated.

1. Wrapped steel pipe shall be wrapped with pressure sensitive polyvinyl chloride or polyethylene tape having nominal thickness of 20 mils. Pipe shall be thoroughly cleaned and primed as recommended by the tape manufacturer.
2. Tapes shall be tightly applied with 1/2-inch minimum uniform lap, free from wrinkles and voids with approved wrapping machines and experienced operators to provide not less than 20 mils thickness.
3. Plastic coating on steel pipe shall be factory applied. Field joints, fittings, and valves for coated steel pipes shall be wrapped to provide continuous protection. Coating imperfections and damage shall be repaired to the satisfaction of the Engineer.
4. Field joints and fittings shall be covered by wrapping polyethylene or polyvinyl tape specified for wrapping pipe, except 2 layers of 10 mil thick tape shall be used. Wrapping at joints shall extend a minimum of 6 inches over adjacent pipe coverings. Width of tape for wrapping fittings shall not exceed 2 inches. Adequate tension shall be applied so tape will conform closely to contours of fittings. Putty tape insulation compounds approved by the Engineer shall be used to fill voids and provide smooth even surface for application of tape wrap.

THRUST BLOCKS AND ANCHORS.--On all pipe lines in the ground, anchors, clamps and rods, or thrust blocks shall be provided at changes in direction of piping, connections or branches from mains 2 inches and larger, and capped connections.

Anchor or thrust blocks shall be formed by pouring concrete between pipe and trench wall. Thrust blocks shall be adequate size and so placed as to take all thrusts created by maximum internal water pressure unless otherwise shown on the plans.

INSTALLING FITTINGS.--

PIPE FITTINGS.--Pipe fittings shall be as follows: for piping less than 3-inch, threaded screw connections; for piping 3-inch or more, mechanical couplings, flanges or butt welded connections. For mechanical couplings the pipe ends receiving the cut groove mechanical coupling shall be supplied grooved in accordance with the coupling manufacturer. For grooving on site, pipe shall be prepared in accordance with the coupling manufacturer's specifications using specially designed tools available.

Cut groove pipe ends shall be clean and free from indentations, projections and roll marks in the area from pipe end to groove for proper gasket sealing.

Before couplings are assembled, pipe ends and outsides of gaskets shall be lightly coated with cup grease, graphite paste, or other lubricant recommended by the pipe coupling manufacturer to facilitate installation.

The entire coupling installation shall be done in accordance with the manufacturer's latest published literature.

Painted surfaces damaged as a result of the Contractor's operations shall be repaired by wire brushing the damaged member to remove all dirt and loose paint and then applying 2 coats of zinc-rich primer.

A manufacturer's representative shall visit the jobsite to observe the first installation of mechanical couplings and to train the Contractor's personnel so that all mechanical couplings are installed by workers trained by the manufacturer's representative and that the couplings are installed in accordance with the manufacturer's recommended installation practices.

No more than two mechanical couplings shall be installed between supports.

In continuous spans, couplings shall be installed in the first 10 percent of the span from a support or further than 33 percent of the span length from a support or further than 33 percent of the span length from a support. For spans less than 60 percent of the maximum spans as listed on the plans the mechanical coupling location rules will not apply. Butt welding shall be in areas where mechanical couplings or threaded screw connections cannot be used.

Elbows, tees, and reducers shall be forged or cast and installed with the same type coupling as the surrounding pipe. Mechanical pipe tops may be used on headers when the branch line is 1-1/2 inches or less.

BRIDGE PIPE FITTINGS.--Bridge pipe shall be supported within the guidelines shown on the plans. Piping shall be supported to allow for weight loading, thermal and bridge expansion, and lateral loading equal to one-half the weight loading. Valves shown on the main 4-inch air and 8-inch water lines shall be located as shown on the plans but may be moved 100 feet in either direction in order to provide personnel better access to the operator. Valves shall be located near supports.

Piping shall be supported using the types of supports shown on the plans or approved equal.

VALVES.--Valves shall be installed as shown on the plans with ends prepared to accept the same coupling method as the surrounding pipe. All valves shall be installed with sufficient clearance on all sides to connect hoses, if applicable, and to operate the valve.

10-4.03 TRENCHING AND BACKFILLING

Trench excavation and backfilling for mechanical piping shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications and these special provisions.

Imported backfill material shall be Class 2 aggregate base and shall conform to the provisions in Section 26, "Aggregate Bases," of the Standard Specifications, except the relative compaction of each layer of compacted base material shall be not less than 90 percent.

