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STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS

AND

SPECIAL PROVISIONS

FOR CONSTRUCTION ON STATE HIGHWAY IN

SAN DIEGO COUNTY IN SAN DIEGO

FROM 0.6 KM EAST OF CACTUS ROAD

TO 0.3 KM WEST OF THE MEXICO BORDER

DISTRICT 11, ROUTE 905

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

CONTRACT NO. 11-091824

11-SD-905-R13.9/R18.6

Federal Aid Project

HPLU-6211(071)N

HPLU-6211(072)N

HPLU-6211(073)N

Bids Open: December 13, 2007

Dated: October 22, 2007

OSD

INFORMATION HANDOUT

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IMPORTANT SPECIAL NOTICES

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- **Design Sequencing:**
  This project is part of a pilot program for "Design Sequencing," per Section 217, et seq., of the Streets and Highways Code (Assembly Bill 405). The purpose of the pilot program is to evaluate Design Sequencing as a tool for acceleration of project completion. Design Sequencing is a method of contracting where bids are based on partial project design, and final design activities are sequenced to permit each construction phase to commence when the design for that phase is complete, before the design of the entire project is complete. The project plans for this project are not considered complete to construct the work anticipated by the contract, and the Engineer's Estimate may contain anticipated items of work that are not indicated on the project plans. Design, and final project plans, will be completed during construction.

- **Pre-Award Qualifications:**
  The bidder's attention is directed to Section 2-1.03, "Pre-Award Qualification Questionnaire," and Section 3-1.01A, "Pre-Award Qualification Review," in the Special Provisions regarding review of the bidder's qualifications to perform the work of this project.

- **Escrow of Bid Documentation:**
  The bidder's attention is directed to Section 2-1.04, "Escrow of Bid Documentation," of the special provisions.

- **Project Schedule (Critical Path Method):**
  The bidder's attention is directed to "Project Schedule (Critical Path Method)," regarding additional requirements for Design Sequencing.

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

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SECTION 13. (BLANK)....499
SECTION 14 FEDERAL REQUIREMENTS FOR FEDERAL-AID CONSTRUCTION PROJECTS....500
FEDERAL REQUIREMENT TRAINING SPECIAL PROVISIONS....519

STANDARD PLANS LIST

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

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A10B	Acronyms and Abbreviations (M-Z)
A10C	Symbols (Sheet 1 of 2)
A10D	Symbols (Sheet 2 of 2)
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A62B	Limits of Payment for Excavation and Backfill – Bridge Surcharge and Wall
A62C	Limits of Payment for Excavation and Backfill - Bridge
A62D	Excavation and Backfill – Concrete Pipe Culverts
A62DA	Excavation and Backfill – Concrete Pipe Culverts
A62E	Excavation and Backfill – Cast-In-Place Reinforced Concrete Box and Arch Culverts
A62F	Excavation and Backfill – Metal and Plastic Culverts
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A63B	Portable Concrete Barrier (Type 60K)
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A73C	Delineators, Channelizers and Barricades
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A76B	Concrete Barrier Type 60
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A77A2	Metal Beam Guard Railing – Standard Railing Section (Steel Post with Notched Wood or Notched Plastic Block)
A77B1	Metal Beam Guard Railing – Standard Hardware
A77C1	Metal Beam Guard Railing – Wood Post and Wood Block Details
A77C2	Metal Beam Guard Railing Steel Post, Notched Wood Block and Notched Plastic Block Details
A77C3	Metal Beam Guard Railing – Typical Line Post Embedment and Hinge Point Offset Details
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A77E1	Metal Beam Guard Railing – Typical Layouts for Embankments
A77F1	Metal Beam Guard Railing – Typical Layouts for Structure Approach
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A77H1	Metal Railing End Anchor Assembly (Type SFT)
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A77H3	Metal Railing Anchor Cable and Anchor Plate Details
A77I2	Metal Beam Guard Railing – Buried Post End Anchor
A77J2	Metal Beam Guard Railing Connections to Bridge Railings without Sidewalks Details No. 2
A77J3	Metal Beam Guard Railing Connections to Abutments and Walls

A77J4	Metal Beam Guard Railing Transition Railing (Type WB)
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A77K2	Metal Beam Guard Railing Connections to Bridge Railings with Sidewalks Details No. 2
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A78D1	Thrie Beam Barrier at Fixed Objects in Median
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RSP A88A	Curb Ramp Details
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RSP P2	Jointed Plain Concrete Pavement – Widen Slab Details
NSP P3	Jointed Plain Concrete Pavement – Nondoweled Shoulder Addition/Reconstruction
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RSP P12	Concrete Pavement – Dowel Bar Basket Details
RSP P17	Concrete Pavement – Tie Bar Basket Details
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D87D	Overside Drains
D88	Construction Loads on Culverts
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D90	Pipe Culvert Headwalls, Endwalls and Wingwalls-Type A, B And C
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D99A	Structural Section Drainage System Details
D100A	Gabion Basket Details No. 1
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H2	Planting and Irrigation – Symbols
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H5	Planting and Irrigation Details
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H7	Planting and Irrigation Details
H8	Planting and Irrigation Details
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T3	Temporary Railing (Type K)
T5	Temporary Terminal Section (Type K)
RSP T7	Construction Project Funding Identification Signs
RSP T11	Traffic Control System for Lane Closure on Multilane Conventional Highways
RSP T12	Traffic Control System for Lane Closure on Multilane Conventional Highways
RSP T13	Traffic Control System for Lane Closure on Two Lane Conventional Highways
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T53	Temporary Water Pollution Control Details (Temporary Cover)
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B0-3	Bridge Details
B0-5	Bridge Details
B0-13	Bridge Details
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B3-7	Retaining Wall Type 5
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B15-9	Soundwall Masonry Block Miscellaneous Details
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RS2	Roadside Signs - Wood Post, Typical Installation Details No. 2
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RSP S2	Overhead Signs – Truss, Single Post Type – Post Type II Thru IX
RSP S3	Overhead Signs – Truss, Single Post Type – Base Plate and Anchorage Details
RSP S4	Overhead Signs – Truss, Single Post Type – Structural Frame Members Details No. 1
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RSP S7	Overhead Signs – Truss, Single Post Type – Square Pedestal Foundation
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RSP S9	Overhead Signs – Truss, Two Post Type – Post Types I-S Thru VII-S
RSP S10	Overhead Signs – Truss, Two Post Type – Base Plate and Anchorage Details
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NSP S17A	Overhead Signs – Walkway Details No. 3
RSP S18	Overhead Signs – Walkway Safety Railing Details
RSP S19	Overhead Signs – Truss, Sign Mounting Details – Laminated Panel – Type A
RSP S20	Overhead Signs – Steel Frames – Removable Sign Panel Frames
S21	Overhead Signs – Removable Sign Panel Frames Mounting Details
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ES-1B	Electrical Systems (Symbols And Abbreviations)
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ES-7B	Electrical Systems (Signal And Lighting Standards – Type 1 Standards and Equipment Numbering)
RSP ES-7D	Electrical Systems (Signal and Lighting Standards – Case 2 Arm Loading, Wind Velocity = 161 km/h, Arm Lengths 4.6 m to 9.1 m)
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RSP ES-7H	Electrical Systems (Signal and Lighting Standards – Case 5 Arm Loading, Wind Velocity = 161 km/h, Arm Lengths 18.2 m to 19.8 m)
RSP ES-7M	Electrical Systems (Signal and Lighting Standards – Details No. 1)
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ES-8	Electrical Systems (Pull Box Details)
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ES-10	Electrical Systems (Isolux Diagrams)
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ES-15A	Electrical Systems (Sign Illumination Equipment)
ES-15C	Electrical Systems (Sign Illumination Equipment)
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DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS

CONTRACT NO. 11-091824

11-SD-905-R13.9/R18.6

Sealed proposals for the work shown on the plans entitled:

STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROJECT PLANS FOR CONSTRUCTION ON STATE HIGHWAY IN SAN DIEGO COUNTY IN SAN DIEGO FROM 0.6 KM EAST OF CACTUS ROAD TO 0.3 KM WEST OF THE MEXICO BORDER

will be received at the Department of Transportation, 3347 Michelson Drive, Suite 100, Irvine, CA 92612-1692, until 2 o'clock p.m. on December 13, 2007, at which time they will be publicly opened and read in Room C - 1116 at the same address.

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

STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROPOSAL AND CONTRACT FOR CONSTRUCTION ON STATE HIGHWAY IN SAN DIEGO COUNTY IN SAN DIEGO FROM 0.6 KM EAST OF CACTUS ROAD TO 0.3 KM WEST OF THE MEXICO BORDER

General work description: To construct new freeway.

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

No prebid meeting is scheduled for this project.

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

Bids are required for the entire work described herein.

At the time this contract is awarded, the Contractor shall possess either a Class A license or one of the following Class C licenses: C-8.

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

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

Bidder inquiries may be made as follows:

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

District 11 Construction Duty Senior
Location address: 4050 Taylor Street, San Diego, CA 92110

Fax Number: (619) 688–6988
E-mail: Duty_Senior_Const_District11@dot.ca.gov
Tel. Number: (619) 688–6635

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

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

http://www.dot.ca.gov/dist11/construc/

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

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

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

The Department of Transportation affirms that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full opportunity to submit bids in response to this invitation.

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

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

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

DEPARTMENT OF TRANSPORTATION

Deputy Director Transportation Engineering

Dated October 22, 2007

AFL

COPY OF ENGINEER'S ESTIMATE

(NOT TO BE USED FOR BIDDING PURPOSES)

11-091824

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
1	070012	PROGRESS SCHEDULE (CRITICAL PATH METHOD)	LS	LUMP SUM
2	070018	TIME-RELATED OVERHEAD	WDAY	654
3	071325	TEMPORARY FENCE (TYPE ESA)	M	1120
4	074016	CONSTRUCTION SITE MANAGEMENT	LS	LUMP SUM
5	074019	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	LUMP SUM
6 (S)	074023	TEMPORARY EROSION CONTROL	M2	1 830 000
7	074028	TEMPORARY FIBER ROLL	M	60 300
8	074032	TEMPORARY CONCRETE WASHOUT FACILITY	EA	47
9	074033	TEMPORARY CONSTRUCTION ENTRANCE	EA	26
10 (S)	074037	MOVE-IN/MOVE-OUT (TEMPORARY EROSION CONTROL)	EA	6
11	074038	TEMPORARY DRAINAGE INLET PROTECTION	EA	180
12	074041	STREET SWEEPING	LS	LUMP SUM
13	074042	TEMPORARY CONCRETE WASHOUT (PORTABLE)	LS	LUMP SUM
14 (S)	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM
15 (S)	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM
16 (S)	120120	TYPE III BARRICADE	EA	29
17 (S)	120140	BARRICADE (LEFT IN PLACE)	EA	10
18 (S)	120149	TEMPORARY PAVEMENT MARKING (PAINT)	M2	210
19 (S)	120159	TEMPORARY TRAFFIC STRIPE (PAINT)	M	32 200
20 (S)	120165	CHANNELIZER (SURFACE MOUNTED)	EA	220

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
21 (S)	120166	CHANNELIZER (SURFACE MOUNTED) (LEFT IN PLACE)	EA	40
22	120300	TEMPORARY PAVEMENT MARKER	EA	2410
23 (S)	128650	PORTABLE CHANGEABLE MESSAGE SIGN	EA	10
24 (S)	129000	TEMPORARY RAILING (TYPE K)	M	7360
25 (S)	012760	TRAFFIC PLASTIC DRUM	EA	170
26 (S)	129100	TEMPORARY CRASH CUSHION MODULE	EA	270
27 (S)	012761	TEMPORARY CRASH CUSHION (ADIEM-350)	EA	5
28	150206	ABANDON CULVERT	EA	3
29	150221	ABANDON INLET	EA	2
30	012762	ABANDON WATER LINE	EA	11
31	150608	REMOVE CHAIN LINK FENCE	M	570
32	150662	REMOVE METAL BEAM GUARD RAILING	M	500
33	150701	REMOVE YELLOW PAINTED TRAFFIC STRIPE	M	4330
34	150717	REMOVE TRAFFIC STRIPE AND PAVEMENT MARKING	M2	1170
35	150742	REMOVE ROADSIDE SIGN	EA	40
36	150826	REMOVE MANHOLE	EA	4
37	150860	REMOVE BASE AND SURFACING	M3	17
38	152320	RESET ROADSIDE SIGN	EA	15
39	152351	RELOCATE HYDRANT	EA	2
40	152390	RELOCATE ROADSIDE SIGN	EA	15

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
41	152430	ADJUST INLET	EA	1
42	152438	ADJUST FRAME AND COVER TO GRADE	EA	2
43	152475	ADJUST SEWER MANHOLE	EA	3
44 (S)	153103	COLD PLANE ASPHALT CONCRETE PAVEMENT	M2	3950
45	153210	REMOVE CONCRETE	M3	92
46	160101	CLEARING AND GRUBBING	LS	LUMP SUM
47	170101	DEVELOP WATER SUPPLY	LS	LUMP SUM
48	190101	ROADWAY EXCAVATION	M3	1 310 000
49 (S)	190110	LEAD COMPLIANCE PLAN	LS	LUMP SUM
50 (F)	192003	STRUCTURE EXCAVATION (BRIDGE)	M3	13 160
51	192037	STRUCTURE EXCAVATION (RETAINING WALL)	M3	660
52 (F)	193003	STRUCTURE BACKFILL (BRIDGE)	M3	7830
53	193013	STRUCTURE BACKFILL (RETAINING WALL)	M3	740
54	193031	PERVIOUS BACKFILL MATERIAL (RETAINING WALL)	M3	79
55	193101	GRAVEL BLANKET	M3	2290
56	193114	SAND BACKFILL	M3	120
57 (F)	193119	LEAN CONCRETE BACKFILL	M3	2930
58	194001	DITCH EXCAVATION	M3	5050
59 (S)	200001	HIGHWAY PLANTING	LS	LUMP SUM
60	202007	DUFF	M2	9240

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
61 (S)	012763	BONDED FIBER MATRIX (EROSION CONTROL)	KG	8240
62 (S)	203014	FIBER (EROSION CONTROL)	KG	63 400
63	203021	FIBER ROLLS	M	61 400
64 (S)	203024	COMPOST (EROSION CONTROL)	M3	160
65 (S)	203026	MOVE-IN/MOVE-OUT (EROSION CONTROL)	EA	6
66 (S)	012764	PURE LIVE SEED (EROSION CONTROL)(TYPE 2)	KG	36
67 (S)	012765	PURE LIVE SEED (EROSION CONTROL)(TYPE 3)	KG	1830
68 (S)	012766	PURE LIVE SEED (EROSION CONTROL)(TYPE 4)	KG	18
69 (S)	012767	PURE LIVE SEED (EROSION CONTROL)(TYPE 5)	KG	93
70 (S)	203056	COMMERCIAL FERTILIZER (EROSION CONTROL)	KG	840
71 (S)	203061	STABILIZING EMULSION (EROSION CONTROL)	KG	7860
72 (S)	204099	PLANT ESTABLISHMENT WORK	LS	LUMP SUM
73 (S)	208000	IRRIGATION SYSTEM	LS	LUMP SUM
74	208038	NPS 3 SUPPLY LINE (BRIDGE)	M	360
75 (S)	208304	WATER METER	EA	1
76 (S)	208731	200 MM CORRUGATED HIGH DENSITY POLYETHYLENE PIPE CONDUIT	M	640
77	250401	CLASS 4 AGGREGATE SUBBASE	M3	72 200
78	260201	CLASS 2 AGGREGATE BASE	M3	67 300
79 (S)	374002	ASPHALTIC EMULSION (FOG SEAL COAT)	TONN	20
80	390102	ASPHALT CONCRETE (TYPE A)	TONN	60 700

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
81	390108	ASPHALT CONCRETE BASE (TYPE A)	TONN	32 700
82	394001	PLACE ASPHALT CONCRETE DIKE	M	5810
83	394002	PLACE ASPHALT CONCRETE (MISCELLANEOUS AREA)	M2	1620
84	397001	ASPHALTIC EMULSION (PAINT BINDER)	TONN	120
85	401000	CONCRETE PAVEMENT	M3	25 000
86	404092	SEAL PAVEMENT JOINT	M	77 700
87 (S)	500001	PRESTRESSING CAST-IN-PLACE CONCRETE	LS	LUMP SUM
88 (F)	510051	STRUCTURAL CONCRETE, BRIDGE FOOTING	M3	1800
89 (F)	510053	STRUCTURAL CONCRETE, BRIDGE	M3	6370
90	510060	STRUCTURAL CONCRETE, RETAINING WALL	M3	470
91 (F)	510085	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE EQ)	M3	47
92 (F)	510086	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE N)	M3	620
93	510126	CLASS 2 CONCRETE (MINOR STRUCTURE)	M3	9
94	510413	CLASS 1 CONCRETE (BOX CULVERT)	M3	5670
95 (F)	510502	MINOR CONCRETE (MINOR STRUCTURE)	M3	418
96 (F)	041151	ARCHITECTURAL TEXTURE (STAMPED CONCETE)	M2	1250
97	511064	FRACTURED RIB TEXTURE	M2	780
98 (S)	519101	JOINT SEAL (TYPE A)	M	43
99 (S)	519102	JOINT SEAL (TYPE AL)	M	78
100 (S)	519117	JOINT SEAL (MR 30 MM)	M	100

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
101 (S)	519142	JOINT SEAL (MR 40 MM)	M	203
102 (S-F)	520102	BAR REINFORCING STEEL (BRIDGE)	KG	815 000
103 (S)	520103	BAR REINFORCING STEEL (RETAINING WALL)	KG	17 000
104 (S)	520107	BAR REINFORCING STEEL (BOX CULVERT)	KG	822 300
105 (S-F)	520120	HEADED BAR REINFORCEMENT	EA	72
106 (S)	012768	WELDED WIRE FABRIC (150 MM X 150 MM,W1.4 X W1.4)	M2	390
107	560213	FURNISH SIGN STRUCTURE (LIGHTWEIGHT)	KG	16 000
108 (S)	560214	INSTALL SIGN STRUCTURE (LIGHTWEIGHT)	KG	16 000
109	560218	FURNISH SIGN STRUCTURE (TRUSS)	KG	174 000
110 (S)	560219	INSTALL SIGN STRUCTURE (TRUSS)	KG	174 000
111	560234	FURNISH LAMINATED PANEL SIGN (25.4 MM-TYPE A)	M2	600
112	560235	FURNISH LAMINATED PANEL SIGN (25.4 MM-TYPE B)	M2	100
113	560238	FURNISH SINGLE SHEET ALUMINUM SIGN (1.6 MM-UNFRAMED)	M2	300
114	560239	FURNISH SINGLE SHEET ALUMINUM SIGN (2.0 MM-UNFRAMED)	M2	150
115	560241	FURNISH SINGLE SHEET ALUMINUM SIGN (1.6 MM-FRAMED)	M2	100
116	560242	FURNISH SINGLE SHEET ALUMINUM SIGN (2.0 MM-FRAMED)	M2	100
117 (S)	561009	920 MM CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	M	43
118 (S)	561015	1524 MM CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	M	130
119	562002	METAL (BARRIER MOUNTED SIGN)	KG	200
120	012769	INSTALL SIGN PANEL ON BARRICADE	EA	18

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
121	012770	HABITAT RESTORATION SIGN	EA	7
122	566011	ROADSIDE SIGN - ONE POST	EA	180
123	566012	ROADSIDE SIGN - TWO POST	EA	20
124	568001	INSTALL SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	54
125 (S)	597600	PREPARE AND PAINT CONCRETE	M2	560
126	620909	450 MM ALTERNATIVE PIPE CULVERT	M	170
127	620913	600 MM ALTERNATIVE PIPE CULVERT	M	4850
128	620919	750 MM ALTERNATIVE PIPE CULVERT	M	240
129	620924	900 MM ALTERNATIVE PIPE CULVERT	M	490
130	620930	1050 MM ALTERNATIVE PIPE CULVERT	M	220
131	620933	1200 MM ALTERNATIVE PIPE CULVERT	M	29
132	650069	450 MM REINFORCED CONCRETE PIPE	M	380
133	650075	600 MM REINFORCED CONCRETE PIPE	M	1060
134	650077	750 MM REINFORCED CONCRETE PIPE	M	140
135	012771	750 MM REINFORCED CONCRETE PIPE (SEWER PIPE ENCASEMENT)	M	140
136	650079	900 MM REINFORCED CONCRETE PIPE	M	160
137	650084	1200 MM REINFORCED CONCRETE PIPE	M	220
138	650089	1500 MM REINFORCED CONCRETE PIPE	M	96
139	012772	1680 MM REINFORCED CONCRETE PIPE	M	33
140	698162	450 MM ALTERNATIVE PIPE DOWNDRAIN	M	6

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
141	703233	GRATED LINE DRAIN	M	50
142	703284	900 MM CORRUGATED STEEL PIPE RISER (2.77 MM THICK)	M	3
143	012773	1850 MM WELDED STEEL PIPE CASING (10 MM)	M	250
144	012774	1500 MM WELDED STEEL CASING	M	200
145	012775	750 MM WELDED STEEL PIPE (9.53 MM)	M	220
146	012776	450 MM CEMENT MORTAR LINED AND COATED WATER MAIN	M	890
147	012777	300 MM CEMENT MORTAR LINED AND COATED WATER MAIN	M	360
148	012778	510 MM CEMENT MORTAR LINED AND COATED WATER MAIN	M	1790
149	012779	50 MM TYPE K COPPER PIPE	M	210
150	012780	300 MM CEMENT MORTAR LINED AND COATED RECLAIMED WATER MAIN	M	100
151	705222	450 MM CONCRETE FLARED END SECTION	EA	2
152	705224	600 MM CONCRETE FLARED END SECTION	EA	7
153	705226	750 MM CONCRETE FLARED END SECTION	EA	1
154	705337	600 MM ALTERNATIVE FLARED END SECTION	EA	9
155	705339	900 MM ALTERNATIVE FLARED END SECTION	EA	1
156	705340	1050 MM ALTERNATIVE FLARED END SECTION	EA	2
157	208494	100 MM GATE VALVE	EA	4
158	208495	150 MM GATE VALVE	EA	2
159	705954	300 MM GATE VALVE	EA	1
160	012781	100 MM BLOW OFF ASSEMBLY	EA	6

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
161	012782	150 MM BLOW OFF ASSEMBLY	EA	8
162	012783	50 MM BLOW OFF ASSEMBLY	EA	2
163	012784	400 MM BUTTERFLY VALVE, CLASS 250	EA	2
164	012785	450 MM BUTTERFLY VALVE, CLASS 250	EA	6
165	012786	500 MM BUTTERFLY VALVE, CLASS 250	EA	3
166	012787	600 MM BUTTERFLY VALUE, CLASS 250	EA	2
167	012788	100 MM COMBINATION AIR RELEASE AND AIR VACCUM VALUE	EA	6
168	012789	50 MM COMBINATION AIR RELEASE AND AIR VACCUM VALUE	EA	5
169	707479	900 MM REINFORCED CONCRETE PIPE RISER	M	28
170	012790	900 MM REINFORCED CONCRETE PIPE RISER (MODIFIED)	M	5
171	012791	900 MM OPEN CONCRETE PIPE RISER (MODIFIED)	M	4
172 (S)	012792	CATHODIC PROTECTION TEST STATION	EA	25
173 (S)	012793	100 MM POLYVINYL CHLORIDE PIPE	M	10
174 (S)	012794	300 MM FLEXIBLE EXPANSION JOINT W/MECHANICAL JOINT ENDS	EA	6
175 (S)	012795	380 MM POLYVINYL CHLORIDE SEWER PIPE	M	460
176 (S)	719190	SEWER MANHOLE FRAME AND COVER	EA	7
177 (S)	719202	SEWER MANHOLE B	EA	7
178	719598	CLASS 4 CONCRETE (BACKFILL)	M3	280
179	721007	ROCK SLOPE PROTECTION (1/4 TON, METHOD B)	M3	260
180	721009	ROCK SLOPE PROTECTION (FACING, METHOD B)	M3	150

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
181	721010	ROCK SLOPE PROTECTION (BACKING NO. 1, METHOD B)	M3	30
182	012796	CONCRETE (APRON AND DITCH LINING)	M3	790
183 (F)	041152	SLOPE PAVING (STAMPED CONCRETE)	M2	410
184	729010	ROCK SLOPE PROTECTION FABRIC	M2	8850
185	731502	MINOR CONCRETE (MISCELLANEOUS CONSTRUCTION)	M3	1270
186	731530	MINOR CONCRETE (TEXTURED PAVING)	M2	4830
187	012797	MINOR CONCRETE (GORE PAVING)	M3	320
188	012798	MINOR CONCRETE (RAISED MEDIAN)	M3	280
189 (S)	750001	MISCELLANEOUS IRON AND STEEL	KG	23 900
190 (S-F)	750501	MISCELLANEOUS METAL (BRIDGE)	KG	1470
191 (S-F)	750505	BRIDGE DECK DRAINAGE SYSTEM	KG	1230
192 (S)	012799	WILDLIFE FENCE	M	1400
193 (S)	012800	CHAIN LINK FENCE (TYPE CL-1.8, 25 MM X 25 MM MESH)	M	9340
194 (S)	802585	1.2 M CHAIN LINK GATE (TYPE CL-1.8)	EA	6
195 (S)	802590	1.8 M CHAIN LINK GATE (TYPE CL-1.8)	EA	5
196 (S)	802592	2.4 M CHAIN LINK GATE (TYPE CL-1.8)	EA	4
197	820107	DELINEATOR (CLASS 1)	EA	220
198	820110	MILEPOST MARKER	EA	10
199	820118	GUARD RAILING DELINEATOR	EA	260
200	820130	OBJECT MARKER	EA	10

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
201 (S)	832001	METAL BEAM GUARD RAILING	M	360
202 (F)	833032	CHAIN LINK RAILING (TYPE 7)	M	149
203	833080	CONCRETE BARRIER (TYPE K)	M	200
204 (F)	833142	CONCRETE BARRIER (TYPE 26 MODIFIED)	M	149
205 (S)	839302	SINGLE THRIE BEAM BARRIER (WOOD POST)	M	1010
206 (S)	839311	DOUBLE THRIE BEAM BARRIER (WOOD POST)	M	2750
207 (F)	839521	CABLE RAILING	M	209
208 (S)	839540	TRANSITION RAILING (TYPE STB)	EA	2
209 (S)	839541	TRANSITION RAILING (TYPE WB)	EA	8
210 (S)	839542	TRANSITION RAILING (TYPE DTB)	EA	2
211 (S)	839568	TERMINAL ANCHOR ASSEMBLY (TYPE SFT)	EA	17
212 (S)	839582	END ANCHOR ASSEMBLY (TYPE CA)	EA	3
213 (S)	839584	ALTERNATIVE IN-LINE TERMINAL SYSTEM	EA	3
214 (S)	839585	ALTERNATIVE FLARED TERMINAL SYSTEM	EA	17
215 (S)	839601	CRASH CUSHION (TYPE CAT)	EA	2
216 (S)	839604	CRASH CUSHION (REACT 9CBB)	EA	3
217	839701	CONCRETE BARRIER (TYPE 60)	M	1430
218	839703	CONCRETE BARRIER (TYPE 60C)	M	50
219	839704	CONCRETE BARRIER (TYPE 60D)	M	70
220	839726	CONCRETE BARRIER (TYPE 736A)	M	130

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
221 (F)	839727	CONCRETE BARRIER (TYPE 736 MODIFIED)	M	469
222	839731	CONCRETE BARRIER (TYPE 736B)	M	50
223 (S)	840515	THERMOPLASTIC PAVEMENT MARKING	M2	600
224 (S)	840563	200 MM THERMOPLASTIC TRAFFIC STRIPE	M	4500
225 (S)	840564	200 MM THERMOPLASTIC TRAFFIC STRIPE (BROKEN 3.66 M - 0.92 M)	M	800
226 (S)	840567	100 MM THERMOPLASTIC TRAFFIC STRIPE (BROKEN 1.83 M - 0.30 M)	M	180
227 (S)	840571	100 MM THERMOPLASTIC TRAFFIC STRIPE (BROKEN 5.18 M - 2.14 M)	M	400
228 (S)	840656	PAINT TRAFFIC STRIPE (2-COAT)	M	60 000
229 (S)	850101	PAVEMENT MARKER (NON-REFLECTIVE)	EA	4800
230 (S)	850111	PAVEMENT MARKER (RETROREFLECTIVE)	EA	3000
231 (S)	860251	SIGNAL AND LIGHTING (LOCATION 1)	LS	LUMP SUM
232 (S)	860252	SIGNAL AND LIGHTING (LOCATION 2)	LS	LUMP SUM
233 (S)	860253	SIGNAL AND LIGHTING (LOCATION 3)	LS	LUMP SUM
234 (S)	860254	SIGNAL AND LIGHTING (LOCATION 4)	LS	LUMP SUM
235 (S)	860255	SIGNAL AND LIGHTING (LOCATION 5)	LS	LUMP SUM
236 (S)	860300	SIGNAL AND LIGHTING (CITY STREET LOCATION 1)	LS	LUMP SUM
237 (S)	860302	SIGNAL AND LIGHTING (CITY STREET LOCATION 2)	LS	LUMP SUM
238 (S)	860303	SIGNAL AND LIGHTING (CITY STREET LOCATION 3)	LS	LUMP SUM
239 (S)	860402	LIGHTING (CITY STREET)	LS	LUMP SUM
240 (S)	860460	LIGHTING AND SIGN ILLUMINATION	LS	LUMP SUM

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
241 (S-F)	860796	SPRINKLER CONTROL CONDUIT (BRIDGE)	M	180
242 (S-F)	860931	TRAFFIC MONITORING STATION (LOCATION 1)	LS	LUMP SUM
243 (S)	860932	TRAFFIC MONITORING STATION (LOCATION 2)	LS	LUMP SUM
244 (S)	860933	TRAFFIC MONITORING STATION (LOCATION 3)	LS	LUMP SUM
245 (S)	012801	FIBER OPTIC COMMUNICATION SYSTEM	LS	LUMP SUM
246 (S)	861101	RAMP METERING SYSTEM (LOCATION 1)	LS	LUMP SUM
247 (S)	861102	RAMP METERING SYSTEM (LOCATION 2)	LS	LUMP SUM
248 (S)	861103	RAMP METERING SYSTEM (LOCATION 3)	LS	LUMP SUM
249 (S)	861349	REMOVE EXISTING SIGNAL SYSTEM	LS	LUMP SUM
250	993013	150 MM FIRE HYDRANT ASSEMBLY	EA	5
251	999990	MOBILIZATION	LS	LUMP SUM

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISIONS

Annexed to Contract No. 11-091824

SECTION 1 SPECIFICATIONS AND PLANS

The project plans for this project are not considered to be complete to construct the work anticipated by the contract. Design of the project, including preparation of final project plans, will be completed in phases after approval of the contract in conformance with the following:

Phase I shall consist of the following work:

Title sheet
Typical Cross Sections
Layouts
Profiles
Superelevation Diagrams
Temporary Water Pollution Control Plans/Details for Stage 1
Temporary Water Pollution Control Quantities
Permanent Erosion Control Quantities
Drainage Quantities
Stage Construction Plans
Stage Construction and Traffic Handling Plans for Stage 1
Stage Construction and Traffic Handling Quantities
Detour Plans
Construction Area Signs
Summary of Quantities
Log of Test Borings
Britannia Blvd. Overcrossing Bridge Plans
La Media Rd. Undercrossing Bridge Plans
Airway Rd. Undercrossing Bridge Plans
Sanitary Sewer Plans (Segment C)
Sanitary Sewer Details (Segments C and D)
Sanitary Sewer Quantities
Water Main Relocation Quantities
Right-of-Way Parcel Location/Key Map
Planting and Irrigation Plans
Planting and Irrigation Quantities
Pavement Delineation Quantities
Sign Quantities
Retaining Wall Quantities

Complete design of Phase I, including final plans for Phase I, is included in the project plans for this project.

Phase II shall consist of the following work:

Construction Details
Contour Grading Plans
Drainage Plans, Profiles, Details
Utility Plans/Profiles/Details

Temporary Water Pollution Control Plans/Details
Permanent Erosion Control Plans/Details
All Remaining Stage Construction and Traffic Handling Plans
Retaining Wall Plans and Details

Complete design of Phase II, including final plans for Phase II, will be provided to the Contractor within 30 days after approval of the contract.

Phase III shall consist of the following work:

Pavement Delineation Plans
Sign Plans/Quantities
Sign Detail
Signals, Lighting and Electrical Systems

Complete design of Phase III, including final plans for Phase III, will be provided to the Contractor within 120 days after approval of the contract.

The issuance of Phases II and III shall be by change order in conformance with Section 4, "Scope of Work," of the Standard Specifications.

Project plan sheets marked, "Preliminary for Bidding Purposes Only," shall not be considered complete as to the design. These plan sheets are provided only to show the scope of the work to be performed, and shall only be used for the purpose of bid preparation.

Should the Department fail to provide the complete design, including final plans for any phase within the times specified and, in the opinion of the Engineer, the controlling operation or operations are delayed or interfered with by the delay in providing the complete design, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications. Attention is directed to "Progress Schedule (Critical Path)" of these special provisions.

AMENDMENTS TO JULY 1999 STANDARD SPECIFICATIONS

UPDATED OCTOBER 5, 2007

SECTION 0: GLOBAL REVISIONS

Issue Date: August 17, 2007

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SECTION 1: DEFINITIONS AND TERMS

Issue Date: October 5, 2007

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

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

1. Use of:

    1.1. Imperative mood
    1.2. Introductory modifiers
    1.3. Conditional clauses

2. Elimination of:

    2.1. Language variations
    2.2. Definitions for industry-standard terms
    2.3. Redundant specifications

2.4. Needless cross-references

- The use of this new style does not change the meaning of a specification not yet using this style.
- The specifications are written to the Bidder before award and the Contractor after. Before award, interpret sentences written in the imperative mood as starting with "The Bidder must" and interpret "you" as "the Bidder" and "your" as "the Bidder's." After award, interpret sentences written in the imperative mood as starting with "The Contractor must" and interpret "you" as "the Contractor" and "your" as "the Contractor's."
- Unless an object or activity is specified to be less than the total, the quantity or amount is all of the object or activity.
- All items in a list apply unless the items are specified as choices.
- Interpret terms as defined in the Contract documents. A term not defined in the Contract documents has the meaning defined in Means Illustrated Construction Dictionary, Condensed Version, Second Edition.

The 1st table in Section 1-1.02, "Abbreviations," of the Standard Specifications is amended by adding:

SSPC	The Society for Protective Coatings

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

1-1.082 BUSINESS DAY

- Day on the calendar except Saturday or holiday.

1-1.084 CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES

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

1-1.125 DEDUCTION

- Amount of money permanently taken from progress payment and final payment. Deductions are cumulative and are not retentions under Pub Cont Code § 7107.

1-1.205 FEDERAL-AID CONTRACT

- Contract that has a Federal-aid project number on the cover of the Notice to Contractors and Special Provisions.

1-1.245 HOLIDAY

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

1-1.475 WITHHOLD

- Money temporarily or permanently taken from progress payment. Withholds are cumulative and are not retentions under Pub Cont Code § 7107.

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

1-1.25 LABORATORY

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

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

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

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

1-1.275 OFFICES OF STRUCTURE DESIGN

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

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

1-1.39 STATE

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

SECTION 2: PROPOSAL REQUIREMENTS AND CONDITIONS

Issue Date: June 19, 2003

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

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

• The bidder shall examine carefully the site of the work contemplated, the plans and specifications, and the proposal and contract forms therefor. The submission of a bid shall be conclusive evidence that the bidder has investigated and is satisfied as to the general and local conditions to be encountered, as to the character, quality and scope of work to be performed, the quantities of materials to be furnished and as to the requirements of the proposal, plans, specifications and the contract.

• The submission of a bid shall also be conclusive evidence that the bidder is satisfied as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information was reasonably ascertainable from an inspection of the site and the records of exploratory work done by the Department as shown in the bid documents, as well as from the plans and specifications made a part of the contract.

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

• Where there has been prior construction by the Department or other public agencies within the project limits, records of the prior construction that are currently in the possession of the Department and which have been used by, or are known to, the designers and administrators of the project will be made available for inspection by bidders or contractors, upon written request, subject to the conditions hereinafter set forth. The records may include, but are not limited to, as-built drawings, design calculations, foundation and site studies, project reports and other data assembled in connection with the investigation, design, construction and maintenance of the prior projects.

• Inspection of the records of investigations and project records may be made at the office of the district in which the work is situated, or in the case of records of investigations related to structure work, at the Transportation Laboratory in Sacramento, California.

• When a log of test borings or other record of geotechnical data obtained by the Department's investigation of surface and subsurface conditions is included with the contract plans, it is furnished for the bidders' or Contractor's information and its use shall be subject to the conditions and limitations set forth in this Section 2-1.03.

• In some instances, information considered by the Department to be of possible interest to bidders or contractors has been compiled as "Materials Information." The use of the "Materials Information" shall be subject to the conditions and limitations set forth in this Section 2-1.03 and Section 6-2, "Local Materials."

• When cross sections are not included with the plans, but are available, bidders or contractors may inspect the cross sections and obtain copies for their use, at their expense.

• When cross sections are included with the contract plans, it is expressly understood and agreed that the cross sections do not constitute part of the contract, do not necessarily represent actual site conditions or show location, character, dimensions and details of work to be performed, and are included in the plans only for the convenience of bidders and their use is subject to the conditions and limitations set forth in this Section 2-1.03.

• When contour maps were used in the design of the project, the bidders may inspect those maps, and if available, they may obtain copies for their use.

• The availability or use of information described in this Section 2-1.03 is not to be construed in any way as a waiver of the provisions of the first paragraph in this Section 2-1.03 and bidders and contractors are cautioned to make independent investigations and examinations as they deem necessary to be satisfied as to conditions to be encountered in the performance of the work and, with respect to possible local material sources, the quality and quantity of material available from the property and the type and extent of processing that may be required in order to produce material conforming to the requirements of the specifications.

• The Department assumes no responsibility for conclusions or interpretations made by a bidder or contractor based on the information or data made available by the Department. The Department does not assume responsibility for representation made by its officers or agents before the execution of the contract concerning surface or subsurface conditions, unless that representation is expressly stated in the contract.

• No conclusions or interpretations made by a bidder or contractor from the information and data made available by the Department will relieve a bidder or contractor from properly fulfilling the terms of the contract.

SECTION 3: AWARD AND EXECUTION OF CONTRACT

Issue Date: August 17, 2007

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

3-1.025 INSURANCE POLICIES

• The successful bidder shall submit:

1. Copy of its commercial general liability policy and its excess policy or binder until such time as a policy is available, including the declarations page, applicable endorsements, riders, and other modifications in effect at the time of contract execution. Standard ISO form No. CG 0001 or similar exclusions are allowed if not inconsistent with Section 7-1.12, "Indemnification and Insurance." Allowance of additional exclusions is at the discretion of the Department.
2. Certificate of insurance showing all other required coverages. Certificates of insurance, as evidence of required insurance for the auto liability and any other required policy, shall set forth deductible amounts applicable to each policy and all exclusions that are added by endorsement to each policy. The evidence of insurance shall provide that no cancellation, lapse, or reduction of coverage will occur without 10 days prior written notice to the Department.
3. A declaration under the penalty of perjury by a certified public accountant certifying the accountant has applied Generally Accepted Accounting Principles (GAAP) guidelines confirming the successful bidder has sufficient funds and resources to cover any self-insured retentions if the self-insured retention is $50 000 or higher.

• If the successful bidder uses any form of self-insurance for workers compensation in lieu of an insurance policy, it shall submit a certificate of consent to self-insure in accordance with the provisions of Section 3700 of the Labor Code.

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

3-1.03 EXECUTION OF CONTRACT

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

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

3-1.04 FAILURE TO EXECUTE CONTRACT

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

Section 3-1.05, "Return of Proposal Guaranties," of the Standard Specifications is amended to read:

3-1.05 RETURN OF PROPOSAL GUARANTIES

- The Department keeps the proposal guaranties of the 1st, 2nd and 3rd lowest responsible bidders until the contract has been executed. The other bidders' guaranties, other than bidders' bonds, are returned upon determination of the 1st, 2nd, and 3rd apparent lowest bidders, and their bidders' bonds are of no further effect.

SECTION 4: SCOPE OF WORK

Issue Date: August 17, 2007

Section 4-1.01, "Intent of Plans and Specifications," of the Standard Specifications is amended by adding the following:

- Nothing in the specifications voids the Contractor's public safety responsibilities.

SECTION 5: CONTROL OF WORK

Issue Date: August 17, 2007

Section 5, "Control of Work," of the Standard Specifications is amended by adding the following sections:

5-1.005 GENERAL

- Failure to comply with any specification part is a breach of the contract and a waiver of your right to time or payment adjustment.
- After contract approval, submit documents and direct questions to the Engineer. Orders, approvals, and requests to the Contractor are by the Engineer.

- The Engineer furnishes the following in writing:

1. Approvals
2. Notifications
3. Orders

- The Contractor must furnish the following in writing:

1. Assignments
2. Notifications
3. Proposals
4. Requests for information, sequentially numbered
5. Subcontracts
6. Test results

- The Department rejects a form if it has any error or any omission.
- Convert foreign language documents to English.
- Use contract administration forms available at the Department's Web site.

5-1.015 RECORD RETENTION, INSPECTION, COPYING, AND AUDITING

- Retain project records and make them available for inspection, copying, and auditing by State representatives from bid preparation through:

1. Final payment
2. Resolution of claims, if any

- For at least 3 years after the later of these, retain and make available for inspection, copying, and auditing cost records by State representatives including:

1. Records pertaining to bid preparation
2. Overhead
3. Payroll records and certified payroll

4. Payments to suppliers and subcontractors
5. Cost accounting records
6. Records of subcontractors and suppliers

- Maintain the records in an organized way in the original format, electronic and hard copy, conducive to professional review and audit.
- Before contract acceptance, the State representative notifies the Contractor, subcontractor, or supplier 5 days before inspection, copying, or auditing.
- If an audit is to start more than 30 days after contract acceptance, the State representative notifies the Contractor, subcontractor, or supplier when the audit is to start.

Section 5-1.01, "Authority of Engineer," of the Standard Specifications is amended by adding:

- Failure to enforce a contract provision does not waive enforcement of any contract provision.

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

5-1.02A Excavation Safety Plans

- The Construction Safety Orders of the Division of Occupational Safety and Health shall apply to all excavations. For all excavations 1.5 m or more in depth, the Contractor shall submit to the Engineer a detailed plan showing the design and details of the protective systems to be provided for worker protection from the hazard of caving ground during excavation. The detailed plan shall include any tabulated data and any design calculations used in the preparation of the plan. Excavation shall not begin until the detailed plan has been reviewed and approved by the Engineer.
- Detailed plans of protective systems for which the Construction Safety Orders require design by a registered professional engineer shall be prepared and signed by an engineer who is registered as a Civil Engineer in the State of California, and shall include the soil classification, soil properties, soil design calculations that demonstrate adequate stability of the protective system, and any other design calculations used in the preparation of the plan.
- No plan shall allow the use of a protective system less effective than that required by the Construction Safety Orders.
- If the detailed plan includes designs of protective systems developed only from the allowable configurations and slopes, or Appendices, contained in the Construction Safety Orders, the plan shall be submitted at least 5 days before the Contractor intends to begin excavation. If the detailed plan includes designs of protective systems developed from tabulated data, or designs for which design by a registered professional engineer is required, the plan shall be submitted at least 3 weeks before the Contractor intends to begin excavation.
- Attention is directed to Section 7-1.01E, "Trench Safety."

Section 5-1.04, "Coordination and Interpretation of Plans, Standard Specifications, and Special Provisions," of the Standard Specifications is amended to read:

5-1.04 CONTRACT COMPONENTS

- A component in one contract part applies as if appearing in each. The parts are complementary and describe and provide for a complete work.
- If a discrepancy exists:

1. The governing ranking of contract parts in descending order is:

    1.1. Special provisions
    1.2. Project plans
    1.3. Revised Standard Plans
    1.4. Standard Plans
    1.5. Amendments to the Standard Specifications
    1.6. Standard Specifications
    1.7. Project information

2. Written numbers and notes on a drawing govern over graphics
3. A detail drawing governs over a general drawing
4. A detail specification governs over a general specification
5. A specification in a section governs over a specification referenced by that section

- If a discrepancy is found or confusion arises, request correction or clarification.

Section 5-1.07, "Lines and Grades," of the Standard Specifications is replaced with the following:

5-1.07 LINES AND GRADES

- The Engineer places stakes and marks under Chapter 12, "Construction Surveys," of the Department's Surveys Manual.
- Submit your request for Department-furnished stakes:

1. On a Request for Construction Stakes form. Ensure:

   1.1. Requested staking area is ready for stakes
   1.2. You use the stakes in a reasonable time

2. A reasonable time before starting an activity using the stakes

- Establish priorities for stakes and note priorities on the request.
- Preserve stakes and marks placed by the Engineer. If the stakes or marks are destroyed, the Engineer replaces them at the Engineer's earliest convenience and deducts the cost.

SECTION 6: CONTROL OF MATERIALS

Issue Date: August 17, 2007

Section 6-1.05, "Trade Names and Alternatives," of the Standard Specifications is amended to read:

6-1.05 Specific Brand or Trade Name and Substitution

- A reference to a specific brand or trade name establishes a quality standard and is not intended to limit competition. You may use a product that is equal to or better than the specified brand or trade name if approved.
- Submit a substitution request within a time period that:

1. Follows Contract award
2. Allows 30 days for review
3. Causes no delay

- Include substantiating data with the substitution request that proves the substitution:

1. Is of equal or better quality and suitability
2. Causes no delay in product delivery and installation

Section 6, "Control of Materials," of the Standard Specifications is amended by adding the following sections:

6-1.085 BUY AMERICA (23 CFR 635.410)

- For a Federal-aid contract, furnish steel and iron materials to be incorporated into the work that are produced in the United States except:

1. Foreign pig iron and processed, pelletized, and reduced iron ore may be used in the domestic production of the steel and iron materials [60 Fed Reg 15478 (03/24/1995)]
2. If the total combined cost of the materials does not exceed the greater of 0.1 percent of the total bid or $2 500, material produced outside the United States may be used

- Production includes:

1. Processing steel and iron materials, including smelting or other processes that alter the physical form or shape (such as rolling, extruding, machining, bending, grinding, and drilling) or chemical composition

2. Coating application, including epoxy coating, galvanizing, and painting, that protects or enhances the value of steel and iron materials

• For steel and iron materials to be incorporated into the work, submit a Certificate of Compliance under Section 6-1.07, "Certificates of Compliance," of the Standard Specifications that certifies all production processes occurred in the United States except for the above exceptions.

6-1.087 BUY AMERICA (PUB RES CODE § 42703(d))

• Furnish crumb rubber to be incorporated into the work that is produced in the United States and is derived from waste tires taken from vehicles owned and operated in the United States.

• For crumb rubber to be incorporated into the work, submit a Certificate of Compliance under Section 6-1.07, "Certificates of Compliance," of the Standard Specifications that certifies only crumb rubber manufactured in the United States and derived from waste tires taken from vehicles owned and operated in the United States is used.

The 7th and 8th paragraph of Section 6-2.01, "General," of the Standard Specifications are amended to read:

• Upon the Contractor's written request, the Department tests materials from an untested local source. If satisfactory material from that source is used in the work, the Department does not charge the Contractor for the tests; otherwise, the Department deducts the test cost.

The 2nd sentence of the 7th paragraph of Section 6-2.02, "Possible Local Material Sources," of the Standard Specifications is amended to read:

• The Department deducts the charges for the removed material.

SECTION 7: LEGAL RELATIONS AND RESPONSIBILITY

Issue Date: August 17, 2007

Section 7-1.01, "Laws To Be Observed," of the Standard Specifications is amended to read:

7-1.01 LAWS TO BE OBSERVED

• Comply with laws, orders, decrees, and permits. Indemnify and defend the State against any claim or liability arising from the violation of a law, order, decree, or permit by you or your employees. Immediately report to the Engineer in writing a discrepancy or inconsistency between the contract and a law, order, decree, or permit.

The 3rd listed requirement of the 1st paragraph of Section 7-1.01A(2), "Prevailing Wage," of the Standard Specifications is amended to read:

3. Upon becoming aware of the subcontractor's failure to pay the specified prevailing rate of wages to the subcontractor's workers, the Contractor must diligently take corrective action to stop or rectify the failure, including withholding sufficient funds due the subcontractor for work performed on the public works project.

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

• Pursuant to Section 1775 of the Labor Code, the Division of Labor Standards Enforcement must 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 withhold 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 must 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 must pay any money withheld 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 must pay all moneys withheld from the subcontractor to the Department. The Department withholds these moneys pending the final decision of an enforcement action.

The 2nd paragraph of Section 7-1.01A(3), "Payroll Records," of the Standard Specifications is amended to read:

- The Department withholds the penalties specified in subdivision (g) of Labor Code § 1776 for noncompliance with the requirements in Section 1776.

The 4th paragraph of Section 7-1.01A(3), "Payroll Records," of the Standard Specifications is amended to read:

- The Department withholds for delinquent or inadequate payroll records (Labor Code § 1771.5). If the Contractor has not submitted an adequate payroll record by the month's 15th day for the period ending on or before the 1st of that month, the Department withholds 10 percent of the monthly progress estimate, exclusive of mobilization. The Department does not withhold more than $10 000 or less than $1000.

The 5th paragraph of Section 7-1.01A(3), "Payroll Records," of the Standard Specifications is deleted.

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

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

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

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

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

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

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

7-1.101A(6) (Blank)

The last sentence of the 2nd paragraph of Section 7-1.11, "Preservation of Property," of the Standard Specifications is amended to read:

- The cost of the repairs must be borne by the Contractor and will be deducted.

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

7-1.12 INDEMNIFICATION AND INSURANCE

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

7-1.12A Indemnification

- The Contractor shall defend, indemnify, and save harmless the State, including its officers, employees, and agents (excluding agents who are design professionals) from any and all claims, demands, causes of action, damages, costs,

expenses, actual attorneys' fees, losses or liabilities, in law or in equity (Section 7-1.12A Claims) arising out of or in connection with the Contractor's performance of this contract for:

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

• Except as otherwise provided by law, these requirements apply regardless of the existence or degree of fault of the State. The Contractor is not obligated to indemnify the State for Claims arising from conduct delineated in Civil Code Section 2782 and to Claims arising from any defective or substandard condition of the highway that existed at or before the start of work, unless this condition has been changed by the work or the scope of the work requires the Contractor to maintain existing highway facilities and the Claim arises from the Contractor's failure to maintain. The Contractor's defense and indemnity obligation shall extend to Claims arising after the work is completed and accepted if the Claims are directly related to alleged acts or omissions by the Contractor that occurred during the course of the work. State inspection is not a waiver of full compliance with these requirements.

• The Contractor's obligation to defend and indemnify shall not be excused because of the Contractor's inability to evaluate liability or because the Contractor evaluates liability and determine that the Contractor is not liable. The Contractor shall respond within 30 days to the tender of any Claim for defense and indemnity by the State, unless this time has been extended by the State. If the Contractor fails to accept or reject a tender of defense and indemnity within 30 days, in addition to any other remedy authorized by law, the Department may withhold such funds the State reasonably considers necessary for its defense and indemnity until disposition has been made of the Claim or until the Contractor accepts or rejects the tender of defense, whichever occurs first.

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

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

7-1.12B Insurance

7-1.12B(1) General

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

7-1.12B(2) Casualty Insurance

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

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

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

• In accordance with Labor Code Section 1860, the Contractor shall secure the payment of worker's compensation in accordance with Labor Code Section 3700.

• In accordance with Labor Code Section 1861, the Contractor shall submit to the Department the following certification before performing the work:

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

• Contract execution constitutes certification submittal.

- The Contractor shall provide Employer's Liability Insurance in amounts not less than:

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

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

7-1.12B(4) Liability Insurance

7-1.12B(4)(a) General

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

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

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

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

Total Bid	For Each Occurrence[1]	Aggregate for Products/Completed Operation	General Aggregate[2]	Umbrella or Excess Liability[3]
≤$1 000 000	$1 000 000	$2 000 000	$2 000 000	$5 000 000
>$1 000 000 ≤$5 000 000	$1 000 000	$2 000 000	$2 000 000	$10 000 000
>$5 000 000 ≤$25 000 000	$2 000 000	$2 000 000	$4 000 000	$15 000 000
>$25 000 000	$2 000 000	$2 000 000	$4 000 000	$25 000 000

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

- The Contractor shall not require certified Small Business subcontractors to carry Liability Insurance that exceeds the limits in the table above. Notwithstanding the limits specified herein, at the option of the Contractor, the liability insurance limits for certified Small Business subcontractors of any tier may be less than those limits specified in the table. For Small Business subcontracts, "Total Bid" shall be interpreted as the amount of subcontracted work to a certified Small Business.
- The State, including its officers, directors, agents (excluding agents who are design professionals), and employees, shall be named as additional insureds under the General Liability and Umbrella Liability Policies with respect to liability arising out of or connected with work or operations performed by or on behalf of the Contractor under this contract. Coverage for such additional insureds does not extend to liability:

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

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

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

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

7-1.12B(5) Automobile Liability Insurance

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

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

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

7-1.12B(7) Deductibles

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

7-1.12B(8) Enforcement

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

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

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

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

7-1.12B(9) Self-Insurance

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

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

SECTION 8: PROSECUTION AND PROGRESS

Issue Date: August 17, 2007

The 2nd paragraph of Section 8-1.02, "Assignment," of the Standard Specifications is amended to read:

• If the Contractor assigns the right to receive contract payments, the Department accepts the assignment upon the Engineer's receipt of a notice. Assigned payments remain subject to deductions and withholds described in the contract. The Department may use withheld payments for work completion whether payments are assigned or not.

SECTION 9: MEASUREMENT AND PAYMENT

Issue Date: August 17, 2007

The last sentence of the 1st paragraph of Section 9-1.02, "Scope of Payment," of the Standard Specifications is amended to read:

- Neither the payment of any estimate nor of any retained percentage or withhold relieves the Contractor of any obligation to make good any defective work or material.

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

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

The 6th paragraph of Section 9-1.03C, "Records," of the Standard Specifications is deleted.

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

9-1.04 NOTICE OF POTENTIAL CLAIM

- It is the intention of this section that disputes between the parties arising under and by virtue of the contract be brought to the attention of the Engineer at the earliest possible time in order that the matters may be resolved, if possible, or other appropriate action promptly taken.
- Disputes will not be considered unless the Contractor has first complied with specified notice or protest requirements, including Section 4-1.03, "Changes," Section 5-1.116, "Differing Site Conditions," Section 8-1.06, "Time of Completion," Section 8-1.07, "Liquidated Damages," and Section 8-1.10, "Utility and Non-Highway Facilities."
- For disputes arising under and by virtue of the contract, including an act or failure to act by the Engineer, the Contractor shall provide a signed written initial notice of potential claim to the Engineer within 5 days from the date the dispute first arose. The initial notice of potential claim shall provide the nature and circumstances involved in the dispute which shall remain consistent through the dispute. The initial notice of potential claim shall be submitted on Form CEM-6201A furnished by the Department and shall be certified with reference to the California False Claims Act, Government Code Sections 12650-12655. The Contractor shall assign an exclusive identification number for each dispute, determined by chronological sequencing, based on the date of the dispute.
- The exclusive identification number for each dispute shall be used on the following corresponding documents:

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

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

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

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

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

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

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

    4.1. The specific dates for which contract time is being requested
    4.2. The specific reasons for entitlement to a contract time adjustment
    4.3. The specific provisions of the contract that provide the basis for the requested contract time adjustment
    4.4. A detailed time impact analysis of the project schedule. The time impact analysis shall show the effect of changes or disruptions on the scheduled completion date to demonstrate entitlement to a contract time adjustment.

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

- The full and final documentation of the potential claim shall be submitted on Form CEM-6201C furnished by the Department and shall be certified with reference to the California False Claims Act, Government Code Sections 12650-12655.
- Pertinent information, references, arguments, and data to support the potential claim shall be included in the full and final documentation of potential claim. Information submitted subsequent to the full and final documentation submittal will not be considered. Information required in the full and final documentation of potential claim, as listed in items 1 to 5 above, that is not applicable to the dispute may be exempted as determined by the Engineer. No full and final documentation of potential claim will be considered that does not have the same nature and circumstances, and basis of claim as those specified on the initial and supplemental notices of potential claim.
- The Engineer will evaluate the information presented in the full and final documentation of potential claim and provide a written response to the Contractor within 30 days of its receipt unless otherwise specified. The Engineer's receipt of the full and final documentation of potential claim shall be evidenced by postal receipt or the Engineer's written receipt if delivered by hand. If the full and final documentation of potential claim is submitted by the Contractor after acceptance of the work by the Director, the Engineer need not provide a written response.
- Provisions in this section shall not apply to those claims for overhead costs and administrative disputes that occur after issuance of the proposed final estimate. Administrative disputes are disputes of administrative deductions or withholds,

contract item quantities, contract item adjustments, interest payments, protests of contract change orders as provided in Section 4-1.03A, "Procedure and Protest," and protests of the Weekly Statement of Working Days as provided in Section 8-1.06, "Time of Completion." Administrative disputes that occur prior to issuance of the proposed final estimate shall follow applicable requirements of this section. Information listed in the supplemental notice and full and final documentation of potential claim that is not applicable to the administrative dispute may be exempted as determined by the Engineer.

- Unless otherwise specified in the special provisions, the Contractor may pursue the administrative claim process pursuant to Section 9-1.07B, "Final Payment and Claims," for any potential claim found by the Engineer to be without merit.
- Failure of the Contractor to conform to specified dispute procedures shall constitute a failure to pursue diligently and exhaust the administrative procedures in the contract, and is deemed as the Contractor's waiver of the potential claim and a waiver of the right to a corresponding claim for the disputed work in the administrative claim process in conformance with Section 9-1.07B, "Final Payment of Claims," and shall operate as a bar to arbitration pursuant to Section 10240.2 of the California Public Contract Code.

Section 9-1.05, "Stop Notices," of the Standard Specifications is amended to read:

9-1.05 STOP NOTICE WITHHOLDS

- The Department may withhold payments to cover claims filed under Civ Code § 3179 et seq.

Section 9, "Measurement and Payment," of the Standard Specifications is amended by adding the following sections:

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

9-1.053 PERFORMANCE FAILURE WITHHOLDS

- During each estimate period you fail to comply with a contract part, including submittal of a document as specified, the Department withholds a part of the progress payment. The documents include quality control plans, schedules, traffic control plans, and water pollution control submittals.
- For 1 performance failure, the Department withholds 25 percent of the progress payment but does not withhold more than 10 percent of the total bid.
- For multiple performance failures, the Department withholds 100 percent of the progress payment but does not withhold more than 10 percent of the total bid.
- The Department returns performance-failure withholds in the progress payment following the correction of noncompliance.

9-1.055 PENALTY WITHHOLDS

- Penalties include fines and damages that are proposed, assessed, or levied against you or the Department by a governmental agency or citizen lawsuit. Penalties are also payments made or costs incurred in settling alleged permit violations of Federal, State, or local laws, regulations, or requirements. The cost incurred may include the amount spent for mitigation or correcting a violation.
- If you or the Department is assessed a penalty, the Department may withhold the penalty amount until the penalty disposition has been resolved. The Department may withhold penalty funds and notify you within 15 days of the withhold. If the penalty amount is less than the amount being withheld from progress payments for retentions, the Department will not withhold the penalty amount.
- If the penalty is resolved for less than the amount withheld, the Department pays interest at a rate of 6 percent per year on the excess withhold. If the penalty is not resolved, the withhold becomes a deduction.
- Instead of the withhold, you may provide a bond payable to the Department of Transportation equal to the highest estimated liability for any disputed penalties proposed.

9-1.057 PROGRESS WITHHOLDS FOR FEDERAL-AID CONTRACTS

- Section 9-1.057, "Progress Withholds for Federal-Aid Contracts," applies to a Federal-aid contract.
- The Department withholds 10 percent of a partial payment for noncompliant progress. Noncompliant progress occurs when:

1. Total days to date exceed 75 percent of the revised contract working days
2. Percent of working days elapsed exceeds the percent of value of work completed by more than 15 percent

- The Engineer determines the percent of working days elapsed by dividing the total days to date by the revised contract working days and converting the quotient to a percentage.

- The Engineer determines the percent of value of work completed by summing payments made to date and the amount due on the current progress estimate, dividing this sum by the current total estimated value of the work, and converting the quotient to a percentage. These amounts are shown on the Progress Payment Voucher.
- When the percent of working days elapsed minus the percent of value of work completed is less than or equal to 15 percent, the Department returns the withhold in the next progress payment.

The 3rd paragraph of Section 9-1.06, "Partial Payments," of the Standard Specifications is amended to read:

- For a non-Federal-aid project, the Department retains 10 percent of the estimated value of the work done and 10 percent of the value of materials estimated to have been furnished and delivered and unused or furnished and stored as part security for the fulfillment of the contract by the Contractor, except that at any time after 20 percent of the work has been completed, if the Engineer finds that satisfactory progress is being made, the Department may reduce the total amount being retained from payment pursuant to the above requirements to 5 percent of the total estimated value of the work and materials and may also reduce the amount retained from any of the remaining partial payments to 5 percent of the estimated value of the work and materials. In addition, on any partial payment made after 95 percent of the work has been completed, the Department may reduce the amount retained from payment pursuant to the requirements of this Section 9-1.06, to such lesser amount as the Department determines is adequate security for the fulfillment of the balance of the work and other requirements of the contract, but in no event is that amount reduced to less than 125 percent of the estimated value of the work yet to be completed as determined by the Engineer. The reduction is made only upon the request of the Contractor and must be approved in writing by the surety on the performance bond and by the surety on the payment bond. The approval of the surety must be submitted to the Disbursing Officer of the Department; the signature of the person executing the approval for the surety must be properly acknowledged and the power of attorney authorizing the person to give that consent must either accompany the document or be on file with the Department. The retentions specified in this paragraph are those defined in Pub Cont Code § 7107(b).

The 1st sentence of the 4th paragraph of Section 9-1.06, "Partial Payments," of the Standard Specifications is amended to read:

- The Department shall pay monthly to the Contractor, while carrying on the work, the balance not retained, as aforesaid, after deducting therefrom all previous payments and all sums to be deducted or withheld under the provisions of the contract.

The title and 1st and 2nd paragraphs of Section 9-1.065, "Payment of Withheld Funds," of the Standard Specifications are amended to read:

9-1.065 RELEASE OF RETAINED FUNDS

- The Department releases retained funds if you:

1. Request release of the retention (Pub Cont Code § 10263) in writing
2. Deposit securities equivalent to the funds you want released into escrow with the State Treasurer or with a bank acceptable to the Department
3. Are the beneficial owner of and receive interest on the deposited securities substituted for the retained funds

The 2nd sentence Section 9-1.07A, "Payment Prior to Proposed Final Estimate," of the Standard Specifications is amended to read:

- The Department pays the balance due less previous payments, deductions, withholds, and retentions under the provisions of the contract and those further amounts that the Engineer determines to be necessary pending issuance of the proposed final estimate and payment thereon.

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 makes a proposed final estimate of the total amount payable to the Contractor, including an itemization of the total amount, segregated by contract item quantities, extra work, and other basis for payment, and shows each deduction made or to be made for prior payments and amounts to be deducted, withheld, or retained under the provisions of the contract. Prior estimates and payments are subject to correction in the proposed final estimate. The Contractor must submit written approval of the proposed final estimate or a written statement of claims arising

under or by virtue of the contract so that the Engineer receives the written approval or statement of claims no later than close of business of the 30th day after receiving the proposed final estimate. The Contractor's receipt of the proposed final estimate must be evidenced by postal receipt. The Engineer's receipt of the Contractor's written approval or statement of claims must be evidenced by postal receipt or the Engineer's written receipt if delivered by hand.

- On the Contractor's approval, or if the Contractor files no claim within the specified period of 30 days, the Engineer will issue a final estimate in writing in conformance with the proposed final estimate submitted to the Contractor, and within 30 days thereafter the State will pay the entire sum so found to be due. That final estimate and payment thereon shall be conclusive and binding against both parties to the contract on all questions relating to the amount of work done and the compensation payable therefor, except as otherwise provided in Sections 9-1.03C, "Records," and 9-1.09, "Clerical Errors."
- If the Contractor within the specified period of 30 days files claims, the Engineer will issue a semifinal estimate in conformance with the proposed final estimate submitted to the Contractor and within 30 days thereafter the State will pay the sum found to be due. The semifinal estimate and corresponding payment shall be conclusive and binding against both parties to the contract on each question relating to the amount of work done and the compensation payable therefor, except insofar as affected by the claims filed within the time and in the manner required hereunder and except as otherwise provided in Sections 9-1.03C, "Records," and 9-1.09, "Clerical Errors."
- Except for claims for overhead costs and administrative disputes that occur after issuance of the proposed final estimate, the Contractor shall only provide the following two items of information for each claim:

1. The exclusive identification number that corresponds to the supporting full and final documentation of potential claim
2. The final amount of requested additional compensation

- If the final amount of requested additional compensation is different than the amount of requested compensation included in the full and final documentation of potential claim, the Contractor shall provide in the written statement of claims the reasons for the changed amount, the specific provisions of the contract which support the changed amount, and a statement of the reasons the provisions support and provide a basis for the changed amount. If the Contractor's claim fails to provide an exclusive identification number or if there is a disparity in the provided exclusive identification number, the Engineer will notify the Contractor of the omission or disparity. The Contractor shall have 15 days after receiving notification from the Engineer to correct the omission or disparity. If after the 15 days has elapsed, there is still an omission or disparity of the exclusive identification number assigned to the claim, the Engineer will assign the number. No claim will be considered that has any of the following deficiencies:

1. The claim does not have the same nature, circumstances, and basis as the corresponding full and final documentation of potential claim.
2. The claim does not have a corresponding full and final documentation of potential claim.
3. The claim was not included in the written statement of claims.
4. The Contractor did not comply with applicable notice or protest requirements of Sections 4-1.03, "Changes," 5-1.116, "Differing Site Condition," 8-1.06, "Time of Completion," 8-1.07, "Liquidated Damages," 8-1.10, "Utility and Non-Highway Facilities," and 9-1.04, "Notice of Potential Claim."

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

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

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

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

1. Allowable in conformance with the requirements in Title 48 of the Federal Acquisition Regulations, Chapter 1, Part 31.
2. Adequately supported by reliable documentation.
3. Related solely to the project under examination.

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

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

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

SECTION 12: CONSTRUCTION AREA TRAFFIC CONTROL DEVICES

Issue Date: October 6, 2006

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SECTION 15: EXISTING HIGHWAY FACILITIES

Issue Date: November 2, 2004

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

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

SECTION 19: EARTHWORK

Issue Date: January 5, 2007

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

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

The first paragraph of Section 19-3.025C, "Soil Cement Bedding," of the Standard Specifications is amended to read:

- Cementitious material used in soil cement bedding shall conform to the provisions in Section 90-2.01, "Cementitious Materials." Supplementary cementitious material will not be required.

The fourth paragraph of Section 19-3.025C, "Soil Cement Bedding," of the Standard Specifications is amended to read:

- The aggregate, cementitious material, and water shall be proportioned either by mass or by volume. Soil cement bedding shall contain not less than 175 kg of cementitious material per cubic meter. The water content shall be sufficient to produce a fluid, workable mix that will flow and can be pumped without segregation of the aggregate while being placed.

The first paragraph of Section 19-3.062, "Slurry Cement Backfill," of the Standard Specifications is amended to read:

- Slurry cement backfill shall consist of a fluid, workable mixture of aggregate, cementitious material, and water.

The fifth paragraph of Section 19-3.062, "Slurry Cement Backfill," of the Standard Specifications is amended to read:

- Cementitious material shall conform to the provisions in Section 90-2.01, "Cementitious Materials." Supplementary cementitious material will not be required.

The eighth paragraph of Section 19-3.062, "Slurry Cement Backfill," of the Standard Specifications is amended to read:

- The aggregate, cementitious material, and water shall be proportioned either by mass or by volume. Slurry cement backfill shall contain not less than 110 kg of cementitious material per cubic meter. The water content shall be sufficient to produce a fluid, workable mix that will flow and can be pumped without segregation of the aggregate while being placed.

SECTION 20: EROSION CONTROL AND HIGHWAY PLANTING

Issue Date: August 17, 2007

Section 20-2.03, "Soil Amendment," of the Standard Specifications is amended to read:

20-2.03 SOIL AMENDMENT

- Soil amendment shall comply with the requirements in the California Food and Agricultural Code.

- Soil amendment producers shall comply with the following:

1. Be fully permitted to produce compost as specified under the California Integrated Waste Management Board, Local Enforcement Agencies and any other State and Local Agencies that regulate Solid Waste Facilities. If exempt from State permitting requirements, the composting facility must certify that it follows guidelines and procedures for production of compost meeting the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7.
2. Be a participant in United States Composting Council's Seal of Testing Assurance program.

- Soil amendment shall be composted and may be derived from any single, or mixture of any of the following feedstock materials:

1. Green material consisting of chipped, shredded, or ground vegetation; or clean processed recycled wood products
2. Biosolids
3. Manure
4. Mixed food waste

- Soil amendment feedstock materials shall be composted to reduce weed seeds, pathogens and deleterious materials as specified under Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7, Section 17868.3.
- Soil amendment shall not be derived from mixed municipal solid waste and must be reasonably free of visible contaminates. Soil amendment must not contain paint, petroleum products, pesticides or any other chemical residues harmful to animal life or plant growth. Soil amendment must not possess objectionable odors.
- Metal concentrations in soil amendment must not exceed the maximum metal concentrations listed in Title 14, California Code of Regulations, Division 7, Chapter 3.1, Section 17868.2.
- Soil amendment must comply with the following:

Physical/Chemical Requirements

Property	Test Method	Requirement
pH	*TMECC 04.11-A, Elastometric pH 1:5 Slurry Method, pH Units	6.0–8.0
Soluble Salts	TMECC 04.10-A, Electrical Conductivity 1:5 Slurry Method dS/m (mmhos/cm)	0-10.0
Moisture Content	TMECC 03.09-A, Total Solids & Moisture at 70+/- 5 deg C, % Wet Weight Basis	30–60
Organic Matter Content	TMECC 05.07-A, Loss-On-Ignition Organic Matter Method (LOI), % Dry Weight Basis	30–65
Maturity	TMECC 05.05-A, Germination and Vigor Seed Emergence Seedling Vigor % Relative to Positive Control	 80 or Above 80 or Above
Stability	TMECC 05.08-B, Carbon Dioxide Evolution Rate mg CO_2-C/g OM per day	8 or below
Particle Size	TMECC 02.02-B Sample Sieving for Aggregate Size Classification % Dry Weight Basis	95% Passing 5/8 inch 70% Passing 3/8 inch
Pathogen	TMECC 07.01-B, Fecal Coliform Bacteria < 1000 MPN/gram dry wt.	Pass
Pathogen	TMECC 07.01-B, Salmonella < 3 MPN/4 grams dry wt.	Pass
Physical Contaminants	TMECC 02.02-C, Man Made Inert Removal and Classification: Plastic, Glass and Metal, % > 4mm fraction	Combined Total: < 1.0
Physical Contaminants	TMECC 02.02-C, Man Made Inert Removal and Classification: Sharps (Sewing needles, straight pins and hypodermic needles), % > 4mm fraction	None Detected

*TMECC refers to "Test Methods for the Examination of Composting and Compost," published by the United States Department of Agriculture and the United States Compost Council (USCC).

- Prior to application, the Contractor shall provide the Engineer with a copy of the soil amendment producer's Compost Technical Data Sheet and a copy of the compost producers STA certification. The Compost Technical Data Sheet shall include laboratory analytical test results, directions for product use, and a list of product ingredients.
- Prior to application, the Contractor shall provide the Engineer with a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

The last 3 paragraphs of Section 20-2.10, "Seed," of the Standard Specifications are deleted.

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

20-2.25 BACKFLOW PREVENTERS

- Backflow preventers shall be one of the reduced pressure principle devices as specified in these specifications and the special provisions.
- Backflow preventers shall be factory assembled and shall include 2 check valves, one pressure differential relief valve, 2 shut-off valves and 4 test cocks. Backflow preventer and valves shall be the same size as the pipeline in which they are installed, unless otherwise shown on the plans.
- Backflow preventer shut-off valves shall be manufactured from iron or bronze and shall be either resilient wedged gate valves, resilient seated and fully ported ball valves, or resilient seated butterfly valves. Threaded type shut-off valves shall be provided with a union on one side of each valve. Unions shall be brass or malleable iron.

The last paragraph of Section 20-3.04A, "General," of the Standard Specifications is deleted.

Section 20-4.055, "Pruning," of the Standard Specifications is amended to read:

20-4.055 PRUNING

- Pruning of plants shall be consistent with American National Standards Institute (ANSI), "Tree, Shrub and Other Woody Plant Maintenance Standard Practices," ANSI 300 (Part 1)-2001 and "Best Management Practices Tree Pruning," 2002 (ISBN 1-881956318), published by the International Society of Arboriculture, P.O. Boc 3129, Champaign, IL 61826.

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

20-5.03J Check and Test Backflow Preventers

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

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

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

SECTION 25: AGGREGATE SUBBASES

Issue Date: February 16, 2007

The first paragraph of Section 25-1.02A, "Class 1, Class 2, and Class 3 Aggregate Subbases," of the Standard Specifications is amended to read:

- Aggregate must be clean and free from organic matter and other deleterious substances. Aggregate must consist of any combination of:

1. Broken stone
2. Crushed gravel

3. Natural rough surfaced gravel
4. Sand
5. Up to 100 percent of any combination of processed:

    5.1. Asphalt concrete
    5.2. Portland cement concrete
    5.3. Lean concrete base
    5.4. Cement treated base

The first paragraph of Section 25-1.02B, "Class 4 Aggregate Subbase," of the Standard Specifications is amended to read:

- Aggregate must be clean and free from organic matter and other deleterious substances. Aggregate must consist of any combination of:

1. Broken stone
2. Crushed gravel
3. Natural rough surfaced gravel
4. Sand
5. Up to 100 percent of any combination of processed:

    5.1. Asphalt concrete
    5.2. Portland cement concrete
    5.3. Lean concrete base
    5.4. Cement treated base

SECTION 26: AGGREGATE BASE

Issue Date: February 16, 2007

The first paragraph of Section 26-1.02A, "Class 2 Aggregate Base," of the Standard Specifications is amended to read:

- Aggregate must be clean and free from organic matter and other deleterious substances. Aggregate must consist of any combination of:

1. Broken stone
2. Crushed gravel
3. Natural rough surfaced gravel
4. Sand
5. Up to 100 percent of any combination of processed:

    5.1. Asphalt concrete
    5.2. Portland cement concrete
    5.3. Lean concrete base
    5.4. Cement treated base

The first paragraph of Section 26-1.02B, "Class 3 Aggregate Base," of the Standard Specifications is amended to read:

- Aggregate must be clean and free from organic matter and other deleterious substances. Aggregate must consist of any combination of:

1. Broken stone
2. Crushed gravel
3. Natural rough surfaced gravel
4. Sand
5. Up to 100 percent of any combination of processed:

5.1. Asphalt concrete
5.2. Portland cement concrete
5.3. Lean concrete base
5.4. Cement treated base

SECTION 27: CEMENT TREATED BASES

Issue Date: January 5, 2007

The first paragraph of Section 27-1.02, "Materials," of the Standard Specifications is amended to read:

- Cement shall be Type II portland cement conforming to the provisions in Section 90-2.01A, "Cement."

The third paragraph of Section 27-1.02, "Materials," of the Standard Specifications is amended to read:

- Aggregate for use in Class A cement treated base shall be of such quality that when mixed with cement in an amount not to exceed 5 percent by mass of the dry aggregate and compacted at optimum moisture content, the compressive strength of a sample of the compacted mixture shall not be less than 5.2 MPa at 7 days, when tested by California Test 312.

The fourth paragraph of Section 27-1.02, "Materials," of the Standard Specifications is amended to read:

- Aggregate for use in Class B cement treated base shall have a Resistance (R-value) of not less than 60 before mixing with cement and a Resistance (R-value) of not less than 80 after mixing with cement in an amount not to exceed 2.5 percent by mass of the dry aggregate.

SECTION 28: LEAN CONCRETE BASE

Issue Date: January 5, 2007

The first paragraph of Section 28-1.02, "Materials," of the Standard Specifications is amended to read:

- Cement shall be Type II portland cement conforming to the provisions in Section 90-2.01A, "Cement."

The sixth paragraph of Section 28-1.02, "Materials," of the Standard Specifications is amended to read:

- Aggregate shall be of such quality that, when mixed with cement in an amount not to exceed 180 kg per cubic meter, and tested in conformance with the requirements in California Test 548, the compressive strength of a sample will be not less than 5.0 MPa at 7 days.

SECTION 29: TREATED PERMEABLE BASES

Issue Date: January 5, 2007

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

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

The second paragraph of Section 29-1.02B, "Cement Treated Permeable Base," of the Standard Specifications is amended to read:

- Cement shall be Type II portland cement conforming to the provisions in Section 90-2.01A, "Cement."

The second paragraph of Section 29-1.04B, "Cement Treated Permeable Base," of the Standard Specifications is amended to read:

- Cement treated permeable base shall contain not less than 170 kg of cement per cubic meter.

SECTION 37: BITUMINOUS SEALS

Issue Date: August 17, 2007

The fourth through sixth paragraphs in Section 37-1.03, "Maintaining Traffic," of the Standard Specifications are amended to read:

- On 2-lane two-way roadways, W8-7 "LOOSE GRAVEL" signs and W13-1 (35) speed advisory signs shall be furnished and placed adjacent to both sides of the traveled way where screenings are being spread on a traffic lane. The first W8-7 sign in each direction shall be placed where traffic first encounters loose screenings, regardless of which lane the screenings are being spread on. The W13-1 (35) signs need not be placed in those areas with posted speed limits of less than 40 MPH. The signs shall be placed at maximum 600-m intervals along each side of the traveled way and at public roads or streets entering the seal coat area as directed by the Engineer.
- On multilane roadways (freeways, expressways and multilane conventional highways) where screenings are being spread on a traffic lane, W8-7 "LOOSE GRAVEL" signs and W13-1 (35) speed advisory signs shall be furnished and placed adjacent to the outside edge of the traveled way nearest to the lane being worked on. The first W8-7 sign shall be placed where the screenings begin with respect to the direction of travel on that lane. The W13-1 (35) signs need not be placed in those areas with posted speed limits of less than 40 MPH. The signs shall be placed at maximum 600-m intervals along the edge of traveled way and at on-ramps, public roads or streets entering the seal coat area as directed by the Engineer.
- The W8-7 and W13-1 signs shall be maintained in place at each location until final brooming of the seal coat surface at that location is completed. The W8-7 and W13-1 signs shall conform to the provisions for construction area signs in Section 12, "Construction Area Traffic Control Devices." The signs may be set on temporary portable supports with the W13-1 below the W8-7 or on barricades with the W13-1 sign alternating with the W8-7 sign.

The second paragraph in Section 37-1.09, "Payment," of the Standard Specifications is amended to read:

- The above prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in applying seal coat, complete in place, including furnishing, placing, maintaining, and removing W8-7 and W13-1 signs, when required, and temporary supports or barricades for the signs, as shown on the plans, and as specified in these specifications and the special provisions, and as directed by the Engineer.

SECTION 39: ASPHALT CONCRETE

Issue Date: November 18, 2005

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

- Paving asphalt to be used as a binder for pavement reinforcing fabric shall be a steam-refined paving asphalt conforming to the provisions in Section 92, "Asphalts," and shall be Grade PG 70-10.

SECTION 40: PORTLAND CEMENT CONCRETE PAVEMENT

Issue Date: January 5, 2007

Section 40-1.015, "Cement Content," is deleted.

Section 40-1.05, "Proportioning," of the Standard Specifications is amended to read:

- Aggregate and cementitious material proportioning shall conform to the provisions in Section 90-5, "Proportioning."

The first paragraph in Section 40-1.105, "Exit Ramp Termini," of the Standard Specifications is amended to read:

- Concrete pavement shall be constructed at the ends of exit ramps when required by the plans or the special provisions. Texturing for exit ramp termini shall be by means of heavy brooming in a direction normal to ramp centerline. The hardened surface shall have a coefficient of friction not less than 0.35 as determined by California Test 342. Minimum cementitious material content of concrete in pavement for exit ramp termini shall be 350 kg/m^3.

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

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

The first paragraph in Section 40-1.14, "Payment," of the Standard Specifications is amended to read:

• The contract price paid per cubic meter for concrete pavement shall include full compensation for furnishing all labor, materials (including cementitious material in the amount specified), tools, equipment, and incidentals, and for doing all the work involved in constructing the portland cement concrete pavement, complete in place, as shown on the plans, and as specified in these specifications and the special provisions, and as directed by the Engineer.

SECTION 41: PAVEMENT SUBSEALING AND JACKING

Issue Date: January 5, 2007

The second paragraph of Section 41-1.02, "Materials," of the Standard Specifications is amended to read:

• Cement for grout shall be Type II portland cement conforming to the provisions in Section 90-2.01A, "Cement."

The third paragraph of Section 41-1.02, "Materials," of the Standard Specifications is amended to read:

• Fly ash shall conform to the requirements in AASHTO Designation: M 295 for either Class C or for Class F. The brand of fly ash used in the work shall conform to the provisions for approval of admixture brands in Section 90-4.03, "Admixture Approval."

The fifth paragraph of Section 41-1.02, "Materials," of the Standard Specifications is amended to read:

• Chemical admixtures and calcium chloride may be used. Chemical admixtures in the grout mix shall conform to the provisions in Section 90-4, "Admixtures." Calcium chloride shall conform to ASTM Designation: D 98.

SECTION 42: GROOVE AND GRIND PAVEMENT

Issue Date: December 31, 2001

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

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

SECTION 49: PILING

Issue Date: January 5, 2007

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

• The Contractor may use additional cementitious material in the concrete for the load test and anchor piles.

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

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

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

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

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

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

• Timber piles shall be fresh-headed and square and when permitted by the Engineer, the heads of the piles may be protected by means of heavy steel or wrought iron rings. During driving operations timber piling shall be restrained from lateral movement at intervals not to exceed 6 m over the length between the driving head and the ground surface. During driving operations, the timber pile shall be kept moving by continuous operation of the hammer. When the blow count exceeds either 2 times the blow count required in 300 mm, or 3 times the blow count required in 75 mm for the nominal resistance as shown on the plans, computed in conformance with the provisions in Section 49-1.08, "Pile Driving Acceptance Criteria," additional aids shall be used to obtain the specified penetration. These aids may include the use of water jets or drilling, where permitted, or the use of a larger hammer employing a heavy ram striking with a low velocity.

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

49-1.08 PILE DRIVING ACCEPTANCE CRITERIA

• Except for piles to be load tested, driven piles shall be driven to a value of not less than the nominal resistance shown on the plans unless otherwise specified in the special provisions or permitted in writing by the Engineer. In addition, when a pile tip elevation is specified, driven piles shall penetrate at least to the specified tip elevation, unless otherwise permitted in writing by the Engineer. Piles to be load tested shall be driven to the specified tip elevation.

• When the pile nominal resistance is omitted from the plans or the special provisions, timber piles shall be driven to a nominal resistance of 800 kN, and steel and concrete piles shall be driven to a nominal resistance of 1250 kN.

• The nominal resistance for driven piles shall be determined from the following formula in which "R_u" is the nominal resistance in kilonewtons, "E_r" is the manufacturer's rating for joules of energy developed by the hammer at the observed field drop height, and "N" is the number of hammer blows in the last 300 millimeters. (maximum value to be used for N is 100):

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

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

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

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

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

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

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

• Except for precast prestressed concrete piles in a corrosive environment, lifting anchors used in precast prestressed concrete piles shall be removed, and the holes filled in conformance with the provisions in Section 51-1.18A, "Ordinary Surface Finish."

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

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

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

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

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

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

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

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

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

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

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

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

- Steel pipe piles shall conform to the following requirements:

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

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

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

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

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

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

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

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

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

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

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

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

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

SECTION 50: PRESTRESSING CONCRETE

Issue Date: January 5, 2007

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

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

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

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

• Prestressing steel shall be high-tensile wire conforming to the requirements in ASTM Designation: A 421, including Supplement I; high-tensile seven-wire strand conforming to the requirements in ASTM Designation: A 416; or uncoated

high-strength steel bars conforming to the requirements in ASTM Designation: A 722, including all supplementary requirements. The maximum mass requirement of ASTM Designation: A 722 will not apply.

- In addition to the requirements of ASTM Designation: A 722, for deformed bars, the reduction of area shall be determined from a bar from which the deformations have been removed. The bar shall be machined no more than necessary to remove the deformations over a length of 300 mm, and reduction will be based on the area of the machined portion.
- In addition to the requirements specified herein, epoxy-coated seven-wire prestressing steel strand shall be grit impregnated and filled in conformance with the requirements in ASTM Designation: A 882/A 882M, including Supplement I, and the following:

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

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

of a corrosion inhibitor placed in the ducts or applied to the steel in the duct. The corrosion inhibitor shall conform to the provisions specified herein.

- When steam curing is used, prestressing steel for post-tensioning shall not be installed until the steam curing is completed.
- Water used for flushing ducts shall contain either quick lime (calcium oxide) or slaked lime (calcium hydroxide) in the amount of 0.01-kg/L. Compressed air used to blow out ducts shall be oil free.
- When prestressing steel for post-tensioning is installed in the ducts after completion of concrete curing, and if stressing and grouting are completed within 10 days after the installation of the prestressing steel, rust which may form during those 10 days will not be cause for rejection of the steel. Prestressing steel installed, tensioned, and grouted in this manner, all within 10 days, will not require the use of a corrosion inhibitor in the duct following installation of the prestressing steel. Prestressing steel installed as above but not grouted within 10 days shall be subject to all the requirements in this section pertaining to corrosion protection and rejection because of rust. The requirements in this section pertaining to tensioning and grouting within 10 days shall not apply to epoxy-coated prestressing steel strand.
- Any time prestressing steel for pretensioning is placed in the stressing bed and is exposed to the elements for more than 36 hours prior to encasement in concrete, adequate measures shall be taken by the Contractor, as approved by the Engineer, to protect the steel from contamination or corrosion.
- After final fabrication of the seven-wire prestressing steel strand, no electric welding of any form shall be performed on the prestressing steel. Whenever electric welding is performed on or near members containing prestressing steel, the welding ground shall be attached directly to the steel being welded.
- Pretensioned prestressing steel shall be cut off flush with the end of the member. For epoxy-coated prestressing steel, only abrasive saws shall be used to cut the steel. The exposed ends of the prestressing steel and a 25-mm strip of adjoining concrete shall be cleaned and painted. Cleaning shall be by wire brushing or abrasive blast cleaning to remove all dirt and residue on the metal or concrete surfaces. Immediately after cleaning, the surfaces shall be covered with one application of unthinned zinc-rich primer (organic vehicle type) conforming to the provisions in Section 91, "Paint," except that 2 applications shall be applied to surfaces which will not be covered by concrete or mortar. Aerosol cans shall not be used. The paint shall be thoroughly mixed at the time of application and shall be worked into any voids in the prestressing tendons.

The seventh paragraph in Section 50-1.07, "Ducts," of the Standard Specifications is amended to read:

- All ducts with a total length of 120 m or more shall be vented. Vents shall be placed at intervals of not more than 120 m and shall be located within 2 m of every high point in the duct profile. Vents shall be 12 mm minimum diameter standard pipe or suitable plastic pipe. Connections to ducts shall be made with metallic or plastic structural fasteners. Plastic components, if selected, shall not react with the concrete or enhance corrosion of the prestressing steel and shall be free of water soluble chlorides. The vents shall be mortar tight, taped as necessary, and shall provide means for injection of grout through the vents and for sealing the vents. Ends of vents shall be removed 25 mm below the roadway surface after grouting has been completed.

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

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

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

Where:

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

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

* With the use of lubrication

The thirteenth and fourteenth paragraphs in Section 50-1.08, "Prestressing," of the Standard Specifications are amended to read:

- Prestressing steel in pretensioned members shall not be cut or released until the concrete in the member has attained a compressive strength of not less than the value shown on the plans or 28 MPa, whichever is greater. In addition to these concrete strength requirements, when epoxy-coated prestressing steel strand is used, the steel shall not be cut or released until the temperature of the concrete surrounding the strand is less than 65°C, and falling.
- When ordered by the Engineer, prestressing steel strands in pretensioned members, if tensioned individually, shall be checked by the Contractor for loss of prestress not more than 48 hours prior to placing concrete for the members. The method and equipment for checking the loss of prestress shall be subject to approval by the Engineer. Strands which show a loss of prestress in excess of 3 percent shall be retensioned to the original computed jacking stress.

Item 2 of the eleventh paragraph in Section 50-1.08, "Prestressing," of the Standard Specifications is amended to read:

2. When the concrete is designated by class or cementitious material content, either the concrete compressive strength shall have reached the strength shown on the plans at the time of stressing or at least 28 days shall have elapsed since the last concrete to be prestressed has been placed, whichever occurs first.

The second and third paragraphs in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications are amended to read:

- Grout shall consist of cement and water and may contain an admixture if approved by the Engineer.
- Cement shall conform to the provisions in Section 90-2.01A, "Cement."

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

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

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

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

• No separate payment will be made for pretensioning precast concrete members. Payment for pretensioning precast concrete members shall be considered as included in the contract price paid for furnish precast members as provided for in Section 51, "Concrete Structures."

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

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

SECTION 51: CONCRETE STRUCTURES

Issue Date: October 5, 2007

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- Expanded polystyrene shall be a commercially available polystyrene board. Expanded polystyrene shall have a minimum flexural strength of 240 kPa determined in conformance with the requirements in ASTM Designation: C 203 and a compressive yield strength of between 110 and 275 kPa at 5 percent compression. Surfaces of expanded polystyrene against which concrete is placed shall be faced with hardboard. Hardboard shall be 3 mm minimum thickness, conforming to ANSI A135.4, any class. Other facing materials may be used provided they furnish equivalent protection. Boards shall be held in place by nails, waterproof adhesive, or other means approved by the Engineer.

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

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

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

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

The 2nd paragraph of Section 51-1.12F, "Sealed Joints," of the Standard Specifications is amended to read:

- Type A and AL joint seals shall consist of a groove in the concrete that is filled with field-mixed silicone sealant.

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

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

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

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

Movement Rating (MR)	Seal Type
MR ≤ 25 mm	Type A or Type B
25 mm < MR ≤ 50 mm	Type B
50 mm < MR ≤ 100 mm	Joint Seal Assembly (Strip Seal)
MR > 100 mm	Joint Seal Assembly (Modular Unit) or Seismic Joint

The 1st paragraph of Section 51-1.12F(3)(a), "Type A and AL Seal," of the Standard Specifications is amended to read:

- The sealant must consist of a 2-component silicone sealant that will withstand up to ±50 percent movement.

The 2nd paragraph of Section 51-1.12F(3)(a), "Type A and AL Seal," of the Standard Specifications is amended to read:

- Silicone sealants must be tested under California Test 435 and must comply with the following:

Specification	Requirement
Modulus at 150 percent elongation	35–520 kPa
Recovery	17 mm max.
Notch Test	Notched or loss of bond 6 mm, max.
Water Resistance	Notched or loss of bond 6 mm, max.
Ultraviolet Exposure ASTM Designation: G 154, Table X2.1,Cycle 2.	No more than slight checking or cracking.
Cone Penetration	4.5-12.0 mm

The 3rd paragraph of Section 51-1.12F(3)(a), "Type A and AL Seal," of the Standard Specifications is deleted.

The 8th paragraph of Section 51-1.12F(3)(a), "Type A and AL Seal," of the Standard Specifications is deleted.

The 10th paragraph of Section 51-1.12F(3)(a), "Type A and AL Seal," of the Standard Specifications is amended to read:

• A Certificate of Compliance accompanied by a certified test report must be furnished for each batch of silicone sealant in conformance with the provisions in Section 6-1.07, "Certificates of Compliance."

The 2nd paragraph of Section 51-1.12F(3)(b), "Type B Seal," of the Standard Specifications is amended to read:

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

1. The seal must consist of a multichannel, nonporous, homogeneous material furnished in a finished extruded form.
2. The minimum depth of the seal measured at the contact surface must be at least 95 percent of the minimum uncompressed width of the seal as designated by the manufacturer.
3. When tested in conformance with the requirements in California Test 673 for Type B seals, joint seals must provide a movement rating (MR) of not less than that shown on the plans.
4. The top and bottom edges of the joint seal must maintain continuous contact with the sides of the groove over the entire range of joint movement.
5. The seal must be furnished full length for each joint with no more than 1 shop splice in any 18 m length of seal.
6. The Contractor must demonstrate the adequacy of the procedures to be used in the work before installing seals in the joints.
7. One field splice per joint may be made at locations and by methods approved by the Engineer. The seals are to be manufactured full length for the intended joint, then cut at the approved splice section and rematched before splicing. The Contractor must submit splicing details prepared by the joint seal manufacturer for approval before beginning splicing work.
8. Shop splices and field splices must have no visible offset of exterior surfaces and must show no evidence of bond failure.
9. At all open ends of the seal that would admit water or debris, each cell must be filled to a depth of 80 mm with commercial quality open cell polyurethane foam or closed by other means subject to approval by the Engineer.

The 7th paragraph of Section 51-1.12F(3)(b), "Type B Seal," of the Standard Specifications is amended to read:

• The joint seal must be installed full length for each joint with equipment that does not twist or distort the seal, elongate the seal longitudinally, or otherwise cause damage to the seal or to the concrete forming the groove.

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

(c) Joint Seal Assemblies and Seismic Joints

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

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

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

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

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

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

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

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

A. The bearings shall consist of alternating steel laminates and internal elastomer laminates with top and bottom elastomer covers. Steel laminates shall have a nominal thickness of 1.9 mm (14 gage). Internal elastomer laminates shall have a thickness of 12 mm, and top and bottom elastomer covers shall each have a thickness of 6 mm. The combined thickness of internal elastomer laminates and top and bottom elastomer covers shall be equal to the bearing pad thickness shown on the plans. The elastomer cover to the steel laminates at the sides of the bearing shall be 3 mm. If guide pins or other devices are used to control the side cover over the steel laminates, any exposed portions of the steel laminates shall be sealed by vulcanized patching. The length, width, or diameter of the bearings shall be as shown on the plans.
B. The total thickness of the bearings shall be equal to the thickness of elastomer laminates and covers plus the thickness of the steel laminates.
C. Elastomer for steel reinforced elastomeric bearings shall conform to the provisions for elastomer in Section 51-1.12H(1), "Plain and Fabric Reinforced Elastomeric Bearing Pads."
D. A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," shall be furnished to the Engineer certifying that the bearings to be furnished conform to all of the above provisions. The Certificate of Compliance shall be supported by a certified copy of the results of tests performed by the manufacturer on the bearings.
E. One sample bearing shall be furnished to the Engineer from each lot of bearings to be furnished for the contract. Samples shall be available at least 3 weeks in advance of intended use. The sample bearing shall be one of the following:

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

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

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

The first paragraph in Section 51-1.135, "Mortar," of the Standard Specifications is amended to read:

• Mortar shall be composed of cementitious material, sand, and water proportioned and mixed as specified in this Section 51-1.135.

The third paragraph in Section 51-1.135, "Mortar," of the Standard Specifications is amended to read:

• The proportion of cementitious material to sand, measured by volume, shall be 1:2 unless otherwise specified.

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

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

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

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

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

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

51-1.17A DECK CRACK TREATMENT

- The Contractor shall use all means necessary to minimize the development of shrinkage cracks.

- The Contractor shall remove all equipment and materials from the deck and clean the surface as necessary for the Engineer to measure the surface crack intensity. Surface crack intensity will be determined by the Engineer after completion of concrete cure, before prestressing, and before the release of falsework. In any 50 square meter portion of deck within the limits of the new concrete deck, should the intensity of cracking be such that there are more than 5 m of cracks whose width at any location exceeds 0.5 mm**,** the deck shall be treated with methacrylate resin. The area of deck to be treated shall have a width that extends for the entire width of new deck inside the concrete barriers and a length that extends at least 1.5 m beyond the furthest single continuous crack outside the 50 square meter portion, measured from where that crack exceeds 0.5 mm in width, as determined by the Engineer.
- Deck crack treatment shall include furnishing, testing, and application of methacrylate resin and sand. If grinding is required, deck treatment shall take place before grinding.

51-1.17A(1) Submittals

- Before starting deck treatment, the Contractor shall submit plans in conformance with Section 5-1.02, "Plans and Working Drawings," for the following:

1. Public safety plan for the use of methacrylate resin
2. Placement plan for the construction operation

- The plans shall identify materials, equipment, and methods to be used.
- The public safety plan for the use of methacrylate resin shall include details for the following:

1. Shipping
2. Storage
3. Handling
4. Disposal of residual methacrylate resin and the containers

- The placement plan for construction shall include the following:

1. Schedule of deck treatment for each bridge. The schedule shall be consistent with "Maintaining Traffic," of the special provisions and shall include time for the Engineer to perform California Test 342.
2. Methods and materials to be used, including the following:

    2.1. Description of equipment for applying the resin
    2.2. Description of equipment for applying the sand
    2.3. Gel time range and final cure time for the resin

- If the measures proposed in the safety plan are inadequate to provide for public safety associated with the use of methacrylate resin, the Engineer will reject the plan and direct the Contractor to revise the plan. Directions for revisions will be in writing and include detailed comments. The Engineer will notify the Contractor of the approval or rejection of a submitted or revised plan within 15 days of receipt of that plan.
- In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays."

51-1.17A(2) Materials

- Before using methacrylate resin, a Material Safety Data Sheet shall be submitted for each shipment of resin.
- Methacrylate resin shall be low odor and have a high molecular weight. Before adding initiator, the resin shall have a maximum volatile content of 30 percent when tested in conformance with the requirements in ASTM Designation: D 2369, and shall conform to the following:

PROPERTY	REQUIREMENT	TEST METHOD
* Viscosity	0.025 Pa·s, maximum, (Brookfield RVT with UL adaptor, 50 RPM at 25°C	ASTM D 2196
* Specific Gravity	0.90 minimum, at 25°C	ASTM D 1475
* Flash Point	82°C, minimum	ASTM D 3278
* Vapor Pressure	1.0 mm Hg, maximum, at 25°C	ASTM D 323
Tack-free Time	400 minutes, maximum, at 25°C	Specimen prepared per California Test 551
PCC Saturated Surface-Dry Bond Strength	3.5 MPa, minimum at 24 hours and 21±1°C	California Test 551
* Test shall be performed before adding initiator.		

51-1.17A(3) Testing

- The Contractor shall allow 20 days for sampling and testing by the Engineer of the methacrylate resin before proposed use. If bulk resin is to be used, the Contractor shall notify the Engineer in writing at least 15 days before the delivery of the bulk resin to the job site. Bulk resin is any resin stored in containers in excess of 209 liters.
- Before starting production treatment, the Contractor shall treat a test area of approximately 50 square meters that is within the project limits and at a location approved by the Engineer. When available the test area shall be outside of the traveled way. Weather and pavement conditions during the test treatment shall be similar to those expected on the deck. Equipment used for testing shall be similar to those used for deck treating operations.
- During test and production deck treatment, test tiles shall be used to evaluate the resin cure time. The Contractor shall coat at least one 102 mm x 102 mm commercial quality smooth glazed tile for each batch of methacrylate resin. The coated tile shall be placed adjacent to the corresponding treated area. Sand shall not be applied to the test tiles.
- The acceptance criteria for a treated area is as follows:

1. The test tiles are dry to the touch.
2. The treated deck surface is tack free (non-oily).
3. The sand cover adheres and resists brushing by hand.
4. Excess sand has been removed by vacuuming or sweeping.
5. The coefficient of friction is at least 0.35 when tested in conformance with California Test 342.

- If a test or production area fails to meet the acceptance criteria, as determined by the Engineer, the treatment will be rejected, and the treatment shall be removed and replaced until the area complies with the acceptance criteria.

51-1.17A(4) Construction

- Equipment shall be fitted with suitable traps, filters, drip pans, or other devices as necessary to prevent oil or other deleterious material from being deposited on the deck.
- Before deck treatment with methacrylate resin, the bridge deck surface shall be cleaned by abrasive blasting, and all loose material shall be blown from visible cracks using high-pressure air. Concrete curing seals shall be cleaned from the deck surface to be treated, and the deck shall be dry when blast cleaning is performed. If the deck surface becomes contaminated at any time before placing the resin, the deck surface shall be cleaned by abrasive blasting.
- Where abrasive blasting is being performed within 3 m of a lane occupied by public traffic, the residue including dust shall be removed immediately after contact between the abrasive and the surface being treated. The removal shall be by a vacuum attachment operating concurrently with the abrasive blasting operation.
- A compatible promoter/initiator system shall be capable of providing the resin gel time range shown on the placement plan. Gel time shall be adjusted to compensate for the changes in temperature throughout treatment application.
- Resin shall be applied by machine and by using a two-part resin system with a promoted resin for one part and an initiated resin for the other part. This two-part resin system shall be combined at equal volumes to the spray bars through

separate positive displacement pumps. Combining of the 2 components shall be by either static in-line mixers or by external intersecting spray fans. The pump pressure at the spray bars shall not be great enough to cause appreciable atomization of the resin. Compressed air shall not be used to produce the spray. A shroud shall be used to enclose the spray bar apparatus.

- At the Contractor's option, manual application may be used. For manual application, (1) the quantity of resin mixed with promoter and initiator shall be limited to 20 L at a time, and (2) the resin shall be distributed by squeegees and brooms within 10 minutes after application.
- The Contractor shall apply methacrylate resin only to the specified area. Barriers, railing, joints, and drainage facilities shall be adequately protected to prevent contamination by the treatment material. Contaminated items shall be repaired at the Contractor's expense.
- The relative humidity shall be less than 90 percent at the time of treatment. The prepared area shall be dry and the surface temperature shall be at least 10°C , and not more than 38°C when the resin is applied. The rate of application of promoted/initiated resin shall be 2.2 square meter per liter; the exact rate shall be determined by the Engineer.
- The deck surfaces to be treated shall be completely covered with resin so the resin penetrates and fills all cracks. The resin shall be applied within 5 minutes after complete mixing. A significant increase in viscosity shall be cause for rejection. Excess material shall be redistributed by squeegees or brooms within 10 minutes after application. For textured deck surfaces, including grooved surfaces, excess material shall be removed from the texture indentations.
- After the resin has been applied, at least 20 minutes shall elapse before applying sand. The sand shall be commercial quality dry blast sand. At least 95 percent of the sand shall pass the 2.36-mm sieve and at least 95 percent shall be retained on the 850-µm sieve. The sand shall be applied at a rate of approximately one kilogram per square meter or until refusal as determined by the Engineer.
- Traffic will not be allowed on treated areas until the acceptance criteria has been met as determined by the Engineer.

The second paragraph in Section 51-1.18C, "Class 2 Surface Finish (Gun Finish)," of the Standard Specifications is amended to read:

- When Class 2 surface finish (gun finish) is specified, ordinary surface finish shall first be completed. The concrete surfaces shall then be abrasive blasted to a rough texture and thoroughly washed down with water. While the washed surfaces are damp, but not wet, a finish coating of machine applied mortar, approximately 6 mm thick, shall be applied in not less than 2 passes. The coating shall be pneumatically applied and shall consist of either (1) sand, cementitious material, and water mechanically mixed prior to its introduction to the nozzle or (2) premixed sand and cementitious material to which water is added prior to its expulsion from the nozzle. The use of admixtures shall be subject to the approval of the Engineer as provided in Section 90, "Portland Cement Concrete." Unless otherwise specified, supplementary cementitious materials will not be required. The proportion of cementitious material to sand shall be not less than one to 4, unless otherwise directed by the Engineer. Sand shall be of a grading suitable for the purpose intended. The machines shall be operated and the coating shall be applied in conformance with standard practice. The coating shall be firmly bonded to the concrete surfaces on which it is applied.