All other trench backfill material shall consist of select native material from trench excavation, free of stones or lumps exceeding 2 1/2 inches in greatest dimension, organic or other unsatisfactory material. Select native backfill material shall be compacted to a relative compaction of not less than 90 percent.

10-4.04 TEMPORARY WATER LINES AND AIR LINES

This work shall consist of furnishing and installing temporary water lines and air lines at various locations shown on the plans. As a minimum, the following existing water and air line facilities to be provided with temporary lines and connections during the progress of the contract work until the permanent water line and air line system are completed and in operation:

Water lines serving hose stations for vehicle fire and pavement washdown emergencies (8" and smaller Schedule 40 steel pipes).

Air lines serving ongoing bridge painting operations (4" and smaller Schedule 40 steel pipes).

Existing water and air lines shall be maintained in continuous operation during the life of this contract, except for brief shutdown periods as further described in this section.

Material for temporary air and water lines provided by the Contractor to maintain service shall have a pressure rating of 200 psi.

The Contractor shall submit to the Engineer a plan and schedule for facility shutdowns within 40 working days of approval of the contract. The plan shall show specific location of tie-ins, the order in which the Contractor proposes to carry out the work, the dates on which he will start the various shutdowns, and the dates for establishing permanent service.

The Contractor shall notify the Engineer at least 72 hours prior to the need to shutdown such facilities to make tie-ins to Contractor-installed relocations. Prior to making the cut in existing facilities, the Contractor shall have first installed all bypass lines and extensions up to the point of connection so that system down-time is minimized.

After receiving Engineer approval to make cuts in such existing facilities, the Contractor shall make the tie-in and then restore service within 2 hours of the shutdown.

Temporary water and air line facilities shall be removed and disposed of when no longer required. All removed materials shall become the property of the Contractor and shall be disposed of in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

10-4.05 RELOCATE AND RECONSTRUCT WATER LINES AND AIR LINES

This work shall consist of furnishing and installing temporary pipes, fittings and connections to temporarily relocate and reconstruct existing water lines and air lines that are in conflict with other work under this contract at various locations shown on the plans. The following existing water line and air line facilities shall be temporarily relocated during the progress of the contract work and reconstructed to its new location:

Water lines and air lines, 4 inches and smaller, in the way of column casing installations at the locations shown on the plans.

All water and air lines shall be maintained in continuous operation during the life of this contract, except for brief shutdown periods as further described in this section.

Temporary piping shall be installed by the Contractor when necessary to maintain continuous service while the work progresses.

Temporary water and air lines provided by the Contractor to maintain service shall have a pressure rating of 200 psi.

Water lines and air lines shall be reconstructed to their new locations upon completion of all portions of contract work which were in conflict with the existing facilities. Work and material to reconstruct water lines and air lines to new locations shall conform to the design of the existing facilities, with work meeting the requirements of Section 15-2.05, "Reconstruction," of the Standard Specifications.

The Contractor shall submit to the Engineer a plan and schedule for facility shutdowns within 40 working days of approval of the contract. The plan shall show specific location of tie-ins, the order in which the Contractor proposes to carry out the work, the dates on which he will start the various shutdowns, and the dates for establishing permanent service.

The Contractor shall notify the Engineer at least 72 hours prior to the need to shutdown such facilities to make tie-ins to Contractor-installed relocations. Prior to making the cut in existing facilities, the first order of work shall be to install all bypass lines and extensions up to the point of connection so that system down-time is minimized.

After receiving the Engineer's approval to make cuts in such existing facilities or to reconstruct the facilities, the Contractor shall make the tie-in and then restore service within 2 hours of the shutdown.

10-4.06 REMOVE WATER LINES AND AIR LINES

Existing water lines and air lines where shown on the plans to be removed, shall be completely removed and disposed of.

Removal of existing water lines and air lines shall include the removal of existing anchors, hangers, and supports.

Existing water lines and air lines shall not be removed until the new or temporary water lines and air lines facilities are completed and in operation.

Removed materials shall become the property of the Contractor and shall be disposed of in accordance with the provisions in Section 7-1.13 of the Standard Specifications.