The fifth paragraph in Section 51-1.18C, "Class 2 Surface Finish (Gun Finish)," of the Standard Specifications is amended to read:

- When surfaces to be finished are in pedestrian undercrossings, the sand shall be silica sand and the cementitious material shall be standard white portland cement.

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

Section 51-1.23, "Payment," of the Standard Specifications is amended by adding the following:

- Full compensation for deck crack treatment, including execution of the public safety plan, shall be considered as included in the contract price paid per cubic yard for structural concrete, bridge, and no additional compensation will be allowed therefor.

SECTION 52: REINFORCEMENT

Issue Date: June 30, 2006

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

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

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

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

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

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

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

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

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

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

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

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

52-1.08 SPLICING

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

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

• Unless otherwise shown on the plans, splices in adjacent reinforcing bars at any particular section shall be staggered. The minimum distance between staggered lap splices or mechanical lap splices shall be the same as the length required for a

lap splice in the largest bar. The minimum distance between staggered butt splices shall be 600 mm, measured between the midpoints of the splices along a line which is centered between the axes of the adjacent bars.

52-1.08A Lap Splicing Requirements

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

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

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

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

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

• Splices in bundled bars shall conform to the following:

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

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

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

52-1.08B Service Splicing and Ultimate Butt Splicing Requirements

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

52-1.08B(1) Mechanical Splices

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

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

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

- Slip requirements shall not apply to mechanical lap splices, splices that are welded, or splices that are used on hoops.
- Splicing procedures shall be in conformance with the manufacturer's recommendations, except as modified in this section. Splices shall be made using the manufacturer's standard equipment, jigs, clamps, and other required accessories.
- Splice devices shall have a clear coverage of not less than 40 mm measured from the surface of the concrete to the outside of the splice device. Stirrups, ties, and other reinforcement shall be adjusted or relocated, and additional reinforcement shall be placed, if necessary, to provide the specified clear coverage to reinforcement.
- The Contractor shall furnish the following information for each shipment of splice material in conformance with the provisions in Section 6-1.07, "Certificates of Compliance:"

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

52-1.08B(2) Butt Welded Splices

- Except for resistance butt welds, butt welded splices of reinforcing bars shall be complete joint penetration butt welds conforming to the requirements in AWS D 1.4, and these specifications.
- Welders and welding procedures shall be qualified in conformance with the requirements in AWS D 1.4.
- Only the joint details and dimensions as shown in Figure 3.2, "Direct Butt Joints," of AWS D 1.4, shall be used for making complete joint penetration butt welds of bar reinforcement. Split pipe backing shall not be used.
- Butt welds shall be made with multiple weld passes using a stringer bead without an appreciable weaving motion. The maximum stringer bead width shall be 2.5 times the diameter of the electrode and slagging shall be performed between each weld pass. Weld reinforcement shall not exceed 4 mm in convexity.
- Electrodes used for welding shall meet the minimum Charpy V-notch impact requirement of 27°J at –20°C.
- For welding of bars conforming to the requirements of ASTM Designation: A 615/A 615M, Grade 280 or Grade 420, the requirements of Table 5.2, "Minimum Preheat and Interpass Temperatures," of AWS D 1.4 are superseded by the following:

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

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

52-1.08B(3) Resistance Butt Welds

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

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

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

• The Contractor shall designate in writing a splicing Quality Control Manager (QCM). The QCM shall be responsible directly to the Contractor for 1) the quality of all service and ultimate butt splicing including the inspection of materials and workmanship performed by the Contractor and all subcontractors; and 2) submitting, receiving, and approving all correspondence, required submittals, and reports regarding service and ultimate splicing to and from the Engineer.

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

• Testing on prequalification and production sample splices shall be performed at the Contractor's expense, at an independent qualified testing laboratory. The laboratory shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors who will provide other services or materials for the project, and shall have the following:

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

• The Contractor shall provide samples for quality assurance testing in conformance with the provisions in these specifications and the special provisions.

• Prequalification and production sample splices shall be 1) a minimum length of 1.5 meters for reinforcing bars No. 25 or smaller, and 2 meters for reinforcing bars No. 29 or larger, with the splice located at mid-point; and 2) suitably identified before shipment with weatherproof markings that do not interfere with the Engineer's tamper-proof markings or seals. Splices that show signs of tampering will be rejected.

• Shorter length sample splice bars may be furnished if approved in writing by the Engineer.

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

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

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

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

52-1.08C(1) Splice Prequalification Report

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

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

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

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

52-1.08C(2) Service Splice Test Criteria

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

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

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

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

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

• Before performing any tensile tests on production test sample splices, one of the 4 samples shall be tested for, and shall conform to, the requirements for total slip. Should this sample not meet the total slip requirements, one retest, in which the 3 remaining samples are tested for total slip, will be allowed. Should any of the 3 remaining samples not conform to the total slip requirements, all splices in the lot represented by this production test will be rejected.

• If 3 or more sample splices from a production test conform to the provisions in this Section 52-1.08C(2),"Service Splice Test Criteria," all splices in the lot represented by this production test will be considered acceptable, provided each of the 4 samples develop a minimum tensile strength of not less than 420 MPa.

• Should only 2 sample splices from a production test conform to the provisions in this Section 52-1.08C(2), "Service Splice Test Criteria," one additional production test shall be performed on the same lot of splices. This additional production test shall consist of testing 4 samples splices that have been randomly selected by the Engineer and removed by the Contractor from the actual completed lot of splices. Should any of the 4 splices from this additional test fail to conform to these provisions, all splices in the lot represented by these production tests will be rejected.

• If only one sample splice from a production test conforms to the provisions in this Section 52-1.08C(2), "Service Splice Test Criteria," all splices in the lot represented by this production test will be rejected.

• If a production test for a lot fails, the Contractor shall repair or replace all reinforcing bars from which sample splices were removed before the Engineer selects additional splices from this lot for further testing.

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

• For the first production test performed, and for at least one, randomly selected by the Engineer, of every 5 subsequent production tests, or portion thereof, the Contractor shall concurrently prepare 4 additional service quality assurance sample splices. These service quality assurance sample splices shall be prepared in the same manner as specified herein for service production sample splices.

• These 4 additional quality assurance sample splices shall be shipped to the Transportation Laboratory for quality assurance testing. The 4 sample splices shall be securely bundled together and identified by location and contract number with weatherproof markings before shipment. Bundles containing fewer than 4 samples of splices will not be tested. Sample splices not accompanied by the supporting documentation required in Section 52-1.08B(1), for mechanical splices, or in Section 52-1.08B(3), for resistance butt welds, will not be tested.

• Quality assurance testing will be performed in conformance with the requirements for service production sample splices in Section 52-1.08C(2)(a), "Production Test Requirements for Service Splices."

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

• Ultimate production and quality assurance sample splices shall be tensile tested in conformance with the requirements described in ASTM Designation: A 370 and California Test 670.

• A minimum of one control bar shall be removed from the same bar as, and adjacent to, all ultimate prequalification, production, and quality assurance sample splices. Control bars shall be 1) a minimum length of one meter for reinforcing bars No. 25 or smaller and 1.5 meters for reinforcing bars No. 29 or larger, and 2) suitably identified before shipment with weatherproof markings that do not interfere with the Engineer's tamper-proof markings or seals. The portion of adjacent bar remaining in the work shall also be identified with weatherproof markings that correspond to its adjacent control bar.

• Each sample splice and its associated control bar shall be identified and marked as a set. Each set shall be identified as representing a prequalification, production, or quality assurance sample splice.

• The portion of hoop reinforcing bar, removed to obtain a sample splice and control bar, shall be replaced using a prequalified ultimate mechanical butt splice, or the hoop shall be replaced in kind.

• Reinforcing bars, other than hoops, from which sample splices are removed, shall be repaired using ultimate mechanical butt splices conforming to the provisions in Section 52-1.08C(1), "Splice Prequalification Report," or the bars shall be replaced in kind. These bars shall be repaired or replaced such that no splices are located in any "No Splice Zone" shown on the plans.

• Ultimate production and quality assurance sample splices shall rupture in the reinforcing bar either: 1) outside of the affected zone or 2) within the affected zone, provided that the sample splice has achieved at least 95 percent of the ultimate tensile strength of the control bar associated with the sample splice. In addition, necking of the bar, as defined in California Test 670, shall be evident at rupture regardless of whether the bar breaks inside or outside the affected zone.

• The affected zone is the portion of the reinforcing bar where any properties of the bar, including the physical, metallurgical, or material characteristics, have been altered by fabrication or installation of the splice.

• The ultimate tensile strength shall be determined for all control bars by tensile testing the bars to rupture, regardless of where each sample splice ruptures. If 2 control bars are tested for one sample splice, the bar with the lower ultimate tensile strength shall be considered the control bar.

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

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

• After the splices in a lot have been completed, and the bars have been epoxy-coated when required, the QCM shall notify the Engineer in writing that the splices in this lot conform to the specifications and are ready for testing. Except for hoops, sample splices will be selected by the Engineer at the job site. Sample splices for hoops will be selected by the Engineer either at the job site or a fabrication facility.

• After notification has been received, the Engineer will randomly select the 4 sample splices to be removed from the lot and place tamper-proof markings or seals on them. The Contractor shall select the adjacent control bar for each sample splice bar, and the Engineer will place tamper-proof markings or seals on them. These ultimate production sample splices and control bars shall be removed by the Contractor, and tested by an independent qualified testing laboratory.

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

• A sample splice or control bar from any set will be rejected if a tamper-proof marking or seal is disturbed before testing.

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

• Before performing any tensile tests on production test sample splices, one of the 4 sample splices shall be tested for, and shall conform to, the requirements for total slip. Should this sample splice not meet these requirements, one retest, in which the 3 remaining sample splices are tested for total slip, will be allowed. Should any of the 3 remaining sample splices not conform to these requirements, all splices in the lot represented by this production test will be rejected.

- If 3 or more sample splices from a production test conform to the provisions in Section 52-1.08C(3), "Ultimate Butt Splice Test Criteria," all splices in the lot represented by this production test will be considered acceptable.
- Should only 2 sample splices from a production test conform to the provisions in Section 52-1.08C(3), "Ultimate Butt Splice Test Criteria," one additional production test shall be performed on the same lot of splices. Should any of the 4 sample splices from this additional test fail to conform to these provisions, all splices in the lot represented by these production tests will be rejected.
- If only one sample splice from a production test conforms to the provisions in Section 52-1.08C(3), "Ultimate Butt Splice Test Criteria," all splices in the lot represented by this production test will be rejected.
- If a production test for a lot fails, the Contractor shall repair or replace all reinforcing bars from which sample splices were removed, complete in place, before the Engineer selects additional splices from this lot for further testing.
- Production tests will not be required on repaired splices from a lot, regardless of the type of prequalified ultimate mechanical butt splice used to make the repair. However, should an additional production test be required, the Engineer may select any repaired splice for the additional production test.

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

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

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

- When the specifications allow for welded sample splices to be taken from other than the completed lot of splices, the Contractor shall meet the following additional requirements.
- Except for resistance butt welded splices, radiographic examinations shall be performed on 25 percent of all complete joint penetration butt welded splices from a production lot. The size of a production lot will be a maximum of 150 splices. The Engineer will select the splices which will compose the production lot and also the splices within each production lot to be radiographically examined.
- All required radiographic examinations of complete joint penetration butt welded splices shall be performed by the Contractor in conformance with the requirements in AWS D 1.4 and these specifications.
- Before radiographic examination, welds shall conform to the requirements in Section 4.4, "Quality of Welds," of AWS D 1.4.
- Should more than 12 percent of the splices which have been radiographically examined in any production lot be defective, an additional 25 percent of the splices, selected by the Engineer from the same production lot, shall be radiographically examined. Should more than 12 percent of the cumulative total of splices tested from the same production lot be defective, all remaining splices in the lot shall be radiographically examined.
- Additional radiographic examinations performed due to the identification of defective splices shall be at the Contractor's expense.
- All defects shall be repaired in conformance with the requirements in AWS D 1.4.
- The Contractor shall notify the Engineer in writing 48 hours before performing any radiographic examinations.
- The radiographic procedure used shall conform to the requirements in AWS D1.1, AWS D1.4, and the following:

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

B. 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.
C. Radiographs shall be made by either X-ray or gamma ray. Radiographs made by X-ray or gamma rays shall have densities of not less than 2.3 nor more than 3.5 in the area of interest. A tolerance of 0.05 in density is allowed for densitometer variations. Gamma rays shall be from the iridium 192 isotope and the emitting specimen shall not exceed 4.45 mm in the greatest diagonal dimension.
D. 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.
E. The minimum source to film distance shall be maintained so as to ensure that all radiographs maintain a maximum geometric unsharpness of 0.020 at all times, regardless of the size of the reinforcing bars.
F. 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.
G. When radiography of more than one weld is being performed per exposure, each exposure shall have a minimum of one penetrameter per bar, or 3 penetrameters per exposure. When 3 penetrameters per exposure are used, one penetrameter shall be placed on each of the 2 outermost bars of the exposure, and the remaining penetrameter shall be placed on a centrally located bar.
H. An allowable weld buildup of 4 mm may be added to the total material thickness when determining the proper penetrameter selection. No image quality indicator equivalency will be accepted. Wire penetrameters or penetrameter blocks shall not be used.
I. 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.
J. Radiographic film shall be Class 1, regardless of the size of reinforcing bars.
K. 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.
L. 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.
M. Radiographic film shall be developed within a time range of one minute less to one minute more than the film manufacturer's recommended maximum development time. Sight development will not be allowed.
N. 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.
O. The results of all radiographic interpretations shall be recorded on a signed certification and a copy kept with the film packet.
P. Technique sheets prepared in conformance with the requirements in ASME Boiler and Pressure Vessels Code, Section V, Article 2 Section T-291 shall also contain the developer temperature, developing time, fixing duration and all rinse times.

52-1.08D Reporting Test Results

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

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

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

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

SECTION 53: SHOTCRETE

Issue Date: January 5, 2007

The third paragraph in Section 53-1.01, "Description," of the Standard Specifications is amended to read:

- The dry-mix process shall consist of delivering dry mixed aggregate and cementitious material pneumatically or mechanically to the nozzle body and adding water and mixing the materials in the nozzle body. The wet-mix process shall consist of delivering mixed aggregate, cement, and water pneumatically to the nozzle and adding any admixture at the nozzle.

The first through fourth paragraphs in Section 53-1.02, "Materials," of the Standard Specifications is amended to read:

- Cementitious material, fine aggregate, and mixing water shall conform to the provisions in Section 90, "Portland Cement Concrete."
- Shotcrete to be mixed and applied by the dry-mix process shall consist of one part cementitious material to not more than 4.5 parts fine aggregate, thoroughly mixed in a dry state before being charged into the machine. Measurement may be either by volume or by mass. The fine aggregate shall contain not more than 6 percent moisture by mass.
- Shotcrete to be mixed and applied by the wet-mix process shall consist of cementitious material, fine aggregate, and water and shall contain not less than 375 kilograms of cementitious material per cubic meter. A maximum of 30 percent pea gravel may be substituted for fine aggregate. The maximum size of pea gravel shall be such that 100 percent passes the 12.5 mm screen and at least 90 percent passes the 9.5 mm screen.
- Admixtures may be added to shotcrete and shall conform to the provisions in Section 90-4, "Admixtures."

The third subparagraph of the third paragraph in Section 53-1.04, "Placing Shotcrete," of the Standard Specifications is amended to read:

Aggregate and cementitious material that have been mixed for more than 45 minutes shall not be used unless otherwise permitted by the Engineer.

SECTION 55: STEEL STRUCTURES

Issue Date: January 5, 2007

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

- Details of connections for highway bridges selected for use by the Contractor shall conform to the AASHTO LRFD Bridge Design Specifications with Caltrans Amendments.
- Details of design selected by the Contractor, fabrication and workmanship, for steel railway bridges shall conform to the requirements of the Specifications for Steel Railway Bridges, for Fixed Spans Not Exceeding 400 Feet in Length of the AREMA, as set forth in the special provisions.

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

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

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

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

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

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

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

Structural Steel Materials

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

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

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

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

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

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

The first paragraph in Section 55-3.05, "Flatness of Faying and Bearing Surfaces," of the Standard Specifications is amended to read:

- 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 one mm tolerance in 305 mm and to within 2 mm 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 mortar shall be flat to within 3 mm tolerance in 305 mm and to within 5 mm tolerance overall.

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

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

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

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

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

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

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

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

The fifth paragraph in Section 55-3.19, "Bearings and Anchorages," of the Standard Specifications is amended to read:

• Mortar to be placed below masonry plates or bearing plates of the bearing assemblies and in anchor bolt sleeves or canisters shall conform to the provisions in Section 51-1.135, "Mortar," except that the proportion of cementitious material to sand shall be 1:3.

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

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

SECTION 56: SIGNS

Issue Date: March 16, 2007

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

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

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

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

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

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

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

56-1.02B Sheets

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

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

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

56-1.02F Steel Walkway Gratings

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

A. Gratings shall be the standard product of an established grating manufacturer.
B. Material for gratings shall be structural steel conforming to the requirements in ASTM Designation: A 1011/A 1011M, Designation CS, Type B.
C. For welded type gratings, each joint shall be full resistance welded under pressure, to provide a sound, completely beaded joint.
D. For mechanically locked gratings, the method of fabrication and interlocking of the members shall be approved by the Engineer, and the fabricated grating shall be equal in strength to the welded type.
E. Gratings shall be accurately fabricated and free from warps, twists, or other defects affecting their appearance or serviceability. Ends of all rectangular panels shall be square. The tops of the bearing bars and cross members shall be in the same plane. Gratings distorted by the galvanizing process shall be straightened.

The fifth paragraph in Section 56-1.03, "Fabrication," of the Standard Specifications is amended to read:

• Clips, eyes, or removable brackets shall be affixed to all signs and all posts and shall be used to secure the sign during shipping and for lifting and moving during erection as necessary to prevent damage to the finished galvanized or painted surfaces. Brackets on tubular sign structures shall be removed after erection. Details of the devices shall be shown on the working drawings.

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

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

The fourth paragraph of Section 56-1.10, "Payment," of the Standard Specifications is amended to read:

• The contract price paid per kilogram for install sign structure of the type or types designated in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in installing sign structures, complete in place, including installing anchor bolt assemblies, removable sign

panel frames, and sign panels and performing any welding, painting or galvanizing required during installation, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

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

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

The fourth paragraph in Section 56-2.03, "Construction," of the Standard Specifications is amended to read:

• Backfill material for metal posts shall consist of minor concrete conforming to the provisions in Section 90-10, "Minor Concrete," and shall contain not less than 275 kilograms of cementitious material per cubic meter.

SECTION 57: TIMBER STRUCTURES

Issue Date: October 12, 2004

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

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

SECTION 58: PRESERVATIVE TREATMENT OF LUMBER, TIMBER AND PILING

Issue Date: November 18, 2005

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

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

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

SECTION 59: PAINTING

Issue Date: January 19, 2007

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

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

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

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

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

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

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

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

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

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

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

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

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

The third paragraph of Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications is amended to read:

• Mechanical mixers shall be used in mixing the primer. After mixing, the zinc-rich primer shall be strained through a 0.6 to 0.25 mm screen or a double layer of cheesecloth immediately prior to or during pouring into the spray pot.

SECTION 64: PLASTIC PIPE

Issue Date: January 5, 2007

The first paragraph of Section 64-1.06, "Concrete Backfill," of the Standard Specifications is amended to read:

• At locations where pipe is to be backfilled with concrete as shown on the plans, the concrete backfill shall be constructed of minor concrete or Class 4 concrete conforming to the provisions in Section 90, "Portland Cement Concrete."

Minor concrete shall contain not less than 250 kg of cementitious material per cubic meter. The concrete to be used will be designated in the contract item or shown on the plans.

SECTION 65: REINFORCED CONCRETE PIPE

Issue Date: January 5, 2007

The first paragraph of Section 65-1.02, "Materials," of the Standard Specifications is amended to read:

- Cementitious material and aggregate shall conform to the provisions in Section 90-2, "Materials," except that mortar strengths relative to Ottawa sand and grading requirements shall not apply to the aggregate. Use of supplemental cementitious material shall conform to AASHTO Designation: M 170M.

Subparagraph "c" of the eleventh paragraph of Section 65-1.02A(1) "Circular Reinforced Concrete Pipe (Designated or Selected by Class)," of the Standard Specifications is amended to read:

c. Cementitious material and aggregate for non-reinforced concrete pipe shall conform to the provisions in Section 65-1.02, "Materials."

The first paragraph of Section 65-1.035, "Concrete Backfill," of the Standard Specifications is amended to read:

- At locations where pipe is to be backfilled with concrete as shown on the plans, the concrete backfill shall be constructed of minor concrete or Class 4 concrete in conformance with the provisions in Section 90, "Portland Cement Concrete." Minor concrete shall contain not less than 225 kg of cementitious material per cubic meter. The concrete to be used will be designated in the contract item.

The first subparagraph of the second paragraph of Section 65-1.06, "Joints," of the Standard Specifications is amended to read:

- Cement Mortar.- Mortar shall be composed of one part cementitious material and 2 parts sand by volume. Supplementary cementitious material will not be required.

SECTION 66: CORRUGATED METAL PIPE

Issue Date: January 5, 2007

The first paragraph of Section 66-1.045, "Concrete Backfill," of the Standard Specifications is amended to read:

- At locations where pipe is to be backfilled with concrete as shown on the plans, the concrete backfill shall be constructed of minor concrete or Class 4 concrete conforming to the provisions in Section 90, "Portland Cement Concrete." Minor concrete shall contain not less than 225 kg of cementitious material per cubic meter. The concrete to be used will be designated in the contract item or shown on the plans.

SECTION 68: SUBSURFACE DRAINS

Issue Date: January 5, 2007

The first and second paragraphs of Section 68-3.02D, "Miscellaneous," of the Standard Specifications are amended to read:

- Concrete for splash pads shall be produced from minor concrete conforming to the provisions in Section 90-10, "Minor Concrete." Minor concrete shall contain not less than 275 kg of cementitious material per cubic meter.
- Mortar placed where edge drain outlets and vents connect to drainage pipe and existing drainage inlets shall conform to the provisions in Section 51-1.135, "Mortar."

SECTION 70: MISCELLANEOUS FACILITIES

Issue Date: January 5, 2007

The second paragraph of Section 70-1.02C, "Flared End Sections," of the Standard Specifications is amended to read:

• Precast concrete flared end sections shall conform to the requirements for Class III Reinforced Concrete Pipe in AASHTO Designation: M 170M. Cementitious materials and aggregate shall conform to the provisions in Section 90-2, "Materials," except that mortar strengths relative to Ottawa sand and grading requirements shall not apply to the aggregate. Use of supplementary cementitious material shall conform to the requirements in AASHTO Designation: M 170M. The area of steel reinforcement per meter of flared end section shall be at least equal to the minimum steel requirements for circular reinforcement in circular pipe for the internal diameter of the circular portion of the flared end section. The basis of acceptance of the precast concrete flared end section shall conform to the requirements of Section 5.1.2 of AASHTO Designation: M 170M.

The first paragraph of Section 70-1.02H, "Precast Concrete Structures," of the Standard Specifications is amended to read:

• Precast concrete pipe risers and pipe reducers, and precast concrete pipe sections, adjustment rings and tapered sections for pipe energy dissipators, pipe inlets and pipe manholes shall conform to the requirements in AASHTO Designation: M 199M, except that the cementitious material and aggregate shall conform to the provisions in Section 90-2, "Materials," except that mortar strengths relative to Ottawa sand and grading requirements shall not apply to the aggregate. Use of supplementary cementitious material shall conform to the requirements in AASHTO Designation: M 170M.

The second paragraph of Section 70-1.03, "Installation," of the Standard Specifications is amended to read:

• Cutoff walls for precast concrete flared end sections shall be constructed of minor concrete conforming to the provisions in Section 90-10, "Minor Concrete." Minor concrete shall contain not less than 275 kg of cementitious material per cubic meter.

SECTION 72: SLOPE PROTECTION

Issue Date: November 18, 2005

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

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

SECTION 73: CONCRETE CURBS AND SIDEWALKS

Issue Date: January 5, 2007

The second subparagraph of the second paragraph of Section 73-1.01, "Description," of the Standard Specifications is amended to read:

2. Minor concrete shall contain not less than 275 kg of cementitious material per cubic meter except that when extruded or slip-formed curbs are constructed using 9.5-mm maximum size aggregate, minor concrete shall contain not less than 325 kg of cementitious material per cubic meter.

SECTION 75: MISCELLANEOUS METAL

Issue Date: August 17, 2007

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

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

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

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

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

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

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

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

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

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

* Maximum stud diameter permitted for mechanical expansion anchors.

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

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

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

Installation Torque Values, (newton meters)

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

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

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

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

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

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

- Concrete for filling cable drum units shall conform to the provisions in Section 90-10, "Minor Concrete," or at the option of the Contractor, may be a mix with 9.5 mm maximum size aggregate and not less than 400 kilograms of cementitious material per cubic meter.

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

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

SECTION 80: FENCES

Issue Date: January 5, 2007

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

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

The fourth paragraph of Section 80-3.01F, "Miscellaneous," of the Standard Specifications is amended to read:

• Portland cement concrete for metal post and brace footings and for deadmen shall be minor concrete conforming to the provisions in Section 90-10, "Minor Concrete." Minor concrete shall contain not less than 275 kg of cementitious material per cubic meter.

The fourth paragraph of Section 80-4.01C, "Miscellaneous," of the Standard Specifications is amended to read:

• Portland cement concrete for metal post and for deadmen shall be produced from minor concrete conforming to the provisions in Section 90-10, "Minor Concrete." Minor concrete shall contain not less than 275 kg of cementitious material per cubic meter.

SECTION 81: MONUMENTS

Issue Date: June 30, 2006

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

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

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

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

SECTION 82: MARKERS AND DELINEATORS

Issue Date: June 30, 2006

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

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

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

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

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

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

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

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

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

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

SECTION 83: RAILINGS AND BARRIERS

Issue Date: August 17, 2007

The seventh paragraph in Section 83-1.02, "Materials and Construction," of the Standard Specifications is amended to read:

- Mortar shall conform to the provisions in Section 51-1.135, "Mortar," and shall consist of one part by volume of cementitious material and 3 parts of clean sand.

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

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

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

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

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

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

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

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

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

The 24th paragraph of Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications is amended to read:

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

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

2. An end anchor assembly (Type CA) for metal beam guard railing shall consist of an anchor cable, an anchor plate, a single anchor rod or double anchor rods, hardware and one concrete anchor.
3. A rail tensioning assembly for metal beam guard railing shall consist of an anchor cable, an anchor plate, and hardware.
4. The anchor plate, metal plates, steel foundation tubes and steel soil plate shall be fabricated of steel conforming to the requirements in ASTM Designation: A 36/A 36M.
5. The anchor rods shall be fabricated of steel conforming to the requirements in ASTM Designation: A 36/A 36M, A 441 or A 572, or ASTM Designation: A 576, Grades 1018, 1019, 1021 or 1026. The eyes shall be hot forged or formed with full penetration welds. After fabrication, anchor rods with eyes that have been formed with any part of the eye below 870°C during the forming operation or with eyes that have been closed by welding shall be thermally stress relieved prior to galvanizing. The completed anchor rod, after galvanizing, shall develop a strength of 220 kN.
6. In lieu of built-up fabrication of anchor plates as shown on the plans, anchor plates may be press-formed from steel plate, with or without welded seams.
7. All bolts and nuts shall conform to the requirements in ASTM Designation: A 307, unless otherwise specified in the special provisions or shown on the plans.
8. Anchor cable shall be 19 mm preformed, 6 x 19, wire strand core or independent wire rope core (IWRC), galvanized in conformance with the requirements in Federal Specification RR-W-410, right regular lay, manufactured of improved plow steel with a minimum breaking strength of 200 kN. Two certified copies of mill test reports of each manufactured length of cable used shall be furnished to the Engineer. The overall length of each cable anchor assembly shall be as shown on the plans, but shall be a minimum of 2 m.
9. Where shown on the plans, cable clips and a cable thimble shall be used to attach cable to the anchor rod. Thimbles shall be commercial quality, galvanized steel. Cable clips shall be commercial quality drop forged galvanized steel.
10. The swaged fitting shall be machined from hot-rolled bars of steel conforming to AISI Designation: C 1035, and shall be annealed suitable for cold swaging. The swaged fitting shall be galvanized before swaging. A lock pin hole to accommodate a 6 mm, plated, spring steel pin shall be drilled through the head of the swage fitting to retain the stud in proper position. The manufacturer's identifying mark shall be stamped on the body of the swage fitting.
11. The 25 mm nominal diameter stud shall conform to the requirements in ASTM Designation: A 449 after galvanizing. Prior to galvanizing, a 10 mm slot for the locking pin shall be milled in the stud end.
12. The swaged fittings, stud and nut assembly shall develop the specified breaking strength of the cable.
13. The cable assemblies shall be shipped as a complete unit including stud and nut.
14. Clevises shall be drop forged galvanized steel and shall develop the specified breaking strength of the cable.
15. One sample of cable properly fitted with swaged fitting and right hand thread stud at both ends as specified above, including a clevis when shown on the plans, one meter in total length, shall be furnished the Engineer for testing.
16. The portion of the anchor rod to be buried in earth shall be coated with a minimum 0.5 mm thickness of coal tar enamel conforming to AWWA Standard: C203 or a coal tar epoxy conforming to the requirements in Steel Structures Painting Council Paint Specification No. 16, Coal-Tar Epoxy-Polymide Black Paint or Corps of Engineers Specification, Formula C-200a, Coal-Tar Epoxy Paint.
17. Metal components of the anchor assembly shall be fabricated in conformance with good shop practice and shall be hot-dip galvanized in conformance with the provisions in Section 75-1.05, "Galvanizing."
18. Anchor cables shall be tightened after the concrete anchor has cured for at least 5 days.
19. Concrete used to construct anchors for end anchor assemblies shall be Class 3 or minor concrete conforming to the provisions in Section 90, "Portland Cement Concrete."
20. Concrete shall be placed against undisturbed material of the excavated holes for end anchors. The top 300 mm of holes shall be formed, if required by the Engineer.
21. Reinforcing steel in concrete anchors for end anchor assemblies shall conform to the provisions in Section 52, "Reinforcement."

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

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

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

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

The 2nd sentence of the 7th paragraph of Section 83-1.02E, "Cable Railing," of the Standard Specifications is amended to read:

Cable shall be galvanized in conformance with the requirements in Federal Specification RR-W-410.

The 5th paragraph of Section 83-1.02I, "Chain Link Railing," of the Standard Specifications is amended to read:

Where shown on the plans, cables used in the frame shall be 8 mm in diameter, wire rope, with a minimum breaking strength of 22 kN and shall be galvanized in conformance with the requirements in Federal Specification RR-W-410.

The 14th paragraph of Section 83-1.02I, "Chain Link Railing," of the Standard Specifications is amended to read:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SECTION 84: TRAFFIC STRIPES AND PAVEMENT MARKINGS

Issue Date: July 21, 2006

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

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

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

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

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

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

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

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

Traffic stripes and pavement markings shall be applied only on dry surfaces and only during periods of favorable weather. Painting shall not be performed when the atmospheric temperature is below 5°C when using acetone-based paint or below 10°C when using water borne paint; when freshly painted surfaces may become damaged by rain, fog, or condensation; nor when it can be anticipated that the atmospheric temperature will drop below the aforementioned 5°C or 10°C temperatures during the drying period.

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

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

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

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

SECTION 85: PAVEMENT MARKERS

Issue Date: August 17, 2007

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

Sampling

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

Tolerances

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

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

85-1.04 Non-Reflective Pavement Markers

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

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

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

Testing

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

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

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

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

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

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

Testing

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

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

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

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

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

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

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

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

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

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

SECTION 86: SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

Issue Date: January 5, 2007

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

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

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

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

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

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

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

- After each post, standard, and pedestal on structures is in proper position, mortar shall be placed under the base plate as shown on the plans. The exposed portions shall be formed to present a neat appearance. Mortar shall conform to Section 51-1.135, "Mortar," except the mortar shall consist of one part by volume of cementitious material and 3 parts of clean sand and shall contain only sufficient moisture to permit packing. Mortar shall be cured by keeping it damp for 3 days.

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

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

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

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

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

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

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

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

- Bolts, nuts and washers, and anchor bolts for use in signal and lighting support structures shall conform to the provisions in Section 55-2, "Materials." Except when bearing-type connections or slipbases are specified, high-strength

bolted connections shall conform to the provisions in Section 55-3.14, "Bolted Connections." Welding, nondestructive testing (NDT) of welds, and acceptance and repair criteria for NDT of steel members shall conform to the requirements of AWS D1.1 and the special provisions.

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

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

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

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

A. Except as otherwise specified, standards shall be fabricated from sheet steel of weldable grade having a minimum yield strength, after fabrication, of 276 MPa.
B. Certified test reports which verify conformance to the minimum yield strength requirements shall be submitted to the Engineer. The test reports may be the mill test reports for the as-received steel or, when the as-received steel has a lower yield strength than required, the Contractor shall provide supportive test data which provides assurance that the Contractor's method of cold forming will consistently increase the tensile properties of the steel to meet the specified minimum yield strength. The supportive test data shall include tensile properties of the steel after cold forming for specific heats and thicknesses.
C. When a single-ply 8-mm thick pole is specified, a 2-ply pole with equivalent section modulus may be substituted.
D. Standards may be fabricated of full-length sheets or shorter sections. Each section shall be fabricated from not more than 2 pieces of sheet steel. Where 2 pieces are used, the longitudinal welded seams shall be directly opposite one another. When the sections are butt-welded together, the longitudinal welded seams on adjacent sections shall be placed to form continuous straight seams from base to top of standard.
E. Butt-welded circumferential joints of tubular sections requiring CJP groove welds shall be made using a metal sleeve backing ring inside each joint. The sleeve shall be 3-mm nominal thickness, or thicker, and manufactured from steel having the same chemical composition as the steel in the tubular sections to be joined. When the sections to be joined have different specified minimum yield strengths, the steel in the sleeve shall have the same chemical composition as the tubular section having the higher minimum yield strength. The width of the metal sleeve shall be consistent with the type of NDT chosen and shall be a minimum width of 25 mm. The sleeve shall be centered at the joint and be in contact with the tubular section at the point of the weld at time of fit-up.
F. Welds shall be continuous.
G. The weld metal at the transverse joint shall extend to the sleeve, making the sleeve an integral part of the joint.
H. During fabrication, longitudinal seams on vertical tubular members of cantilevered support structures shall be centered on and along the side of the pole that the pole plate is located. Longitudinal seams on horizontal tubular members, including signal and luminaire arms, shall be within +/-45 degrees of the bottom of the arm.
I. The longitudinal seam welds in steel tubular sections may be made by the electric resistance welding process.
J. Longitudinal seam welds shall have 60 percent minimum penetration, except that within 150 mm of circumferential welds, longitudinal seam welds shall be CJP groove welds. In addition, longitudinal seam welds on lighting support structures having telescopic pole segment splices shall be CJP groove welds on the female end for a length on each end equal to the designated slip fit splice length plus 150 mm.
K. Exposed circumferential welds, except fillet and fatigue-resistant welds, shall be ground flush (-0, +2 mm) with the base metal prior to galvanizing or painting.
L. Circumferential welds and base plate-to-pole welds may be repaired only one time without written permission from the Engineer.
M. Exposed edges of the plates that make up the base assembly shall be finished smooth and exposed corners of the plates shall be broken unless otherwise shown on the plans. Shafts shall be provided with slip-fitter shaft caps.

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

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

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

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

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

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

T. The cast steel option for slip bases shall be fabricated from material conforming to the requirements in ASTM Designation: A 27/A 27M, Grade 70-40. Other comparable material may be used if written permission is given by the Engineer. The casting tolerances shall be in conformance with the Steel Founder's Society of America recommendations (green sand molding).

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

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

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

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

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

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

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

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

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

The fourth subparagraph of the eighteenth paragraph in Section 86-2.05C, "Installation," of the Standard Specifications is amended to read:

• The conduit shall be placed in the bottom of the trench, and the trench shall be backfilled with minor concrete conforming to the provisions in Section 90-10, "Minor Concrete." Minor concrete shall contain not less than 350 kilograms of cementitious material per cubic meter. Concrete backfill shall be placed to the pavement surface except, when the trench is in asphalt concrete pavement and additional pavement is not being placed, the top 30 mm of the trench shall be backfilled with asphalt concrete produced from commercial quality paving asphalt and aggregates.

The third subparagraph of the twenty-third paragraph in Section 86-2.05C, "Installation," of the Standard Specifications is amended to read:

• Precast concrete conduit cradles shall conform to the dimensions shown on the plans and shall be constructed of minor concrete and commercial quality welded wire fabric. Minor concrete shall conform to the provisions in Section 90-10, "Minor Concrete," and shall contain not less than 350 kilograms of cementitious material per cubic meter. The cradles shall be moist cured for not less than 3 days.

The seventh subparagraph of the twenty-third paragraph in Section 86-2.05C, "Installation," of the Standard Specifications is amended to read:

• The space around conduits through bridge abutment walls shall be filled with mortar conforming to the provisions in Section 51-1.135, "Mortar," except that the proportion of cementitious material to sand shall be 1:3.

The fifth paragraph in Section 86-2.07, "Traffic Pull Boxes," of the Standard Specifications is amended to read:

• Concrete placed around and under traffic pull boxes as shown on the plans shall be minor concrete conforming to the provisions in Section 90-10, "Minor Concrete."

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

Traffic Signal Controller Cabinet	Ungrounded Circuit Conductor	Blk	None	CON-1	6
	Grounded Circuit Conductor	Wht	None	CON-2	6

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

• At any point, the minimum insulation thickness of any Type USE, RHH, or RHW insulation shall be 1.0 mm for conductor sizes No. 14 to No. 10, inclusive; and 1.3 mm for No. 8 to No. 2, inclusive.
• At any point, the minimum insulation thickness of any Type THW or TW wires shall be 0.7 mm for conductor sizes No. 14 to No. 10, inclusive; 1.0 mm for No. 8; and 1.4 mm for No. 6 to No. 2, inclusive.

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

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

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

• Galvanizing shall be in conformance with the provisions in Section 75-1.05, "Galvanizing," except that cabinets may be constructed of material galvanized prior to fabrication in conformance with the requirements in ASTM Designation:

A 653/653M, Coating Designation G 90, in which case all cut or damaged edges shall be painted with at least 2 applications of approved unthinned zinc-rich primer (organic vehicle type) conforming to the provisions in Section 91, "Paint." Aerosol cans shall not be used. Other types of protective coating must be approved by the Engineer prior to installation.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- Mechanical vibration testing shall be in conformance with the requirements in Military Specification MIL-STD-883, Test Method 2007, using three 4-minute cycles along each x, y and z axis, at a force of 2.5 Gs, with a frequency sweep from 2 Hz to 120 Hz. The loosening of the lens or of internal components, or other physical damage shall be cause for rejection.

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

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

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

The first paragraph in Section 86-5.01D, "Removing or Abandoning Existing Pressure-Sensitive Detectors," of the Standard Specifications is amended to read:

- When a foundation for a pressure-sensitive vehicle detector is to be removed, the hole left by removing the detector frame and foundation shall be filled with minor concrete, except the roadway surface shall be reconstructed with material to match existing surfacing. Minor concrete shall conform to the provisions in Section 90-10, "Minor Concrete," except that the concrete shall contain not less than 250 kilograms of cementitious material per cubic meter for asphalt concrete surfaced roadways and not less than 350 kilograms of cementitious material per cubic meter for portland cement concrete surfaced roadways.

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

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

The first paragraph of Section 86-8.01, "Payment," of the Standard Specifications is amended to read:

- The contract lump sum price or prices paid for signal, ramp metering, flashing beacon, lighting, sign illumination, traffic monitoring station, highway advisory radio systems, closed circuit television systems, or combinations thereof; for modifying or removing those systems; for temporary systems; or the lump sum or unit prices paid for various units of those systems; or the lump sum or per meter price paid for conduit of the various sizes, types and installation methods listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in furnishing and installing, modifying, or removing the systems, combinations or units thereof, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer, including any necessary pull boxes (except when the type required is shown as a separate contract item); excavation and backfill; concrete foundations (except when shown as a separate contract item); pedestrian barricades; furnishing and installing illuminated street name signs; installing sign panels on pedestrian barricades, on flashing beacon standards, and on traffic signal mast arms; restoring sidewalk, pavement and appurtenances damaged or destroyed during construction; salvaging existing materials; and making all required tests.

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

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

SECTION 88: ENGINEERING FABRIC

Issue Date: January 15, 2002

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

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

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

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

SECTION 90: PORTLAND CEMENT CONCRETE

Issue Date: March 16, 2007

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

SECTION 90: PORTLAND CEMENT CONCRETE

90-1 GENERAL

90-1.01 DESCRIPTION

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

• The Contractor shall determine the mix proportions for concrete in conformance with these specifications.

• Class 1 concrete shall contain not less than 400 kg of cementitious material per cubic meter.

• Class 2 concrete shall contain not less than 350 kg of cementitious material per cubic meter.

• Class 3 concrete shall contain not less than 300 kg of cementitious material per cubic meter.

• Class 4 concrete shall contain not less than 250 kg of cementitious material per cubic meter.

• Minor concrete shall contain not less than 325 kg of cementitious material per cubic meter unless otherwise specified in these specifications or the special provisions.

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

Use	Cementitious Material Content (kg/m^3)
Concrete designated by compressive strength:	
Deck slabs and slab spans of bridges	400 min., 475 max.
Roof sections of exposed top box culverts	400 min., 475 max.
Other portions of structures	350 min., 475 max.
Concrete not designated by compressive strength:	
Deck slabs and slab spans of bridges	400 min.
Roof sections of exposed top box culverts	400 min.
Prestressed members	400 min.
Seal courses	400 min.
Other portions of structures	350 min.
Concrete for precast members	350 min., 550 max.

• Whenever the 28-day compressive strength shown on the plans is greater than 25 MPa, the concrete shall be designated by compressive strength. If the plans show a 28-day compressive strength that is 28 MPa or greater, an additional 14 days will be allowed to obtain the specified strength. The 28-day compressive strengths shown on the plans that are 25 MPa or less are shown for design information only and are not a requirement for acceptance of the concrete.

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

• Before using concrete for which the mix proportions have been determined by the Contractor, or in advance of revising those mix proportions, the Contractor shall submit in writing to the Engineer a copy of the mix design.

• Compliance with cementitious material content requirements will be verified in conformance with procedures described in California Test 518 for cement content. For testing purposes, supplementary cementitious material shall be considered to be cement. Batch proportions shall be adjusted as necessary to produce concrete having the specified cementitious material content.

• If any concrete has a cementitious material, portland cement, or supplementary cementitious material content that is less than the minimum required, the concrete shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place and the Contractor shall pay to the State $0.55 for each kilogram of cementitious material, portland cement, or supplementary cementitious material that is less than the minimum required. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract. The deductions will not be made unless the difference between the contents required and those actually provided exceeds the batching tolerances permitted by Section 90-5, "Proportioning." No deductions will be made based on the results of California Test 518.

• The requirements of the preceding paragraph shall not apply to minor concrete or commercial quality concrete.

90-2 MATERIALS

90-2.01 CEMENTITIOUS MATERIALS

• Unless otherwise specified, cementitious material shall be either a combination of Type II or Type V portland cement and a supplementary cementitious material, or a blended cement.

• Cementitious materials used in cast-in-place concrete for exposed surfaces of like elements of a structure shall be from the same sources and of the same proportions.

• Cementitious materials shall be protected from moisture until used. Sacked cementitious materials shall be piled to permit access for tallying, inspecting, and identifying each shipment.

• Facilities shall be provided to ensure that cementitious materials meeting this Section 90-2.01 are kept separate from other cementitious materials. Sampling cementitious materials shall be in conformance with California Test 125.

• The Contractor shall furnish a Certificate of Compliance for cementitious materials in conformance with the provisions in Section 6-1.07, "Certificates of Compliance." The Certificate of Compliance shall indicate the source by name and location (including country, state, and city). If cementitious material is delivered directly to the job site, the Certificate of Compliance shall be signed by the cementitious material supplier. If the cementitious material is used in ready-mixed concrete or in precast concrete products purchased as such by the Contractor, the Certificate of Compliance shall be signed by the manufacturer of the concrete or product.

90-2.01A CEMENT

• Portland cement shall conform to the requirements in ASTM Designation: C 150 except, using a 10-sample moving average, limestone shall not exceed 2.5 percent. The C_3S content of Type II cement shall not exceed 65 percent.

• Blended cement shall conform to the requirements for Portland Blast-Furnace Slag, Cement Type IS (MS) or Portland-Pozzolan Cement, Type IP (MS) in AASHTO Designation: M 240 and shall be comprised of an intimate and uniform blend of Type II or Type V cement and supplementary cementitious material in an amount conforming to the requirements in Section 90-2.01C, "Required Use of Supplementary Cementitious Materials."

• In addition, blended cement, Type II portland cement, and Type V portland cement shall conform to the following requirements:

A. The cement shall not contain more than 0.60-percent by mass of alkalies, calculated as the percentage of Na_2O plus 0.658 times the percentage of K_2O, when determined by methods as required in AASHTO Designation: T 105;
B. The autoclave expansion shall not exceed 0.50-percent; and
C. Mortar, containing the cement to be used and Ottawa sand, when tested in conformance with California Test 527, shall not expand in water more than 0.010-percent and shall not contract in air more than 0.048-percent, except that when cement is to be used for precast prestressed concrete piling, precast prestressed concrete members, or steam cured concrete products, the mortar shall not contract in air more than 0.053-percent.

• Type III portland cement shall be used only as specified in the special provisions or with the approval of the Engineer. Type III portland cement shall conform to the additional requirements listed above for Type II portland cement, except when tested in conformance with California Test 527, mortar containing Type III portland cement shall not contract in air more than 0.075-percent.

90-2.01B SUPPLEMENTARY CEMENTITIOUS MATERIALS (SCM)

• Fly ash shall conform to the requirements in AASHTO Designation: M 295, Class F, and the following:

A. Calcium oxide content shall not exceed 10 percent.
B. The available alkali, as sodium oxide equivalent, shall not exceed 1.5 percent when determined in conformance with the requirements in ASTM Designation: C 311 or the total alkali, as sodium oxide equivalent, shall not exceed 5.0 percent when determined in conformance with the requirements in AASHTO Designation: T 105.
C. Commingling of fly ash from different sources at uncontrolled ratios is permissible only if the following criteria are satisfied:

1. Sources of fly ash to be commingled shall be on the approved list of materials for use in concrete.
2. Testing of the commingled product is the responsibility of the fly ash supplier.
3. Each fly ash's running average of density shall not differ from any other by more than $0.25 g/cm^3$ at the time of commingling.
4. Each fly ash's running average of loss on ignition shall not differ from any other by more than one percent at the time of commingling.
5. The final product of commingled fly ash shall conform to the requirement in AASHTO Designation: M 295.

• Raw or calcined natural pozzolans shall conform to the requirements in AASHTO Designation: M 295, Class N and the following requirements:

A. Calcium oxide content shall not exceed 10 percent.
B. The available alkali, as sodium oxide equivalent, shall not exceed 1.5 percent when determined in conformance with the requirements in ASTM Designation: C 311 or the total alkali, as sodium oxide equivalent, shall not exceed 5.0 percent when determined in conformance with the requirements in AASHTO Designation: T 105.

• Ground Granulated Blast Furnace Slag (GGBFS) shall conform to the requirements in AASHTO Designation: M 302, Grade 100 or Grade 120.

• Silica Fume shall conform to the requirements of AASHTO Designation: M 307 with reduction in mortar expansion of 80 percent, minimum, using the cement from the proposed mix design.

90-2.01C REQUIRED USE OF SUPPLEMENTARY CEMENTITIOUS MATERIALS

• The amount of portland cement and SCM used in portland cement concrete shall conform to the minimum cementitious material content provisions in Section 90-1.01, "Description," or Section 90-4.05, "Optional Use of Chemical Admixtures," and the following:

A. If a blended cement conforming to the provisions in Section 90-2.01A, "Cement," is used, the minimum amount of SCM incorporated into the cement shall conform to the provisions in this Section 90-2.01C.

B. Fly ash or natural pozzolan, silica fume, or GGBFS shall not be used with Type IP or Type IS cements.

- Use of SCMs shall conform to the following:

A. If fly ash or natural pozzolan is used:

1. The minimum amount of portland cement shall not be less than 75 percent by mass of the specified minimum cementitious material content.
2. The minimum amount of fly ash or natural pozzolan shall be:
   a. Fifteen percent by mass of the total amount of cementitious material if the calcium oxide content of fly ash or natural pozzolan is equal to or less than 2 percent by mass;
   b. Twenty-five percent by mass of the total amount of cementitious material if the calcium oxide content of fly ash or natural pozzolan is greater than 2 percent by mass.

B. The total amount of fly ash or natural pozzolan shall not exceed 35 percent by mass of the total amount of cementitious material to be used in the mix. If Section 90-1.01, "Description," specifies a maximum cementitious material content in kilograms per cubic meter, the total mass of portland cement and fly ash or natural pozzolan per cubic meter shall not exceed the specified maximum cementitious material content.

C. If silica fume is used:

1. The amount of silica fume shall not be less than 10 percent by mass of the total amount of cementitious material.
2. The amount of portland cement shall not be less than 75 percent by mass of the specified minimum cementitious material content.
3. If Section 90-1.01, "Description," specifies a maximum cementitious material content in kilograms per cubic meter, the total mass of portland cement and silica fume per cubic meter shall not exceed the specified maximum cementitious material content.

D. If GGBFS is used:

1. The minimum amount of GGBFS shall be either:
   a. Forty percent of the total cementitious material to be used, if the aggregates used in the concrete are on the Department's list of "Approved Aggregates For Use in Concrete with Reduced Fly Ash."
   b. No less than 50 percent.
2. The amount of GGBFS shall not exceed 60 percent by mass of the total amount of cementitious materials to be used.

90-2.02 AGGREGATES

- Aggregates shall be free from deleterious coatings, clay balls, roots, bark, sticks, rags, and other extraneous material.
- The Contractor shall provide safe and suitable facilities, including necessary splitting devices for obtaining samples of aggregates, in conformance with California Test 125.
- Aggregates shall be of such character that it will be possible to produce workable concrete within the limits of water content provided in Section 90-6.06, "Amount of Water and Penetration."
- Aggregates shall have not more than 10 percent loss when tested for soundness in conformance with the requirements in California Test 214. The soundness requirement for fine aggregate will be waived, provided that the durability index, D_f, of the fine aggregate is 60 or greater when tested for durability in conformance with California Test 229.
- If the results of any one or more of the Cleanness Value, Sand Equivalent, or aggregate grading tests do not meet the requirements specified for "Operating Range" but all meet the "Contract Compliance" requirements, the placement of concrete shall be suspended at the completion of the current pour until tests or other information indicate that the next material to be used in the work will comply with the requirements specified for "Operating Range."
- If the results of either or both the Cleanness Value and coarse aggregate grading tests do not meet the requirements specified for "Contract Compliance," the concrete that is represented by the tests shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place, and the Contractor shall pay to the State $4.60 per cubic meter for paving concrete and $7.20 per cubic meter for all other concrete for the concrete represented by these tests and left in place. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract.

• If the results of either or both the Sand Equivalent and fine aggregate grading tests do not meet the requirements specified for "Contract Compliance," the concrete that is represented by the tests shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place and the Contractor shall pay to the State $4.60 per cubic meter for paving concrete and $7.20 per cubic meter for all other concrete for the concrete represented by these tests and left in place. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract.

• The 2 preceding paragraphs apply individually to the "Contract Compliance" requirements for coarse aggregate and fine aggregate. When both coarse aggregate and fine aggregate do not conform to the "Contract Compliance" requirements, both paragraphs shall apply. The payments specified in those paragraphs are in addition to any payments made in conformance with the provisions in Section 90-1.01, "Description."

• No single Cleanness Value, Sand Equivalent, or aggregate grading test shall represent more than 250 m^3 of concrete or one day's pour, whichever is smaller.

• When the source of an aggregate is changed, the Contractor shall adjust the mix proportions and submit in writing to the Engineer a copy of the mix design before using the aggregates.