10-4.07 PAYMENT

The contract lump sum price paid for mechanical work shall include full compensation for furnishing all labor, materials (including pipe supports and paints), tools, equipment, and incidentals and for doing all the work involved in furnishing and installing the mechanical work, including trenching and backfilling, pipe supports and painting, 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 temporary water line and air line facilities shall be considered as included in the contract lump sum price paid for mechanical work and no additional compensation will be allowed therefor.

Full compensation for relocate and reconstruct water lines and air lines facilities shall be considered as included in the contract lump sum price paid for mechanical work and no additional compensation will be allowed therefor.

Full compensation for removal and disposal of existing water lines and air lines facilities shall be considered as included in the contract lump sum price paid for mechanical work and no additional compensation will be allowed therefor.

SECTION 11. (BLANK)

SECTION 12. BUILDING WORK

SECTION 12-1. GENERAL REQUIREMENTS

12-1.01 SCOPE

Building work described herein and as shown on the plans shall conform to the requirements of these special provisions and Sections 1 through 9 of the Standard Specifications. Sections 10 through 95 of the Standard Specifications shall not apply to the work in this Section 12 except when specific reference is made thereto.

The building work to be done consists, in general, of furnishing and installing metal doors and frames and such other items or details, not mentioned above, that are required by the plans, Standard Specifications, or these special provisions shall be performed, placed, constructed or installed.

12-1.02 ABBREVIATIONS

Section 1-1.02, "Abbreviations," of the Standard Specifications is amended by adding the following:

AAMA	American Architectural Manufacturers' Association
ACI	American Concrete Institute
AGA	American Gas Association
AITC	American Institute of Timber Construction
AMCA	Air Movement and Control Association
APA	American Plywood Association
ARI	American Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
CS	Commercial Standards (US Department of Commerce)
ESO	Electrical Safety Orders
FGMA	Flat Glass Marketing Association
FM	Factory Mutual
FS	Federal Specification
ICBO	International Conference of Building Officials
NAAMM	National Association of Architectural Metal Manufacturers
NBFU	National Board Fire Underwriters
NEC	National Electrical Code
NFPA	National Fire Protection Association
PEI	Porcelain Enamel Institute
PS	Product Standard (US Department of Commerce)
RIS	Redwood Inspection Service
SCPI	Structural Clay Products Institute
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SSPC	Steel Structures Paint Council
TCA	Tile Council of America
TPI	Truss Plate Institute
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
WCLIB	West Coast Lumber Inspection Bureau (stamped WCLB)
WCLB	Grade stamp for WCLIB
WIC	Woodwork Institute of California
WWPA	Western Wood Products' Association

When reference is made to the Uniform Building Code (UBC) on the plans or in the special provisions, it shall be the 1994 Uniform Building Code as amended by the 1995 Title 24 California Building Standards Code.

12-1.03 GUARANTEE

The Contractor hereby unconditionally guarantees that the building work will be done in accordance with the requirements of the contract, and further guarantees the building work of the contract to be and remain free of defects in workmanship and materials for a period of one year from the date of acceptance of the contract, unless a longer guarantee period is required elsewhere in these special provisions. The Contractor hereby agrees to repair or replace any and all building work, together with any other adjacent work which may be displaced in so doing, that may prove to be not in accordance with the requirements of the contract or that may be defective in its workmanship or material within the guarantee period specified, without any expense whatsoever to the Department, ordinary wear and tear and unusual abuse or neglect excepted.

The performance bond for the contract, or a portion thereof, in the sum equal to one-half the contract price of the building work, shall remain in full force and effect during the guarantee period.

The Contractor further agrees, that within 10 calendar days after being notified in writing by the Department of any building work not in accordance with the requirements of the contract or any defects in the building work, he shall commence and prosecute with due diligence all work necessary to fulfill the terms of this guarantee, and shall complete the work within a reasonable period of time, and, in the event he fails to comply, he does hereby authorize the Department to proceed to have such work done at the Contractor's expense and he shall honor and pay the cost and charges therefor upon demand. The Department shall be entitled to all costs and expenses, including reasonable attorney's fees, necessarily incurred upon the Contractor's refusal to honor and pay the above costs and charges.

12-1.04 SUBMITTALS

Working drawings, material lists, descriptive data, samples and other submittals specified in these special provisions shall be submitted for approval in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications and these special provisions.

Unless otherwise permitted in writing by the Engineer, all submittals required by these special provisions shall be submitted within 35 days after the contract has been approved.

Attention is directed to the provisions in Section 5-1.01, "Authority of Engineer," of the Standard Specifications. The Engineer may request submittals for materials or products where submittals have not been specified in these special provisions, or may request that additional information be included in specified submittals, as necessary to determine the quality or acceptability of such materials or products.

Attention is directed to Section 6-1.05, "Trade Names and Alternatives," of the Standard Specifications. The second indented paragraph of the first paragraph of said Section 6-1.05 is amended to read:

> Whenever the specifications permit the substitution of a similar or equivalent material or article, no test or action relating to the approval of such substituted material will be made until the request for substitution is made in writing by the Contractor accompanied by complete data as to the equality of the material or article proposed. Such request shall be made within 35 days after the date the contract has been approved and in ample time to permit approval without delaying the work, but need not be made in less than 35 days after award of the contract.

Work requiring the submittal of working drawings, material lists, descriptive data, samples, or other submittals shall not begin prior to approval of said submittal by the Engineer. twenty working days shall be allowed for approval or return for correction of each submittal or resubmittal. Should the Engineer fail to complete his review 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 review, 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.

Submittals shall be delivered to the locations indicated in these special provisions. If a specific location is not indicated, the submittal shall be delivered to the Office of Structures Design, Documents Unit, Fourth Floor, 1801 30th Street, Sacramento, California 95816, or mailed to the Office of Structures Design, Documents Unit, P. O. Box 942874, Sacramento, California 94274-0001.

Each submission of drawings, material lists and descriptive data shall consist of at least 5 copies. Two copies will be returned to the Contractor either approved for use or returned for correction and resubmittal.

Each separate item submitted shall bear a descriptive title, the name of the project, district, county, and contract number. Plans and detailed drawings shall be not larger than 22" x 36".

The material list shall be complete as to name of manufacturer, catalog number, size, capacity, finish, all pertinent ratings, and identification symbols used on the plans and in the special provisions for each unit.

Parts lists and service instructions packaged with or accompanying the equipment installed in the work shall be delivered to the Engineer at the jobsite. Required operating and maintenance instructions shall be submitted in triplicate.

Manufacturer's warranties for products installed in the work shall be delivered to the Engineer at the jobsite.

Unapproved samples and samples not incorporated in the work shall be removed from State property, when directed by the Engineer.

12-1.05 SCHEDULE OF VALUES

The Contractor shall prepare and submit to the Engineer 2 copies of a Schedule of Values covering each lump sum item for building work. The Schedule of Values, showing the value of each kind of work, shall be acceptable to the Engineer before any partial payment estimate is prepared.

The sum of the items listed in the Schedule of Values shall equal the contract lump sum price for building work. Overhead, profit, bond premium, temporary construction facilities, and plant shall not be listed.

12-1.06 INSPECTION

All items covered or all stages of work that are not to remain observable must be inspected and approved before progress of work conceals portions to be inspected. The Contractor shall notify the Engineer not less than 72 hours in advance of when such inspection is needed.

12-1.07 OBSTRUCTIONS

Attention is directed to Sections 7-1.11, "Preservation of Property," 7-1.12, "Responsibility for Damage," 7-1.16, "Contractor's Responsibility for the Work and Materials," and 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications.

The Contractor shall notify the Engineer and the appropriate regional notification center for operators of subsurface installations at least 5 working 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:

Underground Service Alert
Northern California (USA)
Telephone: 1(800)642-2444

Underground Service Alert
Southern California (USA)
Telephone: 1(800)422-4133

South Shore Utility
Coordinating Council (DIGS)
Telephone: 1(800)541-3447

Western Utilities
Underground Alert, Inc.
Telephone: 1(800)424-3447

12-1.08 PRESERVATION OF PROPERTY

Attention is directed to Sections 7-1.11, "Preservation of Property," 7-1.12, "Responsibility for Damage," 7-1.16, "Contractor's Responsibility for the Work and Materials," and 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications.

Operations shall be conducted in such a manner that existing facilities, surfacing, installations, and utilities which are to remain in place will not be damaged. Temporary surfacing, facilities, utilities and installations shall also be protected until they are no longer required. The Contractor, at his expense shall furnish and install piling, sheet piling, cribbing, bulkheads, shores, or whatever means may be necessary to adequately support material carrying such facilities, or to support the facilities themselves and shall maintain such support until they are no longer needed.

12-1.09 UTILITY CONNECTION

The Contractor shall make all arrangements, and obtain all permits and licenses required for the extension of and connection to each utility service applicable to this project, shall furnish all labor and materials necessary for such extensions which are not performed or provided by the utility, and shall furnish and install any intermediate equipment required by the serving utilities.