90-2.02A COARSE AGGREGATE

• Coarse aggregate shall consist of gravel, crushed gravel, crushed rock, reclaimed aggregate, crushed air-cooled iron blast furnace slag or combinations thereof. Crushed air-cooled blast furnace slag shall not be used in reinforced or prestressed concrete.

• Reclaimed aggregate is aggregate that has been recovered from plastic concrete by washing away the cementitious material. Reclaimed aggregate shall conform to all aggregate requirements.

• Coarse aggregate shall conform to the following quality requirements:

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

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

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

90-2.02B FINE AGGREGATE

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

• Fine aggregate shall conform to the following quality requirements:

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

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

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

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

90-2.03 WATER

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

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

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

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

90-2.04 ADMIXTURE MATERIALS

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

A. Chemical Admixtures—ASTM Designation: C 494.
B. Air-entraining Admixtures—ASTM Designation: C 260.

90-3 AGGREGATE GRADINGS

90-3.01 GENERAL

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

- The Engineer may waive, in writing, the gradation requirements in this Section 90-3.01 and in Sections 90-3.02, "Coarse Aggregate Grading," 90-3.03, "Fine Aggregate Grading," and 90-3.04, "Combined Aggregate Gradings," if, in the Engineer's opinion, furnishing the gradation is not necessary for the type or amount of concrete work to be constructed.
- Gradations proposed by the Contractor shall be within the following percentage passing limits:

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

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

90-3.02 COARSE AGGREGATE GRADING

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

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

- In the above table, the symbol X is the gradation that the Contractor proposes to furnish for the specific sieve size as provided in Section 90-3.01, "General."
- Coarse aggregate for the 37.5-mm, maximum, combined aggregate grading as provided in Section 90-3.04, "Combined Aggregate Gradings," shall be furnished in 2 or more primary aggregate nominal sizes. Each primary aggregate nominal size may be separated into 2 sizes and stored separately, provided that the combined material conforms to the grading requirements for that particular primary aggregate nominal size.
- When the 25-mm, maximum, combined aggregate grading as provided in Section 90-3.04, "Combined Aggregate Gradings," is to be used, the coarse aggregate may be separated into 2 sizes and stored separately, provided that the combined material shall conform to the grading requirements for the 25-mm x 4.75-mm primary aggregate nominal size.

90-3.03 FINE AGGREGATE GRADING

- Fine aggregate shall be graded within the following limits:

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

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

90-3.04 COMBINED AGGREGATE GRADINGS

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

Grading Limits of Combined Aggregates

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

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

90-4 ADMIXTURES

90-4.01 GENERAL

- Admixtures used in portland cement concrete shall conform to and be used in conformance with the provisions in this Section 90-4 and the special provisions. Admixtures shall be used when specified or ordered by the Engineer and may be used at the Contractor's option as provided herein.
- Chemical admixtures and air-entraining admixtures containing chlorides as Cl in excess of one percent by mass of admixture, as determined by California Test 415, shall not be used.
- Admixtures shall be uniform in properties throughout their use in the work. Should it be found that an admixture as furnished is not uniform in properties, its use shall be discontinued.

- If more than one admixture is used, the admixtures shall be compatible with each other so that the desirable effects of all admixtures used will be realized.
- Chemical admixtures shall be used in conformance with the manufacturer's written recommendations.

90-4.02 MATERIALS

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

90-4.03 ADMIXTURE APPROVAL

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

90-4.04 REQUIRED USE OF CHEMICAL ADMIXTURES

- If the use of a chemical admixture is specified, the admixture shall be used at the dosage specified, except that if no dosage is specified, the admixture shall be used at the dosage normally recommended by the manufacturer of the admixture.

90-4.05 OPTIONAL USE OF CHEMICAL ADMIXTURES

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

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

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

90-4.06 REQUIRED USE OF AIR-ENTRAINING ADMIXTURES

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

90-4.07 OPTIONAL USE OF AIR-ENTRAINING ADMIXTURES

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

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90-4.10 PROPORTIONING AND DISPENSING LIQUID ADMIXTURES

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

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

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

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

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

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

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90-5 PROPORTIONING

90-5.01 STORAGE OF AGGREGATES

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

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

A. Intermingling of the different sizes of aggregates shall be positively prevented. The Contractor shall take the necessary measures to prevent intermingling. The preventive measures may include, but are not necessarily limited to, physical separation of stockpiles or construction of bulkheads of adequate length and height; and
B. Contamination of aggregates by contact with the ground shall be positively prevented. The Contractor shall take the necessary measures to prevent contamination. The preventive measures shall include, but are not necessarily limited to, placing aggregates on wooden platforms or on hardened surfaces consisting of portland cement concrete, asphalt concrete, or cement treated material.

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

90-5.02 PROPORTIONING DEVICES

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

Automatic devices shall be automatic to the extent that the only manual operation required for proportioning the aggregates, cement, and supplementary cementitious material for one batch of concrete is a single operation of a switch or starter.

- Proportioning devices shall be tested as frequently as the Engineer may deem necessary to ensure their accuracy.
- Weighing equipment shall be insulated against vibration or movement of other operating equipment in the plant. When the plant is in operation, the mass of each batch of material shall not vary from the mass designated by the Engineer by more than the tolerances specified herein.
- Equipment for cumulative weighing of aggregate shall have a zero tolerance of ±0.5 percent of the designated total batch mass of the aggregate. For systems with individual weigh hoppers for the various sizes of aggregate, the zero tolerance shall be ±0.5 percent of the individual batch mass designated for each size of aggregate. Equipment for cumulative weighing of cement and supplementary cementitious material shall have a zero tolerance of ±0.5 percent of the designated total batch mass of the cement and supplementary cementitious material. Equipment for weighing cement or supplementary cementitious material separately shall have a zero tolerance of ±0.5 percent of their designated individual batch masses. Equipment for measuring water shall have a zero tolerance of ±0.5 percent of its designated mass or volume.
- The mass indicated for any batch of material shall not vary from the preselected scale setting by more than the following:

A. Aggregate weighed cumulatively shall be within 1.0 percent of the designated total batch mass of the aggregate. Aggregates weighed individually shall be within 1.5 percent of their respective designated batch masses; and
B. Cement shall be 99 to 102 percent of its designated batch mass. When weighed individually, supplementary cementitious material shall be 99 to 102 percent of its designated batch mass. When supplementary cementitious material and cement are permitted to be weighed cumulatively, cement shall be weighed first to 99 to 102 percent of its designated batch mass, and the total for cement and supplementary cementitious material shall be 99 to 102 percent of the sum of their designated batch masses; and
C. Water shall be within 1.5 percent of its designated mass or volume.

- Each scale graduation shall be approximately 0.001 of the total capacity of the scale. The capacity of scales for weighing cement, supplementary cementitious material, or cement plus supplementary cementitious material and aggregates shall not exceed that of commercially available scales having single graduations indicating a mass not exceeding the maximum permissible mass variation above, except that no scale shall be required having a capacity of less than 500 kg, with 0.5-kg graduations.

90-5.03 PROPORTIONING

- Proportioning shall consist of dividing the aggregates into the specified sizes, each stored in a separate bin, and combining them with cementitious material and water as provided in these specifications. Aggregates shall be proportioned by mass.
- At the time of batching, aggregates shall have been dried or drained sufficiently to result in a stable moisture content such that no visible separation of water from aggregate will take place during transportation from the proportioning plant to the point of mixing. In no event shall the free moisture content of the fine aggregate at the time of batching exceed 8 percent of its saturated, surface-dry mass.
- Should separate supplies of aggregate material of the same size group, but of different moisture content or specific gravity or surface characteristics affecting workability, be available at the proportioning plant, withdrawals shall be made from one supply exclusively and the materials therein completely exhausted before starting upon another.
- Bulk Type IP (MS) cement shall be weighed in an individual hopper and shall be kept separate from the aggregates until the ingredients are released for discharge into the mixer.
- Bulk cement and supplementary cementitious material may be weighed in separate, individual weigh hoppers or may be weighed in the same weigh hopper and shall be kept separate from the aggregates until the ingredients are released for discharge into the mixer. If the cement and supplementary cementitious material are weighed cumulatively, the cement shall be weighed first.
- If cement and supplementary cementitious material are weighed in separate weigh hoppers, the weigh systems for the proportioning of the aggregate, the cement, and the supplementary cementitious material 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 supplementary cementitious material shall be discharged into the mixer simultaneously with the aggregate.
- The scales and weigh hoppers for bulk weighing cement, supplementary cementitious material, or cement plus supplementary cementitious material shall be separate and distinct from the aggregate weighing equipment.
- For batches of one cubic meter or more, the batching equipment shall conform to one of the following combinations:

A. Separate boxes and separate scale and indicator for weighing each size of aggregate.

B. Single box and scale indicator for all aggregates.
C. Single box or separate boxes and automatic weighing mechanism for all aggregates.

• In order to check the accuracy of batch masses, the gross mass and tare mass of batch trucks, truck mixers, truck agitators, and non-agitating hauling equipment shall be determined when ordered by the Engineer. The equipment shall be weighed on scales designated by the Engineer.

90-5.03A PROPORTIONING FOR PAVEMENT

• Aggregates and bulk supplementary cementitious material for use in pavement shall be proportioned by mass by means of automatic proportioning devices of approved type conforming to these specifications.

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

• The batching of cement, supplementary cementitious material, or cement plus supplementary cementitious material 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 supplementary cementitious material hoppers or the cement plus supplementary cementitious material hopper are charged with masses that are within the tolerances specified in Section 90-5.02, "Proportioning Devices."

• If interlocks are required for cement and supplementary cementitious material charging mechanisms and cement and supplementary cementitious material are weighed cumulatively, their charging mechanisms shall be interlocked to prevent the introduction of mineral admixture until the mass of cement in the cement weigh hopper is within the tolerances specified in Section 90-5.02, "Proportioning Devices."

• If concrete is completely mixed in stationary paving mixers, the supplementary cementitious materials shall be weighed in a separate weigh hopper and the supplementary cementitious material and cement shall be introduced simultaneously into the mixer proportionately with the aggregate. If the Contractor provides certification that the stationary mixer is capable of mixing the cement, supplementary cementitious material, aggregates, and water uniformly before discharge, weighing the supplementary cementitious material cumulatively with the cement is permitted. Certification shall contain the following:

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

• The discharge gate on the cement and supplementary cementitious material hoppers or the cement plus supplementary cementitious material hopper shall be designed to permit regulating the flow of cement, supplementary cementitious material, or cement plus supplementary cementitious material into the aggregate as directed by the Engineer.

• If separate weigh boxes are used for each size of aggregate, the discharge gates shall permit regulating the flow of each size of aggregate as directed by the Engineer.

• Material discharged from the several bins shall be controlled by gates or by mechanical conveyors. The means of withdrawal from the several bins, and of discharge from the weigh box, shall be interlocked so that not more than one bin can discharge at a time, and so that the weigh box cannot be tripped until the required quantity from each of the several bins has been deposited therein. Should a separate weigh box be used for each size of aggregate, all may be operated and discharged simultaneously.

• If the discharge from the several bins is controlled by gates, each gate shall be actuated automatically so that the required mass is discharged into the weigh box, after which the gate shall automatically close and lock.

• The automatic weighing system shall be designed so that all proportions required may be set on the weighing controller at the same time.

90-6 MIXING AND TRANSPORTING

90-6.01 GENERAL

- Concrete shall be mixed in mechanically operated mixers, except that when permitted by the Engineer, batches not exceeding 0.25-m^3 may be mixed by hand methods in conformance with the provisions in Section 90-6.05, "Hand-Mixing."
- Equipment having components made of aluminum or magnesium alloys that would have contact with plastic concrete during mixing, transporting, or pumping of portland cement concrete shall not be used.
- Concrete shall be homogeneous and thoroughly mixed, and there shall be no lumps or evidence of undispersed cementitious material.
- Uniformity of concrete mixtures will be determined by differences in penetration as determined by California Test 533, or slump as determined by ASTM Designation: C 143, and by variations in the proportion of coarse aggregate as determined by California Test 529.
- When the mix design specifies a penetration value, the difference in penetration, determined by comparing penetration tests on 2 samples of mixed concrete from the same batch or truck mixer load, shall not exceed 10 mm. When the mix design specifies a slump value, the difference in slump, determined by comparing slump tests on 2 samples of mixed concrete from the same batch or truck mixer load, shall not exceed the values given in the table below. Variation in the proportion of coarse aggregate will be determined by comparing the results of tests of 2 samples of mixed concrete from the same batch or truck mixer load and the difference between the 2 results shall not exceed 100 kg per cubic meter of concrete.

Average Slump	Maximum Permissible Difference
Less than 100-mm	25-mm
100-mm to 150-mm	38-mm
Greater than 150-mm to 225-mm	50-mm

- The Contractor shall furnish samples of the freshly mixed concrete and provide satisfactory facilities for obtaining the samples.

90-6.02 MACHINE MIXING

- Concrete mixers may be of the revolving drum or the revolving blade type, and the mixing drum or blades shall be operated uniformly at the mixing speed recommended by the manufacturer. Mixers and agitators that have an accumulation of hard concrete or mortar shall not be used.
- The temperature of mixed concrete, immediately before placing, shall be not less than 10°C or more than 32°C. Aggregates and water shall be heated or cooled as necessary to produce concrete within these temperature limits. Neither aggregates nor mixing water shall be heated to exceed 65°C. If ice is used to cool the concrete, discharge of the mixer will not be permitted until all ice is melted.
- The batch shall be so charged into the mixer that some water will enter in advance of cementitious materials and aggregates. All water shall be in the drum by the end of the first one-fourth of the specified mixing time.
- Cementitious materials shall be batched and charged into the mixer by means that will not result either in loss of cementitious materials due to the effect of wind, in accumulation of cementitious materials on surfaces of conveyors or hoppers, or in other conditions that reduce or vary the required quantity of cementitious material in the concrete mixture.
- Paving and stationary mixers shall be operated with an automatic timing device. The timing device and discharge mechanism shall be interlocked so that during normal operation no part of the batch will be discharged until the specified mixing time has elapsed.
- The total elapsed time between the intermingling of damp aggregates and all cementitious materials and the start of mixing shall not exceed 30 minutes.
- The size of batch shall not exceed the manufacturer's guaranteed capacity.
- When producing concrete for pavement or base, suitable batch counters shall be installed and maintained in good operating condition at job site batching plants and stationary mixers. The batch counters shall indicate the exact number of batches proportioned and mixed.
- Concrete shall be mixed and delivered to the job site by means of one of the following combinations of operations:

A. Mixed completely in a stationary mixer and the mixed concrete transported to the point of delivery in truck agitators or in nonagitating hauling equipment (central-mixed concrete).
B. Mixed partially in a stationary mixer, and the mixing completed in a truck mixer (shrink-mixed concrete).
C. Mixed completely in a truck mixer (transit-mixed concrete).
D. Mixed completely in a paving mixer.

• Agitators may be truck mixers operating at agitating speed or truck agitators. Each mixer and agitator shall have attached thereto in a prominent place a metal plate or plates on which is plainly marked the various uses for which the equipment is designed, the manufacturer's guaranteed capacity of the drum or container in terms of the volume of mixed concrete and the speed of rotation of the mixing drum or blades.

• Truck mixers shall be equipped with electrically or mechanically actuated revolution counters by which the number of revolutions of the drum or blades may readily be verified.

• When shrink-mixed concrete is furnished, concrete that has been partially mixed at a central plant shall be transferred to a truck mixer and all requirements for transit-mixed concrete shall apply. No credit in the number of revolutions at mixing speed will be allowed for partial mixing in a central plant.

90-6.03 TRANSPORTING MIXED CONCRETE

• Mixed concrete may be transported to the delivery point in truck agitators or truck mixers operating at the speed designated by the manufacturer of the equipment as agitating speed, or in nonagitating hauling equipment, provided the consistency and workability of the mixed concrete upon discharge at the delivery point is suitable for adequate placement and consolidation in place, and provided the mixed concrete after hauling to the delivery point conforms to the provisions in Section 90-6.01, "General."

• Truck agitators shall be loaded not to exceed the manufacturer's guaranteed capacity and shall maintain the mixed concrete in a thoroughly mixed and uniform mass during hauling.

• Bodies of nonagitating hauling equipment shall be constructed so that leakage of the concrete mix, or any part thereof, will not occur at any time.

• Concrete hauled in open-top vehicles shall be protected during hauling against rain or against exposure to the sun for more than 20 minutes when the ambient temperature exceeds 24°C.

• No additional mixing water shall be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer. If the Engineer authorizes additional water to be incorporated into the concrete, the drum shall be revolved not less than 30 revolutions at mixing speed after the water is added and before discharge is commenced.

• The rate of discharge of mixed concrete from truck mixer-agitators shall be controlled by the speed of rotation of the drum in the discharge direction with the discharge gate fully open.

• If a truck mixer or agitator is used for transporting concrete to the delivery point, discharge shall be completed within 1.5 hours or before 250 revolutions of the drum or blades, whichever occurs first, after the introduction of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or if the temperature of the concrete is 30°C or above, the time allowed may be less than 1.5 hours. If an admixture is used to retard the set time, the temperature of the concrete shall not exceed 30°C, the time limit shall be 2 hours, and the revolution limitation shall be 300.

• If nonagitating hauling equipment is used for transporting concrete to the delivery point, discharge shall be completed within one hour after the addition of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 30°C or above, the time between the introduction of cement to the aggregates and discharge shall not exceed 45 minutes.

• Each load of concrete delivered at the job site shall be accompanied by a weighmaster certificate showing the mix identification number, nonrepeating load number, date and time at which the materials were batched, the total amount of water added to the load, and for transit-mixed concrete, the reading of the revolution counter at the time the truck mixer is charged with cement. This weighmaster certificate shall also show the actual scale masses (kilograms) for the ingredients batched. Theoretical or target batch masses shall not be used as a substitute for actual scale masses.

• Weighmaster certificates shall be provided in printed form, or if approved by the Engineer, the data may be submitted in electronic media. Electronic media shall be presented in a tab-delimited format on a 90 mm diskette with a capacity of at least 1.4 megabytes. Captured data, for the ingredients represented by each batch shall be "line feed, carriage return" (LFCR) and "one line, separate record" with allowances for sufficient fields to satisfy the amount of data required by these specifications.

• The Contractor may furnish a weighmaster certificate accompanied by a separate certificate that lists the actual batch masses or measurements for a load of concrete provided that both certificates are imprinted with the same nonrepeating load number that is unique to the contract and delivered to the job site with the load.

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

90-6.04 TIME OR AMOUNT OF MIXING

• Mixing of concrete in paving or stationary mixers shall continue for the required mixing time after all ingredients, except water and admixture, if added with the water, are in the mixing compartment of the mixer before any part of the batch is released. Transfer time in multiple drum mixers shall not be counted as part of the required mixing time.

• The required mixing time, in paving or stationary mixers, of concrete used for concrete structures, except minor structures, shall be not less than 90 seconds or more than 5 minutes, except that when directed by the Engineer in writing, the requirements of the following paragraph shall apply.

• The required mixing time, in paving or stationary mixers, except as provided in the preceding paragraph, shall be not less than 50 seconds or more than 5 minutes.

• The minimum required revolutions at the mixing speed for transit-mixed concrete shall not be less than that recommended by the mixer manufacturer, but in no case shall the number of revolutions be less than that required to consistently produce concrete conforming to the provisions for uniformity in Section 90-6.01, "General."

• When a high range water-reducing admixture is added to the concrete at the job site, the total number of revolutions shall not exceed 300.

90-6.05 HAND-MIXING

• Hand-mixed concrete shall be made in batches of not more than 0.25-m^3 and shall be mixed on a watertight, level platform. The proper amount of coarse aggregate shall be measured in measuring boxes and spread on the platform and the fine aggregate shall be spread on this layer, the 2 layers being not more than 0.3-meters in total depth. On this mixture shall be spread the dry cementitious materials and the whole mass turned no fewer than 2 times dry; then sufficient clean water shall be added, evenly distributed, and the whole mass again turned no fewer than 3 times, not including placing in the carriers or forms.

90-6.06 AMOUNT OF WATER AND PENETRATION

• The amount of water used in concrete mixes shall be regulated so that the penetration of the concrete as determined by California Test 533 or the slump of the concrete as determined by ASTM Designation: C 143 is within the nominal values shown in the following table. When the penetration or slump of the concrete is found to exceed the nominal values listed, the mixture of subsequent batches shall be adjusted to reduce the penetration or slump to a value within the nominal range shown. Batches of concrete with a penetration or slump exceeding the maximum values listed shall not be used in the work. If Type F or Type G chemical admixtures are added to the mix, the penetration requirements shall not apply and the slump shall not exceed 225 mm after the chemical admixtures are added.

Type of Work	Nominal		Maximum	
	Penetration (mm)	Slump (mm)	Penetration (mm)	Slump (mm)
Concrete Pavement	0 - 25	—	40	—
Non-reinforced concrete facilities	0 - 35	—	50	—
Reinforced concrete structures				
Sections over 300-mm thick	0 - 35	—	65	—
Sections 300-mm thick or less	0 - 50	—	75	—
Concrete placed under water	—	150 - 200	—	225
Cast-in-place concrete piles	65 - 90	130 - 180	100	200

• The amount of free water used in concrete shall not exceed 183 kg/m^3, plus 20 kg for each required 100 kg of cementitious material in excess of 325 kg/m^3.

• The term free water is defined as the total water in the mixture minus the water absorbed by the aggregates in reaching a saturated surface-dry condition.

• If there are adverse or difficult conditions that affect the placing of concrete, the above specified penetration and free water content limitations may be exceeded providing the Contractor is granted permission by the Engineer in writing to increase the cementitious material content per cubic meter of concrete. The increase in water and cementitious material shall be at a ratio not to exceed 30 kg of water per added 100 kg of cementitious material per cubic meter. Full compensation for additional cementitious material and water added under these conditions shall be considered as included in the contract price paid for the concrete work involved and no additional compensation will be allowed therefor.

• The equipment for supplying water to the mixer shall be constructed and arranged so that the amount of water added can be measured accurately. Any method of discharging water into the mixer for a batch shall be accurate within 1.5 percent of the quantity of water required to be added to the mix for any position of the mixer. Tanks used to measure water shall be designed so that water cannot enter while water is being discharged into the mixer and discharge into the mixer shall be made rapidly in one operation without dribbling. All equipment shall be arranged so as to permit checking the amount of water delivered by discharging into measured containers.

90-7 CURING CONCRETE

90-7.01 METHODS OF CURING

- Newly placed concrete shall be cured by the methods specified in this Section 90-7.01 and the special provisions.

90-7.01A WATER METHOD

- The concrete shall be kept continuously wet by the application of water for a minimum curing period of 7 days after the concrete has been placed.
- Cotton mats, rugs, carpets, or earth or sand blankets may be used as a curing medium to retain the moisture during the curing period.
- If a curing medium consisting of cotton mats, rugs, carpets, polyethylene sheeting, polyethylene sheeting on burlap, or earth or sand blankets is to be used to retain the moisture, the entire surface of the concrete shall be kept damp by applying water with a nozzle that so atomizes the flow that a mist and not a spray is formed, until the surface of the concrete is covered with the curing medium. The moisture from the nozzle shall not be applied under pressure directly upon the concrete and shall not be allowed to accumulate on the concrete in a quantity sufficient to cause a flow or wash the surface. At the expiration of the curing period, the concrete surfaces shall be cleared of all curing media.
- At the option of the Contractor, a curing medium consisting of white opaque polyethylene sheeting extruded onto burlap may be used to cure concrete structures. The polyethylene sheeting shall have a minimum thickness of 100 µm, and shall be extruded onto 283.5-gram burlap.
- At the option of the Contractor, a curing medium consisting of polyethylene sheeting may be used to cure concrete columns. The polyethylene sheeting shall have a minimum thickness of 250 µm achieved in a single layer of material.
- If the Contractor chooses to use polyethylene sheeting or polyethylene sheeting on burlap as a curing medium, these media and any joints therein shall be secured as necessary to provide moisture retention and shall be within 75 mm of the concrete at all points along the surface being cured. When these media are used, the temperature of the concrete shall be monitored during curing. If the temperature of the concrete cannot be maintained below 60°C, use of these curing media shall be disallowed.
- When concrete bridge decks and flat slabs are to be cured without the use of a curing medium, the entire surface of the bridge deck or slab shall be kept damp by the application of water with an atomizing nozzle as specified above, until the concrete has set, after which the entire surface of the concrete shall be sprinkled continuously with water for a period of not less than 7 days.

90-7.01B CURING COMPOUND METHOD

- Surfaces of the concrete that are exposed to the air shall be sprayed uniformly with a curing compound.
- Curing compounds to be used shall be as follows:

1. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class B, except the resin type shall be poly-alpha-methylstyrene.
2. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class B.
3. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class A.
4. Nonpigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 1, Class B.
5. Nonpigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 1, Class A.
6. Nonpigmented curing compound with fugitive dye conforming to the requirements in ASTM Designation: C 309, Type 1-D, Class A.

- The infrared scan for the dried vehicle from curing compound (1) shall match the infrared scan on file at the Transportation Laboratory.
- The loss of water for each type of curing compound, when tested in conformance with the requirements in California Test 534, shall not be more than 0.15-kg/m^2 in 24 hours.
- The curing compound to be used will be specified elsewhere in these specifications or in the special provisions.
- If the use of curing compound is required or permitted elsewhere in these specifications or in the special provisions and no specific kind is specified, any of the curing compounds listed above may be used.
- Curing compound shall be applied at a nominal rate of 3.7 m^2/L, unless otherwise specified.
- At any point, the application rate shall be within ±1.2 m^2/L of the nominal rate specified, and the average application rate shall be within ±0.5 m^2/L of the nominal rate specified when tested in conformance with the requirements in California Test 535. Runs, sags, thin areas, skips, or holidays in the applied curing compound shall be evidence that the application is not satisfactory.
- Curing compounds shall be applied using power operated spray equipment. The power operated spraying equipment shall be equipped with an operational pressure gage and a means of controlling the pressure. Hand spraying of

small and irregular areas that are not reasonably accessible to mechanical spraying equipment, in the opinion of the Engineer, may be permitted.

- The curing compound shall be applied to the concrete following the surface finishing operation, immediately before the moisture sheen disappears from the surface, but before any drying shrinkage or craze cracks begin to appear. In the event of any drying or cracking of the surface, application of water with an atomizing nozzle as specified in Section 90-7.01A, "Water Method," shall be started immediately and shall be continued until application of the compound is resumed or started; however, the compound shall not be applied over any resulting freestanding water. Should the film of compound be damaged from any cause before the expiration of 7 days after the concrete is placed in the case of structures and 72 hours in the case of pavement, the damaged portion shall be repaired immediately with additional compound.
- At the time of use, compounds containing pigments shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. A paddle shall be used to loosen all settled pigment from the bottom of the container, and a power driven agitator shall be used to disperse the pigment uniformly throughout the vehicle.
- Agitation shall not introduce air or other foreign substance into the curing compound.
- The manufacturer shall include in the curing compound the necessary additives for control of sagging, pigment settling, leveling, de-emulsification, or other requisite qualities of a satisfactory working material. Pigmented curing compounds shall be manufactured so that the pigment does not settle badly, does not cake or thicken in the container, and does not become granular or curdled. Settlement of pigment shall be a thoroughly wetted, soft, mushy mass permitting the complete and easy vertical penetration of a paddle. Settled pigment shall be easily redispersed, with minimum resistance to the sideways manual motion of the paddle across the bottom of the container, to form a smooth uniform product of the proper consistency.
- Curing compounds shall remain sprayable at temperatures above 4°C and shall not be diluted or altered after manufacture.
- The curing compound shall be packaged in clean 1040-L totes, 210-L barrels, or 19-L pails, or shall be supplied from a suitable storage tank located at the job site. The containers shall comply with "Title 49, Code of Federal Regulations, Hazardous Materials Regulations." The 1040-L totes and the 210-L barrels shall have removable lids and airtight fasteners. The 19-L pails shall be round and have standard full open head and bail. Lids with bungholes will not be permitted. Settling or separation of solids in containers, except tanks, must be completely redispersed with low speed mixing prior to use, in conformance with these specifications and the manufacturer's recommendations. Mixing shall be accomplished either manually by use of a paddle or by use of a mixing blade driven by a drill motor, at low speed. Mixing blades shall be the type used for mixing paint. On-site storage tanks shall be kept clean and free of contaminants. Each tank shall have a permanent system designed to completely redisperse settled material without introducing air or other foreign substances.
- Steel containers and lids shall be lined with a coating that will prevent destructive action by the compound or chemical agents in the air space above the compound. The coating shall not come off the container or lid as skins. Containers shall be filled in a manner that will prevent skinning. Plastic containers shall not react with the compound.
- Each container shall be labeled with the manufacturer's name, kind of curing compound, batch number, volume, date of manufacture, and volatile organic compound (VOC) content. The label shall also warn that the curing compound containing pigment shall be well stirred before use. Precautions concerning the handling and the application of curing compound shall be shown on the label of the curing compound containers in conformance with the Construction Safety Orders and General Industry Safety Orders of the State.
- Containers of curing compound shall be labeled to indicate that the contents fully comply with the rules and regulations concerning air pollution control in the State.
- When the curing compound is shipped in tanks or tank trucks, a shipping invoice shall accompany each load. The invoice shall contain the same information as that required herein for container labels.
- Curing compound will be sampled by the Engineer at the source of supply, at the job site, or at both locations.
- Curing compound shall be formulated so as to maintain the specified properties for a minimum of one year. The Engineer may require additional testing before use to determine compliance with these specifications if the compound has not been used within one year or whenever the Engineer has reason to believe the compound is no longer satisfactory.
- Tests will be conducted in conformance with the latest ASTM test methods and methods in use by the Transportation Laboratory.

90-7.01C WATERPROOF MEMBRANE METHOD

- The exposed finished surfaces of concrete shall be sprayed with water, using a nozzle that so atomizes the flow that a mist and not a spray is formed, until the concrete has set, after which the curing membrane, shall be placed. The curing membrane shall remain in place for a period of not less than 72 hours.
- Sheeting material for curing concrete shall conform to the requirements in AASHTO Designation: M 171 for white reflective materials.

• The sheeting material shall be fabricated into sheets of such width as to provide a complete cover for the entire concrete surface. Joints in the sheets shall be securely cemented together in such a manner as to provide a waterproof joint. The joint seams shall have a minimum lap of 100 mm.

• The sheets shall be securely weighted down by placing a bank of earth on the edges of the sheets or by other means satisfactory to the Engineer.

• Should any portion of the sheets be broken or damaged before the expiration of 72 hours after being placed, the broken or damaged portions shall be immediately repaired with new sheets properly cemented into place.

• Sections of membrane that have lost their waterproof qualities or have been damaged to such an extent as to render them unfit for curing the concrete shall not be used.

90-7.01D FORMS-IN-PLACE METHOD

• Formed surfaces of concrete may be cured by retaining the forms in place. The forms shall remain in place for a minimum period of 7 days after the concrete has been placed, except that for members over 0.5-m in least dimension the forms shall remain in place for a minimum period of 5 days.

• Joints in the forms and the joints between the end of forms and concrete shall be kept moisture tight during the curing period. Cracks in the forms and cracks between the forms and the concrete shall be resealed by methods subject to the approval of the Engineer.

90-7.02 CURING PAVEMENT

• The entire exposed area of the pavement, including edges, shall be cured by the waterproof membrane method, or curing compound method using curing compound (1) or (2) as the Contractor may elect. Should the side forms be removed before the expiration of 72 hours following the start of curing, the exposed pavement edges shall also be cured. If the pavement is cured by means of the curing compound method, the sawcut and all portions of the curing compound that have been disturbed by sawing operations shall be restored by spraying with additional curing compound.

• Curing shall commence as soon as the finishing process provided in Section 40-1.10, "Final Finishing," has been completed. The method selected shall conform to the provisions in Section 90-7.01, "Methods of Curing."

• When the curing compound method is used, the compound shall be applied to the entire pavement surface by mechanical sprayers. Spraying equipment shall be of the fully atomizing type equipped with a tank agitator that provides for continual agitation of the curing compound during the time of application. The spray shall be adequately protected against wind, and the nozzles shall be so oriented or moved mechanically transversely as to result in the minimum specified rate of coverage being applied uniformly on exposed faces. Hand spraying of small and irregular areas, and areas inaccessible to mechanical spraying equipment, in the opinion of the Engineer, will be permitted. When the ambient air temperature is above 15°C, the Contractor shall fog the surface of the concrete with a fine spray of water as specified in Section 90-7.01A, "Water Method." The surface of the pavement shall be kept moist between the hours of 10:00 a.m. and 4:30 p.m. on the day the concrete is placed. However, the fogging done after the curing compound has been applied shall not begin until the compound has set sufficiently to prevent displacement. Fogging shall be discontinued if ordered in writing by the Engineer.

90-7.03 CURING STRUCTURES

• Newly placed concrete for cast-in-place structures, other than highway bridge decks, shall be cured by the water method, the forms-in-place method, or, as permitted herein, by the curing compound method, in conformance with the provisions in Section 90-7.01, "Methods of Curing."

• The curing compound method using a pigmented curing compound may be used on concrete surfaces of construction joints, surfaces that are to be buried underground, and surfaces where only ordinary surface finish is to be applied and on which a uniform color is not required and that will not be visible from a public traveled way. If the Contractor elects to use the curing compound method on the bottom slab of box girder spans, the curing compound shall be curing compound (1).

• The top surface of highway bridge decks shall be cured by both the curing compound method and the water method. The curing compound shall be curing compound (1).

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

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

90-7.04 CURING PRECAST CONCRETE MEMBERS

• Precast concrete members shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing." Curing shall be provided for the minimum time specified for each method or until the concrete reaches

its design strength, whichever is less. Steam curing may also be used for precast members and shall conform to the following provisions:

A. After placement of the concrete, members shall be held for a minimum 4-hour presteaming period. If the ambient air temperature is below 10°C, steam shall be applied during the presteaming period to hold the air surrounding the member at a temperature between 10°C and 32°C.
B. To prevent moisture loss on exposed surfaces during the presteaming period, members shall be covered as soon as possible after casting or the exposed surfaces shall be kept wet by fog spray or wet blankets.
C. Enclosures for steam curing shall allow free circulation of steam about the member and shall be constructed to contain the live steam with a minimum moisture loss. The use of tarpaulins or similar flexible covers will be permitted, provided they are kept in good repair and secured in such a manner as to prevent the loss of steam and moisture.
D. Steam at the jets shall be at low pressure and in a saturated condition. Steam jets shall not impinge directly on the concrete, test cylinders, or forms. During application of the steam, the temperature rise within the enclosure shall not exceed 22°C per hour. The curing temperature throughout the enclosure shall not exceed 65°C and shall be maintained at a constant level for a sufficient time necessary to develop the required transfer strength. Control cylinders shall be covered to prevent moisture loss and shall be placed in a location where temperature is representative of the average temperature of the enclosure.
E. Temperature recording devices that will provide an accurate, continuous, permanent record of the curing temperature shall be provided. A minimum of one temperature recording device per 60 m of continuous bed length will be required for checking temperature.
F. Members in pretension beds shall be detensioned immediately after the termination of steam curing while the concrete and forms are still warm, or the temperature under the enclosure shall be maintained above 15°C until the stress is transferred to the concrete.
G. Curing of precast concrete will be considered completed after termination of the steam curing cycle.

90-7.05 CURING PRECAST PRESTRESSED CONCRETE PILES

• Newly placed concrete for precast prestressed concrete piles shall be cured in conformance with the provisions in Section 90-7.04, "Curing Precast Concrete Members," except that piles in a corrosive environment shall be cured as follows:

A. Piles shall be either steam cured or water cured. If water curing is used, the piles shall be kept continuously wet by the application of water in conformance with the provisions in Section 90-7.01A, "Water Method."
B. If steam curing is used, the steam curing provisions in Section 90-7.04, "Curing Precast Concrete Members," shall apply except that the piles shall be kept continuously wet for their entire length for a period of not less than 3 days, including the holding and steam curing periods.

90-7.06 CURING SLOPE PROTECTION

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

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

90-7.07 CURING MISCELLANEOUS CONCRETE WORK

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

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

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

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

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

90-8 PROTECTING CONCRETE

90-8.01 GENERAL

- In addition to the provisions in Section 7-1.16, "Contractor's Responsibility for the Work and Materials," the Contractor shall protect concrete as provided in this Section 90-8. If required by the Engineer, the Contractor shall submit a written outline of the proposed methods for protecting the concrete.
- The Contractor shall protect concrete from damage from any cause, which shall include, but not be limited to: rain, heat, cold, wind, Contractor's actions, and actions of others.
- Concrete shall not be placed on frozen or ice-coated ground or subgrade nor on ice-coated forms, reinforcing steel, structural steel, conduits, precast members, or construction joints.
- Under rainy conditions, placing of concrete shall be stopped before the quantity of surface water is sufficient to damage surface mortar or cause a flow or wash of the concrete surface, unless the Contractor provides adequate protection against damage.
- Concrete that has been frozen or damaged by other causes, as determined by the Engineer, shall be removed and replaced by the Contractor at the Contractor's expense.

90-8.02 PROTECTING CONCRETE STRUCTURES

- Structure concrete and shotcrete used as structure concrete shall be maintained at a temperature of not less than 7°C for 72 hours after placing and at not less than 4°C for an additional 4 days.

90-8.03 PROTECTING CONCRETE PAVEMENT

- Pavement concrete shall be maintained at a temperature of not less than 4°C for 72 hours.
- Except as provided in Section 7-1.08, "Public Convenience," the Contractor shall protect concrete pavement against construction and other activities that abrade, scar, discolor, reduce texture depth, lower coefficient of friction, or otherwise damage the surface. Stockpiling, drifting, or excessive spillage of soil, gravel, petroleum products, and concrete or asphalt mixes on the surface of concrete pavement is prohibited unless otherwise specified in these specifications, the special provisions or permitted by the Engineer.
- If ordered by the Engineer or shown on the plans or specified in the special provisions, pavement crossings shall be constructed for the convenience of public traffic. The material and work necessary for the construction of the crossings, and their subsequent removal and disposal, will be paid for at the contract unit prices for the items of work involved and if there are no contract items for the work involved, payment for pavement crossings will be made by extra work as provided in Section 4-1.03D, "Extra Work.". Where public traffic will be required to cross over the new pavement, Type III portland cement may be used in concrete, if permitted in writing by the Engineer. The pavement may be opened to traffic as soon as the concrete has developed a modulus of rupture of 3.8 MPa. The modulus of rupture will be determined by California Test 523.
- No traffic or Contractor's equipment, except as hereinafter provided, will be permitted on the pavement before a period of 10 days has elapsed after the concrete has been placed, nor before the concrete has developed a modulus of rupture of at least 3.8 MPa. Concrete that fails to attain a modulus of rupture of 3.8 MPa within 10 days shall not be opened to traffic until directed by the Engineer.
- Equipment for sawing weakened plane joints will be permitted on the pavement as specified in Section 40-1.08B, "Weakened Plane Joints."
- When requested in writing by the Contractor, the tracks on one side of paving equipment will be permitted on the pavement after a modulus of rupture of 2.4 MPa has been attained, provided that:

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

- In case of visible cracking of, or other damage to the pavement, operation of the paving equipment on the pavement shall be immediately discontinued.
- Damage to the pavement resulting from early use of pavement by the Contractor's equipment as provided above shall be repaired by the Contractor.
- The State will furnish the molds and machines for testing the concrete for modulus of rupture, and the Contractor, at the Contractor's expense, shall furnish the material and whatever labor the Engineer may require.

90-9 COMPRESSIVE STRENGTH

90-9.01 GENERAL

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

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

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

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

• If the test result indicates that the compressive strength at the maximum curing age specified or allowed is below the specified strength, but is 85 percent or more of the specified strength, payments to the State as required above shall be made, unless the Contractor, at the Contractor's expense, obtains and submits evidence acceptable to the Engineer that the strength of the concrete placed in the work meets or exceeds the specified 28-day compressive strength. If the test result indicates a compressive strength at the maximum curing age specified or allowed below 85 percent, the concrete represented by that test will be rejected, unless the Contractor, at the Contractor's expense, obtains and submits evidence acceptable to the Engineer that the strength and quality of the concrete placed in the work are acceptable. If the evidence consists of tests made on cores taken from the work, the cores shall be obtained and tested in conformance with the requirements in ASTM Designation: C 42.

• No single compressive strength test shall represent more than 250 m^3.

• If a precast concrete member is steam cured, the compressive strength of the concrete will be determined from test cylinders that have been handled and stored in conformance with Method 3 of California Test 540. The compressive strength of steam cured concrete will be evaluated on the basis of individual tests representing specific portions of production. If the concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete shall be considered to be acceptable whenever its compressive strength reaches the specified 28-day compressive strength provided that strength is reached in not more than the maximum number of days specified or allowed after the member is cast.

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

• Certified test data, in order to be acceptable, shall indicate that not less than 90 percent of at least 20 consecutive tests exceed the specified strength at the maximum number of cure days specified or allowed, and none of those tests are less than 95 percent of specified strength. Strength tests included in the data shall be the most recent tests made on concrete of the proposed mix design and all shall have been made within one year of the proposed use of the concrete.

• Trial batch test reports, in order to be acceptable, shall indicate that the average compressive strength of 5 consecutive concrete cylinders, taken from a single batch, at not more than 28 days (or the maximum age allowed) after

molding shall be at least 4 MPa greater than the specified 28-day compressive strength, and no individual cylinder shall have a strength less than the specified strength at the maximum age specified or allowed. Data contained in the report shall be from trial batches that were produced within one year of the proposed use of specified strength concrete in the project. Whenever air-entrainment is required, the air content of trial batches shall be equal to or greater than the air content specified for the concrete without reduction due to tolerances.

- Tests shall be performed in conformance with either the appropriate California Test methods or the comparable ASTM test methods. Equipment employed in testing shall be in good condition and shall be properly calibrated. If the tests are performed during the life of the contract, the Engineer shall be notified sufficiently in advance of performing the tests in order to witness the test procedures.
- The certified test data and trial batch test reports shall include the following information:

A. Date of mixing.
B. Mixing equipment and procedures used.
C. The size of batch in cubic meters and the mass, type, and source of all ingredients used.
D. Penetration or slump (if the concrete will be placed under water or placed in cast-in-place concrete piles) of the concrete.
E. The air content of the concrete if an air-entraining admixture is used.
F. The age at time of testing and strength of all concrete cylinders tested.

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

90-10 MINOR CONCRETE

90-10.01 GENERAL

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

90-10.02 MATERIALS

- Minor concrete shall conform to the following requirements:

90-10.02A CEMENTITIOUS MATERIAL

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

90-10.02B AGGREGATE

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

90-10.02C WATER

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

90-10.02D ADMIXTURES

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

90-10.03 PRODUCTION

• Cementitious material, water, aggregate, and admixtures shall be stored, proportioned, mixed, transported, and discharged in conformance with recognized standards of good practice that will result in concrete that is thoroughly and uniformly mixed, that is suitable for the use intended, and that conforms to requirements specified herein. Recognized standards of good practice are outlined in various industry publications such as are issued by American Concrete Institute, AASHTO, or the Department.

• The cementitious material content of minor concrete shall conform to the provisions in Section 90-1.01, "Description."

• The amount of water used shall result in a consistency of concrete conforming to the provisions in Section 90-6.06, "Amount of Water and Penetration." Additional mixing water shall not be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer.

• Discharge of ready-mixed concrete from the transporting vehicle shall be made while the concrete is still plastic and before stiffening occurs. An elapsed time of 1.5 hours (one hour in nonagitating hauling equipment), or more than 250 revolutions of the drum or blades, after the introduction of the cementitious material to the aggregates, or a temperature of concrete of more than 32°C will be considered conditions contributing to the quick stiffening of concrete. The Contractor shall take whatever action is necessary to eliminate quick stiffening, except that the addition of water will not be permitted.

• The required mixing time in stationary mixers shall be not less than 50 seconds or more than 5 minutes.

• The minimum required revolutions at mixing speed for transit-mixed concrete shall be not less than that recommended by the mixer manufacturer, and shall be increased, if necessary, to produce thoroughly and uniformly mixed concrete.

• When a high range water-reducing admixture is added to the concrete at the job site, the total number of revolutions shall not exceed 300.

• Each load of ready-mixed concrete shall be accompanied by a weighmaster certificate that shall be delivered to the Engineer at the discharge location of the concrete, unless otherwise directed by the Engineer. The weighmaster certificate shall be clearly marked with the date and time of day when the load left the batching plant and, if hauled in truck mixers or agitators, the time the mixing cycle started.

• A Certificate of Compliance conforming to the provisions in Section 6–1.07, "Certificates of Compliance," shall be furnished to the Engineer, prior to placing minor concrete from a source not previously used on the contract, stating that minor concrete to be furnished meets contract requirements, including minimum cementitious material content specified.

90-10.04 CURING MINOR CONCRETE

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

90-10.05 PROTECTING MINOR CONCRETE

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

90-10.06 MEASUREMENT AND PAYMENT

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

90-11 MEASUREMENT AND PAYMENT

90-11.01 MEASUREMENT

• Portland cement concrete will be measured in conformance with the provisions specified in the various sections of these specifications covering construction requiring concrete.

• For concrete measured at the mixer, the volume in cubic meters shall be computed as the total mass of the batch in kilograms divided by the density of the concrete in kilograms per cubic meter. The total mass of the batch shall be calculated

as the sum of all materials, including water, entering the batch. The density of the concrete will be determined in conformance with the requirements in California Test 518.

90-11.02 PAYMENT

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

SECTION 91: PAINT

Issue Date: November 18, 2005

Section 91-3, "Paints for Timber," of the Standard Specifications is amended to read:

91-3 PAINTS FOR TIMBER

91-3.01 WOOD PRIMER, LATEX-BASE

Classification:

- This specification covers a ready-mixed priming paint for use on unpainted wood or exterior woodwork. It shall conform with the requirements in the Detailed Performance Standards of the Master Painters Institute (MPI) for exterior wood primers, and be listed on the Exterior Latex Wood Primer MPI List Number 6.

91-3.02 PAINT; LATEX-BASE FOR EXTERIOR WOOD, WHITE AND TINTS

Classification:

- This specification covers a ready-mixed paint for use on wood surfaces subject to outside exposures. This paint shall conform to the requirements in the Detailed Performance Standards of the Master Painters Institute (MPI) for Paint, Latex, Exterior, and shall be listed on the following MPI Approved Products List:

A. Exterior Latex, Flat MPI Gloss Level 1, MPI List Number 10.
B. Exterior Latex, Semi-Gloss, MPI Gloss Level 5, MPI List Number 11.
C. Exterior Latex, Gloss, MPI Gloss Level 6, MPI List Number 119.

- Unpainted wood shall first be primed with wood primer conforming to the provisions in Section 91-3.01, "Wood Primer, Latex-Base."

Section 91-4, "Miscellaneous Paints," of the Standard Specifications is amended to read:

91-4 MISCELLANEOUS PAINTS

91-4.01 THROUGH 91-4.04 (BLANK)

91-4.05 PAINT; ACRYLIC EMULSION, EXTERIOR WHITE AND LIGHT AND MEDIUM TINTS

Classification:

- This specification covers an acrylic emulsion paint designed for use on exterior masonry. This paint shall conform to the requirements in the Detailed Performance Standards of the Master Painters Institute (MPI) for Paint, Latex, Exterior, and shall be listed on the following MPI Approved Products Lists:

A. Exterior Latex, Flat MPI Gloss Level 1, MPI List Number 10.
B. Exterior Latex, Semi-Gloss, MPI Gloss Level 5, MPI List Number 11.
C. Exterior Latex, Gloss, MPI Gloss Level 6, MPI List Number 119.

- This paint may be tinted by using "universal" or "all purpose" concentrates.

SECTION 92: ASPHALTS

Issue Date: February 2, 2007

Section 92, "Asphalts," of the Standard Specifications is amended to read:

92-1.01 DESCRIPTION

- Asphalt is refined petroleum or a mixture of refined liquid asphalt and refined solid asphalt that are prepared from crude petroleum. Asphalt is:

1. Free from residues caused by the artificial distillation of coal, coal tar, or paraffin
2. Free from water
3. Homogeneous

92-1.02 MATERIALS

GENERAL

- Furnish asphalt under the Department's "Certification Program for Suppliers of Asphalt." The Department maintains the program requirements, procedures, and a list of approved suppliers at:

http://www.dot.ca.gov/hq/esc/Translab/fpmcoc.htm

- Transport, store, use, and dispose of asphalt safely.
- Prevent the formation of carbonized particles caused by overheating asphalt during manufacturing or construction.

GRADES

- Performance graded (PG) asphalt binder is:

Performance Graded Asphalt Binder

Property	AASHTO Test Method	Specification Grade				
		PG 58-22 [a]	PG 64-10	PG 64-16	PG 64-28	PG 70-10
Original Binder						
Flash Point, Minimum °C	T 48	230	230	230	230	230
Solubility, Minimum % [b]	T 44	99	99	99	99	99
Viscosity at 135°C, [c] Maximum, Pa·s	T 316	3.0	3.0	3.0	3.0	3.0
Dynamic Shear, Test Temp. at 10 rad/s, °C Minimum G*/sin(delta), kPa	T 315	58 1.00	64 1.00	64 1.00	64 1.00	70 1.00
RTFO Test, [e] Mass Loss, Maximum, %	T 240	1.00	1.00	1.00	1.00	1.00
RTFO Test Aged Binder						
Dynamic Shear, Test Temp. at 10 rad/s, °C Minimum G*/sin(delta), kPa	T 315	58 2.20	64 2.20	64 2.20	64 2.20	70 2.20
Ductility at 25°C Minimum, cm	T 51	75	75	75	75	75
PAV [f] Aging, Temperature, °C	R 28	100	100	100	100	110
RTFO Test and PAV Aged Binder						
Dynamic Shear, Test Temp. at 10 rad/s, °C Maximum G*sin(delta), kPa	T 315	22 [d] 5000	31 [d] 5000	28 [d] 5000	22 [d] 5000	34 [d] 5000
Creep Stiffness, Test Temperature, °C Maximum S-value, Mpa Minimum M-value	T 313	-12 300 0.300	0 300 0.300	-6 300 0.300	-18 300 0.300	0 300 0.300

Notes:

a. Use as asphalt rubber base stock for high mountain and high desert area.

b. The Engineer waives this specification if the supplier is a Quality Supplier as defined by the Department's "Certification Program for Suppliers of Asphalt."

c. The Engineer waives this specification if the supplier certifies the asphalt binder can be adequately pumped and mixed at temperatures meeting applicable safety standards.

d. Test the sample at 3°C higher if it fails at the specified test temperature. G*sin(delta) remains 5000 kPa maximum.

e. "RTFO Test" means the asphaltic residue obtained using the Rolling Thin Film Oven Test, AASHTO Test Method T 240 or ASTM Designation: D 2872. The residue from mass change determination may be used for other tests.

f. "PAV" means Pressurized Aging Vessel.

- Performance graded polymer modified asphalt binder (PG Polymer Modified) is:

Performance Graded Polymer Modified Asphalt Binder [a]

Property	AASHTO Test Method	Specification Grade		
		PG 58-34 PM	PG 64-28 PM	PG 76-22 PM
Original Binder				
Flash Point, Minimum °C	T 48	230	230	230
Solubility, Minimum % [b]	T 44[c]	98.5	98.5	98.5
Viscosity at 135°C, [d] Maximum, Pa·s	T 316	3.0	3.0	3.0
Dynamic Shear, Test Temp. at 10 rad/s, °C Minimum G*/sin(delta), kPa	T 315	58 1.00	64 1.00	76 1.00
RTFO Test , Mass Loss, Maximum, %	T 240	1.00	1.00	1.00
RTFO Test Aged Binder				
Dynamic Shear, Test Temp. at 10 rad/s, °C Minimum G*/sin(delta), kPa	T 315	58 2.20	64 2.20	76 2.20
Dynamic Shear, Test Temp. at 10 rad/s, °C Maximum (delta), %	T 315	Note e 80	Note e 80	Note e 80
Elastic Recovery[f], Test Temp., °C Minimum recovery, %	T 301	25 75	25 75	25 65
PAV[g] Aging, Temperature, °C	R 28	100	100	110
RTFO Test and PAV Aged Binder				
Dynamic Shear, Test Temp. at 10 rad/s, °C Maximum G*sin(delta), kPa	T 315	16 5000	22 5000	31 5000
Creep Stiffness, Test Temperature, °C Maximum S-value, MPa Minimum M-value	T 313	-24 300 0.300	-18 300 0.300	-12 300 0.300

Notes:

a. Do not modify PG Polymer Modified using acid modification.

b. The Engineer waives this specification if the supplier is a Quality Supplier as defined by the Department's "Certification Program for Suppliers of Asphalt."

c. The Department allows ASTM D 5546 instead of AASHTO T 44

d. The Engineer waives this specification if the supplier certifies the asphalt binder can be adequately pumped and mixed at temperatures meeting applicable safety standards.

e. Test temperature is the temperature at which G*/sin(delta) is 2.2 kPa. A graph of log G*/sin(delta) plotted against temperature may be used to determine the test temperature when G*/sin(delta) is 2.2 kPa. A graph of (delta) versus temperature may be used to determine delta at the temperature when G*/sin(delta) is 2.2 kPa. The Engineer also accepts direct measurement of (delta) at the temperature when G*/sin(delta) is 2.2 kPa.

f. Tests without a force ductility clamp may be performed.

g. "PAV" means Pressurized Aging Vessel.