Upon written request by the Contractor, the State will pay all utility permits, licenses, connection charges, and excess length charges directly to the utility. Such request shall be submitted not less than 15 days before service connections are required.

The costs incurred by the Contractor for the extensions of utilities beyond the limits shown on the plans, and in furnishing and installing any intermediate equipment required by the serving utilities, will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

Full compensation for any costs incurred by the Contractor to obtain the permits and licenses shall be considered as included in the contract lump sum price paid for building work and no additional compensation will be allowed therefor.

12-1.10 TEMPORARY UTILITIES

The Contractor may obtain electrical power and water from existing State electrical power and water outlets within the contract limits free of charge for contract operations where such utilities exist, provided that such utility services are in service and are not required by the State for other purposes and subject to the provisions in the section "Cooperation" of these special provisions.

The Contractor shall make his own arrangements to obtain any additional electrical power and water or other utilities required for his operations and shall make and maintain the necessary service connections at his own expense.

When existing utility systems are being modified, periods of shutdown will be determined by the Engineer.

The Contractor shall provide adequate temporary lighting to perform the work and allow the Engineer to inspect the project as each portion is completed.

The Contractor shall provide and pay for telephone service he may require. State telephone facilities shall not be used.

12-1.11 SANITARY FACILITIES

When operational, State sanitary facilities will be available for use by the Contractor's employees, during normal State working hours. Tools shall not be cleaned nor shall cleaning liquids be disposed of in State sanitary facilities or sewers.

During toilet room renovation or other periods when State-owned sanitary facilities are not operational, the Contractor shall provide and pay for wash facilities, drinking water fixtures and a minimum of two temporary toilet units for State forces. Separate toilet facilities shall be provided for Contractor's personnel. Facilities shall include the periodic flushing, waste removal and cleaning of such facilities. Units shall to be maintained in a clean and sanitary condition, including a supply of toilet tissue, toilet seat covers, paper towels and paper cups. Waste material shall be disposed of off site in a lawful manner. Temporary toilet units shall be single occupant units of the chemical, aerated recirculation or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material.

12-1.12 MEASUREMENT AND PAYMENT

The contract lump sum price paid for building work shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the building work, 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 any incidental materials and labor, not shown on the plans or specified, which are necessary to complete the buildings and appurtenances shall be considered as included in the contract lump sum price paid for building work and no additional compensation will be allowed therefor.

12-1.13 PROJECT RECORD DRAWINGS

One set of the project plans shall be kept on file by the Contractor for the sole purpose of recording as-built information and shall be so marked. Data to be recorded shall include, but not limited to, all clarifications and change orders, location of underground utilities, and changes in size, manufacture or location of features shown on the plans. In addition, the locations of significant items such as main filters, controls, isolating valves, and similar items shall be highlighted on this set of project record drawings.

All corrections shall be made in red ink or red pencil. Superseded data shall be neatly lined out. Original figures shall not be eradicated nor written over. Each sheet shall be clearly marked as having "As-Built Changes" or "No As-Built Changes," as appropriate. The Contractor shall sign and date each sheet of the plans certifying that all information shown is correct.

Additional drawings shall be submitted when as-built information cannot be clearly shown on existing drawings. Supplemental drawings for as-built information shall be not less than 11" x 17" in size and shall have the contract number on each drawing.

The Contractor shall periodically review the set of record drawings with the Engineer during the progress of the work to assure that all changes and other required information are being recorded.

Before completion of the work, the Contractor shall request a review of the record drawings to determine completeness and adequacy. If the record drawings are unacceptable, the Contractor shall inspect, measure and survey the project and record the required additional information.

The record set of plans shall be delivered to the Engineer prior to acceptance of the contract.

SECTION 12-2. SITEWORK

12-2.01 REMOVING PORTIONS OF EXISTING FACILITIES

PART 1.- GENERAL

Scope.--This work shall consist of removing portions of the existing facilities, including removal of existing work to gain access to or for new work, in accordance with the details shown on the plans and these special provisions.

PART 2.- PRODUCTS (Not applicable)

PART 3.- EXECUTION

PREPARATION.--

General.--The limits of removal shall be located and identified. Items to be removed and the interface of items to be removed and items to remain intact shall be identified and marked.

Prior to removing concrete or masonry, a saw cut approximately one inch deep shall be made along the limits of removal on all faces which will be visible in the completed work.

At new door openings in concrete or masonry, full depth saw cuts shall be made from both faces. Overcuts shall not be made at corners. Remaining material at corners shall be chipped out and the surfaces ground smooth.

REMOVAL.--

General.--Removal shall be to the limits shown on the plans. Removal shall be done carefully to minimize damage to the portions to remain. Remaining portions that are damaged by the Contractor's operation shall be restored to original condition at the Contractor's expense.

Assemblies to be salvaged which require dismantling for removal shall be matchmarked before dismantling.

Existing apparatuses, devices, or accessories which would be functionally impaired by new construction or remodeling shall be moved, brought out to new surfaces, or provided with new access covers, as necessary to restore apparatuses, devices, or accessories to their original usefulness.

Piping and conduits to be abandoned shall be capped or plugged.

Surfaces that are exposed to view at the limits of removal work shall be patched, bumps shall be removed and depressions filled, and the surface shall be finished to match the existing surrounding surfaces. Depressions in concrete less than one inch deep shall be deepened to one inch minimum depth before filling with cement mortar.

Anchor bolts and reinforcement shall be removed at least one inch below the surrounding surfaces, and the resulting hole shall be patched with cement mortar.

Existing reinforcement that is to be incorporated into the new work shall be protected from damage and thoroughly cleaned before being embedded in new concrete.

DISPOSAL.--

General.--Materials that are to be removed, shall become the property of the Contractor and shall be disposed of outside the highway right of way in accordance with the requirements in Section 7-1.13, "Disposal of Material Outside of the Highway Right of Way," of the Standard Specifications.

SECTION 12-3. THROUGH SECTION 12-7. (BLANK)

SECTION 12-8. DOORS AND WINDOWS

12-8.01 METAL DOORS AND FRAMES

This work shall consist of furnishing and installing metal doors and frames in accordance to the details shown on the plans and specified in these special provisions, and as directed by the Engineer.

SUBMITTALS.--Shop drawings in accordance to the provisions is Section 5-1.02, “Plans and Working Drawings, “ of the Standard Specifications shall be submitted to the Engineer for review showing applicable information for each type or door and frame prior to performance or fabrication of metal doors and frames.

DELIVERY, STORAGE, AND HANDLING.--Properly identify each item with number used in Contract Drawings.

Store doors upright, in protected dry area, at least 1 inch off ground or floor and at least 1/4 inch between individual pieces.

PRODUCTS.--

HOLLOW METAL UNITS.--The following manufacturers are acceptable if they can produce items from specified basic metal:

1. Curries Manufacturing.
2. The Ceco Corp.
3. Fenestra Division, Marmon Group.
4. Mesker Industries, Inc.
5. Monarch Steelcraft, Ltd.
6. Overly Manufacturing Co.
7. Pioneer Industries.
8. Precision Metals, Inc.
9. Republic Steel Corp.
10. Steelcraft Manufacturing Co.
11. Trussbilt, Inc.
12. Williamsburg Steel Products Co.
13. Stiles Custom Metal, Inc.

Basic Metal Material.--Basic metal material shall conform to the requirements in ASTM Designation: A167, for Type 316 stainless steel.

Hollow Metal Frames.--

1. Products of hollow metal door manufacturer.
2. SDI 100, except as modified herein.
3. Frames for Doors.--14-gauge, welded type, of cross-section shown.
4. Prepare floor and wall anchors, reinforcement, and cutouts for hardware to meet requirements of SDI 107.
5. Finished size, shape, and profile of frame members as shown.
6. Concealed fasteners or welding are preferred to through-the-face fasteners.
7. Identification.--Stamp opening number, as shown on Drawings, on center hinge reinforcement of each frame.

Hollow Metal Doors.--SDI 100, except as modified herein. SDI 107 and ANSI A115 to receive hardware specified in Door and Hardware Schedule.

1. Flush Panel Doors.--16-gauge, Grade III, Model 1, with honeycomb core.
2. Double Doors.--Overlapping astragals for active leaf, except as noted or detailed otherwise.
3. Flush end closure at top of doors.

MISCELLANEOUS ITEMS.--Provide manufacturer's standard core filler, anchors, fasteners, and other ancillary items.