SAMPLING

- Provide a sampling device in the asphalt feed line connecting the plant storage tanks to the asphalt weighing system or spray bar. Make the sampling device accessible between 600 and 750 mm above the platform. Provide a receptacle for flushing the sampling device.
- Include with the sampling device a valve:

1. Between 10 and 20 mm in diameter

2. Manufactured in a manner that a one-liter sample may be taken slowly at any time during plant operations
3. Maintained in good condition

- Replace failed valves.
- In the Engineer's presence, take 2 one-liter samples per operating day. Provide round, friction top, one-liter containers for storing samples.

92-1.03 EXECUTION

- If asphalt is applied, you must comply with the heating and application specifications for liquid asphalt in Section 93, "Liquid Asphalts."

92-1.04 MEASUREMENT

- If the contract work item for asphalt is paid by mass, the Department measures asphalt tonnes by complying with the specifications for mass determination of liquid asphalt in Section 93, "Liquid Asphalts."
- The Engineer determines the asphalt mass from volumetric measurements if you:

1. Use a partial asphalt load.
2. Use asphalt at a location other than a mixing plant and no scales within 35 km are available and suitable.
3. Deliver asphalt in either of the following:

   3.1. A calibrated truck with each tank accompanied by its measuring stick and calibration card.
   3.2. A truck equipped with a calibrated thermometer that determines the asphalt temperature at the delivery time and with a vehicle tank meter complying with the specifications for weighing, measuring, and metering devices in Section 9-1.01, "Measurement of Quantities."

- If you furnish asphalt concrete from a mixing plant producing material for only one project, the Engineer determines the asphalt quantity by measuring the volume in the tank at the project's start and end provided the tank is calibrated and equipped with its measuring stick and calibration card.

- The Engineer determines pay quantities from volumetric measurements as follows:

1. Before converting the volume to mass, the Engineer reduces the measured volume to that which the asphalt would occupy at 15°C.
2. The Engineer uses 981 L/tonne and 1020 g/L for the average mass and volume for PG and PG Polymer Modified asphalt grades at 15°C.
3. The Engineer uses the Conversion Table in Section 93, "Liquid Asphalts."

SECTION 93: LIQUID ASPHALTS

Issue Date: November 3, 2006

The ninth paragraph of Section 93-1.04, "Measurement," of the Standard Specifications is amended to read:

- The following Legend and Conversion Table is to be used for converting volumes of liquid asphalt products, Grades 70 to 3000, inclusive, and paving asphalt Grades PG 58-22, PG 64-10, PG 64-16, PG 64-28, and PG 70-10, and Grades PG 58-34 PM, PG 64-28 PM, and PG 76-22 PM.

SECTION 95: EPOXY

Issue Date: March 16, 2007

Section 95, "Epoxy," of the Standard Specifications is amended to read:

95-1 GENERAL

95-1.01 DESCRIPTION

- These specifications are intended to specify epoxy that will meet service requirements for highway construction.
- Epoxy shall be furnished as 2 components, which shall be mixed together at the site of the work.

95-1.02 SAMPLING AND TESTING

• Epoxy shall not be used prior to sampling and testing unless its use is permitted prior to sampling and testing in conformance with the provisions in Section 6-1.07, "Certificates of Compliance."

• Tests will be conducted in conformance with the latest test methods of the American Society for Testing and Materials, and California Test Methods in use by the Transportation Laboratory.

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

95-1.03 PACKAGING, LABELING AND STORING

• Each component shall be packaged in containers of size proportional to the amount of that component in the mix so that one container of each component is used in mixing one batch of epoxy. The containers shall be of such design that all of the contents may be readily removed and shall be well sealed to prevent leakage. The containers and labeling shall meet U.S. Department of Transportation Hazardous Material Shipping Regulations, and the containers shall be of a material, or lined with a material, of such character as to resist any action by the components. Each container shall be clearly labeled with the ASTM Designation: C881 Class and Type; designation (Component A or B); manufacturer's name; date of manufacture; batch number (a batch shall consist of a single charge of all components in a mixing chamber); all directions for use (as specified elsewhere) and such warning or precautions concerning the contents as may be required by State or Federal Laws and Regulations. The manufacturer of the finished epoxy components shall furnish a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," and a copy of the label for each material. The certificate shall include a list, by Title and Section, of the State and Federal packaging and labeling laws and regulations that the manufacturer has complied with.

• Attention is directed to the characteristic of some epoxy components to crystallize or thicken excessively prior to use when stored at temperatures below 2ºC. Any material which shows evidence of crystallization or a permanent increase in viscosity or settling of pigments which cannot be readily redispersed with a paddle shall not be used.

95-1.04 DIRECTIONS FOR USE

• At the time of mixing, components A and B shall be at a temperature between 15°C and 30°C, unless otherwise specified. Any heating of the adhesive components shall be done by application of indirect heat. Immediately prior to mixing, each component shall be thoroughly mixed with a paddle. Separate paddles shall be used to stir each component. Immediately prior to use, the 2 components shall be thoroughly mixed together in the specified ratios. No solvent shall be added to any epoxy.

• After mixing, epoxies shall be placed in the work and any overlaying or inserted material which is to be bonded to the work by the epoxy shall also be placed before thickening of the epoxy has begun. Surfaces upon which epoxy is to be placed shall be free of rust, paint, grease, asphalt, and loose and deleterious material. When epoxy is used as a binder to make epoxy concrete or mortar, the 2 components of epoxy shall be thoroughly mixed together before the aggregate is added and, unless otherwise specified, the mix proportions shall consist of one part of binder to approximately 4 parts of aggregate, by volume. Aggregate for use in epoxy concrete and mortar shall be clean and shall have a moisture content of not more than 0.50-percent when tested by California Test 226. Surfaces against which epoxy concrete and mortar are to be placed shall be primed with a coat of the epoxy used just prior to placing the concrete or mortar.

95-2 TYPES OF EPOXIES

95-2.01 BINDER (ADHESIVE), EPOXY RESIN BASE

Classification:

• This specification covers a low viscosity epoxy formulated primarily for use in making high-strength epoxy concrete and epoxy mortar and in pressure grouting of cracks in concrete. For load bearing applications, use ASTM Designation: C 881, Type IV, Grade 1, Class B or C. Class B or C shall be used depending on the substrate and ambient temperatures. Use Grade B for atmospheric and surface temperatures as low as 4°C. Use Class C when temperatures are 15°C or higher. For non-load bearing applications use ASTM Designation: C881, Type I, Grade 1, Class B or C. Apply no thicker than recommended by the manufacturer. Thick sections of this epoxy are not suitable for use in freeze thaw environments. In a freeze-thaw environment, increase the aggregate loading to improve the properties of the epoxy concrete.

Directions for Use:

• Mix in conformance with the manufacturer's written recommendations. No more material shall be mixed than can be used within the pot-life from the time mixing operations are started.

95-2.02 (BLANK)

95-2.03 EPOXY RESIN ADHESIVE FOR BONDING NEW CONCRETE TO OLD CONCRETE

Classification:

• This specification covers a low viscosity paste epoxy formulated primarily for use in bonding new portland cement concrete to hardened portland cement concrete. The epoxy shall meet the specification requirements of ASTM Designation: C 881, Type V, Grade 2. This epoxy is available in 2 Classes: Class C for general use at temperature greater than 15°C and Class B for use when cure temperatures are below 15°C and above 4°C, or when a faster cure is required.

Directions for Use:

• The mixing ratio and use shall be in conformance with the manufacturer's written recommendations. When measuring as individual Components A and B, stir and tap the measuring containers to remove possible air voids. The ingredients in Components A and B shall be thoroughly dispersed such that each component forms a uniform paste. Do not mix more material than can be spread within the pot life from the time mixing operations are started. The spreading rate shall be sufficient to thoroughly coat the surface. Spread the mixed adhesive by brush or roller over blast-cleaned concrete at a rate recommended by the manufacturer. The new concrete shall be placed against the adhesive coating on the old concrete before the adhesive has set. If the adhesive has set and is not tacky prior to placing the new concrete, a new coating of adhesive shall be applied.

95-2.04 RAPID SET EPOXY ADHESIVE FOR PAVEMENT MARKERS

Classification:

• This specification covers a high viscosity paste, rapid set epoxy formulated primarily for use in bonding pavement markers to portland cement concrete and asphalt concrete. The adhesive shall meet ASTM Designation: C 881, Type IV, Grade 3, Class B and C except that the gel time may be shorter than 30 minutes. The adhesive shall conform to these requirements and the following.

Characteristics of Combined Components:

• All tests shall be performed in conformance with the requirements in California Test 434.

Property	Requirement
Gel time, minutes, maximum, at 25°C	30
Bond Strength to Concrete, Time, minutes (maximum) to reach not less than 1.4 MPa	
at 25ºC ±1ºC	35
at 10ºC ±1ºC	45
Slant Shear Strength	
2 days at 25ºC ±1ºC, MPa	7
14 days at 25ºC ±1ºC, plus water soak, MPa	10.5
Tensile Adhesion and Cohesion	
Ceramic marker bottom, MPa	4.8 min.
Ceramic marker bottom, including post cure, MPa	4.8 min.
Retroreflective pavement marker bottom, MPa	3.4 min.
Color of mixed epoxy	gray
Glass transition temperature, Tg, samples conditioned at 25°C for 24 hours, ASTM Designation: D 4065	30ºC min.

Directions for Use:

• Components A and B shall be mixed in conformance with the manufacturer's written recommendations. When an automatic proportioning and mixing machine is used, the temperature of the components shall be maintained by indirect heating or cooling, so that the adhesive will meter, mix and extrude properly. The maximum temperature shall be such that after proper mixing no excess adhesive shall flow from under the marker other than that specified in Section 85-1.06, "Placement."

95-2.05 STANDARD SET EPOXY ADHESIVE FOR PAVEMENT MARKERS

Classification:

• This specification covers a high viscosity paste standard set epoxy formulated primarily for use in bonding pavement markers to portland cement concrete and asphalt concrete. The epoxy shall meet ASTM Designation: C 881, Type IV, Viscosity Grade 3, Classes B or C, except that the gel time may be shorter than 30 minutes.

Characteristics of Combined Components:

• All tests shall be performed in conformance with the requirements in California Test 434.

Property	Requirement
Gel time, minutes, maximum, at 25ºC	30
Bond Strength to Concrete, Time (maximum) to reach not less than 1.4 MPa	
at 25ºC ±1ºC	3.5 hours
at 13ºC ±1ºC	24 hours
Slant Shear Strength	
2 days at 25ºC ±1ºC, MPa	7 min.
14 days at 25ºC ±1ºC, plus water soak, MPa	10.5 min.
Tensile Adhesion and Cohesion	
Ceramic marker bottom, MPa	4.8 min.
Ceramic marker bottom, including post cure, MPa	4.8 min.
Reflective pavement marker bottom, MPa	3.4 min.
Color of Mixed Components	gray
Glass transition temperature, Tg, samples conditioned at 25ºC for 24 hours, ASTM Designation: D 4065	30ºC min.

Directions for Use:

• Components A and B shall be mixed in conformance with the manufacturer's written recommendations. When an automatic proportioning and mixing machine is used, the temperature of the components shall be maintained by indirect heating or cooling, so that the adhesive will meter, mix and extrude properly. The maximum temperature shall be such that after proper mixing no excess adhesive shall flow from under the marker other than that specified in Section 85-1.06, "Placement."

95-2.06 (BLANK)

95-2.07 (BLANK)

95-2.08 (BLANK)

95-2.09 EPOXY SEALANT FOR INDUCTIVE LOOPS

Classification:

• This specification covers a high viscosity liquid epoxy formulated primarily for use in sealing inductive wire loops and leads imbedded in asphalt concrete and portland cement concrete for traffic signal controls and vehicle counters. This epoxy is to be used for repair work on existing spalls, cracks and other deformations in and around saw cuts housing inductor loops and leads. The rapid cure allows minimum traffic delay. This sealant is suitable for use in freeze-thaw areas. The epoxy shall meet ASTM Designation: C 881, Type I, Grade 2 and the following requirements.

Characteristics of Combined Components:

• All tests shall be performed in conformance with the requirements in California Test 434.

Property	Requirement
Gel time, minutes, maximum	30
On 3-mm cast sheet, cured 18 hours at 25ºC, + 5 hours at 70ºC	
Tensile Strength, MPa	2.7 min.
Elongation, percent	90 min.
Shore D Hardness	45 min.

Directions for Use:

- Saw cuts shall be cleaned with compressed air to remove all excess moisture and debris. For repairing damaged saw cuts, all loose spalled material shall be cleaned away from the saw cut, chipping back to sound asphalt concrete or portland cement concrete and all loose material cleaned from loop wires.
- The mixing ratio shall be in conformance with the manufacturer's recommendations. No more material shall be mixed than can be used within the gel time from the time mixing operations are started.
- When automatic mixing equipment is used for mixing the sealant, the provisions in the twelfth paragraph in Section 85-1.06, "Placement," shall apply.

95-2.10 (BLANK)

95-2.11 EPOXY RESIN ADHESIVE FOR INJECTION GROUTING OF PORTLAND CEMENT CONCRETE PAVEMENTS

Directions for Use:

- Both components and the mixed material shall contain no solvents. The mixing ratio of the components in terms of volume and mass shall be clearly stated. The material shall be suitable for use in the mixing equipment used by the applicator. Epoxy adhesive samples shall be furnished to the Engineer for testing at least 12 days before the expected time of use.

Characteristics of Adhesive:

Test[a]	California Test	Requirement
Brookfield Viscosity, No. 3 Spindle at 20 rpm, Pa·s at 25ºC	434, Part 4	0.9 max.
Gel time, minutes	434, Part 1	2 to 15
Slant Shear Strength on Dry Concrete, MPa, after 4 days of cure in air at 25ºC ±1ºC	434, Part 5[b]	41.4 min.
Slant Shear Strength on Wet Concrete, MPa, after 4 days of cure in air at 25ºC ±1ºC	434, Part 5[b]	21.1 min.
Tensile Strength, Mpa	434, Part 7, except test after 4 days of cure at 25ºC ±1ºC	31.0 min.
Elongation, %	434, Part 7, except test after 4 days of cure at 25ºC ±1ºC	10 max.

a The mixing ratio used will be that recommended by the manufacturer.

b For slant shear strength on concrete, delete Sections B-1 and B-5 of California Test 434, Part 5. For dry concrete, use Step "2" below only. For wet concrete, use both Steps "1" & "2":

1 Soak blocks in water for 24 hours at 25ºC ±1ºC. Remove and wipe off excess water.

2 Mix epoxy as described in California Test 434, Part 1, and apply a coat approximately 250 µm thick to each diagonal surface. Place four 3-mm square pieces of shim stock 305 µm thick on one block to control final film thickness. Before pressing the coated surfaces together, leave the blocks so that the coated surfaces are horizontal until the epoxy reacts slightly to prevent excessive flow.

END OF AMENDMENTS

SECTION 2. PROPOSAL REQUIREMENTS AND CONDITIONS

2-1.01 GENERAL

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

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

Submit request for substitution of an "or equal" item, and the data substantiating the request to the Department of Transportation, District 11, Construction Duty Senior MS 222, 4050 Taylor Street, San Diego, CA 92110, so that the request is received by the Department by close of business on the fourth business day following bid opening.

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

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

Failure of the bidder to fulfill the requirements of the Special Provisions for submittals required to be furnished after bid opening, including but not limited to escrowed bid documents, where applicable, may subject the bidder to a determination of the bidder's responsibility in the event it is the apparent low bidder on a future public works contracts.

2-1.015 FEDERAL LOBBYING RESTRICTIONS

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

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

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

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

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

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

2-1.02 DISADVANTAGED BUSINESS ENTERPRISE (DBE)

This project is subject to title 49, part 26, Code of Federal Regulations (49 CFR 26) entitled "Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs." In order to ensure the Department achieves its federally mandated statewide overall DBE goal, the Department encourages the participation of Disadvantaged Business Enterprises (DBEs), as defined in 49 CFR 26 in the performance of contracts financed in whole or in part with Federal Funds. The Contractor shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of subcontracts.

Bidders shall be fully informed respecting the requirements of the Regulations. The Regulations in their entirety are incorporated herein by this reference Attention is directed to the following matters:

A. A DBE must be a small business concern as defined pursuant to Section 3 of U.S. Small Business Act and relevant regulations promulgated pursuant thereto.
B. A DBE may participate as a prime contractor, subcontractor, joint venture partner with a prime or subcontractor, vendor of material or supplies, or as a trucking company.
C. A DBE joint venture partner must be responsible for specific contract items of work, or clearly defined portions thereof. Responsibility means actually performing, managing and supervising the work with its own forces. The DBE joint venture partner must share in the capital contribution, control, management, risks and profits of the joint venture commensurate with its ownership interest.
D. A DBE must perform a commercially useful function, i.e., must be responsible for the execution of a distinct element of the work and must carry out its responsibility by actually performing, managing and supervising the work.
E. DBEs must be certified by the California Unified Certification Program (CUCP). Listings of DBEs certified by the CUCP are available from the following sources:

    1. The Department's web site at http://www.dot.ca.gov/hq/bep.
    2. The Department's DBE Directory. This Directory may be obtained from the Department of Transportation, Materiel Operations Branch, Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, California 95815, Telephone: (916) 445-3520.

F. When reporting DBE participation, bidders may count the cost of materials or supplies purchased from DBEs as follows:

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

G. When reporting DBE participation, bidders may count the participation of DBE trucking companies as follows:

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

H. Bidders are encouraged to use services offered by financial institutions owned and controlled by DBEs.

2-1.03 PRE-AWARD QUALIFICATION QUESTIONNAIRE

The Department has established the need to obtain information regarding each bidder's qualifications for performing the work to be done.

Bidders shall submit responses to the "Pre-Award Qualification Questionnaire" included in the Proposal. The responses to the Questionnaire shall be submitted with the bid.

Joint venture contractors shall submit a combined "Pre-Award Qualification Questionnaire" providing separate responses for each joint venture partner.

In signing the signature page of the Proposal, the bidder certifies that the information and answers on the "Pre-Award Qualification Questionnaire" are complete and accurate.

Upon approval of the contract, the completed "Pre-Award Qualification Questionnaire" of each unsuccessful bidder will be returned, unless a determination of non-qualification has been made by the Department, or the award of the contract has been challenged.

2-1.04 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.

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 first, second and third apparent low bidders shall submit to the Department of Transportation, District 11 Construction Duty Senior 4050 Taylor Street, San Diego, CA 92110 (619) 688-6635, fax (619) 688-6988 the identification of the bidder's representative authorized to present the bid documentation and the persons responsible for preparing the bidder's estimate before the close of business on the first Monday after bid opening.

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 Contractor shall submit its bid documentation which shall include, but not be limited to:

1. quantity takeoffs;
2. rate schedules for the direct costs and the time and nontime related indirect costs for
    a. labor (by craft),
    b. plant and equipment ownership and operation,
    c. permanent and expendable materials,
    d. insurance and subcontracted work;
3. estimated construction schedules, including sequence and duration and development of production rates;
4. quotations, terms and limitations of quotes and subcontracts related to subcontractors, manufacturers and suppliers;
5. estimates of field and home office overhead;
6. contingency and margin for each contract item of work;
7. names of the persons responsible for preparing the bidder's estimate, and other reports, calculations, assumptions and supplemental information used by the bidder to arrive at the estimate submitted with the proposal;
8. bid documentation for each subcontractor, manufacturer and supplier whose subcontract or purchase orders exceed or are expected to exceed $250,000.00. Bid documentation for other subcontractors, manufacturers, and suppliers may be submitted, if required by the Contractor, or requested by the subcontractor, manufacturer, or supplier.

If required by the Contractor or requested by the subcontractor, manufacturer, or supplier, additional information may be submitted by the subcontractor, manufacturer, or supplier. Subcontractor, manufacturer and supplier bid documentation shall conform to the requirements for the Contractor's documentation and shall be enclosed with the Contractor's submittal regardless of whether or not subcontracts or purchase orders have been executed or entered into on the date that bid documentation is submitted for escrow. If at the time that bid documentation is submitted for escrow, the subcontractor, manufacturer or supplier does not have an executed subcontract or purchase order, and a subcontract or purchase order is subsequently executed, then a copy of the executed subcontract or purchase order shall be submitted into escrow within 14 days of the execution of the respective subcontract or purchase orders. The examination of subcontractors', manufacturers' and suppliers' bid documentation will be accomplished in the same manner as for the Contractor's bid documentation. If a subcontractor, manufacturer or supplier is replaced, bid documentation for the new subcontractor, manufacturer or supplier shall be submitted for review and escrow before authorization for the substitution will be granted. Upon written request of a subcontractor, manufacturer or supplier, the bid documentation from that subcontractor, manufacturer or supplier shall be reviewed only by the subcontractor, manufacturer or supplier and the Department and shall be placed in a separate container within the Contractor's container. The written request from the subcontractor, manufacturer or supplier shall be included with the bid documentation.

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 District 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 11 Office, Construction Duty Senior (619) 688-6635, 4050 Taylor Street, San Diego, CA, 92110 on the first Tuesday between 1:00 p.m. and 2:00 p.m., following the time indicated in the "Notice to Contractors" for the opening of bids. The fourth and subsequent apparent low bidders shall present the bid documentation for escrow if requested by the Department to do so.

Bid documentation shall be submitted as a paper copy 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 business in San Diego, CA.

Bid documentation submitted by the second and third apparent low bidders will be jointly deposited at agreed commercial businesses in San Diego, CA. 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. Bid documentation from subsequent bidders, if requested, will be examined and inventoried in the same manner as specified above, then sealed and deposited 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.

Any and all components of 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 to assist in the potential resolution or in the settlement of claims or disputes. Such a joint review shall be performed within 15 days of receipt of a written request to do so by either party. If the Contractor refuses to participate in the joint examination of any and all components of the escrowed bid documentation as provided herein, such refusal shall be considered as a failure by the Contractor to exhaust administrative claim remedies with respect to the particular protest, notice of potential claim, or claim. In addition, this refusal by the Contractor shall constitute a bar to future arbitration with respect to the protest, potential claim or claim as provided by Section 10240.2 of the California Public Contract Code.

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 or upon written request of a subcontractor, manufacturer or supplier shall be reviewed only by the subcontractor, supplier or manufacturer and the Department unless it involves a dispute or claim**.** 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 business will be paid by the State.

SECTION 3. PRE-AWARD QUALIFICATION REVIEW 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 the Pre-Award Qualifications Review and the award and execution of contract.

Bid protests are to be delivered to the following address: Department of Transportation, MS 43, Attn: Office Engineer, 1727 30th Street, Sacramento, CA 95816 or by facsimile to the Office Engineer at (916) 227-6282.

3-1.01A PRE-AWARD QUALIFICATIONS REVIEW.

The Engineer will review the responses to the "Pre-Award Qualification Questionnaire" submitted by the apparent low bidder and the Engineer will make a determination on the bidder's qualifications for performing the work in a manner that is safe for the workers and the public, based on the bidder's experience, qualifications of the on-site supervisory personnel, equipment, conceptual approach to the work, and safety history of the bidder and its supervisory personnel.

If the Engineer determines it necessary, a pre-award qualifications review meeting will be conducted by an agent of the Director, and the apparent low bidder shall participate. Notification of whether a meeting will be conducted will be provided on or before the first Thursday following the time indicated in the "Notice to Contractors" for the opening of bids. The meeting, if held, will be on second Thursday following the time indicated in the "Notice to Contractors" for the opening of bids at 10:00 a.m. in the third floor conference room, 1727 30th Street, Sacramento, Ca. 95816. Non-attendance by the apparent low bidder at the pre-award qualifications review meeting shall be just cause for rejection of the bid and forfeiture of the proposal guaranty.

At the pre-award qualifications review meeting, the low bidder shall be prepared to discuss and answer questions relative to the responses to the "Pre-Award Qualification Questionnaire." 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 "Pre-Award Qualification Questionnaire" and responses submitted, and on the information provided at the pre-award qualifications review meeting, if held. The decision of the Engineer regarding the bidder's qualifications shall be final.

The second and third apparent bidders shall participate in pre-award qualifications review meetings if requested to do so by the Department. Notification by the Department will be provided a least 48 hours prior to the pre-award 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 the contract, if it be awarded, will be to the lowest responsible bidder whose proposal complies with all the requirements prescribed and who has met the goal for DBE participation or has demonstrated, to the satisfaction of the Department, adequate good faith efforts to do so and who has established to the satisfaction of the Engineer, the qualifications to complete the work on this project. Meeting the goal for DBE participation or demonstrating, to the satisfaction of the Department, adequate good faith efforts to do so is a condition for being eligible for award of contract.

The contract shall be executed by the successful bidder and shall be returned, together with the contract bonds, to the Department so that it is received within 10 days, not including Saturdays, Sundays and legal holidays, after the bidder has received the contract for execution. Failure to do so shall be just cause for forfeiture of the proposal guaranty. The executed contract documents shall be delivered to the following address: Department of Transportation MS 43, Attn: Office Engineer, 1727 30th Street, Sacramento, CA 95816.

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

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

The first working day is the fifty-fifth day after contract approval.

The Contractor shall not begin work at the job site, except for measuring controlling field dimensions and locating utilities, until the following submittals are received and approved by the Engineer:

1. Baseline Progress Schedule (Critical Path Method)
2. Storm Water Pollution Prevention Plan (SWPPP)
3. Notification of Dispute Review Board (DRB) nominee and disclosure statement

In addition to the above submittals, the Contractor shall not begin work at the job site, except for measuring controlling field dimensions and locating utilities, until the following submittals are received by the Engineer:

1. Notice of Materials To Be Used.
2. Contingency plan for reopening closures to public traffic.

The Contractor may begin work at the job site before the fifty-fifth day after contract approval if:

1. The Contractor submits and obtains required approvals for the submittals before the fifty-fifth day.
2. Authorized by the Engineer in writing.

The Department will grant time extensions for delays only that are beyond the Contractor's control and that prevent the Contractor from starting work at the job site on the first working day.

The work (except plant establishment work) shall be diligently prosecuted to completion before the expiration of 655 **WORKING DAYS.**

The Contractor shall pay to the State of California the sum of $16,100 per day for each day's delay in finishing the work (except plant establishment work) in excess of the number of working days specified above.

The work (including plant establishment work) shall be diligently prosecuted to completion before the expiration of 905 **WORKING DAYS**.

The Contractor shall pay to the State of California the sum of $600 per day for each day's delay in completing the plant establishment work.

In no case will liquidated damages of more than $16,100 per day be assessed.

SECTION 5. GENERAL

SECTION 5-1. MISCELLANEOUS

5-1.01 GUARANTEE

GENERAL

The Contractor shall guarantee the work is in accordance with contract requirements and remains free from substantial defects in materials and workmanship for a period of one year after contract acceptance. For certain portions of the work where the Director relieves the Contractor of responsibility in accordance with Section 7-1.15, "Relief from Maintenance and Responsibility," of the Standard Specifications, the guarantee period starts on the relief date and ends one year therefrom.

Substantial defects in materials and workmanship means defective work objectively manifested by damaged, displaced, or missing parts or components and workmanship resulting in improper function of materials, components, equipment, or systems, as installed or manufactured by the Contractor, subcontractor, supplier, or manufacturer.

During the guarantee period, the Contractor shall repair or replace contract work and associated work which is not in accordance with contract requirements or has substantial defects in materials and workmanship. The Contractor shall perform the corrective work with no expense to the Department other than State-provided field inspection services.

The guarantee of work excludes damage or displacement that is outside the control of the Contractor and caused by normal wear and tear, improper operation, insufficient maintenance, abuse, unauthorized modification, or natural disaster as described in Section 7-1.165, "Damage by Storm, Flood, Tsunami or Earthquake," of the Standard Specifications.

The Contractor shall have the same insurance coverage during corrective work operations as prior to contract acceptance, in accordance with Section 7-1.12, "Indemnification and Insurance," of the Standard Specifications.

The contract bonds furnished in accordance with Section 3-1.02, "Contract Bonds," of the Standard Specifications must remain in full force and effect during the guarantee period and until all corrective work is complete.

In the case of conflict between this guarantee provision and any warranty provision included in the contract, the warranty provision shall govern for the specific construction product or feature covered.

CORRECTIVE WORK

During the guarantee period, the Department will monitor performance of the highway facilities completed by the Contractor and will perform a thorough review of the contract work at least 60 days before the expiration of the one-year guarantee.

If the Engineer discovers contract work not in compliance with contract requirements or that has substantial defects in materials and workmanship, at any time during the guarantee period, a list of items that require corrective work will be developed and forwarded to the Contractor. Within 15 days of receipt of a list, the Contractor shall submit to the Engineer a detailed plan for performing corrective work. The work plan shall include a start to finish schedule. It shall include a list of labor, equipment, materials, and any special services intended to be used. It shall clearly show related work including traffic control, temporary delineation, and permanent delineation.

The Contractor shall start the corrective and related work within 15 days of receiving notice from the Engineer that the Contractor's work plan is approved. The corrective work shall be diligently prosecuted and completed within the time allotted in the approved work plan.

If the Engineer determines that corrective work, covered by the guarantee, is urgently needed to prevent injury or property damage, the Engineer will give the Contractor a request to start emergency repair work and a list of items that require repair work. The Contractor shall mobilize within 24 hours and diligently perform emergency repair work on the damaged highway facilities. The Contractor shall submit a work plan within 5 days of starting emergency repair work.

If the Contractor fails to commence and execute, with due diligence, corrective work and related work required under the guarantee in the time allotted, the Engineer may proceed to have the work performed by State forces or other forces at the Contractor's expense. Upon demand, the Contractor shall pay all costs incurred by the Department for work performed by State forces or other forces including labor, equipment, material, and special services.

PAYMENT

Full compensation for performing corrective work; and related work such as traffic control, temporary delineation, and permanent delineation, and to maintain insurance coverage and bonds, shall be considered as included in the contract prices paid for the various contract items of work and no separate payment will be made therefor.

5-1.019 COST REDUCTION INCENTIVE

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

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

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

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

5-1.02 LABOR NONDISCRIMINATION

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

NOTICE OF REQUIREMENT FOR NONDISCRIMINATION PROGRAM

(GOV. CODE, SECTION 12990)

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

5-1.03 INTEREST ON PAYMENTS

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

A. Unpaid progress payments, payment after acceptance, and final payments shall begin to accrue interest 30 days after the Engineer prepares the payment estimate.
B. Unpaid extra work bills shall begin to accrue interest 30 days after preparation of the first pay estimate following receipt of a properly submitted and undisputed extra work bill. To be properly submitted, the bill must be submitted within 7 days of the performance of the extra work and in conformance with the provisions in Section 9-1.03C, "Records," and Section 9-1.06, "Partial Payments," of the Standard Specifications. An undisputed extra work bill not submitted within 7 days of performance of the extra work will begin to accrue interest 30 days after the preparation of the second pay estimate following submittal of the bill.
C. The rate of interest payable for unpaid progress payments, payments after acceptance, final payments, and extra work payments shall be 10 percent per annum.
D. The rate of interest payable on a claim, protest or dispute ultimately allowed under this contract shall be 6 percent per annum. Interest shall begin to accrue 61 days after the Contractor submits to the Engineer information in sufficient detail to enable the Engineer to ascertain the basis and amount of said claim, protest or dispute.

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

5-1.04 PUBLIC SAFETY

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

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

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

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

B. Temporarily Unprotected Permanent Obstacles—The work includes the installation of a fixed obstacle together with a protective system, such as a sign structure together with protective railing, and the Contractor elects to install the obstacle prior to installing the protective system; or the Contractor, for the Contractor's convenience and with permission of the Engineer, removes a portion of an existing protective railing at an obstacle and does not replace such railing complete in place during the same day.
C. Storage Areas—Material or equipment is stored within 3.6 m of the lane and the storage is not otherwise prohibited by the provisions of the Standard Specifications and these special provisions.

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

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

Approach Speed of Public Traffic (Posted Limit) (Kilometers Per Hour)	Work Areas
Over 72 (45 Miles Per Hour)	Within 1.8 m of a traffic lane but not on a traffic lane
56 to 72 (35 to 45 Miles Per Hour)	Within 0.9-m of a traffic lane but not on a traffic lane

The lane closure provisions of this section shall not apply if the work area is protected by permanent or temporary railing or barrier.

When traffic cones or delineators are used to delineate a temporary edge of a traffic lane, the line of cones or delineators shall be considered to be the edge of the traffic lane, however, the Contractor shall not reduce the width of an existing lane to less than 3 m without written approval from the Engineer.

When work is not in progress on a trench or other excavation that required closure of an adjacent lane, the traffic cones or portable delineators used for the lane closure shall be placed off of and adjacent to the edge of the traveled way. The spacing of the cones or delineators shall be not more than the spacing used for the lane closure.

Suspended loads or equipment shall not be moved nor positioned over public traffic or pedestrians.

Full compensation for conforming to the provisions in this section "Public Safety," including furnishing and installing temporary railing (Type K) and temporary crash cushion modules, shall be considered as included in the contract prices paid for the various items of work involved and no additional compensation will be allowed therefor.

5-1.05 TESTING

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

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

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

5-1.06 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES

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

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

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

5-1.065 SOLID WASTE DISPOSAL AND RECYCLING REPORT

This work shall consist of reporting disposal and recycling of construction solid waste, as specified in these special provisions. For the purposes of this section, solid waste includes construction and demolition waste debris, but not hazardous waste.

Annually by the fifteenth day of January, the Contractor shall complete and certify Form CEM-4401, "Solid Waste Disposal and Recycling Report," which quantifies solid waste generated by the work performed and disposed of in landfills or recycled during the previous calendar year. The amount and type of solid waste disposed of or recycled shall be reported in tons. The Contractor shall also complete and certify Form CEM-4401 within 5 days following contract acceptance.

Form CEM-4401, "Solid Waste Disposal and Recycling Report" can be downloaded from the following website:

http://www.dot.ca.gov/hq/construc/manual2001

If the Contractor has not submitted Form CEM-4401, by the dates specified above, the Department will withhold the amount of $10,000 for each missing or incomplete report. The moneys withheld will be released for payment on the next monthly estimate for partial payment following the date that a complete and acceptable Form CEM-4401 is submitted to the Engineer. Upon completion of all contract work and submittal of the final Form CEM-4401, remaining withheld funds associated with this section, "Solid Waste Disposal and Recycling Report," will be released for payment. Withheld funds in

conformance with this section shall be in addition to other moneys withheld provided for in the contract. No interest will be due the Contractor on withheld amounts.

Full compensation for preparing and submitting Form CEM-4401, "Solid Waste Disposal and Recycling Report," shall be considered as included in the contract price for the various items of work involved and no additional compensation will be allowed therefor.

5-1.07 (BLANK)

5-1.08 SUBCONTRACTOR AND DBE RECORDS

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

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

Prior to the fifteenth of each month, the Contractor shall submit documentation to the Engineer showing the amount paid to DBE trucking companies. The Contractor shall also obtain and submit documentation to the Engineer showing the amount paid by DBE trucking companies to all firms, including owner-operators, for the leasing of trucks. If the DBE leases trucks from a non-DBE, the Contractor may count only the fee or commission the DBE receives as a result of the lease arrangement.

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

5-1.083 DBE CERTIFICATION STATUS

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

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

5-1.086 PERFORMANCE OF SUBCONTRACTORS

The subcontractors listed by the Contractor in conformance with Section 2-1.054, "Required Listing of Proposed Subcontractors," of the Standard Specifications, shall perform the work and supply the materials for which they are listed, unless the Contractor has received prior written authorization to perform the work with other forces or to obtain the materials from other sources.

The Contractor should notify the Engineer in writing of any changes to its anticipated DBE participation. This notice should be provided prior to the commencement of that portion of the work.

5-1.09 SUBCONTRACTING

Attention is directed to the provisions in Section 8-1.01, "Subcontracting," of the Standard Specifications, and these special provisions.

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

Each subcontract and lower tier subcontracts that may in turn be made shall include the "Required Contract Provisions Federal-Aid Construction Contracts" in Section 14 of these special provisions. Noncompliance shall be corrected. Payment for subcontracted work involved will be withheld from progress payments due, or to become due, until correction is made. Failure to comply may result in termination of the contract.

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

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

5-1.10 PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS

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

5-1.103 RECORDS

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

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

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

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

5-1.104 INTERNET DAILY EXTRA WORK REPORT

When extra work is being paid for on a force account basis, the Contractor shall submit daily extra work reports in conformance with the provisions in Section 9-1.03C, "Records," of the Standard Specifications and these special provisions.

The Contractor shall send daily extra work reports to the Engineer using the Department's Internet extra work billing system. The reports shall conform to the requirements in the "iCAS User's Guide" (Guide). The Guide is available from the Department, and is also found on the Internet at:

http://www.dot.ca.gov/hq/construc/ewb/EWB_INSTRUCTION.pdf

The Department will provide system accounts to the Contractor's authorized representatives when at least one of the representatives has received training. The Department will provide system training to at least one of the Contractor's authorized representatives within 30 days of the Contractor's request for training. The Department will assign an account and user identification to the Contractor's authorized representatives, and each Contractor's authorized representative shall maintain a unique password. A daily extra work report that the Contractor's authorized representative sends to the Department using the Internet extra work billing system will be considered signed by the Contractor. A daily extra work report that the Engineer approves using the Internet extra work billing system will be considered signed by the Engineer.

Daily extra work reports that include billing for materials shall be substantiated by a valid copy of a vendor's invoice in conformance to the requirements in Section 9-1.03C, "Records," of the Standard Specifications. Each materials invoice shall clearly identify the relative daily extra work report and the associated cost of the materials. In addition to postal service and parcel service and if approved by the Engineer, invoices may be sent by facsimile or as an electronic-mail attachment.

The Contractor shall maintain the Contractor's interface with the Department's Internet extra work billing system. If the Contractor is using the file transfer process to submit extra work reports, it shall conform to the file transfer format and process defined in the Guide.

5-1.105 ARCHAEOLOGICAL DISCOVERIES

If archaeological materials, including but not limited to human skeletal material and disarticulated human bone, are discovered at the job site, protect and leave undisturbed and in place archaeological materials in accordance with the following codes and these special provisions:

1. California Public Resources Code, Division 5, Chapter 1.7 § 5097.5
2. California Public Resources Code, Division 5, Chapter 1.75 § 5097.98 and § 5097.99
3. California Administrative Code, Title 14 § 4308
4. California Penal Code, Part 1, Title 14 § 622-1/2
5. California Health and Safety Code, Division 7, Part 1, Chapter 2, § 7050.5

Archaeological materials are the physical remains of past human activity and include historic-period archaeological materials and prehistoric Native American archaeological materials. Nonhuman fossils are not considered to be archaeological except when showing direct evidence of human use or alteration or when found in direct physical association with archaeological materials as described in these special provisions.

Historic-period archaeological materials include cultural remains beginning with initial European contact in California, but at least 50 years old. Historical archaeological materials include:

1. Trash deposits or clearly defined disposal pits containing tin cans, bottles, ceramic dishes, or other refuse indicating previous occupation or use of the site
2. Structural remains of stone, brick, concrete, wood, or other building material found above or below ground or
3. Human skeletal remains from the historic period, with or without coffins or caskets, including any associated grave goods

Prehistoric Native American archaeological materials include:

1. Human skeletal remains or associated burial goods such as beads or ornaments
2. Evidence of tool making or hunting such as arrowheads and associated chipping debris of fine-grained materials such as obsidian, chert, or basalt
3. Evidence of plant processing such as pestles, grinding slabs, or stone bowls
4. Evidence of habitation such as cooking pits, stone hearths, packed or burnt earth floors or
5. Remains from food processing such as concentrations of discarded or burnt animal bone, shellfish remains, or burnt rocks used in cooking

Immediately upon discovery of archaeological materials, stop all work within a 18.5 meter radius of the archaeological materials and immediately notify the Engineer. Archaeological materials found during construction are the property of the State. Do not resume work within the 18.5 meter radius of the find until the Engineer gives you written approval. If, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of an archeological find or investigation or recovery of archeological materials, you will be compensated for resulting losses and an extension of time will be granted in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The Department may use other forces to investigate and recover archaeological materials from the location of the find. When ordered by the Engineer furnish labor, material, tools and equipment, to secure the location of the find, and assist in the investigation or recovery of archaeological materials and the cost will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

Full compensation for immediately notifying the Engineer upon discovery of archaeological materials and leaving undisturbed and in place archaeological materials discovered on the job site shall be considered as included in the contract price paid for various items of work involved and no additional compensation will be allowed therefor.

5-1.11 PARTNERING

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

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

A one-day "Training in Partnering Concepts" session will be conducted regardless of whether the Contractor requests the formation of a "Partnering" relationship. The "Training in Partnering Concepts" session will be conducted locally for the Contractor's and the Engineer's project representatives. The Contractor shall be represented by a minimum of 2 representatives, one being the Contractor's authorized representative pursuant to Section 5-1.06, "Superintendence," of the Standard Specifications. Scheduling of the "Training in Partnering Concepts" session and selection of the trainer and training site shall be determined cooperatively by the Contractor and the Engineer. If, upon the Contractor's request, "Partnering" is approved by the Engineer, the "Training in Partnering Concepts" session shall be conducted prior to the initial "Partnering Workshop."

The costs involved in providing the "Training in Partnering Concepts" trainer and training site will be borne entirely by the State. The costs will be determined in conformance with the provisions in Section 9-1.03B, "Work Performed by Special Forces or Other Special Services," of the Standard Specifications, and paying to the Contractor the sum of that cost, except no markups will be allowed.

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

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

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

5-1.114 VALUE ANALYSIS

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

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

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

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

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

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

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

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

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

5-1.12 DISPUTE REVIEW BOARD

GENERAL

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

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

Disputes, as used in this section, shall include differences of opinion, properly noticed as provided hereinafter, between the State and Contractor on matters related to the work and other subjects considered by the State or Contractor, or by both, to be of concern to the DRB on this project, except matters relating to Contractor, subcontractor or supplier potential claims not actionable against the Department as specified in these special provisions or quantification of disputes for overhead type expenses or costs. Disputes for overhead type expenses or costs shall conform to the requirements of Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications. Whenever the term "dispute" or "disputes" is used herein, it shall be deemed to include potential claims as well as disputes.

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

SELECTION PROCESS, DISCLOSURE AND APPOINTMENTS

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

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

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

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

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

The first 2 DRB members shall select a third DRB member subject to mutual approval of the parties or may mutually concur on a list of potentially acceptable third DRB members and submit the list to the parties for final selection and approval

of the third member. The goal in the selection of the third member is to complement the professional experience of the first 2 members and to provide leadership for the DRB's activities.

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

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

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

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

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

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

COMPENSATION

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

REPLACEMENT OF DRB MEMBERS

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

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

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

OPERATION

The following procedure shall be used for dispute resolution:

A. If the Contractor objects to any decision, act or order of the Engineer, the Contractor shall give written notice of potential claim in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications and these special provisions, including the provision of applicable cost documentation; or file written protests or notices in conformance with the provisions in the Standard Specifications and these special provisions.
B. The Engineer will respond, in writing, to the Contractor's written supplemental notice of potential claim within 20 days of receipt of the notice.
C. Within 15 days after receipt of the Engineer's written response, the Contractor shall, if the Contractor still objects, file a written reply with the Engineer, stating clearly and in detail the basis of the objection.
D. Following an objection to the Engineer's written response, the Contractor shall refer the dispute to the DRB if the Contractor wishes to further pursue the objection to the Engineer's decision. The Contractor shall make the referral in writing to the DRB, simultaneously copied to the State, within 21 days after receipt of the written response from the Engineer. The written dispute referral shall describe the disputed matter in individual discrete segments so that it will be clear to both parties and the DRB what discrete elements of the dispute have been resolved, and which remain unresolved, and shall include an estimate of the cost of the affected work and impacts, if any, on project completion.
E. By failing to submit the written notice of referral to the DRB, within 21 days after receipt of the Engineer's written response to the supplemental notice of potential claim, the Contractor waives future claims and arbitration on the matter in contention.
F. The Contractor and the State shall each be afforded an opportunity to be present and to be heard by the DRB, and to offer evidence. Either party furnishing written evidence or documentation to the DRB must furnish copies of such information to the other party a minimum of 15 days prior to the date the DRB is scheduled to convene the meeting for the dispute. Either party shall produce such additional evidence as the DRB may deem necessary to reach an understanding and a determination of the dispute. The party furnishing additional evidence shall furnish copies of such additional evidence to the other party at the same time the evidence is provided to the DRB. The DRB shall not consider evidence not furnished in conformance with the terms specified herein.
G. Upon receipt by the DRB of a written referral of a dispute, the DRB shall convene to review and consider the dispute. The dispute meeting shall be held no earlier than 30 days and no later than 60 days after receipt of the written referral unless otherwise agreed to by all parties. The DRB shall determine the time and location of the DRB dispute meeting, with due consideration for the needs and preferences of the parties while recognizing the paramount importance of a timely hearing of the dispute.
H. There shall be no participation of either party's attorneys at DRB dispute meetings.
I. There shall be no participation of persons who are not directly involved in the contract or who do not have direct knowledge of the dispute, including but not limited to consultants, except for expert testimony allowed at the discretion of the DRB and with approval prior to the dispute meeting by both parties.
J. The DRB shall furnish a report, containing findings and recommendations as described in the Dispute Review Board Agreement, in writing to both the State and the Contractor. The DRB may request clarifying information of either party within 10 days after the DRB dispute meeting. Requested information shall be submitted to the DRB within

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

K. Within 30 days after receiving the DRB's report, both the State and the Contractor shall respond to the DRB in writing signifying that the dispute is either resolved or remains unresolved. Failure to provide the written response within the time specified, or a written rejection of the DRB's recommendation or response to a request for reconsideration presented in the report by either party, shall conclusively indicate that the party(s) failing to respond accepts the DRB recommendation. Immediately after responses have been received from both parties, the DRB shall provide copies of both responses to the parties simultaneously. Either party may request clarification of elements of the DRB's report from the DRB prior to responding to the report. The DRB shall consider any clarification request only if submitted within 10 days of receipt of the DRB's report, and if submitted simultaneously in writing to both the DRB and the other party. Each party may submit only one request for clarification for any individual DRB report. The DRB shall respond, in writing, to requests for clarification within 10 days of receipt of such requests.

L. The DRB's recommendations, stated in the DRB's reports, are not binding on either party. Either party may seek a reconsideration of a recommendation of the DRB. The DRB shall only grant a reconsideration based upon submission of new evidence and if the request is submitted within the 30-day time limit specified for response to the DRB's written report. Each party may submit only one request for reconsideration regarding an individual DRB recommendation.

M. If the State and the Contractor are able to resolve their dispute with the aid of the DRB's report, the State and Contractor shall promptly accept and implement the recommendations of the DRB. If the parties cannot agree on compensation within 60 days of the acceptance by both parties of the DRB's recommendation, either party may request the DRB to make a recommendation regarding compensation.

N. The State or the Contractor shall not call DRB members who served on the DRB for this contract as witnesses in arbitration proceedings which may arise from this contract, and all documents created by the DRB shall be inadmissible as evidence in subsequent arbitration proceedings, except the DRB's final written reports on each issue brought before it.

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

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

DISPUTES INVOLVING SUBCONTRACTOR POTENTIAL CLAIMS

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

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

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

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

D. Failure by the Contractor to declare a subcontractor potential claim on behalf of its subcontractor (including lower tier subcontractors' and suppliers' pass through potential claims) at the time of submission of the Contractor's

potential claims, as provided hereunder, shall constitute a release of the State by the Contractor of such subcontractor potential claim.

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

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

DISPUTE REVIEW BOARD AGREEMENT

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

Form 6202 Rev (09/01/02)

DISPUTE REVIEW BOARD AGREEMENT

_____
(Contract Identification)

Contract No. _____

THIS DISPUTE REVIEW BOARD AGREEMENT, hereinafter called "AGREEMENT", made and entered into this _____ day of _____, _____, between the State of California, acting through the California Department of Transportation and the Director of Transportation, hereinafter called the "STATE," _____ _____ hereinafter called the "CONTRACTOR," and the Dispute Review Board, hereinafter called the "DRB" consisting of the following members:

_____ ,
(Contractor Appointee)

_____ ,
(State Appointee)

and _____
(Third Person)

WITNESSETH, that

WHEREAS, the STATE and the CONTRACTOR, hereinafter called the "parties," are now engaged in the construction on the State Highway project referenced above; and

WHEREAS, the special provisions for the above referenced contract provides for the establishment and operation of the DRB to assist in resolving disputes; and

WHEREAS, the DRB is composed of three members, one selected by the STATE, one selected by the CONTRACTOR, and the third member selected by the other two members and approved by the parties;

NOW THEREFORE, in consideration of the terms, conditions, covenants, and performance contained herein, or attached and incorporated and made a part hereof, the STATE, the CONTRACTOR, and the DRB members hereto agree as follows:

SECTION I DESCRIPTION OF WORK

To assist in the resolution of disputes between the parties, the contract provides for the establishment and the operation of the DRB. The intent of the DRB is to fairly and impartially consider disputes placed before it and provide written recommendations for resolution of these disputes to both parties. The members of this DRB shall perform the services necessary to participate in the DRB's actions as designated in Section II, Scope of Work.

SECTION II SCOPE OF WORK

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

A. OBJECTIVE

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

B. PROCEDURES

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

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

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

C. CONSTRUCTION SITE VISITS, PROGRESS MEETINGS AND FIELD INSPECTIONS

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

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

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

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

D. DRB CONSIDERATION AND HANDLING OF DISPUTES

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

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

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

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

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

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

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

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

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

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

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

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

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

E. DRB MEMBER REPLACEMENT

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

SECTION III CONTRACTOR RESPONSIBILITIES

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

SECTION IV STATE RESPONSIBILITIES

The STATE will furnish the following services and items:

A. CONTRACT RELATED DOCUMENTS

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

B. COORDINATION AND SERVICES

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

SECTION V TIME FOR BEGINNING AND COMPLETION

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

SECTION VI PAYMENT

A. ALL INCLUSIVE RATE PAYMENT

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

B. PAYMENTS

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

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

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

C. INSPECTION OF COSTS RECORDS

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

SECTION VII ASSIGNMENT OF TASKS OF WORK

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

SECTION VIII TERMINATION OF DRB MEMBERS

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

SECTION IX LEGAL RELATIONS

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

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

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

SECTION X CONFIDENTIALITY

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

SECTION XI DISPUTES

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

SECTION XII VENUE, APPLICABLE LAW, AND PERSONAL JURISDICTION

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

SECTION XIII FEDERAL REVIEW AND REQUIREMENTS

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

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

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

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

DRB MEMBER

By: _____

Title: _____

DRB MEMBER

By: _____

Title : _____

DRB MEMBER

By : _____

Title : _____

CONTRACTOR

By: _____

Title: _____

CALIFORNIA STATE DEPARTMENT
OF TRANSPORTATION

By: _____

Title: _____

5-1.13 FORCE ACCOUNT PAYMENT

Payment for extra work at force account will be determined by either non-subcontracted or subcontracted force account payment unless otherwise specified.