FACTORY FINISHING REQUIREMENTS.--

Hollow Metal Door and Frame Finish.--

1. Stainless Steel.--ASTM A480-91a, No. 3 or No. 4.

EXECUTION.--

INSTALLATION.--

1. Frames:

A. Installation:

(1) Maintain scheduled dimensions, hold head level, and maintain jambs plumb and square.
(2) Secure anchorages and connections to adjacent construction.
(3) Wherever possible, leave frame spreader bars intact until frames are set perfectly square and plumb and anchors are securely attached.

B. Hollow Metal Frames: SDI 105.

2. Doors:

A. Hollow Metal Doors: SDI 100.
B. Hardware: In accordance with manufacturer's templates and instructions.

(1) Adjust operable parts for correct function.

PROTECTION.--Protect installed doors and frames against damage from other construction work.

SCHEDULES .--

1. Single Doors: 3'-0" wide by 7'-0" opening with 2" by 5-3/4" frame.
2. Double Doors: 7'-0" wide by 9'-0" opening with 2" by 6-3/4" frame.

12-8.02 DOOR HARDWARE

SUBMITTALS.--

Shop Drawings.--Shop drawings in accordance to the provisions is Section 5-1.02, “Plans and Working Drawings,” of the Standard Specifications shall be submitted to the Engineer for review showing the following:

1. Product Data.--Manufacturers' literature for each item of finish hardware required herein, clearly marked.
2. Finish Hardware Schedule.--Furnish complete and detailed schedule, show product items, numbers, and finishes for all hardware for each separate opening.
3. Special Tools.--Provide listing and description of usage.

QUALITY ASSURANCE.--

1. Qualifications of Supplier.--A recognized supplier of architectural finish hardware, with warehousing facilities, who has been furnishing hardware in the vicinity of the Project for not less than 5 years, and who is, or who employs, an architectural hardware consultant.

DELIVERY, STORAGE, AND HANDLING.--

1. Provide secure storage for all finish hardware until installation is made.
2. Before delivery, clearly identify and tag each item of hardware with respect to specified description and location of installation.

SPECIAL TOOLS.--

1. Two sets of special tools for installation and maintenance of hardware.

PRODUCTS.--

MATERIALS.--

1. Provide end products of one manufacturer for each product in order to achieve standardization for appearance, maintenance, and replacement.
2. Finishes.--ANSI A156.18-93.

FASTENERS.--

1. Stainless steel.

BUTT HINGES.--

1. ANSI A156.1-88.
2. Quality per Door Leaf (Minimum):

Door Height	Hinges
Up to 5'-0"	1 pair
5'-1" to 7'-7"	1-1/2 pair
7'-7" to 10'-0"	2 pairs
10'-1" to 12'-6"	2-1/2 pairs

3. Hinge Height (Minimum):

Door Width	Hinge Height
Up to 3'-0"	4 1/2"
3'-1" to 4'-0"	5"
Over 4'-0"	6"

4. Width.--Minimum for clearance of trim and 180-degree swing.
5. Exterior Hinges.--Nonremoveable pin.
4. Joint Tolerance.--0.012-inch maximum, gauged in CLOSED position.
5. Finish.--Satin stainless steel No. 630.
6. Types and Manufacturers:

No.	Type Description
H4	Extra heavy-weight, four ball races, full mortise, stainless steel

Stanley	McKinney
FBB199-32D	T4B3386

Lawrence	ANSI/BHMA
BB5151-A	A5111

LOCKS AND LATCH SETS.--

Cylindrical or Bored Locks.--ANSI A156.2-89, highest grade.

1. Trim.--Wrought or cold-forged metal knobs and roses.
2. Core Cylinders.--Interchangeable, removable; minimum of six pins.
3. Strikes.--Lip dimensions to fit configuration of trim.
4. Bolt Throw.--3/4-inch minimum, on latchbolts for pair of doors.
5. Knob Backset.--3-3/4 inches.
6. Manufacturers and Products:

   A. Sargent; AC.
   B. Schlage; Plymouth.
   C. Best; 4C Washington.

Finish.--Satin stainless steel No. 630 with corrosion-resistant mechanism.

Types and Manufacturers.--

No.	Type Description
L2	Bored, entrance lock

Best	Sargent
84K7AB4C	9G05

Schlage	ANSI/BHMA
C53PD	F81, F82

Keying.--

1. Lock Cylinders.--Operate by a grand master key system that allows for future expansion.
2. Keylocks.--As directed by Owner.
3. Keys.--Two per lock; tag with schedule information.
4. Master Keys: Four; send by registered mail to Owner.

CONSTRUCTION KEY SYSTEM.--

1. Removable construction core system for locks.

CLOSERS.--

1. ANSI A156.4-92.
2. Size closers in accordance with manufacturer's standards. Mount regular arm closers on pull side of doors. Mount parallel arm closers on push side of doors. On pair of doors provide closer on each leaf. Provide with through bolts.
3. Finish.--Satin chromium-plated No. 626.
4. Types and Manufacturers.--

No.	Type Description
C6	Parallel arm with integral stop and hold-open

LCN	Sargent
4110H Cush-N-Stop Series	350-PSH Series

ANSI/BHMA

C02061

BOLTS.--

1. ANSI A156.16-89.
2. Finish.--Bright nickel No. 645.
3. Types and Manufacturers.--

No.	Type Description
B1	Top and bottom flush bolts

Stanley	Lawrence
393-1/2	280

ANSI/BHMA

L04201

THRESHOLDS.--

1. Thresholds.--One-piece full width of opening; extend beyond jamb where indicated.
2. Provide with stainless steel machine screws in threaded expansion anchors at concrete.
3. Finish.--Mill finish aluminum, unless indicated otherwise.
4. Types and Manufacturers.--

No.	Type Description
T7	Saddle (serrated, 5" x 1/2")

Pemko	Reese
171A	S205A

WEATHERSTRIP.--

1. Finish.--Clear anodized aluminum, unless indicated otherwise.
2. Seal Types and Manufacturers.--

No.	Type Description
W1	Rubber or vinyl bulb at jambs and head, and at meeting stiles of pairs

Pemko	Reese
S88D with 357SS	797B with 183SS

No.	Type Description
W1	Door shoe

Pemko	Reese
216AV	DB595A

No.	Type Description
W1	Rain drip

Pemko	Reese
346C	R201C

No.	Type Description
W2	Rubber or vinyl bulb at jambs and head

Pemko	Reese
S88D	797B

No.	Type Description
W2	Door shoe

Pemko	Reese
216AV	DB595A

No.	Type Description
W2	Rain drip

Pemko	Reese
346C	R201C

TEMPLATES.--

1. Fabricate to template hardware applied to metal doors and frames.
2. Ensure that required templates are furnished to the various manufacturers for fabrication purposes.
3. Templates.--Make available not more than 10 days after receipt of approved Hardware Schedule.

EXECUTION.--

INSTALLATION.--

1. In accordance with manufacturer's written instructions.
2. Make work neat and secure, develop full strength of components, and provide proper function.
3. Prevent marring, scratching, or otherwise damaging adjacent finishes during hardware installation.
4. Latchbolts.--Install to engage in strikes automatically, whether activated by closers or manually.

    A. In no case shall additional manual pressure be required to engage latchbolt in strike.

5. Thresholds.--

    A. Cope ends neatly to profile of jamb.
    B. Set in sealant and seal ends to jambs.

6. Hardware.--Adjust for easy, noise-free operation.
7. Replace damaged hardware items.

MOUNTING DIMENSIONS.--

1. Standard Door Hardware Locations.--As recommended and published by the Door and Hardware Institute, except as noted or detailed otherwise.

MANUFACTURER'S SERVICES.--

1. Deliver permanent lock cores to the site.
2. Remove temporary construction cores and insert permanent cores.
3. Inspect each lock set to ensure permanent cores are operating satisfactorily.
4. Deliver to Owner change and control keys for the permanent system.
5. Return temporary construction cores to the manufacturer.

PROTECTION.--

1. Cover and protect exposed surfaces of hardware during installation and until Substantial Completion.
2. Fit, dismantle, and reinstall finish hardware as required for finish painting work.
3. Protect and prevent staining of hardware during construction in accordance with manufacturer's recommendations.
4. Remove protective measures and permanent lock cylinders installed prior to final cleaning.

HARDWARE SETS.--

HDW-1	Item	Type
Use for Double Doors	3 Pair butts, 5 by 5	H4
	1 Lock, active leaf	L2
	1 Set flush bolts, top and bottom	B1
	2 Closers	C6
	1 Threshold	T7
	1 Set weatherstrip	W1

HDW-2	Item	Type
Use for Single Doors	1-1/2 Pair butts, 4-1/2 by 4-1/2	H4
	1 Lock	L2
	1 Closer	C6
	1 Threshold	T7
	1 Set weatherstrip	W2