Non-Subcontracted Force Account Payment:

When extra work to be paid for on a force account basis is performed by the Contractor, compensation will be determined in accordance with Section 9-1.03, "Force Account Payment," of the Standard Specifications and these special provisions.

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

Attention is directed to "Time-Related Overhead" of these special provisions.

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

Cost	Percent Markup
Labor	28
Materials	10
Equipment Rental	10

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

The above markups, together with payments made for time-related overhead pursuant to "Time-Related Overhead" of these special provisions, shall constitute full compensation for all overhead costs for work performed on a force account basis. These overhead costs shall be deemed to include all items of expense not specifically designated as cost or equipment rental in conformance with the provisions in Sections 9-1.03A(1), "Labor," 9-1.03A(2), "Materials," and 9-1.03A(3), "Equipment Rental," of the Standard Specifications. The total payment made as provided above and in the first paragraph of

Section 9-1.03A, "Work Performed by Contractor," of the Standard Specifications shall be deemed to be the actual cost of the work performed on a force account basis, and shall constitute full compensation therefor.

Full compensation for overhead costs for work performed on a force account basis, and for which no adjustment is made to the quantity for time-related overhead conforming to the provisions in "Time-Related Overhead" of these special provisions, shall be considered as included in the markups specified above, and no additional compensation will be allowed therefor.

Subcontracted Force Account Payment:

When extra work to be paid for on a force account basis is performed by a subcontractor approved in conformance with the provisions in Section 8-1.01, "Subcontracting," of the Standard Specifications, compensation will be determined in accordance with the provisions in Section 9-1.03, "Force Account Payment," of the Standard Specifications.

5-1.14 COMPENSATION ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS

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

ITEM CODE	ITEM
390102	ASPHALT CONCRETE (TYPE A)
397001	ASPHALTIC EMULSION (PAINT BINDER)
390108	ASPHALT CONCRETE BASE (TYPE A)

The compensation payable for paving asphalt used in asphalt concrete, asphalt concrete base and asphaltic emulsion (paint binder) will be increased or decreased in conformance with the provisions of this section for paving asphalt price fluctuations exceeding 10 percent (Iu/Ib is greater than 1.10 or less than 0.90) which occur during performance of the work.

The quantity of paving asphalt used in asphaltic emulsion (paint binder) will be determined by multiplying the item quantity for asphaltic emulsion (paint binder) included in a monthly estimate by the minimum percent residue specified in Section 94, "Asphaltic Emulsions," of the Standard Specifications. The asphaltic emulsion minimum percent residue will be based on the type of emulsion used by the Contractor.

At the Contractor's option, the Contractor may provide actual daily test results for paving asphalt residue for the asphaltic emulsion (paint binder) used. Test results provided by the Contractor shall be from an independent testing laboratory that participates in the AASHTO Proficiency Sample Program. The Contractor shall take samples of asphaltic emulsion from the distributor truck at mid-load from a sampling tap or thief. Two separate 2-liter samples shall be taken in the presence of the Engineer. The Contractor shall provide one sample to the Contractor's independent testing laboratory within 24 hours of sampling. The second sample shall be given to the Engineer. The test results from the Contractor's independent testing laboratory shall be delivered to the Engineer within 10 days from sample date.

The adjustment in compensation will be determined in conformance with the following formulae when the item of asphalt concrete, asphalt concrete base or asphaltic emulsion (paint binder), or both, are included in a monthly estimate:

A. Total monthly adjustment = AQ

B. For an increase in paving asphalt price index exceeding 10 percent:

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

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

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

D. Where:

A = Adjustment in dollars per tonne of paving asphalt used to produce asphalt concrete, asphalt concrete base and asphaltic emulsion residue used as paint binder rounded to the nearest $0.01.

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

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

Q = Quantity in tonnes of paving asphalt that was used in producing the quantity of asphalt concrete, and asphalt concrete base shown under "This Estimate" on the monthly estimate using the amount of asphalt determined by the Engineer plus the quantity in tonnes of paving asphalt that would have been used as residue in the asphaltic emulsion (paint binder) shown under "This Estimate" on the monthly estimate.

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

A. The compensation adjustments provided herein will be shown separately on payment estimates. The Contractor shall be liable to the State for decreased compensation adjustments and the Department may deduct the amount thereof from moneys due or that may become due the Contractor.
B. Compensation adjustments made under this section will be taken into account in making adjustments in conformance with the provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications.
C. In the event of an overrun of contract time, adjustment in compensation for paving asphalt included in estimates during the overrun period will be determined using the California Statewide Paving Asphalt Price Index in effect on the first business day of the month within the pay period in which the overrun began.

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

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

The California Statewide Paving Asphalt Price Index is available on the Division of Engineering Services website at:

http://www.dot.ca.gov/hq/esc/oe/asphalt_index/astable.html

5-1.15 AREAS FOR CONTRACTOR'S USE

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

Areas available for the exclusive use of the Contractor are designated on the plans. Use of the Contractor's work areas and other State-owned property shall be at the Contractor's own risk, and the State shall not be held liable for damage to or loss of materials or equipment located within these areas.

The Contractor shall obtain encroachment permits prior to occupying State-owned parcels outside the contract limits. The required encroachment permits may be obtained from the Department of Transportation, Permit Engineer, 4050 Taylor Street, San Diego, CA 92110.

Residence trailers will not be allowed within the highway right of way, except that one trailer will be allowed for yard security purposes.

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

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

5-1.16 PAYMENTS

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

For the purpose of making partial payments pursuant to Section 9-1.06, "Partial Payments," of the Standard Specifications, the amount set forth for the contract items of work hereinafter listed shall be deemed to be the maximum value of the contract item of work which will be recognized for progress payment purposes:

A.	Clearing and Grubbing	$400,000.00
B.	Develop Water Supply	$ 70,000.00
C.	Progress Schedule (Critical Path Method)	$ 60,000.00
D.	Lead Compliance Plan	$ 70,000.00

After acceptance of the contract pursuant to the provisions in Section 7-1.17, "Acceptance of Contract," of the Standard Specifications, the amount, if any, payable for a contract item of work in excess of the maximum value for progress payment purposes hereinabove listed for the item, will be included for payment in the first estimate made after acceptance of the contract.

In determining the partial payments to be made to the Contractor, only the following listed materials will be considered for inclusion in the payment as materials furnished but not incorporated in the work:

A. Prestressing steel including ducts and anchorages
B. Piling
C. Type B joint seal
D. Joint seal assembly
E. Bar reinforcing steel
F. Miscellaneous bridge metal
G. Chain link railing
H. Cable railing
I. Pipe (Irrigation System)
J. Metal sign structures
K. Alternative culvert pipe
L. Reinforced concrete pipe
M. Alternative pipe downdrain
N. Miscellaneous facilities
O. Sewer pipes and appurtenances
P. Rock slope protection fabric
Q. Miscellaneous iron and steel
R. Fences and gates
S. Metal beam guard railing
T. Thrie beam barrier
U. Crash cushions
V. Pavement markers
W. Fiber optic conduit
X. Fiber optic cable
Y. Fiber optic vaults
AA. Signal and lighting standards
BB. Signal heads and mounting brackets
CC. Luminaires
DD. Lighting fixtures
EE. Metal structures
FF. Service equipment enclosures

For the contract item of Plant Establishment the Department has determined that the amount of $50,000.00 shall be considered to be the value of the contract item for the purpose of calculating contract retention pursuant to Public Contract Code section 10261.

If the amount bid is less than the value, the partial payments for all work performed prior to start of plant establishment will be reduced by the difference between the amount bid for plant establishment and the value specified. This reduction in payment shall not be considered funds withheld to ensure performance of the contract. Partial payments during the plant establishment period will be increased proportionately by the amount the value exceeds the amount bid for plant establishment.

5-1.17 PROJECT INFORMATION

The information in this section has been compiled specifically for this project and is made available for bidders and Contractors. Other information referenced in the Standard Specifications and these special provisions do not appear in this section. The information is subject to the conditions and limitations set forth in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," and Section 6-2, "Local Materials," of the Standard Specifications. Bidders and Contractors shall be responsible for knowing the procedures for obtaining information.

Information attached to the project plans is as follows:

A. Britania Blvd Overcrossing, Log of Test Borings.
B. Airway Road Undercrossing, Log of Test Borings.
C. La Media Road UC, Log of Test Borings.

Information included in the Information Handout provided to bidders and Contractors is as follows:

A. Water Letter from the City of San Diego.
B. Water Letter from the Otay Water District.
C. California Department of Fish and Game – Section 1602 Permit Dated September 19, 2005.
D. United States Army Corps of Engineer – Section 404 Permit Dated June 12, 2006.
E. United States Fish and Wildlife Service – Biological Opinion Dated July 12, 2004.
F. California Regional Water Quality Control Board – Section 401 Dated February 27, 2006.
G. Britania Blvd Overcrossing, Foundation Recommendations.
H. Britania Blvd Overcrossing, Revised Foundation Recommendations.
I. Airway Road Undercrossing, Foundation Recommendations.
J. Airway Road Undercrossing, Revised Foundation Recommendations.
K. La Media Road UC, Foundation Recommendations.
L. La Media Road UC, Revised Foundation Recommendations.
M. Foundation Review, Britania Blvd OC.
N. Foundation Review, La Media Road UC.
O. Foundation Review, Airway Road UC.

Information available for inspection at the District Office is as follows:

A. Cross sections.
B. Material Design Report.
C. Haul Road Information.
D. Utilities Site Preparation Requirements.
E. Geotechnical Design Report Dated 09/14/2005.

Cross sections are available in electronic copy.

The District Office in which the work is situated is located at 4050 Taylor Street, San Diego, California 92110.

Bidders and Contractors may contact the Transportation Laboratory to request viewing rock cores via electronic mail at the following address:

Coreroom@dot.ca.gov

Request shall be submitted at least 5 working days before the intended date for viewing, and shall include the District-County-Route, bridge number, contract number, viewing date, and contact information including telephone number.

5-1.18 SOUND CONTROL REQUIREMENTS

Sound control shall conform to the provisions in Section 7-1.01I, "Sound Control Requirements," of the Standard Specifications and these special provisions.

The noise level from the Contractor's operations, between the hours of 7:00 p.m. and 7:00 a.m., shall not exceed 86 dbA at a distance of 15 m. This requirement shall not relieve the Contractor from responsibility for complying with local ordinances regulating noise level outside the limits of the State right of way.

The noise level from the Contractor's operations at the excavation site, between the hours of 7:00 p.m. and 7:00 a.m., shall not exceed 67 Leq(h) at the right of way line at the three residences located North of Otay Mesa Road between Sanyo Avenue and Enrico Fermi Drive. Leq(h) is the energy-average of the A-weighted sound levels occurring during a one hour period, in decibels.

The Contractor may elect to seek other arrangements with the Residents occupying the three residences. If the Contractor and the Residents enter into agreements, a signed copy of each written agreement between the Contractor and the Resident shall be provided to the Engineer for approval 15 days prior to the start of any work that may exceed the noise level in excess of 67 Leq(h) at the right of way line at the residences.

If the Engineer does not review the agreements within the specified time, and if in the opinion of the Engineer, the Contractor's operations are delayed, the State will compensate the Contractor for the delays to the extent provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The noise level requirement specified herein shall apply to the equipment on the job or related to the job, including but not limited to trucks, transit mixers or transient equipment that may or may not be owned by the Contractor. The use of loud sound signals shall be avoided in favor of light warnings except those required by safety laws for the protection of personnel.

Full compensation for conforming to the requirements of this section shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

5-1.19 CALIFORNIA DEPARTMENT OF FISH AND GAME REQUIREMENTS

An agreement regarding a stream or lake has been entered into by the Department and the California Department of Fish and Game (CDFG) for project areas located within the jurisdiction of the CDFG. The Contractor shall be fully informed of the requirements of this agreement as well as rules, regulations, and conditions that may govern the Contractor's operations in these areas and shall conduct the work accordingly.

Attention is directed to "Project Information" of these special provisions regarding environmental permits, agreements or additional information.

It is unlawful for any person to divert, obstruct or change the natural flow of the bed, channel or bank of a stream, river or lake without first notifying the CDFG, unless the project or activity is noticed and constructed in conformance with conditions imposed under Fish and Game Code Section 1602.

Modifications to the agreement between the Department and the CDFG that are proposed by the Contractor shall be submitted in writing to the Engineer for consideration for transmittal to the CDFG for their consideration.

No work shall be performed which is inconsistent with the original agreement or proposed modification prior to receiving written approval from the Engineer. A delay, when ordered by the Engineer, will be considered a temporary suspension of work, in accordance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications.

Modifications to any agreement between the Department and the CDFG shall be fully binding on the Contractor.

The provisions of this section shall be made a part of every subcontract executed pursuant to this contract.

5-1.20 UNITED STATES FISH AND WILDLIFE SERVICE REQUIREMENTS

The United States Fish and Wildlife Service (USFWS) has issued a Biological Opinion to the Department for project areas located within the jurisdiction of the USFWS. The Contractor shall be fully informed of the requirements and all rules, regulations, and conditions that may govern the Contractor's operations in these areas and shall conduct the work accordingly.

Attention is directed to "Project Information" of these special provisions regarding environmental permits, agreements or additional information.

Modifications to the Biological Opinion issued to the Department and the USFWS that are proposed by the Contractor shall be submitted in writing to the Engineer for consideration for transmittal to the USFWS for their consideration.

No work shall be performed which is inconsistent with the original Biological Opinion or proposed modification prior to receiving written approval from the Engineer. A delay, when ordered by the Engineer, will be considered a temporary suspension of work, in accordance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications.

Modifications to the Biological Opinion between the Department and the USFWS shall be fully binding on the Contractor.

The provisions of this section and approved modifications shall be made a part of every subcontract executed pursuant to this contract.

5-1.21 CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD REQUIREMENTS

The California Regional Water Quality Control Board (CRWQCB) has issued a 401 permit to the Department for project areas located within the jurisdiction of the CRWQCB. The Contractor shall be fully informed of the requirements and all rules, regulations, and conditions that may govern the Contractor's operations in these areas and shall conduct the work accordingly.

Attention is directed to "Project Information" of these special provisions regarding environmental permits, agreements or additional information.

Modifications to the permit between the Department and CRWQCB that are proposed by the Contractor shall be submitted in writing to the Engineer for consideration for transmittal to the CRWQCB for their consideration.

No work shall be performed which is inconsistent with the original permit or proposed modification prior to receiving written approval from the Engineer. A delay, when ordered by the Engineer, will be considered a temporary suspension of work, in accordance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications.

Modifications to the permit between the Department and CRWQCB shall be fully binding on the Contractor.

The provisions of this section and approved modifications shall be made a part of every subcontract executed pursuant to this contract.

5-1.22 RELATIONS WITH CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

This project lies within the boundaries of the San Diego Regional Water Quality Control Board (RWQCB).

The State Water Resources Control Board (SWRCB) has issued to the Department a permit that governs storm water and non-storm water discharges from the Department's properties, facilities, and activities. The Department's permit is entitled "Order No. 99 - 06 - DWQ, NPDES No. CAS000003, National Pollutant Discharge Elimination System (NPDES) Permit,

Statewide Storm Water Permit and Waste Discharge Requirements (WDRs) for the State of California, Department of Transportation (Caltrans)." Copies of the Department's permit are available for review from the SWRCB, Storm Water Permit Unit, 1001 "I" Street, P.O. Box 1977, Sacramento, California 95812-1977, Telephone: (916) 341-5254, and may also be obtained at:

http://www.swrcb.ca.gov/stormwtr/caltrans.html

The Department's permit references and incorporates by reference the current statewide general permit issued by the SWRCB entitled "Order No. 99-08-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction Activity" that regulates discharges of storm water and non-storm water from construction activities disturbing 0.4-hectare or more of soil in a common plan of development. Sampling and analysis requirements as specified in SWRCB Resolution No. 2001-46 are added to the statewide general permit. Copies of the statewide permit and modifications thereto are available for review from the SWRCB, Storm Water Permit Unit, 1001 "I" Street, P.O. Box 1977, Sacramento, California 95812-1977, Telephone: (916) 341-5254 and may also be obtained at:

http://www.swrcb.ca.gov/stormwtr/construction.html

The NPDES permits that regulate this project, as referenced above, are collectively referred to in this section as the "permits."

This project shall conform to the permits and modifications thereto. The Contractor shall maintain copies of the permits at the project site and shall make them available during construction.

The Contractor shall know and comply with provisions of Federal, State, and local regulations and requirements that govern the Contractor's operations and storm water and non-storm water discharges from the project site and areas of disturbance outside the project limits during construction. Attention is directed to Sections 7-1.01, "Laws to be Observed," 7-1.11, "Preservation of Property," and 7-1.12, "Indemnification and Insurance," of the Standard Specifications.

The Contractor shall be responsible for penalties assessed on the Contractor or the Department as a result of the Contractor's failure to comply with the provisions in "Water Pollution Control" of these special provisions or with the applicable provisions of the Federal, State, and local regulations and requirements.

Penalties as used in this section shall include fines, penalties, and damages, whether proposed, assessed, or levied against the Department or the Contractor, including those levied under the Federal Clean Water Act and the State Porter-Cologne Water Quality Control Act, by governmental agencies or as a result of citizen suits. Penalties shall also include payments made or costs incurred in settlement for alleged violations of applicable laws, regulations, or requirements. Costs incurred could include sums spent instead of penalties, in mitigation or to remediate or correct violations.

WITHHOLDS

The Department will withhold money due the Contractor, in an amount estimated by the Department, to include the full amount of penalties and mitigation costs proposed, assessed, or levied as a result of the Contractor's violation of the permits, or Federal or State law, regulations, or requirements. Funds will be withheld by the Department until final disposition of these costs has been made. The Contractor shall remain liable for the full amount until the potential liability is finally resolved with the entity seeking the penalties. Instead of the withhold, the Contractor may provide a suitable bond in favor of the Department to cover the highest estimated liability for any disputed penalties proposed as a result of the Contractor's violation of the permits, law, regulations, or requirements.

If a regulatory agency identifies a failure to comply with the permits and modifications thereto, or other Federal, State, or local requirements, the Department will withhold money due the Contractor, subject to the following:

A. The Department will give the Contractor 30 days notice of the Department's intention to withhold funds from payments which may become due to the Contractor before acceptance of the contract. Funds withheld after acceptance of the contract will be made without prior notice to the Contractor.
B. No withholds of additional amounts out of payments will be made if the amount to be withheld does not exceed the amount being withheld from partial payments in accordance with Section 9-1.06, "Partial Payments," of the Standard Specifications.
C. If the Department has withheld funds and it is subsequently determined that the State is not subject to the entire amount of the costs and liabilities assessed or proposed in connection with the matter for which the withhold was made, the Department will return the excess amount withheld to the Contractor in the progress payment following the determination. If the matter is resolved for less than the amount withheld, the Department will pay interest at a rate of 6 percent per year on the excess withhold.

The Contractor shall notify the Engineer immediately upon request from the regulatory agencies to enter, inspect, sample, monitor, or otherwise access the project site or the Contractor's records pertaining to water pollution control work. The Contractor and the Department shall provide copies of correspondence, notices of violation, enforcement actions, or proposed fines by regulatory agencies to the requesting regulatory agency.

5-1.23 UNITED STATES ARMY CORPS OF ENGINEERS REQUIREMENTS

The Army Corps of Engineers (ACOE) has issued a permit to the Department for project areas located within the jurisdiction of ACOE. The Contractor shall be fully informed of the requirements of this permit and all rules, regulations, and conditions that may govern the Contractor's operations in these areas and shall conduct the work accordingly.

Attention is directed to "Project Information" of these special provisions regarding environmental permits, agreements or additional information.

Modifications to the permit between the Department and the ACOE that are proposed by the Contractor shall be submitted in writing to the Engineer for consideration for transmittal to the ACOE for their consideration.

No work shall be performed which is inconsistent with the original permit or proposed modification prior to receiving written approval from the Engineer. A delay, when ordered by the Engineer, will be considered a temporary suspension of work, in accordance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications.

Modifications to the permit between the Department and the ACOE shall be fully binding on the Contractor.

The provisions of this section and approved modifications shall be made a part of every subcontract executed pursuant to this contract.

5-1.24 CONTRACTOR ENVIRONMENTAL EDUCATION PROGRAM

The United States Fish and Wild Life Service Biological Opinion requires a Contractor Environmental Education Program to ensure that all the Contractor's personnel are fully informed of the biological sensitivities associated with this project.

A Biologist will be provided by the State to present a 2-hour Environmental Educational Program to all the Contractor's personnel at the first scheduled safety meeting held by the Contractor's Project Manager, or as agreed upon by the Engineer and the Contractor.

The content of the educational program will focus on:

1) The occurrence of listed and sensitive species within the project limits and their general ecology;
2) Species sensitivity to human activities;
3) Legal protection of the listed species;
4) Penalties for violations of Federal and State laws;
5) Reporting requirements;
6) Project features designed to reduce impacts to the listed species and promote their survival within the project limits.

The Biologist will provide a fact sheet that includes color photographs of the listed species within the project limits. The fact sheet shall be displayed at all construction field offices through the duration of the project.

For new contractor personnel a refresher Environmental Educational Program will be provided as determined by the Biologist and presented at the scheduled safety meeting held by the Contractor's Project Manager or as agreed upon by the Engineer and the Contractor.

Full compensation for conforming to 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.

5-1.25 PALEONTOLOGY

Attention is directed to the California Public Resources Code Section 5097.5, which protects vertebrate paleontological sites or other paleontological features situated on public lands. In compliance with the California Environmental Quality Act (CEQA) requirements a Paleontologist will monitor the excavation within the project limits to salvage fossil specimens as necessary during construction within the project limits.

A Paleontologist will be provided by the State for this project.

The Contractor shall provide the Engineer with a schedule of excavation operations within the project limits in writing at least 15 working days prior to construction and update the schedule as needed. The Contractor shall notify the Engineer 15 days in advance of the start of excavation operations.

If fossils are discovered, the Engineer may temporarily divert or suspend the excavation operations until the Paleontologist completes the salvage and removal of the fossil specimens.

All fossil specimens salvaged from within the State Right of Way shall remain the property of the State.

A delay due to paleontological monitoring or the salvage and removal of fossil specimens, when ordered by the Engineer, will be considered a temporary suspension of work, in accordance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications.

Any additional excavation required due to the discovery of paleontological remains, when ordered by the Engineer will be paid for as extra work as provided in Section 4-1.03, "Extra Work," of the Standard Specifications.

5-1.26 ENVIRONMENTALLY SENSITIVE AREA

An environmentally sensitive area (ESA) shall consist of an area within and near the limits of construction where access is prohibited or limited for the preservation of archeological site or existing vegetation, or protection of biological habitat as shown on the plans. The Engineer will determine the exact location of the boundaries of the ESA. No work shall be conducted within the ESA.

Attention is directed to Section 7—1.01, "Laws to be Observed," and Section 7—1.04, "Permits and Licenses," of the Standard Specifications regarding State and Federal regulations, permits, or agreements which pertain to an ESA.

Any lighting used during construction shall be shielded and directed away from adjacent ESA.

Attention is directed to "Migratory Birds" of these special provisions.

Prior to beginning work, the boundaries of the ESA shall be clearly delineated by the placement of temporary fence (Type ESA).

Vehicle access, storage or transport of materials or equipment, or other project related activities are prohibited within the boundaries of ESA. Limited access to an ESA may be allowed for biological monitoring when approved in writing by the Engineer. No other access will be allowed within an ESA.

The Contractor shall mitigate damage or impacts to the ESA caused by the Contractor's operations, at the Contractor's expense. If the Engineer determines mitigation work will be performed by others, or if mitigation fees are assessed the Department, deductions from moneys due or to become due the Contractor will be made for the mitigation costs.

5-1.27 MIGRATORY BIRDS

Attention is directed to the Federal Migratory Bird Treaty Act (16 USC 703 et seq.) Title 50 Code of Federal Regulations Part 10, and the California Department of Fish and Game Code Sections 3503, 3513, and 3800, that protect migratory birds, their occupied nests, and their eggs from destruction or take.

A Biologist will be provided by the State for this project. The Biologist will verify the presence or absence of migratory birds.

Attention is directed to "Order of Work" and "Clearing and Grubbing" of these special provisions.

Prior to the migratory bird nesting season of March 15 through September 15 at La Media (Drainage Unit 7), and February 15 through August 31 for the remaining project limits, vegetation mowing and tree removal within the limits of clearing and grubbing work shall be completed in conformance with the provisions in "Clearing and Grubbing" of these special provisions.

The Contractor shall use exclusion techniques prior to the nesting season when determined by the Biologist and directed by the Engineer to prevent migratory birds from nesting on the ground within the project limits. Preventing nesting by using appropriate exclusion techniques will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

If evidence of bird nesting is discovered during the nesting season, the Contractor shall not disturb the nesting birds or nests, and shall immediately stop work adjacent to the nesting birds and notify the Engineer. During the nesting season migratory birds shall be handled as follows:

The Contractor shall place temporary noise barriers when determined by the Biologist and directed by the Engineer to minimize impacts to nesting migratory birds when discovered within the project limits. Placing temporary noise barriers to minimize impacts to nesting migratory birds when directed by the Engineer will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

A. If at any time during the year, burrowing owls are found nesting within the project limits when exclusion or noise mitigation is not feasible, the nesting area shall be designated as an environmentally sensitive area and no work shall occur within 75 meters until the nesting season is over.
B. If any other nesting migratory birds are found within the project limits where noise mitigation is not feasible, the nesting area shall be designated as an environmentally sensitive area and no work shall occur within 30 meters until the nesting season is over.

The boundaries of the environmentally sensitive areas for migratory birds shall be delineated in conformance with "Environmentally Sensitive Area" and "Temporary Fence (Type ESA)" of these special provisions. Once the nesting season is over, the areas will no longer be considered an environmentally sensitive area and temporary fence (Type ESA) shall be removed.

Temporary fence (Type ESA), when required to delineate the boundaries of the environmentally sensitive areas for migratory birds, will be measured and paid for in conformance with "Temporary Fence (Type ESA)" of these special provisions.

A delay due to migratory birds or their nests, when ordered by the Engineer, will be considered a temporary suspension of work, in accordance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications.

Attention is directed to "Time Related Overhead" of these special provisions.

5-1.28 PRESERVATION OF PROPERTY

Attention is directed to Section 7-1.11, "Preservation of Property," of the Standard Specifications and these special provisions.

Existing trees, shrubs and other plants, that are not to be removed as shown on the plans or specified in these special provisions, and are injured or damaged by reason of the Contractor's operations, shall be replaced by the Contractor. The minimum size of tree replacement shall be 600 mm box and the minimum size of shrub replacement shall be No. 15 container. Replacement planting shall conform to the requirements in Section 20-4.07, "Replacement," of the Standard Specifications. The Contractor shall water replacement plants in conformance with the provisions in Section 20-4.06, "Watering," of the Standard Specifications.

Damaged or injured plants shall be removed and disposed of outside the highway right of way in conformance with the provisions in Section 7-l.13 of the Standard Specifications.

Replacement planting of injured or damaged trees, shrubs, and other plants shall be completed prior to the start of the plant establishment period. Replacement planting shall conform to the provisions in Section 20-4.05, "Planting," of the Standard Specifications.

5-1.29 DAMAGE REPAIR

Attention is directed to Section 7-1.16, "Contractor's Responsibility for the Work and Materials," and Section 7-1.165, "Damage by Storm, Flood, Tsunami or Earthquake," of the Standard Specifications and these special provisions.

When as a result of freezing conditions (as defined herein) during the plant establishment period, plants have died or, in the opinion of the Engineer, have deteriorated to a point beyond which the plants will not mature as typical examples of their species, the Engineer may direct replacement of the affected plants. The total cost of ordered plant replacement work will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. A freezing condition, for the purpose of this specification, occurs when the temperature at or near the affected area has been officially recorded below 0°C and plants have been killed or damaged to the degree described above.

When, as a result of drought conditions (as defined herein) during the plant establishment period, plants have died or, in the opinion of the Engineer, have deteriorated to a point beyond which the plants will not mature as typical examples of their species, the Engineer may direct replacement of the affected plants. The total cost of ordered plant replacements, after water has been restricted or stopped, will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. Restriction or shutoff of available water shall not relieve the Contractor from performing other contract work. A drought condition occurs when the Department, or its supplier, restricts or stops delivery of water to the Contractor to the degree that plants have died or deteriorated as described above.

When the provisions in Section 7-1.165, "Damage by Storm, Flood, Tsunami or Earthquake," of the Standard Specifications are applicable, the provisions above for payment of costs for repair of damage due to rain, freezing conditions and drought shall not apply.

5-1.30 RELIEF FROM MAINTENANCE AND RESPONSIBILITY

The Contractor may be relieved of the duty of maintenance and protection for those items not directly connected with plant establishment work in conformance with the provisions in Section 7-1.15, "Relief From Maintenance and Responsibility," of the Standard Specifications. Water pollution control, maintain existing planted areas, maintain existing irrigation facilities, transplant trees, and transplant palm trees shall not be relieved of maintenance.

SECTION 6. (BLANK)

SECTION 7. (BLANK)

SECTION 8. MATERIALS

SECTION 8-1. MISCELLANEOUS

8-1.01 SUBSTITUTION OF NON-METRIC MATERIALS AND PRODUCTS

Only materials and products conforming to the requirements of the specifications shall be incorporated in the work. When metric materials and products are not available, and when approved by the Engineer, and at no cost to the State, materials and products in the United States Standard Measures which are of equal quality and of the required properties and characteristics for the purpose intended, may be substituted for the equivalent metric materials and products, subject to the following provisions:

A. Materials and products shown on the plans or in the special provisions as being equivalent may be substituted for the metric materials and products specified or detailed on the plans.
B. Before other non-metric materials and products will be considered for use, the Contractor shall furnish, at the Contractor's expense, evidence satisfactory to the Engineer that the materials and products proposed for use are equal to or better than the materials and products specified or detailed on the plans. The burden of proof as to the quality and suitability of substitutions shall be upon the Contractor and the Contractor shall furnish necessary information as required by the Engineer. The Engineer will be the sole judge as to the quality and suitability of the substituted materials and products and the Engineer's decision will be final.
C. When the Contractor elects to substitute non-metric materials and products, including materials and products shown on the plans or in the special provisions as being equivalent, the list of sources of material specified in Section 6-1.01, "Source of Supply and Quality of Materials," of the Standard Specification shall include a list of substitutions to be made and contract items involved. In addition, for a change in design or details, the Contractor shall submit plans and working drawings in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The plans and working drawings shall be submitted at least 7 days before the Contractor intends to begin the work involved.

Unless otherwise specified, the following substitutions of materials and products will be allowed:

SUBSTITUTION TABLE FOR PLAIN WIRE REINFORCEMENT
ASTM Designation: A 82

METRIC SIZE SHOWN ON THE PLANS mm^2	SIZE TO BE SUBSTITUTED $inch^2$ x 100
MW9	W1.4
MW10	W1.6
MW13	W2.0
MW15	W2.3
MW19	W2.9
MW20	W3.1
MW22	W3.5
MW25	W3.9, except W3.5 in piles only
MW26	W4.0
MW30	W4.7
MW32	W5.0
MW35	W5.4
MW40	W6.2
MW45	W6.5
MW50	W7.8
MW55	W8.5, except W8.0 in piles only
MW60	W9.3
MW70	W10.9, except W11.0 in piles only
MW80	W12.4
MW90	W14.0
MW100	W15.5

SUBSTITUTION TABLE FOR BAR REINFORCEMENT

METRIC BAR DESIGNATION NUMBER[1] SHOWN ON THE PLANS	BAR DESIGNATION NUMBER[2] TO BE SUBSTITUTED
10	3
13	4
16	5
19	6
22	7
25	8
29	9
32	10
36	11
43	14
57	18

[1]Bar designation numbers approximate the number of millimeters of the nominal diameter of the bars.

[2]Bar numbers are based on the number of eighths of an inch included in the nominal diameter of the bars.

No adjustment will be required in spacing or total number of reinforcing bars due to a difference in minimum yield strength between metric and non-metric bars.

SUBSTITUTION TABLE FOR SIZES OF:

(1) STEEL FASTENERS FOR GENERAL APPLICATIONS (ASTM Designation: A 307 or AASHTO Designation: M 314, Grade 36 or 55), and

(2) HIGH STRENGTH STEEL FASTENERS (ASTM Designation: A 325 or A 449)

METRIC SIZE SHOWN ON THE PLANS mm	SIZE TO BE SUBSTITUTED inch
6 or 6.35	1/4
8 or 7.94	5/16
10 or 9.52	3/8
11 or 11.11	7/16
13, 12.70, or M12	1/2
14 or 14.29	9/16
16, 15.88, or M16	5/8
19, 19.05, or M20	3/4
22, 22.22, or M22	7/8
24, 25, 25.40, or M24	1
29, 28.58, or M27	1-1/8
32, 31.75, or M30	1-1/4
35 or 34.93	1-3/8
38, 38.10, or M36	1-1/2
44 or 44.45	1-3/4
51 or 50.80	2
57 or 57.15	2-1/4
64 or 63.50	2-1/2
70 or 69.85	2-3/4
76 or 76.20	3
83 or 82.55	3-1/4
89 or 88.90	3-1/2
95 or 95.25	3-3/4
102 or 101.60	4

SUBSTITUTION TABLE FOR NOMINAL THICKNESS OF SHEET METAL

UNCOATED HOT AND COLD ROLLED SHEETS		HOT-DIPPED ZINC COATED SHEETS (GALVANIZED)	
METRIC THICKNESS SHOWN ON THE PLANS mm	GAGE TO BE SUBSTITUTED inch	METRIC THICKNESS SHOWN ON THE PLANS mm	GAGE TO BE SUBSTITUTED inch
7.94	0.3125	4.270	0.1681
6.07	0.2391	3.891	0.1532
5.69	0.2242	3.510	0.1382
5.31	0.2092	3.132	0.1233
4.94	0.1943	2.753	0.1084
4.55	0.1793	2.372	0.0934
4.18	0.1644	1.994	0.0785
3.80	0.1495	1.803	0.0710
3.42	0.1345	1.613	0.0635
3.04	0.1196	1.461	0.0575
2.66	0.1046	1.311	0.0516
2.28	0.0897	1.158	0.0456
1.90	0.0747	1.006 or 1.016	0.0396
1.71	0.0673	0.930	0.0366
1.52	0.0598	0.853	0.0336
1.37	0.0538	0.777	0.0306
1.21	0.0478	0.701	0.0276
1.06	0.0418	0.627	0.0247
0.91	0.0359	0.551	0.0217
0.84	0.0329	0.513	0.0202
0.76	0.0299	0.475	0.0187
0.68	0.0269	--------	--------
0.61	0.0239	--------	--------
0.53	0.0209	--------	--------
0.45	0.0179	--------	--------
0.42	0.0164	--------	--------
0.38	0.0149	--------	--------

SUBSTITUTION TABLE FOR WIRE

METRIC THICKNESS SHOWN ON THE PLANS mm	WIRE THICKNESS TO BE SUBSTITUTED inch	GAGE NO.
6.20	0.244	3
5.72	0.225	4
5.26	0.207	5
4.88	0.192	6
4.50	0.177	7
4.11	0.162	8
3.76	0.148	9
3.43	0.135	10
3.05	0.120	11
2.69	0.106	12
2.34	0.092	13
2.03	0.080	14
1.83	0.072	15
1.57	0.062	16
1.37	0.054	17
1.22	0.048	18
1.04	0.041	19
0.89	0.035	20

SUBSTITUTION TABLE FOR PIPE PILES

METRIC SIZE SHOWN ON THE PLANS mm x mm	SIZE TO BE SUBSTITUTED inch x inch
PP 360 x 4.55	NPS 14 x 0.179
PP 360 x 6.35	NPS 14 x 0.250
PP 360 x 9.53	NPS 14 x 0.375
PP 360 x 11.12	NPS 14 x 0.438
PP 406 x 12.70	NPS 16 x 0.500
PP 460 x T	NPS 18 x T"
PP 508 x T	NPS 20 x T"
PP 559 x T	NPS 22 x T"
PP 610 x T	NPS 24 x T"
PP 660 x T	NPS 26 x T"
PP 711 x T	NPS 28 x T"
PP 762 x T	NPS 30 x T"
PP 813 x T	NPS 32 x T"
PP 864 x T	NPS 34 x T"
PP 914 x T	NPS 36 x T"
PP 965 x T	NPS 38 x T"
PP 1016 x T	NPS 40 x T"
PP 1067 x T	NPS 42 x T"
PP 1118 x T	NPS 44 x T"
PP 1219 x T	NPS 48 x T"
PP 1524 x T	NPS 60 x T"

The thickness in millimeters (T) represents an exact conversion of the thickness in inches (T").

SUBSTITUTION TABLE FOR CIDH CONCRETE PILING

METRIC SIZE SHOWN ON THE PLANS	ACTUAL AUGER SIZE TO BE SUBSTITUTED inches
350 mm	14
400 mm	16
450 mm	18
600 mm	24
750 mm	30
900 mm	36
1.0 m	42
1.2 m	48
1.5 m	60
1.8 m	72
2.1 m	84
2.4 m	96
2.7 m	108
3.0 m	120
3.3 m	132
3.6 m	144
4.0 m	156

SUBSTITUTION TABLE FOR STRUCTURAL TIMBER AND LUMBER

METRIC MINIMUM DRESSED DRY, SHOWN ON THE PLANS mm x mm	METRIC MINIMUM DRESSED GREEN, SHOWN ON THE PLANS mm x mm	NOMINAL SIZE TO BE SUBSTITUTED inch x inch
19x89	20x90	1x4
38x89	40x90	2x4
64x89	65x90	3x4
89x89	90x90	4x4
140x140	143x143	6x6
140x184	143x190	6x8
184x184	190x190	8x8
235x235	241x241	10x10
286x286	292x292	12x12

SUBSTITUTION TABLE FOR NAILS AND SPIKES

METRIC COMMON NAIL, SHOWN ON THE PLANS Length, mm Diameter, mm	METRIC BOX NAIL, SHOWN ON THE PLANS Length, mm Diameter, mm	METRIC SPIKE, SHOWN ON THE PLANS Length, mm Diameter, mm	SIZE TO BE SUBSTITUTED Penny-weight
50.80 2.87	50.80 2.51	_____	6d
63.50 3.33	63.50 2.87	_____	8d
76.20 3.76	76.20 3.25	76.20 4.88	10d
82.55 3.76	82.55 3.25	82.55 4.88	12d
88.90 4.11	88.90 3.43	88.90 5.26	16d
101.60 4.88	101.60 3.76	101.60 5.72	20d
114.30 5.26	114.30 3.76	114.30 6.20	30d
127.00 5.72	127.00 4.11	127.00 6.68	40d
_____	_____	139.70 7.19	50d
_____	_____	152.40 7.19	60d

SUBSTITUTION TABLE FOR IRRIGATION COMPONENTS

METRIC WATER METERS, TRUCK LOADING STANDPIPES, VALVES, BACKFLOW PREVENTERS, FLOW SENSORS, WYE STRAINERS, FILTER ASSEMBLY UNITS, PIPE SUPPLY LINES, AND PIPE IRRIGATION SUPPLY LINES SHOWN ON THE PLANS DIAMETER NOMINAL (DN) mm	NOMINAL SIZE TO BE SUBSTITUTED inch
15	1/2
20	3/4
25	1
32	1-1/4
40	1-1/2
50	2
65	2-1/2
75	3
100	4
150	6
200	8
250	10
300	12
350	14
400	16

Unless otherwise specified, substitutions of United States Standard Measures standard structural shapes corresponding to the metric designations shown on the plans and in conformance with the requirements in ASTM Designation: A 6/A 6M, Annex 2, will be allowed.

8-1.02 PREQUALIFIED AND TESTED SIGNING AND DELINEATION MATERIALS

The Department maintains the following list of Prequalified and Tested Signing and Delineation Materials. The Engineer shall not be precluded from sampling and testing products on the list of Prequalified and Tested Signing and Delineation Materials.

The manufacturer of products on the list of Prequalified and Tested Signing and Delineation Materials shall furnish the Engineer a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each type of traffic product supplied.

For those categories of materials included on the list of Prequalified and Tested Signing and Delineation Materials, only those products shown within the listing may be used in the work. Other categories of products, not included on the list of Prequalified and Tested Signing and Delineation Materials, may be used in the work provided they conform to the requirements of the Standard Specifications.

Materials and products may be added to the list of Prequalified and Tested Signing and Delineation Materials if the manufacturer submits a New Product Information Form to the New Product Coordinator at the Transportation Laboratory. Upon a Departmental request for samples, sufficient samples shall be submitted to permit performance of required tests. Approval of materials or products will depend upon compliance with the specifications and tests the Department may elect to perform.

PAVEMENT MARKERS, PERMANENT TYPE

Retroreflective With Abrasion Resistant Surface (ARS)

1. Apex, Model 921AR (100 mm x 100 mm)
2. Ennis Paint, Models C88 (100 mm x 100 mm), 911 (100 mm x 100 mm) and 953 (70 mm x 114 mm)

3. Ray-O-Lite, Model "AA" ARS (100 mm x 100 mm)
4. 3M Series 290 (89 mm x 100 mm)
5. 3M Series 290 PSA, with pressure sensitive adhesive pad (89 mm x 100 mm)

Retroreflective With Abrasion Resistant Surface (ARS)

(for recessed applications only)

1. Ennis Paint, Model 948 (58 mm x 119 mm)
2. Ennis Paint, Model 944SB (51 mm x 100 mm)*
3. Ray-O-Lite, Model 2002 (51 mm x 117 mm)
4. Ray-O-Lite, Model 2004 ARS (51 mm x 100 mm)*

*For use only in 114 mm wide (older) recessed slots

Non-Reflective, 100-mm Round

1. Apex Universal (Ceramic)
2. Apex Universal, Models 929 (ABS) and 929PP (Polypropylene)
3. Glowlite, Inc. (Ceramic)
4. Hi-Way Safety, Inc., Models P20-2000W and 2001Y (ABS)
5. Interstate Sales, "Diamond Back" (Polypropylene)
6. Novabrite Models Cdot (White) Cdot-y (Yellow), Ceramic
7. Novabrite Models Pdot-w (White) Pdot-y (Yellow), Polypropylene
8. Three D Traffic Works TD10000 (ABS), TD10500 (Polypropylene)

PAVEMENT MARKERS, TEMPORARY TYPE

Temporary Markers For Long Term Day/Night Use (6 months or less)

1. Vega Molded Products "Temporary Road Marker" (75 mm x 100 mm)

Temporary Markers For Short Term Day/Night Use (14 days or less)

(For seal coat or chip seal applications, clear protective covers are required)

1. Apex Universal, Model 932
2. Filtrona Extrusion, Models T.O.M., T.R.P.M., and "HH" (High Heat)
3. Hi-Way Safety, Inc., Model 1280/1281
4. Glowlite, Inc., Model 932

STRIPING AND PAVEMENT MARKING MATERIAL

Permanent Traffic Striping and Pavement Marking Tape

1. Advanced Traffic Marking, Series 300 and 400
2. Brite-Line, Series 1000
3. Brite-Line, "DeltaLine XRP"
4. Swarco Industries, "Director 35" (For transverse application only)
5. Swarco Industries, "Director 60"
6. 3M, "Stamark" Series 380 and 5730
7. 3M, "Stamark" Series 420 (For transverse application only)

Temporary (Removable) Striping and Pavement Marking Tape (6 months or less)

1. Advanced Traffic Marking, Series 200
2. Brite-Line, Series 100
3. Garlock Rubber Technologies, Series 2000
4. P.B. Laminations, Aztec, Grade 102
5. Swarco Industries, "Director-2"
6. Trelleborg Industries, R140 Series
7. 3M Series 620 "CR", and Series A750
8. 3M Series A145, Removable Black Line Mask
   (Black Tape: for use only on Asphalt Concrete Surfaces)
9. Advanced Traffic Marking Black "Hide-A-Line"
   (Black Tape: for use only on Asphalt Concrete Surfaces)

10. Brite-Line "BTR" Black Removable Tape
    (Black Tape: for use only on Asphalt Concrete Surfaces)
11. Trelleborg Industries, RB-140
    (Black Tape: for use only on Asphalt Concrete Surfaces)

Preformed Thermoplastic (Heated in place)

1. Flint Trading Inc., "Hot Tape"
2. Flint Trading Inc., "Premark Plus"
3. Ennis Paint Inc., "Flametape"

Ceramic Surfacing Laminate, 150 mm x 150 mm

1. Highway Ceramics, Inc.

CLASS 1 DELINEATORS

One Piece Driveable Flexible Type, 1700-mm

1. Filtrona Extrusion, "Flexi-Guide Models 400 and 566"
2. Carsonite, Curve-Flex CFRM-400
3. Carsonite, Roadmarker CRM-375
4. FlexStake, Model 654 TM
5. GreenLine Model CGD1-66

Special Use Type, 1700-mm

1. Filtrona Extrusion, Model FG 560 (with 450-mm U-Channel base)
2. Carsonite, "Survivor" (with 450-mm U-Channel base)
3. Carsonite, Roadmarker CRM-375 (with 450-mm U-Channel base)
4. FlexStake, Model 604
5. GreenLine Model CGD (with 450-mm U-Channel base)
6. Impact Recovery Model D36, with #105 Driveable Base
7. Safe-Hit with 200-mm pavement anchor (SH248-GP1)
8. Safe-Hit with 380-mm soil anchor (SH248-GP2) and with 450-mm soil anchor (SH248-GP3)

Surface Mount Type, 1200-mm

1. Bent Manufacturing Company, Masterflex Model MF-180EX-48
2. Carsonite, "Channelizer"
3. FlexStake, Models 704, 754 TM, and EB4
4. Impact Recovery Model D48, with #101 Fixed (Surface-Mount) Base
5. Three D Traffic Works "Channelflex" ID No. 522248W

CHANNELIZERS

Surface Mount Type, 900-mm

1. Bent Manufacturing Company, Masterflex Models MF-360-36 (Round) and MF-180-36 (Flat)
2. Filtrona Extrusion, Flexi-Guide Models FG300PE, FG300UR, and FG300EFX
3. Carsonite, "Super Duck" (Round SDR-336)
4. Carsonite, Model SDCF03601MB "Channelizer"
5. FlexStake, Models 703, 753 TM, and EB3
6. GreenLine, Model SMD-36
7. Hi-way Safety, Inc. "Channel Guide Channelizer" Model CGC36
8. Impact Recovery Model D36, with #101 Fixed (Surface-Mount) Base
9. Safe-Hit, Guide Post, Model SH236SMA
10. Three D Traffic Works "Boomerang" ID No. 522053W

Lane Separation System

1. Filtrona Extrusion, "Flexi-Guide (FG) 300 Curb System"
2. Qwick Kurb, "Klemmfix Guide System"
3. Recycled Technology, Inc. "Safe-Lane System"
4. Dura-Curb System

CONICAL DELINEATORS, 1070-mm

(For 700-mm Traffic Cones, see Standard Specifications)

1. Bent Manufacturing Company "T-Top"
2. Plastic Safety Systems "Navigator-1070 mm
3. TrafFix Devices "Grabber"
4. Three D Traffic Works "Ringtop" TD7000, ID No. 742143
5. Three D Traffic Works, TD7500

OBJECT MARKERS

Type "K", 450-mm

1. Filtrona Extrusion, Model FG318PE
2. Carsonite, Model SMD 615
3. FlexStake, Model 701 KM
4. Safe-Hit, Model SH718SMA

Type "K-4" / "Q" Object Markers, 600-mm

1. Bent Manufacturing "Masterflex" Model MF-360-24
2. Filtrona Extrusion, Model FG324PE
3. Carsonite, "Channelizer"
4. FlexStake, Model 701KM
5. Safe-Hit, Models SH824SMA_WA and SH824GP3_WA
6. The Line Connection, Model DP21-4Q
7. Three D Traffic Works ID No. 531702W and TD 5200
8. Three D Traffic Works ID No. 520896W

CONCRETE BARRIER MARKERS AND
TEMPORARY RAILING (TYPE K) REFLECTORS

Impactable Type

1. ARTUK, "FB"
2. Filtrona Extrusion, Models PCBM-12 and PCBM-T12
3. Duraflex Corp., "Flexx 2020" and "Electriflexx"
4. Hi-Way Safety, Inc., Model GMKRM100
5. Plastic Safety Systems "BAM" Models OM-BARR and OM-BWAR
6. Three D Traffic Works "Roadguide" Model TD 9304

Non-Impactable Type

1. ARTUK, JD Series
2. Plastic Safety Systems "BAM" Models OM-BITARW and OM-BITARA
3. Vega Molded Products, Models GBM and JD
4. Plastic Vacuum Forming, "Cap-It C400"

METAL BEAM GUARD RAIL POST MARKERS

(For use to the left of traffic)

1. Filtrona Extrusion, "Mini" (75 mm x 254 mm)
2. Creative Building Products, "Dura-Bull, Model 11201"
3. Duraflex Corp., "Railrider"
4. Plastic Vacuum Forming, "Cap-It C300"

CONCRETE BARRIER DELINEATORS, 400-mm

(For use to the right of traffic)

1. Filtrona Extrusion, Model PCBM T-16
2. Safe-Hit, Model SH216RBM

CONCRETE BARRIER-MOUNTED MINI-DRUM (260 mm x 360 mm x 570 mm)

1. Stinson Equipment Company "SaddleMarker"

GUARD RAILING DELINEATOR

(Place top of reflective element at 1200 mm above plane of roadway)

Wood Post Type, 686-mm

1. Filtrona Extrusion, FG 427 and FG 527
2. Carsonite, Model 427
3. FlexStake, Model 102 GR
4. GreenLine GRD 27
5. Safe-Hit, Model SH227GRD
6. Three D Traffic Works "Guardflex" TD9100
7. New Directions Mfg, NDM27

Steel Post Type

1. Carsonite, Model CFGR-327 with CFGRBK300 Mounting Bracket

RETROREFLECTIVE SHEETING

Channelizers, Barrier Markers, and Delineators

1. Avery Dennison T-6500 Series (For rigid substrate devices only)
2. Avery Dennison WR-7100 Series
3. Nippon Carbide Industries, Flexible Ultralite Grade (ULG) II
4. Reflexite, PC-1000 Metalized Polycarbonate
5. Reflexite, AC-1000 Acrylic
6. Reflexite, AP-1000 Metalized Polyester
7. Reflexite, Conformalight, AR-1000 Abrasion Resistant Coating
8. 3M, High Intensity

Traffic Cones, 100-mm and 150-mm Sleeves

1. Nippon Carbide Industries, Flexible Ultralite Grade (ULG) II
2. Reflexite, Vinyl, "TR" (Semi-transparent) or "Conformalight"
3. 3M Series 3840
4. Avery Dennison S-9000C

Drums

1. Avery Dennison WR-6100
2. Nippon Carbide Industries, Flexible Ultralite Grade (ULG) II
3. Reflexite, "Conformalight", "Super High Intensity" or "High Impact Drum Sheeting"
4. 3M Series 3810

Barricades: Type I, Medium-Intensity (Typically Enclosed Lens, Glass-Bead Element)

1. Nippon Carbide Industries, CN8117
2. Avery Dennison, W 1100 series
3. 3M Series CW 44

Barricades: Type II, Medium-High-Intensity (Typically Enclosed Lens, Glass-Bead Element)

1. Avery Dennison, W-2100 Series

Signs: Type II, Medium-High-Intensity (Typically Enclosed Lens, Glass-Bead Element)

1. Avery Dennison, T-2500 Series
2. Nippon Carbide Industries, Nikkalite 18000

Signs: Type III, High-Intensity (Typically Encapsulated Glass-Bead Element)

1. Avery Dennison, T-5500A and T-6500 Series
2. Nippon Carbide Industries, Nikkalite Brand Ultralite Grade II
3. 3M 3870 and 3930 Series

Signs: Type IV, High-Intensity (Typically Unmetallized Microprismatic Element)

1. Avery Dennison, T-6500 Series
2. Nippon Carbide Industries, Crystal Grade, 94000 Series
3. Nippon Carbide Industries, Model No. 94847 Fluorescent Orange
4. 3M Series 3930 and Series 3924S

Signs: Type VI, Elastomeric (Roll-Up) High-Intensity, without Adhesive

1. Avery Dennison, WU-6014
2. Novabrite LLC, "Econobrite"
3. Reflexite "Vinyl"
4. Reflexite "SuperBright"
5. Reflexite "Marathon"
6. 3M Series RS20

Signs: Type VII, Super-High-Intensity (Typically Unmetallized Microprismatic Element)

1. 3M Series 3924S, Fluorescent Orange
2. 3M LDP Series 3970

Signs: Type VIII, Super-High-Intensity (Typically Unmetallized Microprismatic Element)

1. Avery Dennison, T-7500 Series
2. Avery Dennison, T-7511 Fluorescent Yellow
3. Avery Dennison, T-7513 Fluorescent Yellow Green
4. Avery Dennison, W-7514 Fluorescent Orange
5. Nippon Carbide Industries, Nikkalite Crystal Grade Series 92800
6. Nippon Carbide Industries, Nikkalite Crystal Grade Model 92847 Fluorescent Orange

Signs: Type IX, Very-High-Intensity (Typically Unmetallized Microprismatic Element)

1. 3M VIP Series 3981 Diamond Grade Fluorescent Yellow
2. 3M VIP Series 3983 Diamond Grade Fluorescent Yellow/Green
3. 3M VIP Series 3990 Diamond Grade
4. Avery Dennison T-9500 Series
5. Avery Dennison, T9513, Fluorescent Yellow Green
6. Avery Dennison, W9514, Fluorescent Orange

SPECIALTY SIGNS

1. Reflexite "Endurance" Work Zone Sign (with Semi-Rigid Plastic Substrate)

ALTERNATIVE SIGN SUBSTRATES

Fiberglass Reinforced Plastic (FRP) and Expanded Foam PVC

1. Fiber-Brite (FRP)
2. Sequentia, "Polyplate" (FRP)
3. Inteplast Group "InteCel" (13 mm for Post-Mounted CZ Signs, 1200 mm or less)(PVC)

Aluminum Composite, Temporary Construction Signs Only

1. Alcan Composites "Dibond Material, 2 mm"
2. Mitsubishi Chemical America, Alpolic 350

8-1.03 STATE-FURNISHED MATERIALS

Attention is directed to Section 6-1.02, "State-Furnished Materials," of the Standard Specifications and these special provisions.

The following materials will be furnished to the Contractor:

A. Padlocks for backflow preventer assembly enclosures, walk gates, and irrigation controller enclosure cabinets.
B. Model 170 controller assemblies, including controller unit, completely wired controller cabinet, and inductive loop detector sensor units.
C. Self-adhesive numbers (with reflective sheet background) for numbering electrical equipment.

Completely wired controller cabinets, with auxiliary equipment but without controller unit, will be furnished to the Contractor at the District 11 Signal Laboratory, 7181 Opportunity Road, San Diego, California 92111, telephone No. (858) 467-4010.

The Contractor shall notify the Engineer not less than 48 hours before State-furnished material is to be picked up by the Contractor. A full description of the material and the time the material will be picked up shall be provided.

8-1.04 SLAG AGGREGATE

Air-cooled iron blast furnace slag shall not be used to produce aggregate for:

A. Structure backfill material.
B. Pervious backfill material.
C. Permeable material.
D. Reinforced or prestressed portland cement concrete component or structure.
E. Nonreinforced portland cement concrete component or structure for which a Class 1 Surface Finish is required by the provisions in Section 51-1.18B, "Class 1 Surface Finish," of the Standard Specifications.

Aggregate produced from slag resulting from a steel-making process shall not be used for a highway construction project except for the following items:

A. Imported Borrow.
B. Aggregate Subbase.
C. Class 2 Aggregate Base.
D. Asphalt Concrete.

Steel slag to be used to produce aggregate for aggregate subbase and Class 2 aggregate base shall be crushed so that 100 percent of the material will pass a 19-mm sieve and then shall be control aged for a period of at least 3 months under conditions that will maintain all portions of the stockpiled material at a moisture content in excess of 6 percent of the dry mass of the aggregate.

A supplier of steel slag aggregate shall provide separate stockpiles for controlled aging of the slag. An individual stockpile shall contain not less than 9075 tonnes nor more than 45 350 tonnes of slag. The material in each individual stockpile shall be assigned a unique lot number and each stockpile shall be identified with a permanent system of signs. The supplier shall maintain a permanent record of the dates on which stockpiles are completed and controlled aging begun, of the dates when controlled aging was completed, and of the dates tests were made and the results of these tests. Moisture tests shall be made at least once each week. No credit for aging will be given for the time period covered by tests which show a moisture content of 6 percent or less. The stockpiles and records shall be available to the Engineer during normal working hours for inspection, check testing and review.

The supplier shall notify the Transportation Laboratory, 5900 Folsom Boulevard, Sacramento, California 95819, when each stockpile is completed and controlled aging begun. No more aggregate shall be added to the stockpile unless a new aging period is initiated. A further notification shall be sent when controlled aging is completed.

The supplier shall provide a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. Each stockpile or portion of a stockpile that is used in the work will be considered a lot. The Certificates of Compliance shall state that the steel slag aggregate has been aged in a stockpile for at least 3 months at a moisture content in excess of 6 percent of the dry mass of the aggregate.

Steel slag used for imported borrow shall be weathered for at least 3 months. Prior to the use of steel slag as imported borrow, the supplier shall furnish a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance shall state that the steel slag has been weathered for at least 3 months.

Each delivery of aggregate containing steel slag for use as aggregate subbase or Class 2 aggregate base shall be accompanied by a delivery tag for each load which will identify the lot of material by stockpile number, where the slag was aged, and the date that the stockpile was completed and controlled aging begun.

Air-cooled iron blast furnace slag or natural aggregate may be blended in proper combinations with steel slag aggregate to produce the specified gradings, for those items for which steel slag aggregate is permitted, unless otherwise provided.

Aggregate containing slag shall meet the applicable quality requirements for the items in which the aggregate is used.

The combined slag aggregate shall conform to the specified grading for the item in which it is used. The grading will be determined by California Test 202, modified by California Test 105 when there is a difference in specific gravity of 0.2 or more between the coarse and fine portion of the aggregate or between blends of different aggregates.

No aggregate produced from slag shall be placed within 0.3-m, measured in any direction, of a non-cathodically protected pipe or structure unless the aggregate is incorporated in portland cement concrete pavement, in asphalt concrete, or in treated base.

When slag is used as aggregate in asphalt concrete, the K_c factor requirements, as determined by California Test 303, will not apply.

Slag aggregate used for embankment construction shall not be placed within 0.46-m of finished slope lines, measured normal to the plane of the slope.

If steel slag aggregates are used to make asphalt concrete, there shall be no other aggregates used in the mixture, except that up to 50 percent of the material passing the 4.75-mm sieve may consist of iron blast furnace slag aggregates or natural aggregates, or a combination thereof. If iron blast furnace aggregates or natural aggregates or a combination thereof are used in the mix, each type of aggregate shall be fed to the drier at a uniform rate. The rate of feed of each type of aggregate shall be maintained within 10 percent of the amount set. Adequate means shall be provided for controlling and checking the accuracy of the feeder.

In addition to the requirements of Section 39-3.01, "Storage," of the Standard Specifications, steel slag aggregate shall be stored separately from iron blast furnace slag aggregate and each type of slag aggregate shall also be stored separately from natural aggregate.

Asphalt concrete produced from more than one of the following shall not be placed in the same layer: steel slag aggregates, iron blast furnace slag aggregates, natural aggregates or any combination thereof. Once a type of aggregate or aggregates is selected, it shall not be changed without prior approval by the Engineer.

If steel slag aggregates are used to produce asphalt concrete, and if the specific gravity of a compacted stabilometer test specimen is in excess of 2.40, the quantity of asphalt concrete to be paid for will be reduced. The stabilometer test specimen will be fabricated in conformance with the procedures in California Test 304 and the specific gravity of the specimen will be determined in conformance with Method C of California Test 308. The pay quantity of asphalt concrete will be determined by multiplying the quantity of asphalt concrete placed in the work by 2.40 and dividing the result by the specific gravity of the compacted stabilometer test specimen. Such reduction in quantity will be determined and applied as often as is necessary to ensure accurate results as determined by the Engineer.

8-1.05 ENGINEERING FABRICS

Engineering fabrics shall conform to the provisions in Section 88, "Engineering Fabrics," of the Standard Specifications and these special provisions.

Filter fabric for this project shall be ultraviolet (UV) ray protected.

8-1.06 ASPHALTIC EMULSION

Asphaltic emulsion shall conform to the provisions in Section 94, "Asphaltic Emulsions," of the Standard Specifications and these special provisions.

When tested in conformance with the "Residue and Oil Distallate by Distallation" test of AASHTO Designation: T 59, the composition of SS1 asphaltic emulsion shall be a minimum 57 percent of residue.

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.

The Department maintains a list of sources of fine and coarse aggregate that have been approved for use with a reduced amount of supplementary cementitious material in the total amount of cementitious material to be used. A source of aggregate will be considered for addition to the approved list if the producer of the aggregate submits to the Transportation Laboratory certified test results from a qualified testing laboratory that verify the aggregate complies with the requirements. Before the testing starts, the aggregate test shall be registered with the Department. A registration number can be obtained by calling (916) 227-7228. The registration number shall be used as the identification for the aggregate sample in correspondence with the Department. Upon request, a split of the tested sample shall be provided to the Department. Approval of aggregate will depend upon compliance with the specifications, based on the certified test results submitted, together with any replicate testing the Department may elect to perform. Approval will expire 3 years from the date the most recent registered and evaluated sample was collected from the aggregate source.

Qualified testing laboratories shall conform to the following requirements:

1. Laboratories performing ASTM Designation: C 1293 shall participate in the Cement and Concrete Reference Laboratory (CCRL) Concrete Proficiency Sample Program and shall have received a score of 3 or better on each test of the previous 2 sets of concrete samples.
2. Laboratories performing ASTM Designation: C 1260 shall participate in the Cement and Concrete Reference Laboratory (CCRL) Pozzolan Proficiency Sample Program and shall have received a score of 3 or better on the shrinkage and soundness tests of the previous 2 sets of pozzolan samples.

Aggregates on the list shall conform to one of the following requirements:

1. When the aggregate is tested in conformance with the requirements in California Test 554 and ASTM Designation: C 1293, the average expansion at one year shall be less than or equal to 0.040 percent; or
2. When the aggregate is tested in conformance with the requirements in California Test 554 and ASTM Designation: C 1260, the average of the expansion at 16 days shall be less than or equal to 0.15 percent.

If the aggregates used in the concrete are on the Department's list, the minimum amount of supplementary cementitious material shall conform to the following:

1. If fly ash or natural pozzolan conforming to the provisions in Section 90-2.01C, "Required Use of Supplementary Cementitious Materials," of the Standard Specifications is used, the minimum amount of supplementary cementitious material shall be 15 percent by mass of the total cementitious material; or
2. If silica fume conforming to the provisions in Section 90-2.01C, "Required Use of Supplementary Cementitious Materials," of the Standard Specifications is used, the minimum amount of supplementary cementitious material shall be 7 percent by mass of the total cementitious material.

The limitation on tricalcium silicate (C_3S) content in Type II cement specified in Section 90-2.01A, "Cement," of the Standard Specifications shall not apply.

8-2.02 CEMENTITIOUS MATERIAL AND AIR CONTENT

Except for concrete listed below, all concrete that is designated as Class 2 and all concrete for use in structures shall contain not less than 375 kg of cementitious material per cubic meter and shall be air entrained as provided in Section 90-4, "Admixtures," of the Standard Specifications. The air content at time of mixing and prior to placing shall be 3.0 ± 1.0 percent.

A. Paving concrete.
B. Concrete designated by 28-day compressive strength.
C. Concrete specified to have a cementitious material content that exceeds 375 kilograms per cubic meter.
D. Seal course concrete.
E. Concrete for deck slabs of bridges and structure approach slabs.
F. Concrete for piling.

8-2.03 PRECAST CONCRETE QUALITY CONTROL

GENERAL

Precast concrete quality control shall conform to these special provisions.

Unless otherwise specified, precast concrete quality control shall apply when any precast concrete members are fabricated in conformance with the provisions in Section 49, "Piling," or Section 51, "Concrete Structures," of the Standard Specifications.

Quality Control (QC) shall be the responsibility of the Contractor. The Contractor's QC inspectors shall perform inspection and testing prior to precasting, during precasting, and after precasting, and as specified in this section and additionally as necessary to ensure that materials and workmanship conform to the details shown on the plans and specifications.

Quality Assurance (QA) is the prerogative of the Engineer. Regardless of the acceptance for a given precast element by the Contractor, the Engineer will evaluate the precast element. The Engineer will reject any precast element that does not conform to the approved Precast Concrete Quality Control Plan (PCQCP), the details shown on the plans, and these special provisions.

The Contractor shall designate in writing a precast Quality Control Manager (QCM) for each precasting facility. The QCM shall be responsible directly to the Contractor for the quality of precasting, including materials and workmanship, performed by the Contractor and all subcontractors. The QCM shall be the sole individual responsible to the Contractor for submitting, receiving, and approving all correspondence, required submittals, and reports to and from the Engineer. The

QCM shall not be employed or compensated by any subcontractor, or other persons or entities hired by subcontractors, or suppliers, who will provide other services or materials for the project. The QCM may be an employee of the Contractor.

Prior to submitting the PCQCP required herein, a meeting between the Engineer, the Contractor's QCM, and a representative from each entity performing precast concrete operations for this project, shall be held to discuss the requirements for precast quality control.

QC Inspectors shall either be 1) licensed as Civil Engineers in the State of California, or 2) have a current Plant Quality Personnel Certification, Level II, from the Precast/Prestressed Concrete Institute. A QC Inspector shall witness all precast concrete operations.

PRECAST CONCRETE QUALIFICATION AUDIT

Unless otherwise specified, no Contractors or subcontractors performing precast concrete operations for the project shall commence work without having successfully completed the Department's Precast Fabrication Qualification Audit, hereinafter referred to as the audit. The Engineer will perform the audit, and copies of the audit form, along with procedures for requesting and completing the audit, are available at the Transportation Laboratory or the following website:

http://www.dot.ca.gov/hq/esc/Translab/smbresources.htm

An audit that was previously approved by the Engineer no more than three years prior to the beginning of work on this contract will be acceptable for the entire period of this contract, provided the Engineer determines the audit is for the same type of work that is to be performed on this contract.

Successful completion of an audit shall not relieve the Contractor of the responsibility for furnishing materials or producing finished work of the quality specified in these special provisions and as shown on the plans.

PRECAST CONCRETE QUALITY CONTROL PLAN

Prior to performing any precasting operations, the Contractor shall submit to the Engineer, in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, 3 copies of a separate PCQCP for each item of work which is to be precast. A separate PCQCP shall be submitted for each facility. As a minimum, each PCQCP shall include the following:

A. The name of the precasting firm, the concrete plants to be used, and any concrete testing firm to be used;
B. A manual prepared by the precasting firm that includes equipment, testing procedures, safety plan, and the names, qualifications, and documentation of certifications for all personnel to be used;
C. The name of the QCM and the names, qualifications, and documentation of certifications for all QC inspection personnel to be used;
D. An organizational chart showing all QC personnel and their assigned QC responsibilities;
E. The methods and frequencies for performing all required quality control procedures, including all inspections, material testing, and any required survey procedures for all components of the precast elements including prestressing systems, concrete, grout, reinforcement, steel components embedded or attached to the precast member, miscellaneous metal, and formwork;
F. A system for identification and tracking of required precast element repairs, and a procedure for the re-inspection of any repaired precast element. The system shall have provisions for a method of reporting nonconforming precast elements to the Engineer; and
G. Forms to be used for Certificates of Compliance, daily production logs, and daily reports.

The Engineer shall have 4 weeks to review the PCQCP submittal after a complete plan has been received. No precasting shall be performed until the PCQCP is approved in writing by the Engineer.

A PCQCP that was previously approved by the Engineer no more than one year prior to the beginning of work on this contract will be acceptable for the entire period of this contract, provided the Engineer determines the PCQCP is for the same type of work that is to be performed on this contract.

An amended PCQCP or addendum shall be submitted to, and approved in writing by the Engineer, for any proposed revisions to the approved PCQCP. An amended PCQCP or addendum will be required for any revisions to the PCQCP, including but not limited to changes in concrete plants or source materials, changes in material testing procedures and testing labs, changes in procedures and equipment, changes in QC personnel, or updated systems for tracking and identifying precast elements. The Engineer shall have 2 weeks to complete the review of the amended PCQCP or addendum, once a complete submittal has been received. Work that is affected by any of the proposed revisions shall not be performed until the amended PCQCP or addendum has been approved.

After final approval of the PCQCP, amended PCQCP, or addendum, the Contractor shall submit 7 copies to the Engineer of each of these approved documents.

It is expressly understood that the Engineer's approval of the Contractor's PCQCP shall not relieve the Contractor of any responsibility under the contract for the successful completion of the work in conformance with the requirements of the plans and specifications. The Engineer's approval shall neither 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 PCQCP.

REPORTING

The QC Inspector shall provide reports to the QCM on a daily basis for each day that precasting operations are performed.

A daily production log for precasting shall be kept by the QCM for each day that precasting operations, including setting forms, placing reinforcement, setting prestressing steel, casting, curing, post tensioning, and form release, are performed. The log shall include the facility location, and shall include specific description of casting or related operations, any problems or deficiencies discovered, any testing or repair work performed, and the names of all QC personnel and the specific QC inspections they performed that day. The daily report from each QC Inspector shall also be included in the log. This daily log shall be available for viewing by the Engineer, at the precasting facility.

All reports regarding material tests and any required survey checks shall be signed by the person that performed the test or check, 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 be notified immediately in writing when any precasting problems or deficiencies are discovered and also of the proposed repair or process changes required to correct them. The Engineer shall have 4 weeks to review these procedures. No remedial work shall begin until the Engineer approves these procedures in writing.

The following items shall be included in a Precast Report that is to be submitted to the Engineer following the completion of any precast element:

A. Reports of all material tests and any required survey checks;
B. Documentation that the Contractor has evaluated all tests and corrected all rejected deficiencies, and all repairs have been re-examined with the required tests and found acceptable; and
C. Daily production log.

At the completion of any precast element, and if the QCM determines that element is in conformance with these special provisions, the QCM shall sign and furnish to the Engineer, a certificate of compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. This certificate of compliance shall be submitted with the Precast Report. The certificate shall state that all of the materials and workmanship incorporated in the work, and all required tests and inspections of this work, have been performed in conformance with the details shown on the plans and the provisions of the Standard Specifications and these special provisions.

PAYMENT

In the event the Engineer fails to complete the review of 1) a PCQCP, 2) an amended PCQCP or addendum, or 3) a proposed repair or process change, within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

All required repair work or process changes required to correct precasting operation deficiencies, whether discovered by the QCM, QC Inspector, or by the Engineer, and any associated delays or expenses to the Contractor caused by performing these repairs, shall be at the Contractor's expense.

Full compensation for conforming to the requirements of this section shall be considered as included in the contract prices paid for the various items of work involved, and no additional compensation will be allowed therefor.

SECTION 8-3. WELDING

8-3.01 WELDING

GENERAL

Flux cored welding electrodes conforming to the requirements of AWS A5.20 E6XT-4 or E7XT-4 shall not be used to perform welding for this project.

Wherever reference is made to the following AWS welding codes in the Standard Specifications, on the plans, or in these special provisions, the year of adoption for these codes shall be as listed:

AWS Code	Year of Adoption
D1.1	2006
D1.4	2005
D1.5	2002
D1.6	1999

Requirements of the AWS welding codes shall apply unless otherwise specified in the Standard Specifications, on the plans, or in these special provisions. Wherever the abbreviation AWS is used, it shall be equivalent to the abbreviations ANSI/AWS or AASHTO/AWS.

Section 6.1.1.1 of AWS D1.5 is replaced with the following:

Quality Control (QC) shall be the responsibility of the Contractor. As a minimum, the Contractor shall perform inspection and testing of each weld joint prior to welding, during welding, and after welding as specified in this section and as necessary to ensure that materials and workmanship conform to the requirements of the contract documents.

Unless otherwise specified, Sections 6.1.3 through 6.1.4.3 of AWS D1.1, Section 7.1.2 of AWS D1.4, and Sections 6.1.1.2 through 6.1.3.3 of AWS D1.5 are replaced with the following:

The QC Inspector shall be the duly designated person who acts for and on behalf of the Contractor for inspection, testing, and quality related matters for all welding.

Quality Assurance (QA) is the prerogative of the Engineer. The QA Inspector is the duly designated person who acts for and on behalf of the Engineer.

The QC Inspector shall be responsible for quality control acceptance or rejection of materials and workmanship, and shall be currently certified as an AWS Certified Welding Inspector (CWI) in conformance with the requirements in AWS QC1, "Standard for AWS Certification of Welding Inspectors."

The QC Inspector may be assisted by an Assistant QC Inspector provided that this individual is currently certified as an AWS Certified Associate Welding Inspector (CAWI) in conformance with the requirements in AWS QC1, "Standard for AWS Certification of Welding Inspectors." The Assistant QC Inspector may perform inspection under the direct supervision of the QC Inspector provided the assistant is always within visible and audible range of the QC Inspector. The QC Inspector shall be responsible for signing all reports and for determining if welded materials conform to workmanship and acceptance criteria. The ratio of QC Assistants to QC Inspectors shall not exceed 5 to 1.

When the term "Inspector" is used without further qualification, it shall refer to the QC Inspector.

When any work is welded in conformance with the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications, not including Section 75-1.035, "Bridge Joint Restrainer Units," of the Standard Specifications, Section 6.1.4 of AWS D1.1 is replaced with the following:

The QC Inspector shall be responsible for quality control acceptance or rejection of materials and workmanship and shall be currently certified as an AWS CWI in conformance with the requirements in AWS QC1, "Standard for AWS Certification of Welding Inspectors," or as a Welding Inspector Specialist (WIS) in conformance with the requirements in AWS B5.2, "Specification for the Qualification of Welding Inspector Specialists and Welding Inspector Assistants."

Section 6.14.6, "Personnel Qualification," of AWS D1.1, Section 7.8, "Personnel Qualification," of AWS D1.4, and Section 6.1.3.4, "Personnel Qualification," of AWS D1.5 are replaced with the following:

Personnel performing nondestructive testing (NDT) shall be qualified and certified in conformance with the requirements of the American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A and the Written Practice of the NDT firm. The Written Practice of the NDT firm shall meet or exceed the guidelines of the ASNT Recommended Practice No. SNT-TC-1A. Individuals who perform NDT, review the results, and prepare the written reports shall be either:

A. Certified NDT Level II technicians, or;
B. Level III technicians who hold a current ASNT Level III certificate in that discipline and are authorized and certified to perform the work of Level II technicians.

Section 6.5.4 of AWS D1.5 is replaced with the following:

The QC Inspector shall inspect and approve each joint preparation, assembly practice, welding technique, joint fit-up, and the performance of each welder, welding operator, and tack welder to make certain that the applicable requirements of

this code and the approved Welding Procedure Specification (WPS) are met. The QC Inspector shall examine the work to make certain that it meets the requirements of Sections 3 and 6.26. The size and contour of all welds shall be measured using suitable gages. Visual inspection for cracks in welds and base metal, and for other discontinuities shall be aided by strong light, magnifiers, or such other devices as may be helpful. Acceptance criteria different from those specified in this code may be used when approved by the Engineer.

Section 6.6.5, "Nonspecified NDT Other than Visual," of AWS D1.1, Section 7.6.5 of AWS D1.4 and Section 6.6.5 of AWS D1.5 shall not apply.

For any welding, the Engineer may direct the Contractor to perform NDT that is in addition to the visual inspection or NDT specified in the AWS or other specified welding codes, in the Standard Specifications, or in these special provisions. Except as provided for in these special provisions, additional NDT required by the Engineer, and associated repair work, will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications. Prior to release of welded material by the Engineer, if testing by NDT methods other than those originally specified discloses an attempt to defraud or reveals a gross nonconformance, all costs associated with the repair of the deficient area, including NDT of the weld and of the repair, and any delays caused by the repair, shall be at the Contractor's expense. A gross nonconformance is defined as the sum of planar type rejectable indications in more than 20 percent of the tested length.

When less than 100 percent of NDT is specified for any weld, it is expected that the entire length of weld meet the specified acceptance-rejection criteria. Should any welding deficiencies be discovered by additional NDT directed or performed by the Engineer that utilizes the same NDT method as that originally specified, all costs associated with the repair of the deficient area, including NDT of the weld and of the weld repair, and any delays caused by the repair, shall be at the Contractor's expense.

Repair work to correct welding deficiencies discovered by visual inspection directed or performed by the Engineer, and any associated delays or expenses caused to the Contractor by performing these repairs, shall be at the Contractor's expense.

The Engineer shall have the authority to verify the qualifications or certifications of any welder, QC Inspector, or NDT personnel to specified levels by retests or other means approved by the Engineer.

Inspection and approval of all joint preparations, assembly practices, joint fit-ups, welding techniques, and the performance of each welder, welding operator, and tack welder shall be documented by the QC Inspector on a daily basis for each day welding is performed. For each inspection, including fit-up, Welding Procedure Specification (WPS) verification, and final weld inspection, the QC Inspector shall confirm and document compliance with the requirements of the AWS or other specified code criteria and the requirements of these special provisions on all welded joints before welding, during welding, and after the completion of each weld.

In addition to the requirements specified in the applicable code, the period of effectiveness for a welder's or welding operator's qualification shall be a maximum of 3 years for the same weld process, welding position, and weld type. If welding will be performed without gas shielding, then qualification shall also be without gas shielding. Excluding welding of fracture critical members, a valid qualification at the beginning of work on a contract will be acceptable for the entire period of the contract, as long as the welder's or welding operator's work remains satisfactory.

In addition to the requirements of AWS D1.1, welding procedures qualification for work welded in conformance with that code shall conform to the following requirements:

A. The travel speed, amperage, and voltage values that are used for tests conducted per AWS D1.1, Section 4.1.1, shall be consistent for each pass in a weld joint and shall in no case vary by more than ±10 percent for travel speed, ±10 percent for amperage, and ±7 percent for voltage as measured from a predetermined target value or average within each weld pass. The travel speed shall in no case vary by more than ±15 percent when using submerged arc welding.
B. When a nonstandard weld joint is to be made using a combination of WPSs, a single test may be conducted combining the WPSs to be used in production, provided the essential variables, including weld bead placement, of each process are limited to those established in Table 4.5.

In addition to the requirements of AWS D1.5, Section 5.12 or 5.13, welding procedures qualification for work welded in conformance with that code shall conform to the following requirements:

A. Unless considered prequalified, fillet welds shall be qualified in each position. The fillet weld soundness test shall be conducted using the essential variables of the WPS as established by the Procedure Qualification Record (PQR).
B. For qualification of joints that do not conform to Figures 2.4 and 2.5 of AWS D1.5, a minimum of two WPS qualification tests are required. The tests shall be conducted using both Figure 5.1 and Figure 5.3. The test conforming to Figure 5.1 shall be conducted in conformance with AWS D1.5, Section 5.12 or 5.13. The test conforming to Figure 5.3 shall be conducted using the welding electrical parameters that were established for the test conducted conforming to Figure 5.1. The ranges of welding electrical parameters established during welding

per Figure 5.1 in conformance with AWS D1.5, Section 5.12, shall be further restricted according to the limits in Table 5.3 during welding per Figure 5.3.

C. Multiple zones within a weld joint may be qualified. The travel speed, amperage, and voltage values that are used for tests conducted per AWS D1.5 Section 5.13 shall be consistent for each pass in a weld joint, and shall in no case vary by more than ±10 percent for travel speed, ±10 percent for amperage, and ±7 percent for voltage as measured from a predetermined target value or average within each weld pass or zone. The travel speed shall in no case vary by more than ±15 percent when using submerged arc welding.

D. For a WPS qualified in conformance with AWS D1.5 Section 5.13, the values to be used for calculating ranges for current and voltage shall be based on the average of all weld passes made in the test. Heat input shall be calculated using the average of current and voltage of all weld passes made in the test for a WPS qualified in conformance with Section 5.12 or 5.13.

E. Macroetch tests are required for WPS qualification tests, and acceptance shall be per AWS D1.5 Section 5.19.3.

F. When a nonstandard weld joint is to be made using a combination of WPSs, a test conforming to Figure 5.3 may be conducted combining the WPSs to be used in production, provided the essential variables, including weld bead placement, of each process are limited to those established in Table 5.3.

G. Prior to preparing mechanical test specimens, the PQR welds shall be inspected by visual and radiographic tests. Backing bar shall be 75 mm in width and shall remain in place during NDT testing. Results of the visual and radiographic tests shall comply with AWS D1.5 Section 6.26.2, excluding Section 6.26.2.2. Test plates that do not comply with both tests shall not be used.

WELDING QUALITY CONTROL

Welding quality control shall conform to the requirements in the AWS or other specified welding codes, the Standard Specifications, and these special provisions.

Unless otherwise specified, welding quality control shall apply when any work is welded in conformance with the provisions in Section 49, "Piling," Section 52, "Reinforcement," Section 55, "Steel Structures," or Section 75-1.035, "Bridge Joint Restrainer Units," of the Standard Specifications.

All welding will require inspection by the Engineer. The Contractor shall request inspection at least 3 working days prior to the beginning of welding for locations within California and 5 working days for locations outside of California. The Contractor shall request inspection at:

http://www.dot.ca.gov/hq/esc/Translab/smbforms.htm

Continuous inspection shall be provided when any welding is being performed. Continuous inspection, as a minimum, shall include having a QC Inspector within such close proximity of all welders or welding operators so that inspections by the QC Inspector of each welding operation at each welding location does not lapse for a period exceeding 30 minutes.

When joint weld details that are not prequalified to the details of Section 3 of AWS D1.1 or to the details of Figure 2.4 or 2.5 of AWS D1.5 are proposed for use in the work, the joint details, their intended locations, and the proposed welding parameters and essential variables, shall be approved by the Engineer. The Contractor shall allow the Engineer 2 weeks to complete the review of the proposed joint detail locations. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications. Upon approval of the proposed joint detail locations and qualification of the proposed joint details, welders and welding operators using these details shall perform a qualification test plate using the WPS variables and the joint detail to be used in production. The test plate shall have the maximum thickness to be used in production and a minimum length of 460 mm. The test plate shall be mechanically and radiographically tested. Mechanical and radiographic testing and acceptance criteria shall be as specified in the applicable AWS codes.

The Engineer will witness all qualification tests for WPSs that were not previously approved by the Department. Unless otherwise specified, an approved independent third party will witness the qualification tests for welders or welding operators. The independent third party shall be a current CWI and shall not be an employee of the contractor performing the welding. The Contractor shall allow the Engineer 2 weeks to review the qualifications and copy of the current certification of the independent third party. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications. The Contractor shall notify the Engineer one week prior to performing any qualification tests. Witnessing of qualification tests by the Engineer shall not constitute approval of the intended joint locations, welding parameters, or essential variables.

The Contractor shall designate in writing a welding Quality Control Manager (QCM). The QCM shall be responsible directly to the Contractor for the quality of welding, including materials and workmanship, performed by the Contractor and subcontractors.

The QCM shall be the sole individual responsible to the Contractor for submitting, receiving, reviewing, and approving all correspondence, required submittals, and reports to and from the Engineer. The QCM shall be a registered professional engineer or shall be currently certified as a CWI.

Unless the QCM is hired by a subcontractor providing only QC services, the QCM shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project. The QCM may be an employee of the Contractor.

Welding inspection personnel or NDT firms to be used in the work shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project, except for the following conditions:

A. The work is welded in conformance with AWS D1.5 and is performed at a permanent fabrication or manufacturing facility that is certified under the AISC Quality Certification Program, Category Cbr, Major Steel Bridges and Fracture Critical endorsement F, when applicable.
B. The welding is performed on pipe pile material at a permanent pipe manufacturing facility authorized to apply the American Petroleum Institute (API) monogram for API 5L pipe.

For welding performed at such facilities, the inspection personnel or NDT firms may be employed or compensated by the facility performing the welding provided the facility maintains a QC program that is independent from production.

Prior to submitting the Welding Quality Control Plan (WQCP) required herein, a prewelding meeting between the Engineer, the Contractor's QCM, and a representative from each entity performing welding or inspection for this project, shall be held to discuss the requirements for the WQCP.

The Contractor shall submit to the Engineer, in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, 2 copies of a separate WQCP for each subcontractor or supplier for each item of work for which welding is to be performed.

The Contractor shall allow the Engineer 2 weeks to review the WQCP submittal after a complete plan has been received. No welding shall be performed until the WQCP is approved in writing by the Engineer. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

An amended WQCP or any addendum to the approved WQCP shall be submitted to, and approved in writing by the Engineer, for proposed revisions to the approved WQCP. An amended WQCP or addendum will be required for revisions to the WQCP, including but not limited to a revised WPS; additional welders; changes in NDT firms, QC, or NDT personnel or procedures; or updated systems for tracking and identifying welds. The Engineer shall have one week to complete the review of the amended WQCP or addendum. Work affected by the proposed revisions shall not be performed until the amended WQCP or addendum has been approved. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Information regarding the contents, format, and organization of a WQCP, is available at the Transportation Laboratory and at:

http://www.dot.ca.gov/hq/esc/Translab/smbresources.htm

After final approval of the WQCP, amended WQCP, or addendum, the Contractor shall submit 7 copies to the Engineer of the approved documents. A copy of the Engineer approved document shall be available at each location where welding is to be performed.

A daily production log for welding shall be kept for each day that welding is performed. The log shall clearly indicate the locations of all welding. The log shall include the welders' names, amount of welding performed, any problems or deficiencies discovered, and any testing or repair work performed, at each location. The daily report from each QC Inspector shall also be included in the log.

The following items shall be included in a Welding Report that is to be submitted to the Engineer within 2 weeks following the performance of any welding:

A. A daily production log.
B. Reports of all visual weld inspections and NDT.

C. Radiographs and radiographic reports, and other required NDT reports.
D. A summary of welding and NDT activities that occurred during the reporting period.
E. Reports of each application of heat straightening.
F. A summarized log listing the rejected lengths of weld by welder, position, process, joint configuration, and piece number.
G. Documentation that the Contractor has evaluated all radiographs and other nondestructive tests and corrected all rejectable deficiencies, and that all repaired welds have been reexamined using the required NDT and found acceptable.

The following information shall be clearly written on the outside of radiographic envelopes: name of the QCM, name of the nondestructive testing firm, name of the radiographer, date, contract number, complete part description, and all included weld numbers, report numbers, and station markers or views, as detailed in the WQCP. In addition, all interleaves shall have clearly written on them the part description and all included weld numbers and station markers or views, as detailed in the WQCP. A maximum of 2 pieces of film shall be used for each interleave.

Reports of all visual inspections and NDT shall be signed by the inspector or technician and submitted daily 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. Reports of all NDT, whether specified, additional, or informational, performed by the Contractor shall be submitted to the Engineer.

The Engineer will review the Welding Report to determine if the Contractor is in conformance with the WQCP. Unless otherwise specified, the Engineer shall be allowed 2 weeks to review the report and respond in writing after the complete Welding Report has been received. Prior to receiving notification from the Engineer of the Contractor's conformance with the WQCP, the Contractor may encase in concrete or cover welds for which the Welding Report has been submitted. However, should the Contractor elect to encase or cover those welds prior to receiving notification from the Engineer, it is expressly understood that the Contractor shall not be relieved of the responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase or cover welds pending notification by the Engineer, and in the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

In addition to the requirements in AWS D1.1 and AWS D1.5, second-time excavations of welds or base metal to repair unacceptable discontinuities, regardless of NDT method, and all repairs of cracks require prior approval of the Engineer.

The Engineer shall be notified immediately in writing when welding problems, deficiencies, base metal repairs, or any other type of repairs not submitted in the WQCP are discovered, and also of the proposed repair procedures to correct them. For requests to perform second-time repairs or repairs of cracks, the Contractor shall include an engineering evaluation of the proposed repair. The engineering evaluation, at a minimum, shall address the following:

A. What is causing each defect?
B. Why the repair will not degrade the material properties?
C. What steps are being taken to prevent similar defects from happening again?

The Contractor shall allow the Engineer one week to review these procedures. No remedial work shall begin until the repair procedures are approved in writing by the Engineer. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The QCM shall sign and furnish to the Engineer, a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each item of work for which welding was performed. The certificate shall state that all of the materials and workmanship incorporated in the work, and all required tests and inspections of this work, have been performed in conformance with the details shown on the plans, the Standard Specifications, and these special provisions.

WELDING FOR OVERHEAD SIGN AND POLE STRUCTURES

The Contractor shall meet the following requirements for any work welded in conformance with the provisions in Section 56-1, "Overhead Sign Structures," or Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications.

Welding inspection personnel or NDT firms to be used in the work shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project, except for when the welding is performed at a permanent fabrication or manufacturing facility which is certified under the AISC Quality Certification Program, Category Sbd, Conventional Steel Building Structures.

Welding Qualification Audit

Contractors or subcontractors performing welding operations for overhead sign and pole structures shall not deliver materials to the project without having successfully completed the Department's "Manufacturing Qualification Audit for Overhead Sign and Pole Structures," hereinafter referred to as the audit, not more than one year prior to the delivery of the materials. The Engineer will perform the audit. Copies of the audit form, and procedures for requesting and completing the audit, are available at the Transportation Laboratory or at:

http://www.dot.ca.gov/hq/esc/Translab/smbresources.htm

An audit that was approved by the Engineer no more than one year prior to the beginning of work on this contract will be acceptable for the entire period of this contract, provided the Engineer determines the audit was for the same type of work that is to be performed on this contract.

Successful completion of an audit shall not relieve the Contractor of the responsibility for furnishing materials or producing finished work of the quality specified in these special provisions and as shown on the plans.

Welding Report

For work welded in conformance with the provisions in Section 56-1, "Overhead Sign Structures," or Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, a Welding Report shall be submitted in conformance with the provisions in "Welding Quality Control" of these special provisions.

PAYMENT

Full compensation for conforming to the requirements of "Welding" shall be considered as included in the contract prices paid for the various items of work involved and no additional compensation will be allowed therefor.

SECTION 9. DESCRIPTION OF BRIDGE WORK

This work shall consist, in general, of constructing cast-in-place prestressed concrete box girder bridges with approach slabs, Type N and EQ, as shown on the plans for:

Britania Blvd OC
(Bridge Number 57-1144)

La Media Road UC
(Bridge Number 57-1145L/R)

Airway Road UC
(Bridge Number 57-1148L/R)

SECTION 10. CONSTRUCTION DETAILS

SECTION 10-1. GENERAL

10-1.00 CONSTRUCTION PROJECT INFORMATION SIGNS

Before any major physical construction work readily visible to highway users is started on this contract, the Contractor shall furnish and erect 2 Type 2 Construction Project Information signs at the locations designated by the Engineer.

The signs and overlays shall be of a type and material consistent with the estimated time of completion of the project and shall conform to the details shown on the plans.

The sign letters, border and the Department's construction logos shall conform to the colors (non-reflective) and details shown on the plans, and shall be on a white background (non-reflective). The colors blue and orange shall conform to PR Color Number 3 and Number 6, respectively, as specified in the Federal Highway Administration's Color Tolerance Chart.

The sign message to be used for fund types shall consist of the following, in the order shown:

FEDERAL HIGHWAY TRUST FUNDS
STATE HIGHWAY FUNDS

The sign message to be used for type of work shall consist of the following:

HIGHWAY CONSTRUCTION

The sign message to be used for the Year of Completion of Project Construction will be furnished by the Engineer. The Contractor shall furnish and install the "Year" sign overlay within 10 working days of notification of the year date to be used.

The letter sizes to be used shall be as shown on the plans. The information shown on the signs shall be limited to that shown on the plans.

The signs shall be kept clean and in good repair by the Contractor.

Upon completion of the work, the signs shall be removed and disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.

Full compensation for furnishing, erecting, maintaining, and removing and disposing of the construction project information signs shall be considered as included in the contract lump sum price paid for construction area signs and no additional compensation will be allowed therefor.

10-1.01 ORDER OF WORK

Order of work shall conform to the provisions in Section 5-1.05, "Order of Work," of the Standard Specifications and these special provisions.

At the Contractor's option, the outside mainlane shoulders on Route 905 may be built using the alternate structural section as shown on the plans. Compensation for the alternate outside shoulder structural section shall be considered as included in the in the items and quantities of work involved with the original designed outside shoulder structural section as shown on the summary of quantities and no additional compensation will allowed therefor.

The excavation from the Excavation Site as shown on the plans shall be completed before November 1, 2008

No excavation shall be performed within 1.2 m of the following utilities until the owner, or the owner's representative has located the facility by pot holing, probing, or other means that will positively locate and identify the facility both horizontally and vertically. The utility company will be allowed 20 working days to perform this work

The utility owner or the owner's representative shall be present whenever any excavation is performed within 1.2 meters of the following utilities.

Owner	Type	Location
SDG&E	900 mm Gas Main	Harvest Rd. “U-19 & U-23”
SDG&E	750 mm Gas Main	Sanyo Ave. "U-20, U-24, U-26, U-28 & U-30"
SDG&E	Gas Regulator Station	NE Corner of Otay Mesa Rd. & Harvest Rd. "U-19"
SDG&E	75 mm Gas Main	Sanyo Ave. "U-20, U-24, U-26, U-28 & U-30"
SDG&E	U/G Electrical	Sanyo Ave. "U-20, U-24, U-26, U-28 & U-30"
SDG&E	U/G Electrical	Airway Rd. "U-30"
SDG&E	250 mm Gas Main	Otay Mesa Rd. "U-19 & U-20"

The following parcels do not have Right of Way clearance, therefore the Contractor will not be permitted to enter the parcels as shown on the plans, until after the Right-of-Way clearance dates shown.

Right-of-Way Parcel Numbers and Clearance Dates		
	Parcel No.	Clearance Dates
1	31372	11/01/2007
2	31381	10/01/2007
3	31467	10/01/2007
4	32002	10/01/2007

When traffic is moved from an established path to a new path at existing traffic signal locations, Video Image Vehicle Detection System (VIVDS) video detection zones shall be in place prior to opening the traveled way to public traffic. Vehicle detection at limit lines shall be provided at all times for traveled ways open to public traffic except during traffic signal shutdowns. The vehicle detection shall be aligned with traffic lanes and be offset from limit lines in the same manner as video detection zones shown on the plans. The width of the coverage area of vehicle detection shall be suitable for the traffic signal phase and number of lanes involved. The length of the coverage area of vehicle detection shall equal that of video detection zones at limit lines as shown on the plans. Attention is directed to "Video Image Vehicle Detection System" of these special provisions.

Full compensation for adjusting the video detection zones when traffic is moved from an established path to a new path, but not including the adjustment to the final configuration as shown on the plans, shall be considered as included in the contract prices paid for the items of work that moved traffic from an established path to a new path and no separate payment will be made therefor.

When traffic is moved from an established path to a new path and pavement delineations changes are required, all material and equipment needed for new delineation shall be at the site of the work before any shift of traffic is undertaken. The equipment shall be in good working condition.

After completion of the installation of the construction fence and detours the Contractor shall construct the Airway Road UC (Bridge N0. 57-1148L) followed by the Airway Road UC (Bridge No. 57-1148R).

Prior to performing any work, the Contractor shall install a construction fence at the location shown on the plans or as directed by the Engineer.

Attention is directed to "Migratory Birds," "Contractor Environmental Education Program," "Paleontology," and "Clearing and Grubbing" of these special provisions regarding notification requirements and time constraints for performing work.

Application of temporary erosion control and erosion control (Type 3, Type 4 and Type 5) may require several move-in/move-outs (Temporary Erosion Control or Erosion Control) of erosion control equipment. Attention is directed to "Move-In/Move-Out (Temporary Erosion Control)" and to "Move-In/Move-Out (Erosion Control)" of these special provisions.

Complete design of the various phases of the project will be provided to the Contractor in conformance with the provisions in Section 1, "Specifications and Plans," of these special provisions. Work in any phase of the project shall not begin until the complete design, including final plans, specifications and estimate of quantities, for that phase has been provided to the Contractor by the Engineer.

The work in any phase shall be performed in conformance with the stages of construction shown in the final plans for that phase. Nonconflicting work in subsequent stages within that phase may proceed concurrently with work in preceding stages, provided satisfactory progress is maintained in the preceding stages of construction.

After completion of the installation of the construction fence and detours the Contractor shall construct the Airway Road UC (Bridge N0. 57-1148L) followed by Airway Road UC (Bridge No. 1148R).

Temporary concrete washout facility and temporary concrete washout (Portable) shall be in place prior to the start of any concrete work. Attention is directed to "Temporary Concrete Washout Facility" and to "Temporary Concrete Washout (Portable)" of these special provisions.

Prior to performing any work off the pavement, the Contractor shall install temporary construction entrance as shown on the plans. Attention is directed to "Temporary Construction Entrance" of these special provisions.

A Permit to Enter has been obtained at the Sunroad Enterprises property north and adjacent to Otay Mesa Road for the exclusive use of hauling materials from the Excavation Site. Attention is directed to "Project Information" of these special provisions. If the Contractor elects to use this as haul road the following requirements shall be met:

A. The Contractor shall notify Sunroad Enterprises 2 weeks prior to using the property as a haul road. Contact Tom Story at 858-362-8500.
B. Once the excavation operation on the Excavation site is complete and the haul road is no longer in use, the Sunroad Enterprises property shall be graded to its original conditions.
C. The Contractor shall be responsible for any Environmental Mitigation required as a result of using the Sunroad Enterprises as a haul road.
D. The Contractor shall protect at the Contractor's expense any existing utilities adjacent to or within the limits of the Permit to Enter.
E. The Contractor shall have all underground utilities located by calling 1-800-922-4455 or by calling the utility companies directly before the hauling operation begins.

Attention is directed to "Architectural Surface (Textured Concrete)" of these special provisions regarding constructing a 1.25 m by 1.25 m test panel prior to beginning work on architectural textures.

Attention is directed to "Minor Concrete (Textured Paving)" of these special provisions regarding constructing a 1.25 m by 1.25 m test panel prior to placing minor concrete (textured paving). Areas of minor concrete (miscellaneous construction) for raised medians and areas of minor concrete (gore paving) will receive textured paving work.

Temporary railing (Type K), traffic plastic drums and temporary crash cushions shall be secured in place prior to commencing work for which the temporary railing, traffic plastic drums and crash cushions are required.

Attention is directed to "Jointed Plain Concrete Pavement" of these special provisions in regard to providing Prepaving Conference test strip prior to commencing pavement operations.

Attention is directed to "Environmentally Sensitive Area" and "Temporary Fence (Type ESA)" of these special provisions. Prior to beginning work, the boundaries of the Environmentally Sensitive Areas (ESA) shall be clearly delineated in the field. The boundaries shall be delineated by the installation of temporary fence (Type ESA).

Attention is directed to "Water Pollution Control" of these special provisions regarding the submittal and approval of the "Storm Water Pollution Prevention Plan" prior to performing work having potential to cause water pollution.

The first order of work shall be to place the order for the traffic signal equipment. The Engineer shall be furnished a statement from the vendor that the order for the traffic signal equipment has been received and accepted by the vendor.

The uppermost layer of new pavement shall not be placed until all underlying conduits and loop detectors have been installed.

Prior to commencement of the traffic signal functional test at any location, all items of work related to signal control shall be completed and all roadside signs, pavement delineation, and pavement markings shall be in place at that location.

Attention is directed to "Maintaining Traffic" and "Temporary Pavement Delineation" of these special provisions and to the stage construction sheets of the plans.

Attention is directed to "Progress Schedule (Critical Path Method)" of these special provisions regarding the submittal of a general time-scaled logic diagram within 10 days after approval of the contract. The diagram shall be submitted prior to performing any work that may be affected by any proposed deviations to the construction staging of the project.

The work shall be performed in conformance with the stages of construction shown on the plans. Nonconflicting work in subsequent stages may proceed concurrently with work in preceding stages, provided satisfactory progress is maintained in the preceding stages of construction.

In each stage, after completion of the preceding stage, the first order of work shall be the removal of existing pavement delineation as directed by the Engineer. Pavement delineation removal shall be coordinated with new delineation so that lane lines are provided at all times on traveled ways open to public traffic.

Before obliterating any pavement delineation (traffic stripes, pavement markings, and pavement markers) that is to be replaced on the same alignment and location, as determined by the Engineer, the pavement delineation shall be referenced by the Contractor, with a sufficient number of control points to reestablish the alignment and location of the new pavement delineation. The references shall include the limits or changes in striping pattern, including one- and 2-way barrier lines, limit lines, crosswalks and other pavement markings. Full compensation for referencing existing pavement delineation shall be considered as included in the contract prices paid for new pavement delineation and no additional compensation will be allowed therefor.

Prior to applying asphalt concrete (Type A), the Contractor shall cover all manholes, valve and monument covers, grates, or other exposed facilities located within the area of application, using a plastic or oil resistant construction paper secured to the facility being covered by tape or adhesive. The covered facilities shall be referenced by the Contractor, with a sufficient number of control points to relocate the facilities after the asphalt concrete (Type A) has been placed. After completion of the asphalt concrete (Type A) operation, all covers shall be removed and disposed of in a manner satisfactory to the Engineer. Full compensation for covering manholes, valve and monument covers, grates, or other exposed facilities, referencing, and removing temporary cover shall be considered as included in the contract price paid per tonne for asphalt concrete (Type A), and no additional compensation will be allowed therefor.

At those locations exposed to public traffic where guard railings are to be constructed, the Contractor shall schedule operations so that at the end of each working day there shall be no post holes open nor shall there be any railing posts installed without the blocks and rail elements assembled and mounted thereon.

10-1.02 WATER POLLUTION CONTROL

GENERAL

Water pollution control work shall conform to the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications, section of these special provisions entitled "Relations With California Regional Water Quality Control Board," and these special provisions.

The Contractor may obtain other National Pollutant Discharge Elimination System (NPDES) permits that apply to activities and mobile operations within or outside of the project limits including asphalt batch plants, material borrow areas, concrete plants, staging areas, storage yards, or access roads.

The Contractor shall perform water pollution control work in conformance with the requirements in the "Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual" and addenda in

effect on the day the Notice to Contractors is dated. This manual is referred to as the "Preparation Manual." Copies of the Preparation Manual may be obtained from:

State of California
Department of Transportation
Publication Distribution Unit
1900 Royal Oaks Drive
Sacramento, California 95815
Telephone: (916) 445-3520

Office of the Duty Senior for Construction
Department of Transportation
4050 Taylor Street
San Diego, California 92110
Telephone: (619) 688-6635

The Preparation Manual and other references for performing water pollution control work are available from the Department's Construction Storm Water and Water Pollution Control web site at:

http://www.dot.ca.gov/hq/construc/stormwater/stormwater1.htm

Before the start of job site activities, the Contractor shall provide training for project managers, supervisory personnel, and workers involved with water pollution control work. The training shall include the following topics:

A. Rules and Regulations.
B. Installation and maintenance of the following water pollution control practices:

    1. Temporary Soil Stabilization.
    2. Temporary Sediment Control.
    3. Tracking Control.
    4. Wind Erosion Control.

The Contractor shall designate in writing a Water Pollution Control Manager (WPCM). The Contractor shall submit a statement of qualifications describing the training, work history, and expertise of the proposed WPCM. The qualifications shall include either:

A. A minimum of 24 hours of Department approved storm water management training described at Department's Construction Storm Water and Water Pollution Control web site.
B. Certification as a Certified Professional in Erosion and Sediment Control (CPESC).

The WPCM shall be:

1. Responsible for water pollution control work.
2. The primary contact for water pollution control work.
3. Have authority to mobilize crews to make immediate repairs to water pollution control practices.

The Contractor may designate one manager to prepare the SWPPP and a different manager to implement the plan.

STORM WATER POLLUTION PREVENTION PLAN

The Contractor shall submit a Storm Water Pollution Prevention Plan (SWPPP) to the Engineer for approval. The SWPPP shall conform to the requirements in the Preparation Manual, the NPDES permit, and these special provisions. The SWPPP shall be submitted in place of the water pollution control program required by the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications.

The SWPPP shall include water pollution control practices:

A. For storm water and non-storm water from areas outside of the job site related to construction activities for this contract such as:

1. Staging areas.
2. Storage yards.
3. Access roads.

B. Appropriate for each season as described in "Implementation Requirements" of these special provisions.
C. For activities or mobile operations related to all NPDES permits.

The SWPPP shall include a schedule that:

A. Describes when work activities that could cause water pollution will be performed.
B. Identifies soil stabilization and sediment control practices for disturbed soil area.
C. Includes dates when these practices will be 25, 50, and 100 percent complete.
D. Shows 100 percent completion of these practices before the rainy season.

The SWPPP shall include the following temporary water pollution control practices and their associated contract items of work as shown on the plans or specified in these special provisions:

A. Temporary Soil Stabilization

1. Temporary Erosion Control

B. Temporary Sediment Control

1. Temporary Fiber Roll
2. Temporary Drainage Inlet Protection

C. Tracking Control

1. Temporary Construction Entrance
2. Street Sweeping

D. Waste Management and Materials Pollution Control

1. Temporary Concrete Washout Facility
2. Temporary Concrete Washout (Portable)

The SWPPP shall include the following contract items of work for permanent water pollution control as shown on the plans or as specified in these special provisions:

A. Erosion Control (Type 2, Type 3, Type 4 and Type 5)
B. Fiber Rolls

Within 20 days after contract approval, the Contractor shall submit 3 copies of the SWPPP to the Engineer. The Contractor shall allow 20 days for the Engineer's review. If revisions are required, the Engineer will provide comments and specify the date that the review stopped. The Contractor shall revise and resubmit the SWPPP within 15 days of receipt of the Engineer's comments. The Engineer's review will resume when the complete SWPPP is resubmitted. When the Engineer approves the SWPPP, the Contractor shall submit 4 copies of the approved SWPPP to the Engineer. The Contractor may proceed with construction activities if the Engineer conditionally approves the SWPPP while minor revisions are being completed. In no case will the conditional approval of the SWPPP exceed 40 days. If the Engineer fails to complete the review within the time allowed and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay, the Contractor will be compensated for resulting losses, and an extension of time will be granted, as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The SWPPP shall include a copy of the Notification of Construction, California Department of Fish and Game Agreement, United States Fish and Wildlife Service Biological Opinion, United States Army Corp of Engineers Permit, and California Regional Water Quality Control Board Permit.

The Contractor shall not perform work that may cause water pollution until the SWPPP has been approved by the Engineer. The Engineer's review and approval shall not waive any contract requirements and shall not relieve the Contractor from complying with Federal, State and local laws, regulations, and requirements.

The Contractor shall amend the SWPPP annually and shall resubmit it to the Engineer 25 days before the defined rainy season.

If there is a change in construction schedule or activities, the Contractor shall prepare an amendment to the SWPPP to identify additional or revised water pollution control practices. The Contractor shall submit the amendment to the Engineer for review within a time agreed to by the Engineer not to exceed the number of days specified for the initial submittal of the SWPPP. The Engineer will review the amendment within the same time allotted for the review of the initial submittal of the SWPPP.

If directed by the Engineer or requested in writing by the Contractor and approved by the Engineer, changes to the water pollution control work specified in these special provisions will be allowed. Changes may include addition of new water pollution control practices. The Contractor shall incorporate these changes in the SWPPP. Additional water pollution control work will be paid for as extra work in accordance with Section 4-1.03, "Extra work," of the Standard Specifications.

The Contractor shall keep a copy of the approved SWPPP at the job site. The SWPPP shall be made available when requested by a representative of the Regional Water Quality Control Board, State Water Resources Control Board, United States Environmental Protection Agency, or the local storm water management agency. Requests from the public shall be directed to the Engineer.

SAMPLING AND ANALYSIS

The Contractor shall include a Sampling and Analysis Plan (SAP) in the SWPPP to monitor the effectiveness of the water pollution control practices. The Contractor shall prepare the SAP in conformance with the Preparation Manual.

The Contractor shall designate trained personnel to collect water quality samples. The personnel and training shall be documented in the SAP. Training shall consist of the following elements:

A. SAP review,
B. Health and safety review, and
C. Sampling simulations.

In the SAP the Contractor shall describe the following water quality sampling procedures:

A. Sampling preparation,
B. Collection,
C. Quality assurance and quality control,
D. Sample labeling,
E. Collection documentation,
F. Sample shipping,
G. Chain of custody,
H. Sample numbering, and
I. Precautions from the construction site health and safety plan.

The Contractor shall document sample collection during precipitation.

Samples to be analyzed in the field shall be taken by the Contractor's designated sampling personnel using collection and analysis methods, and equipment calibration specified by the manufacturer of the sampling equipment. Samples to be analyzed by a laboratory, shall be sampled, preserved, and analyzed by a State-certified laboratory in conformance with the requirements in 40 CFR Part 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants." The Contractor shall identify the State-certified laboratory, sample containers, preservation requirements, holding times, and analysis method in the SAP. A list of State-certified laboratories that are approved by the Department is available at:

http://www.dhs.ca.gov/ps/ls/ELAP/html/lablist.htm

Non-Visible Pollutants

This project has the potential to discharge non-visible pollutants in storm water from the construction site. The Contractor shall include in the SAP a description of the sampling and analysis strategy to be implemented on the project for monitoring non-visible pollutants.

In the SAP the Contractor shall identify potential non-visible pollutants that will be present on the construction site associated with the following:

A. Construction materials and wastes;
B. Existing contamination due to historical site usage; or

C. Application of soil amendments, including soil stabilization products, with the potential to alter pH or contribute toxic pollutants to storm water.

The Contractor shall show the locations planned for storage and use of the potential non-visible pollutants on the SWPPP Water Pollution Control Drawings.

The Contractor shall include in the SAP the following list of conditions that require sampling when observed during a storm water inspection:

A. Materials or wastes containing potential non-visible pollutants are not stored under watertight conditions.
B. Materials or wastes containing potential non-visible pollutants are stored under watertight conditions, but:

    1. A breach, leakage, malfunction, or spill is observed;
    2. The leak or spill has not been cleaned up before precipitation; and
    3. There is the potential for discharge of non-visible pollutants to surface waters or drainage system.

C. Construction activities; such as application of fertilizer, pesticide, herbicide, methyl methacrylate concrete sealant, or non-pigmented curing compound; have occurred during precipitation or within 24 hours preceding precipitation, and have the potential to discharge pollutants to surface waters or drainage system.
D. Soil amendments, including soil stabilization products, with the potential to alter pH levels or contribute toxic pollutants to storm water runoff have been applied, and have the potential to discharge pollutants to surface waters or drainage system (unless independent test data are available that demonstrate acceptable concentrations of non-visible pollutants in the soil amendment).
E. Storm water runoff from an area contaminated by historical usage of the site has the potential to discharge pollutants to surface waters or drainage system.

The Contractor shall describe in the SAP the schedule for collecting a sample downhill from each non-visible pollutant source and an uncontaminated control sample, during the first 2 hours of discharge from precipitation during daylight hours that result in enough discharge for sample collection. If discharge flows to the non-visible pollutant source, a sample shall be collected immediately downhill from where the discharge enters the Department's right of way. If precipitation occurs again after at least 72 hours of dry weather the Contractor shall take new samples.

In the SAP the Contractor shall identify sampling locations for collecting downstream and control samples, and the reason for their selection. The control sampling location shall be selected so the sample does not come into contact with materials, wastes or areas associated with potential non-visible pollutants or disturbed soil areas. The Contractor shall show non-visible pollutant sampling locations on the SWPPP Water Pollution Control Drawings.

The Contractor shall identify in the SAP the analytical method to be used for downhill and control samples for potential non-visible pollutants on the project.

Analytical Results and Evaluation

The Contractor shall submit a hard copy and electronic copy of water quality analytical results, and quality assurance and quality control data to the Engineer within 5 days of sampling for field analyses, and within 30 days for laboratory analyses. The Contractor shall also provide an evaluation of whether the downhill samples show levels of the tested parameter higher than in the control sample. If downhill or downstream samples show increased levels, the Contractor will assess the water pollution control measures, site conditions, and surrounding influences to determine the probable cause for the increase. As determined by the assessment, the Contractor will repair or modify water pollution control measures to address increases and amend the SWPPP as necessary. Electronic results (in one of the following file formats: .xls, .txt, .csv, .dbs, or .mdb) shall have the following information:

A. Sample identification number.
B. Contract number.
C. Constituent.
D. Reported value.
E. Analytical method.
F. Method detection limit.
G. Reported limit.

The Contractor shall maintain the water quality sampling documentation and analytical results with the SWPPP on the project site.

If construction activities or knowledge of site conditions change such that discharges or sampling locations change, the Contractor shall amend the SAP in conformance with this section, "Water Pollution Control."

IMPLEMENTATION REQUIREMENTS

The Contractor shall construct, inspect, maintain, remove, and dispose of the water pollution control practices.

The Contractor's responsibility for SWPPP implementation shall continue throughout any temporary suspension of work ordered in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications.

If the Contractor or the Engineer identifies a deficiency in the implementation of the approved SWPPP, the deficiency shall be corrected immediately, unless an agreed date for correction is approved in writing by the Engineer. The deficiency shall be corrected before the onset of precipitation. If the Contractor fails to correct the deficiency by the agreed date or before the onset of precipitation, the Department may correct the deficiency and deduct the cost of correcting deficiencies from payments.

If the Contractor fails to conform to the provisions of this section, "Water Pollution Control," the Engineer may order the suspension of work until the project complies with the requirements of this section.

Year-Round

The Contractor shall monitor the National Weather Service weather forecast on a daily basis during the contract. The Contractor may use an alternative weather forecasting service if approved by the Engineer. Appropriate water pollution control practices shall be in place before precipitation.

The Contractor may discontinue earthwork operations for a disturbed area for up to 21 days and the disturbed soil area will still be considered active. When earthwork operations in the disturbed area have been completed, the Contractor shall implement appropriate water pollution control practices within 15 days, or before predicted precipitation, whichever occurs first.

Rainy Season

The Contractor shall provide soil stabilization and sediment control practices during the rainy season between October 1 and May 1.

The Contractor shall implement soil stabilization and sediment control practices a minimum of 10 days before the start of the rainy season.

During the defined rainy season, the active disturbed soil area of the project site shall be not more than 4 hectares. The Engineer may approve expansions of the active disturbed soil area limit if requested in writing. The Contractor shall maintain soil stabilization and sediment control materials on site to protect disturbed soil areas.

INSPECTION AND MAINTENANCE

The WPCM shall inspect the water pollution control practices identified in the SWPPP as follows:

A. Before a forecasted storm,
B. After precipitation that causes site runoff,
C. At 24-hour intervals during extended precipitation,
D. On a predetermined schedule, a minimum of once every 2 weeks outside of the defined rainy season, and
E. On a predetermined schedule, a minimum of once a week during the defined rainy season.

The WPCM shall oversee the maintenance of the water pollution control practices.

The WPCM shall use the Storm Water Quality Construction Site Inspection Checklist provided in the Preparation Manual or an alternative inspection checklist provided by the Engineer. A copy of the completed site inspection checklist shall be submitted to the Engineer within 24 hours of finishing the inspection.

The Contractor may suspend inspections of water pollution control practices upon written approval from the Engineer only after a Notice of Construction Completion has been submitted and approved.

REPORTING REQUIREMENTS

If the Contractor identifies discharges into surface waters or drainage systems causing or potentially causing pollution, or if the project receives a written notice or order from a regulatory agency, the Contractor shall immediately inform the Engineer. The Contractor shall submit a written report to the Engineer within 3 days of the discharge, notice or order. The report shall include the following information:

A. The date, time, location, nature of the operation, type and quantity of discharge; and the cause of the notice or order.
B. The water pollution control practices used before the discharge, or before receiving the notice or order.
C. The date of placement and type of additional or altered water pollution control practices placed after the discharge, or after receiving the notice or order.
D. A maintenance schedule for affected water pollution control practices.

Annual Certifications

By June 15 of each year, the Contractor shall complete and submit to the Engineer an Annual Certification of Compliance, as contained in the Preparation Manual.

PAYMENT

During each estimate period the Contractor fails to conform to the provisions in this section, "Water Pollution Control," or fails to implement the water pollution control practices shown on the plans or specified elsewhere in these special provisions as items of work, the Department will withhold 25 percent of the progress payment.

Withholds for failure to perform water pollution control work will be in addition to all other withholds provided for in the contract. The Department will return performance-failure withholds in the progress payment following the correction of noncompliance.

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 and for doing all the work involved in preparing, obtaining approval of, and amending the SWPPP, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Payments for prepare storm water pollution prevention plan will be made as follows:

A. After the SWPPP has been approved by the Engineer, 50 percent of the contract item price for prepare storm water pollution prevention plan will be included in the monthly progress estimate.
B. Forty percent of the contract item price for prepare storm water pollution prevention plan will be paid over the life of the contract.
C. After acceptance of the contract in conformance with the provisions in Section 7-1.17, "Acceptance of Contract," of the Standard Specifications, payment for the remaining 10 percent of the contract item price for prepare storm water pollution prevention plan will be made in conformance with the provisions in Section 9-1.07A, "Payment Prior to Proposed Final Estimate."

Storm water sampling and analysis will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications. No payment will be made for the preparation, collection, analysis, and reporting of storm water samples where appropriate water pollution control practices are not implemented before precipitation or if a failure of a water pollution control practice is not corrected before precipitation.

Implementation of water pollution control practices in areas outside the highway right of way not specifically provided for in the SWPPP or in these special provisions will not be paid for.

Water pollution control practices for which there are separate contract items of work will be measured and paid for as those contract items of work.

10-1.03 CONSTRUCTION SITE MANAGEMENT

Construction site management shall consist of controlling potential sources of water pollution before they come in contact with storm water systems or watercourses. The Contractor shall control material pollution and manage waste and non-storm water existing at the construction site by implementing effective handling, storage, use, and disposal practices.

Attention is directed to "Water Pollution Control" of these special provisions regarding the Contractor's appointment of a water pollution control manager (WPCM) for the project.

The Contractor shall train all employees and subcontractors regarding:

A. Material pollution prevention and control;
B. Waste management;
C. Non-storm water management;
D. Identifying and handling hazardous substances; and
E. Potential dangers to humans and the environment from spills and leaks or exposure to toxic or hazardous substances.

Training shall take place before starting work on this project. New employees shall receive the complete training before starting work on this project. The Contractor shall have regular meetings to discuss and reinforce spill prevention and control; material delivery, storage, use, and disposal; waste management; and non-storm water management procedures.

Instructions for material and waste handling, storage, and spill reporting and cleanup shall be posted at all times in an open, conspicuous, and accessible location at the construction site.

Nonhazardous construction site waste and excess material shall be recycled when practical or 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, unless otherwise specified.

Vehicles and equipment at the construction site shall be inspected by the WPCM on a frequent, predetermined schedule, and by the operator each day of use. Leaks shall be repaired immediately, or the vehicle or equipment shall be removed from the construction site.

SPILL PREVENTION AND CONTROL

The Contractor shall implement spill and leak prevention procedures when chemicals or hazardous substances are stored. Spills of petroleum products; substances listed under CFR Title 40, Parts 110, 117, and 302; and sanitary and septic waste shall be contained and cleaned up as soon as is safe.

Minor spills involve small quantities of oil, gasoline, paint, or other material that can be controlled by the first responder upon discovery of the spill. Cleanup of minor spills includes:

A. Containing the spread of the spill,
B. Recovering the spilled material using absorption,
C. Cleaning the contaminated area, and
D. Disposing of contaminated material promptly and properly.

Semi-significant spills are those that can be controlled by the first responder with the help of other personnel. Cleanup of semi-significant spills shall be immediate. Cleanup of semi-significant spills includes:

A. Containing the spread of the spill;
B. Recovering the spilled material using absorption if the spill occurs on paved or an impermeable surface;
C. Containing the spill with an earthen dike and digging up contaminated soil for disposal if the spill occurs on dirt;
D. Covering the spill with plastic or other material to prevent contaminating runoff if the spill occurs during precipitation; and
E. Disposing of contaminated material promptly and properly.

Significant or hazardous spills are those that cannot be controlled by construction personnel. Notifications of these spills shall be immediate. The following steps shall be taken:

A. Construction personnel shall not attempt to cleanup the spill until qualified staff have arrived;
B. Notify the Engineer and follow up with a written report;
C. Obtain the services of a spills contractor or hazardous material team immediately;
D. Notify the local emergency response team by dialing 911 and county officials at the emergency phone numbers kept on the construction site;
E. Notify the Governor's Office of Emergency Services Warning Center at (805) 852-7550;
F. Notify the National Response Center at (800) 424-8802 regarding spills of Federal reportable quantities in conformance with CFR Title 40, Parts 110, 119, and 302;
G. Notify other agencies as appropriate, including:

    1. Fire Department,
    2. Public Works Department,
    3. Coast Guard,
    4. Highway Patrol,
    5. City Police or County Sheriff Department,
    6 Department of Toxic Substances,
    7. California Division of Oil and Gas,
    8. Cal OSHA, or
    9. Regional Water Resources Control Board.

The WPCM shall oversee and enforce proper spill prevention and control measures. Minor, semi-significant, and significant spills shall be reported to the Contractor's WPCM who shall notify the Engineer immediately.

The Contractor shall prevent spills from entering storm water runoff before and during cleanup. Spills shall not be buried or washed with water.

The Contractor shall keep material or waste storage areas clean, well organized, and equipped with enough cleanup supplies for the material being stored. Plastic shall be placed under paving equipment when not in use to catch drips.

MATERIAL MANAGEMENT

Material shall be delivered, used, and stored for this contract in a manner that minimizes or eliminates discharge of material into the air, storm drain systems, or watercourses.

The Contractor shall implement the practices described in this section when taking delivery of, using, or storing the following materials:

A. Hazardous chemicals including:

    1. Acids,
    2. Lime,
    3. Glues,
    4. Adhesives,
    5. Paints,
    6. Solvents, and
    7. Curing compounds;

B. Soil stabilizers and binders;
C. Fertilizers;
D. Detergents;
E. Plaster;
F. Petroleum products including:

    1. Fuel,
    2. Oil, and
    3. Grease;

G. Asphalt components and concrete components; and
H. Pesticides and herbicides.

The Contractor shall supply the Material Safety Data Sheet to the Engineer for material used or stored. The Contractor shall keep an accurate inventory of material delivered and stored at the construction site.

Employees trained in emergency spill cleanup procedures shall be present when hazardous materials or chemicals are unloaded.

The Contractor shall use recycled or less hazardous products when practical.

Material Storage

The Contractor shall store liquids, petroleum products, and substances listed in CFR Title 40, Parts 110, 117, and 302 in containers or drums approved by the United States Environmental Protection Agency, and place them in secondary containment facilities.

Secondary containment facilities shall be impervious to the materials stored there for a minimum contact time of 72 hours.

Throughout the rainy season secondary containment facilities shall be covered during non-working days and when precipitation is predicted. Secondary containment facilities shall be adequately ventilated.

The Contractor shall keep the secondary containment facility free of accumulated rainwater or spills. After precipitation, or in the event of spills or leaks, accumulated liquid shall be collected and placed into drums within 24 hours. These liquids shall be handled as hazardous waste in accordance with the provisions in "Hazardous Waste" of these special provisions, unless testing determines them to be nonhazardous.

Incompatible materials, such as chlorine and ammonia, shall not be stored in the same secondary containment facility.

Materials shall be stored in the original containers with the original product labels maintained in legible condition. Damaged or illegible labels shall be replaced immediately.

The secondary containment facility shall have the capacity to contain precipitation from a 24-hour-long, 25-year storm; and 10 percent of the aggregate volume of all containers, or all of the volume of the largest container within the facility, whichever is greater.

The Contractor shall store bagged or boxed material on pallets. Throughout the rainy season, bagged or boxed material shall be protected from wind and rain during non-working days and when precipitation is predicted.

The Contractor shall provide sufficient separation between stored containers to allow for spill cleanup or emergency response access. Storage areas shall be kept clean, well organized, and equipped with cleanup supplies appropriate for the materials being stored.

The Contractor shall repair or replace perimeter controls, containment structures, covers, and liners as needed. Storage areas shall be inspected before and after precipitation, and at least weekly during other times.

Stockpile Management

The Contractor shall reduce or eliminate potential air and water pollution from stockpiled material including soil, paving material, or pressure treated wood. Stockpiles shall be located out of floodplains when possible, and at least 15 m from concentrated flows of storm water, drainage courses, or inlets unless written approval is obtained from the Engineer.

The Contractor may discontinue adding or removing material for up to 21 days and a stockpile will still be considered active.

The Contractor shall protect active stockpiles with plastic or geotextile cover, soil stabilization measures, or with linear sediment barrier when precipitation is predicted. Active stockpiles of cold mix asphalt concrete shall be placed on an impervious surface and covered with plastic when precipitation is predicted.

The Contractor shall protect inactive soil stockpiles with a plastic or geotextile cover, or with soil stabilization measures at all times during the rainy season. A linear sediment barrier around the perimeter of the stockpile shall also be used. During the non-rainy season soil stockpiles shall be covered and protected with a linear sediment barrier when precipitation is predicted. The Contractor shall control wind erosion during dry weather as provided in Section 10, "Dust Control," of the Standard Specifications.

Stockpiles of portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate subbase shall be covered with plastic or geotextile, or protected with a linear sediment barrier at all times during the rainy season, and when precipitation is predicted during the non-rainy season.

Stockpiles of cold mix asphalt concrete shall be placed on and covered with impermeable material at all times during the rainy season, and when precipitation is predicted during the non-rainy season.

Stockpiles of pressure treated wood shall be covered with impermeable material and placed on pallets at all times during the rainy season, and when precipitation is predicted during the non-rainy season.

The Contractor shall repair or replace linear sediment barriers and covers as needed or as directed by the Engineer to keep them functioning properly. Sediment shall be removed when it accumulates to 1/3 of the linear sediment barrier height.

WASTE MANAGEMENT

Solid Waste

The Contractor shall not allow litter or debris to accumulate anywhere on the construction site, including storm drain grates, trash racks, and ditch lines. The Contractor shall pick up and remove trash and debris from the construction site at least once a week. The WPCM shall monitor solid waste storage and disposal procedures on the construction site. The Contractor shall provide enough dumpsters of sufficient size to contain the solid waste generated by the project. Dumpsters shall be emptied when refuse reaches the fill line. Dumpsters shall be watertight. The Contractor shall not wash out dumpsters on the construction site. The Contractor shall provide additional containers and more frequent pickup during the demolition phase of construction.

Solid waste includes:

A. Brick,
B. Mortar,
C. Timber,
D. Metal scraps,
E. Sawdust,
F. Pipe,
G. Electrical cuttings,
H. Non-hazardous equipment parts,
I. Styrofoam and other packaging materials,
J. Vegetative material and plant containers from highway planting, and
K. Litter and smoking material, including litter generated randomly by the public.

Trash receptacles shall be provided and used in the Contractor's yard, field trailers, and locations where workers gather for lunch and breaks.

Hazardous Waste

The Contractor shall implement hazardous waste management practices when waste is generated on the construction site from the following substances:

A. Petroleum products,
B. Asphalt products,
C. Concrete curing compound,
D. Pesticides,
E. Acids,
F. Paints,
G. Stains,
H. Solvents,
I. Wood preservatives,
J. Roofing tar, and
K. Materials classified as hazardous by California Code of Regulations, Title 22, Division 4.5; or listed in CFR Title 40, Parts 110, 117, 261, or 302.

Nothing in these special provisions shall relieve the Contractor of the responsibility for compliance with Federal, State, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.

The WPCM shall oversee and enforce hazardous waste management practices. Production of hazardous materials and hazardous waste on the construction site shall be kept to a minimum. Perimeter controls, containment structures, covers, and liners shall be repaired or replaced when damaged.

The Contractor shall have a laboratory certified by the Department of Health Services (DHS) sample and test waste when hazardous material levels are unknown to determine safe methods for storage and disposal.

The Contractor shall segregate potentially hazardous waste from nonhazardous waste at the construction site. Hazardous waste shall be handled, stored, and disposed of as required in California Code of Regulations, Title 22, Division 4.5, Section 66262.34; and in CFR Title 49, Parts 261, 262, and 263.

The Contractor shall store hazardous waste in sealed containers constructed and labeled with the contents and date accumulated as required in California Code of Regulations, Title 22, Division 4.5; and in CFR Title 49, Parts 172, 173, 178, and 179. Hazardous waste containers shall be kept in temporary containment facilities conforming to the provisions in "Material Storage" of these special provisions.

There shall be adequate storage volume and containers shall be conveniently located for hazardous waste collection. Containers of hazardous waste shall not be overfilled and hazardous wastes shall not be mixed. Containers of dry waste that are not watertight shall be stored on pallets. The Contractor shall not allow potentially hazardous waste to accumulate on the ground. Hazardous waste shall be stored away from storm drains, watercourses, moving vehicles, and equipment.

The Contractor shall clean water based or oil based paint from brushes or equipment within a contained area and shall not contaminate soil, watercourses, or storm drain systems. Paints, thinners, solvents, residues, and sludges that cannot be recycled or reused shall be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths shall be disposed of as solid waste.

The Contractor shall dispose of hazardous waste within 90 days of being generated. Hazardous waste shall be disposed of by a licensed hazardous waste transporter using uniform hazardous waste manifest forms and taken to a Class I Disposal Site. A copy of the manifest shall be provided to the Engineer.

Contaminated Soil

The Contractor shall identify contaminated soil from spills or leaks by noticing discoloration, odors, or differences in soil properties. Soil with evidence of contamination shall be sampled and tested by a laboratory certified by DHS. If levels of contamination are found to be hazardous, the soil shall be handled and disposed of as hazardous waste.

The Contractor shall prevent the flow of water, including ground water, from mixing with contaminated soil by using one or a combination of the following measures:

A. Berms,
B. Cofferdams,
C. Grout curtains,
D. Freeze walls, or
E. Concrete seal course.

If water mixes with contaminated soil and becomes contaminated, the water shall be sampled and tested by a laboratory certified by the DHS. If levels of contamination are found to be hazardous, the water shall be handled and disposed of as hazardous waste.

Concrete Waste

The Contractor shall implement practices to prevent the discharge of portland cement concrete or asphalt concrete waste into storm drain systems or watercourses.

Portland cement concrete or asphalt concrete waste shall be collected at the following locations and disposed of:

A. Where concrete material, including grout, is used;
B. Where concrete dust and debris result from demolition;
C. Where sawcutting, coring, grinding, grooving, or hydro-concrete demolition of portland cement concrete or asphalt concrete creates a residue or slurry; or
D. Where concrete trucks or other concrete-coated equipment is cleaned at the construction site.

Sanitary and Septic Waste

Wastewater from sanitary or septic systems shall not be discharged or buried within the Department right of way. The WPCM shall inspect sanitary or septic waste storage and monitor disposal procedures at least weekly. Sanitary facilities that discharge to the sanitary sewer system shall be properly connected and free from leaks.

The Contractor shall obtain written approval from the local health agency, city, county, and sewer district before discharging from a sanitary or septic system directly into a sanitary sewer system, and provide a copy to the Engineer. The Contractor shall comply with local health agency requirements when using an on-site disposal system.

Liquid Waste

The Contractor shall not allow construction site liquid waste, including the following, to enter storm drain systems or watercourses:

A. Drilling slurries or fluids,
B. Grease-free or oil-free wastewater or rinse water,
C. Dredgings,
D. Liquid waste running off a surface including wash or rinse water, or
E. Other non-storm water liquids not covered by separate permits.

The Contractor shall hold liquid waste in structurally sound, leak proof containers such as:

A. Sediment traps,
B. Roll-off bins, or
C. Portable tanks.

Liquid waste containers shall be of sufficient quantity and volume to prevent spills and leaks. The containers shall be stored at least 15 m from storm drains, watercourses, moving vehicles, and equipment.

The Contractor shall remove and dispose of deposited solids from sediment traps as provided in "Solid Waste" of these special provisions, unless determined infeasible by the Engineer.

Liquid waste may require testing to determine hazardous material content before disposal.

Drilling fluids and residue shall be disposed of outside the highway right of way. If the Engineer determines that an appropriate location is available, fluids and residue exempt under California Code of Regulations, Title 23, Section 2511(g) may be dried by infiltration and evaporation in a leak proof container. The remaining solid waste may be disposed of as provided in "Solid Waste" of these special provisions.

NON-STORM WATER MANAGEMENT

Water Control and Conservation

The Contractor shall prevent erosion or the discharge of pollutants into storm drain systems or watercourses by managing the water used for construction operations. The Contractor shall obtain the Engineer's approval before washing anything on the construction site with water that could discharge into a storm drain system or watercourse. Discharges shall be reported to the Engineer immediately.

The Contractor shall implement water conservation practices when water is used on the construction site. Irrigation areas shall be inspected and watering schedules shall be adjusted to prevent erosion, excess watering, or runoff. The Contractor shall shut off the water source to broken lines, sprinklers, or valves, and they shall be repaired as soon as possible. When possible, water from waterline flushing shall be reused for landscape irrigation. Paved areas shall be swept and vacuumed, not washed with water.

Construction water runoff, including water from water line repair, shall be directed to areas to infiltrate into the ground and shall not be allowed to enter storm drain systems or watercourses. Spilled water shall not be allowed to escape water truck filling areas. When possible, the Contractor shall direct water from off-site sources around the construction site, or shall minimize contact with the construction site.

Illegal Connection and Discharge Detection and Reporting

The Contractor shall inspect the construction site and the site perimeter before beginning work for evidence of illegal connections, discharges, or dumping. Subsequently, the construction site and perimeter shall be inspected on a frequent, predetermined schedule.

The Contractor shall immediately notify the Engineer when illegal connections, discharges, or dumping are discovered. The Contractor shall take no further action unless directed by the Engineer. Unlabeled or unidentifiable material shall be assumed to be hazardous.

The Contractor shall look for the following evidence of illegal connections, discharges, or dumping:

A. Debris or trash piles,
B. Staining or discoloration on pavement or soils,
C. Pungent odors coming from drainage systems,
D. Discoloration or oily sheen on water,
E. Stains or residue in ditches, channels or drain boxes,
F. Abnormal water flow during dry weather,
G. Excessive sediment deposits,
H. Nonstandard drainage junction structures, or
I. Broken concrete or other disturbances near junction structures.

Vehicle and Equipment Cleaning

The Contractor shall limit vehicle and equipment cleaning or washing on the construction site to that necessary to control vehicle tracking or hazardous waste. Vehicles and equipment shall not be cleaned on the construction site with soap, solvents, or steam until the Engineer has been notified. The resulting waste shall be contained and recycled, or disposed of as provided in "Liquid Waste" or "Hazardous Waste" of these special provisions, whichever is applicable. The Contractor shall not use diesel to clean vehicles or equipment, and shall minimize the use of solvents.

The Contractor shall clean or wash vehicles and equipment in a structure equipped with disposal facilities. If using a structure is not possible, vehicles and equipment shall be cleaned or washed in an outside area with the following characteristics:

A. Located at least 15 m from storm drainage systems or watercourses,
B. Paved with asphalt concrete or portland cement concrete,
C. Surrounded by a containment berm, and
D. Equipped with a sump to collect and dispose of wash water.

When washing vehicles or equipment with water, the Contractor shall use as little water as possible. Hoses shall be equipped with a positive shutoff valve.

Wash racks shall discharge to a recycle system or to another system approved by the Engineer. Sumps shall be inspected regularly, and liquids and sediments shall be removed as needed.

Vehicle and Equipment Fueling and Maintenance

The Contractor shall fuel or perform maintenance on vehicles and equipment off the construction site whenever practical. When fueling or maintenance must be done at the construction site, the Contractor shall designate a site, or sites, and obtain approval from the Engineer before using. The fueling or maintenance site shall be protected from storm water, shall be on level ground, and shall be located at least 15 m from drainage inlets or watercourses. The WPCM shall inspect the fueling or maintenance site regularly. Mobile fueling or maintenance shall be kept to a minimum.

The Contractor shall use containment berms or dikes around the fueling and maintenance area. Adequate amounts of absorbent spill cleanup material and spill kits shall be kept in the fueling and maintenance area and on fueling trucks. Spill

cleanup material and kits shall be disposed of immediately after use. Drip pans or absorbent pads shall be used during fueling or maintenance unless performed over an impermeable surface.

Fueling or maintenance operations shall not be left unattended. Fueling nozzles shall be equipped with an automatic shutoff control. Vapor recovery fueling nozzles shall be used where required by the Air Quality Management District. Nozzles shall be secured upright when not in use. Fuel tanks shall not be topped-off.

The Contractor shall recycle or properly dispose of used batteries and tires.

Material and Equipment Used Over Water

Drip pans and absorbent pads shall be placed under vehicles or equipment used over water, and an adequate supply of spill cleanup material shall be kept with the vehicle or equipment. Drip pans or plastic sheeting shall be placed under vehicles or equipment on docks, barges, or other surfaces over water when the vehicle or equipment will be idle for more than one hour.

The Contractor shall provide watertight curbs or toe boards on barges, platforms, docks, or other surfaces over water to contain material, debris, and tools. Material shall be secured to prevent spills or discharge into water due to wind.

Structure Removal Over or Adjacent to Water

The Contractor shall not allow demolished material to enter storm water systems or watercourses. The Contractor shall use covers and platforms approved by the Engineer to collect debris. Attachments shall be used on equipment to catch debris on small demolition operations. Debris catching devices shall be emptied regularly and debris shall be handled as provided in "Waste Management" of these special provisions.

The WPCM shall inspect demolition sites within 15 m of storm water systems or watercourses every day.

Paving, Sealing, Sawcutting, and Grinding Operations

The Contractor shall prevent the following material from entering storm drain systems or water courses:

A. Cementitious material,
B. Asphaltic material,
C. Aggregate or screenings,
D. Grinding or sawcutting residue,
E. Pavement chunks, or
F. Shoulder backing.

The Contractor shall cover drainage inlets and use linear sediment barriers to protect downhill watercourses until paving, sealing, sawcutting, or grinding operations are completed and excess material has been removed. Drainage inlets and manholes shall be covered during the application of seal coat, tack coat, slurry seal, or fog seal.

During the rainy season or when precipitation is predicted, paving, sawcutting, and grinding operations shall be limited to places where runoff can be captured. Seal coat, tack coat, slurry seal, or fog seal operations shall not begin if precipitation is predicted for the application or the curing period. The Contractor shall not excavate material from existing roadways during precipitation.

The Contractor shall vacuum up slurry from sawcutting operations immediately after the slurry is produced. Slurry shall not be allowed to run onto lanes open to public traffic or off the pavement.

The Contractor shall collect residue from portland cement concrete grinding operations with a vacuum attachment on the grinding machine. The residue shall not be left on the pavement or allowed to flow across the pavement.

Material excavated from existing roadways may be stockpiled as provided in "Stockpile Management" of these special provisions if approved by the Engineer. Asphalt concrete chunks used in embankment shall be placed above the water table and covered by at least 0.3-m of material.

Substances used to coat asphalt trucks and equipment shall not contain soap, foaming agents, or toxic chemicals.

Thermoplastic Striping and Pavement Markers

Thermoplastic striping and preheating equipment shutoff valves shall work properly at all times when on the construction site. The Contractor shall not preheat, transfer, or load thermoplastic within 15 m of drainage inlets or watercourses. The Contractor shall not fill the preheating container to more than 150 mm from the top. Truck beds shall be cleaned daily of scraps or melted thermoplastic.

The Contractor shall not unload, transfer, or load bituminous material for pavement markers within 15 m of drainage inlets or watercourses. All pressure shall be released from melting tanks before removing the lid to fill or service. Melting tanks shall not be filled to more than 150 mm from the top.

The Contractor shall collect bituminous material from the roadway after marker removal.

Pile Driving

The Contractor shall keep spill kits and cleanup material at pile driving locations. Pile driving equipment shall be parked over drip pans, absorbent pads, or plastic sheeting where possible. When not in use, pile driving equipment shall be stored at least 15 m from concentrated flows of storm water, drainage courses, or inlets. The Contractor shall protect pile driving equipment by parking it on plywood and covering it with plastic when precipitation is predicted. The WPCM shall inspect the pile driving area every day for leaks and spills.

The Contractor shall use vegetable oil instead of hydraulic fluid when practical.

Concrete Curing

The Contractor shall not overspray chemical curing compound. Drift shall be minimized by spraying as close to the concrete as possible. Drainage inlets shall be covered before applying curing compound.

The Contractor shall minimize the use and discharge of water by using wet blankets or similar methods to maintain moisture when curing concrete.

Concrete Finishing

The Contractor shall collect and dispose of water and solid waste from high-pressure water blasting. Drainage inlets within 15 m shall be covered before sandblasting. The nozzle shall be kept as close to the surface of the concrete as possible to minimize drift of dust and blast material. Blast residue may contain hazardous material.

Containment structures for concrete finishing operations shall be inspected for damage before each day of use and before predicted precipitation. Liquid and solid waste shall be removed from the containment structure after each work shift.

DEWATERING

Dewatering shall consist of discharging accumulated storm water, ground water, or surface water from excavations or temporary containment facilities. The Contractor shall discharge water within the limits of the project.

Dewatering discharge shall not cause erosion, scour, or sedimentary deposits that impact natural bedding materials.

The Contractor shall conduct dewatering activities in accordance with the Field Guide for Construction Dewatering available at:

http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm

Before dewatering the Contractor shall submit a Dewatering and Discharge Plan to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications and "Water Pollution Control," of these special provisions. At a minimum, the Dewatering and Discharge Plan shall include the following:

A. A title sheet and table of contents;
B. A description of the dewatering and discharge operations detailing the locations, quantity of water, equipment, and discharge point;
C. The estimated schedule for dewatering and discharge (begin and end dates, intermittent or continuous);
D. Discharge alternatives such as dust control or percolation; and
E. Visual monitoring procedures with inspection log.

The Contractor shall not discharge storm water or non-storm water that has an odor, discoloration other than sediment, an oily sheen, or foam on the surface and shall notify the Engineer immediately upon discovery.

If water cannot be discharged within the project limits due to site constraints it shall be disposed of in the same manner specified for material in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

PAYMENT

The contract lump sum price paid for construction site management shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in spill prevention and control, material management, waste management, non-storm water management, and dewatering and identifying, sampling, testing, handling, and disposing of hazardous waste, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.04 TEMPORARY EROSION CONTROL

This work includes furnishing, applying, maintaining, and later removing temporary erosion control at locations shown on the approved Storm Water Pollution Prevention Plan in conformance with "Water Pollution Control" of these special

provisions. Temporary erosion control uses a mixture of fiber, tackifier, and water to stabilize active and nonactive disturbed soil areas.

The Contractor must use temporary erosion control as a water pollution control practice for soil stabilization. The Storm Water Pollution Prevention Plan must describe and include the use of temporary erosion control.

MATERIALS

Tackifier

The tackifier shall conform to the provisions in Section 20-2.11, "Stabilizing Emulsion," of the Standard Specifications and these special provisions. The tackifier shall be nonflammable, nontoxic to aquatic organisms, and shall have no growth or germination inhibiting factors.

1) Tackifier (Plant-Based)

Tackifier shall be a natural high molecular weight polysaccharide derived from a natural, plant-based source. Tackifier shall be a high viscosity hydrocolloid that is miscible in water. Tackifier shall have a minimum functional longevity of 3 months and conform to and be labeled as one of the following:

A. Guar shall be a guar gum based product derived from the ground endosperm of the guar plant, Cyanmopsis tetragonolobus. Guar shall be treated with dispersant agents for easy mixing. It shall be diluted at the rate of 1.2 to 1.8 kg per 1000 liters of water.
B. Psyllium shall consist of the finely ground muciloid coating of plantago ovata or plantago ispaghula seeds. Psyllium shall dry to form a firm but rewettable membrane.
C. Starch shall be a non-ionic, water soluble granular material derived from corn, potato, or other plant-based source.

2) Tackifier (Polymeric Emulsion Blends)

The tackifier shall be a polymeric emulsion blend with a liquid or dry powder formulation. The primary active and nonactive polymeric ingredients shall be anionic with a residual monomer content that does not exceed 0.05 percent by weight. Tackifier shall have a minimum functional longevity of 6 months. Tackifier shall be available as a prepackaged product. The tackifier shall be labeled as containing one of the following as the primary active ingredient of the polymeric emulsion blend:

A. Acrylic copolymers and polymers.
B. Polymers of methacrylates and acrylates.
C. Copolymers of sodium acrylates and acrylamides.
D. Polyacrylamide (PAM) and copolymer of acrylamide.
E. Hydrocolloid polymers.

The product label shall indicate that the tackifier is registered and approved by the California Department of Food and Agriculture as an auxiliary soil and plant substance, and nonplant food ingredient.

Wood Fiber

Wood fiber shall conform to the provisions in Section 20-2.07, "Fiber," of the Standard Specifications and these special provisions. Fiber shall be long strand, whole wood fibers, thermo-mechanically processed from clean, whole wood chips, containing a minimum of 25 percent at 10 mm long, with a minimum of 40 percent retained on a 710 μm sieve. The wood chips shall not contain lead paint, printing ink, varnish, petroleum products, seed germination inhibitors, or chlorine bleach. Fiber shall not be produced from sawdust, cardboard, paper, or paper by-products.

Cellulose Fiber

Cellulose fiber shall conform to the provisions in Section 20-2.07, "Fiber," of the Standard Specifications and these special provisions. Cellulose fiber shall be produced from natural or recycled (pulp) fiber, such as wood chips, sawdust, newsprint, chipboard, corrugated cardboard, or a combination of these processed materials. Cellulose fiber shall be free of synthetic or plastic materials, and shall not contain more than 7 percent ash.

Alternate Fiber

Alternate fiber shall conform to the provisions in Section 20-2.07, "Fiber," of the Standard Specifications and these special provisions. Alternate fiber shall be long-strand, whole natural fibers, processed from clean straw, cotton, corn or other natural feed stock, containing a minimum of 25 percent at 10 mm long, with a minimum of 40 percent retained on a 710 μm sieve. Alternate fiber shall be free of synthetic or plastic materials, and shall not contain more than 7 percent ash.

A coloring agent shall be added to the temporary erosion control to contrast with the area on which it is applied. The coloring agent shall not include copper, mercury, or arsenic, and shall be biodegradable and nontoxic.

A Certificate of Compliance for temporary erosion control shall be furnished to the Engineer in accordance with the provisions in Section 6-1.07, "Certificates of Compliance" of the Standard Specifications. The Certificate of Compliance shall include a list of pollutant indicators and potential pollutants not visually detectable as described under "Sampling and Analysis Plan for Non-Visible Pollutants" in the Storm Water Pollution Prevention Plan and Water Pollution Control Program Preparation Manual of the Storm Water Quality Handbooks issued by the Department.

The Contractor shall provide written documentation certifying the temporary erosion control was applied in accordance with specified rates, including area of application, time of application, and quantities used.

Monitoring for pollutants not visually detectable in storm water is required by the General Construction NPDES Permit for soil amendments, including soil stabilization products.

APPLICATION

Temporary erosion control shall be applied as follows:

A. The following mixture in the proportions indicated shall be applied with hydroseeding equipment. Successive applications or passes shall be used to achieve the indicated rate:

Material	Application Rate
Wood Fiber	1250 kg/ha
Cellulose Fiber*	1250 kg/ha

* At the option of the Contractor, wood fiber or alternate fiber may be used instead of cellulose fiber.

B. The quantity of tackifier to water and fiber per acre shall be as recommended by the manufacturer.
C. The dilution of fiber to water per acre shall be as required to facilitate even application of material.
D. Material shall be applied to form a continuous mat covering all disturbed soil surface, shall have a minimum thickness of 2 mm, and shall have no gaps between the mat and the soil surface.
E. Material shall be applied from 2 or more directions to achieve a continuous mat.
F. Material shall be applied in layers to avoid slumping and to aid drying.
G. Material shall be applied during dry weather, with a minimum of 24 hours of dry weather between completion of material application and predicted precipitation.

MAINTENANCE

The temporary erosion control shall be reapplied when the area treated with temporary erosion control exhibits visible erosion. The temporary erosion control shall be reapplied within 24 hours of identifying visible erosion, or longer if approved by the Engineer.

REMOVAL

Removal shall consist of mechanically incorporating the temporary erosion control into the soil with track laying equipment, disking, or other method approved by the Engineer.

MEASUREMENT AND PAYMENT

The quantity of temporary erosion control to be paid for will be measured by the square meter as determined from measurements along the slope of the actual areas covered by the temporary erosion control.

The contract price paid per square meter for temporary erosion control shall include full compensation for furnishing all labor, materials (including fiber and tackifier), tools, equipment, and incidentals, and for doing all the work involved in applying temporary erosion control, complete in place, including removal of temporary erosion control, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Temporary erosion control disturbed or displaced by the Contractor’s vehicles, equipment, or operations shall be reapplied at the Contractor's expense.

The cost of maintaining the temporary erosion control will be borne equally by the State and the Contractor. The division of cost will be made by determining the cost of maintaining temporary erosion control in conformance with the provisions in Section 9-1.03, "Force Account Payment," of the Standard Specifications and paying to the Contractor one-half of that cost.

Cleanup, repair, removal, disposal, or replacement due to improper installation or the Contractor's negligence will not be considered as included in the cost for performing maintenance.

10-1.05 STREET SWEEPING

Street sweeping shall be conducted where sediment is tracked from the job site onto paved roads, as described in the approved Storm Water Pollution Prevention Plan (SWPPP) in accordance with "Water Pollution Control" of these special provisions, and as directed by the Engineer.

Street sweeping shall be one of the water pollution control practices for sediment control. The SWPPP shall include the use of street sweeping. Street sweeping shall be performed in accordance with Section 4, SC-7 in the Construction Site Best Management Practices Manual of the Caltrans Storm Water Quality Handbooks.

The number of street sweepers shall be as designated in the approved SWPPP. The Contractor shall maintain at least one sweeper on the job site at all times during the period that sweeping work is required. Sweepers shall be self-loading, motorized, and shall have spray nozzles. Sweepers may include a vacuum apparatus.

Street sweeping shall start at the beginning of clearing and grubbing and shall continue until completion of the project, or as directed by the Engineer. Street sweeping shall be performed immediately after soil disturbing activities occur or offsite tracking of material is observed. Street sweeping shall be performed so that dust is minimized. If dust generation is excessive or sediment pickup is ineffective as determined by the Engineer, the use of water or a vacuum will be required.

At the option of the Contractor, collected material may be temporarily stockpiled in accordance with the approved SWPPP. Collected material shall be disposed of at least once per week.

Material collected during street sweeping operations shall be disposed of in conformance with Section 7-1.13, "Disposal of Material Outside The Highway Right Of Way," of the Standard Specifications.

MEASUREMENT AND PAYMENT

The contract lump sum price paid for street sweeping shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in street sweeping, including disposal of collected material, as shown on the plans, as specified in the Standard Specifications, these special provisions, and as directed by the Engineer.

10-1.06 TEMPORARY CONCRETE WASHOUT FACILITY

Temporary concrete washout facilities shall be constructed, maintained, and later removed at the locations shown on the approved Storm Water Pollution Prevention Plan (SWPPP) in conformance with "Water Pollution Control" of these special provisions, and in conformance with details shown on the plans and these special provisions.

Temporary concrete washout facilities shall be one of the water pollution control practices for waste management and materials pollution control. The SWPPP shall include the use of temporary concrete washout facilities.

MATERIALS

Plastic Liner

Plastic liners shall be single ply, new polyethylene sheeting, a minimum of 0.25-mm thick and shall be free of holes, punctures, tears or other defects that compromise the impermeability of the material. Plastic liners shall not have seams or overlapping joints.

Gravel-filled Bags

Gravel bag fabric shall be nonwoven polypropylene geotextile (or comparable polymer) and shall conform to the following requirements:

Specification	Requirements
Mass per unit area, grams per square meter, min. ASTM Designation: D 5261	270
Grab tensile strength (25-mm grip), kilonewtons, min. ASTM Designation: D4632*	0.89
Ultraviolet stability, percent tensile strength retained after 500 hours, ASTM Designation: D4355, xenon arc lamp method	70

* or appropriate test method for specific polymer

Gravel bags shall be between 600 mm and 800 mm in length, and between 400 mm and 500 mm in width.

Yarn used for binding gravel bags shall be as recommended by the manufacturer or bag supplier and shall be of a contrasting color.

Gravel shall be between 10 mm and 20 mm in diameter, and shall be clean and free from clay balls, organic matter, and other deleterious materials.

The opening of gravel-filled bags shall be secured to prevent gravel from escaping. Gravel-filled bags shall be between 13 kg and 22 kg in mass.

Straw Bales

Straw for straw bales shall conform to the provisions in Section 20-2.06, "Straw," of the Standard Specifications.

Straw bales shall be a minimum of 360 mm in width, 450 mm in height, 900 mm in length and shall have a minimum mass of 23 kg. The straw bale shall be composed entirely of vegetative matter, except for binding material.

Straw bales shall be bound by either wire, nylon or polypropylene string. Jute or cotton binding shall not be used. Baling wire shall be a minimum 1.57 mm in diameter. Nylon or polypropylene string shall be approximately 2 mm in diameter with 360 N of breaking strength.

Stakes

Stakes shall be wood or metal. Wood stakes shall be untreated fir, redwood, cedar, or pine and cut from sound timber. They shall be straight and free of loose or unsound knots or other defects which would render them unfit for the purpose intended. Wood stakes shall be a minimum 50 mm x 50 mm in size. Metal stakes may be used as an alternative, and shall be a minimum 13 mm in diameter. Stakes shall be a minimum 1.2 m in length. The tops of the metal stakes shall be bent at a 90-degree angle or capped with an orange or red plastic safety cap that fits snugly to the metal stake. The Contractor shall submit a sample of the metal stake and plastic cap, if used, for the Engineer's approval before installation.

Staples

Staples shall be as shown on the plans. An alternative attachment device such as geotextile pins or plastic pegs may be used instead of staples. The Contractor shall submit a sample of the alternative attachment device for the Engineer's approval before installation.

Signs

Wood posts for signs shall conform to the provisions in Section 56-2.02B, "Wood Posts," of the Standard Specifications. Lag screws shall conform to the provisions in Section 56-2.02D, "Sign Panel Fastening Hardware," of the Standard Specifications.

Plywood shall be freshly painted for each installation with not less than 2 applications of flat white paint. Sign letters shown on the plans shall be stenciled with commercial quality exterior black paint. Testing of paint will not be required.

INSTALLATION

Temporary concrete washout facilities shall be as follows:

1. Temporary concrete washout facilities shall be installed before beginning placement of concrete and located a minimum of 15 m from storm drain inlets, open drainage facilities, and water courses unless determined infeasible by the Engineer. Temporary concrete washout facilities shall be located away from construction traffic or access areas at a location determined by the Contractor and approved by the Engineer.
2. A sign shall be installed adjacent to each washout facility at a location determined by the Contractor and approved by the Engineer. Signs shall be installed in conformance with the provisions in Section 56-2.03, "Construction," and Section 56-2.04, "Sign Panel Installation," of the Standard Specifications.
3. The length and width of a temporary concrete washout facility may be increased from the minimum dimensions shown on the plans upon approval of the Engineer.
4. Temporary concrete washout facilities shall be constructed in sufficient quantity and size to contain liquid and concrete waste generated by washout operations for concrete wastes. These facilities shall be constructed to contain liquid and concrete waste without seepage, spills, or overflow.
5. Berms for below grade temporary concrete washout facilities shall be constructed from compacted native material. Gravel may be used in conjunction with compacted native material.
6. A plastic liner shall be installed in below grade temporary concrete washout facilities.

Details for an alternative temporary concrete washout facility shall be submitted to the Engineer for approval at least 7 days before installation.

When temporary concrete washout facilities are no longer required for the work, as determined by the Engineer, the hardened concrete and liquid residue shall be removed and disposed of in conformance with the provisions in Section 15-3.02, "Removal Methods," of the Standard Specifications. Temporary concrete washout facilities shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Ground disturbance, including holes and depressions, caused by the installation and removal of the temporary concrete washout facilities shall be backfilled and repaired in conformance with the provisions in Section 15-1.02, "Preservation of Property," of the Standard Specifications.

MAINTENANCE

Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 300 mm. Maintaining temporary concrete washout facilities shall include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials shall be removed and disposed of in conformance with the provisions in Section 15-3.02, "Removal Methods," of the Standard Specifications. Holes, rips, and voids in the plastic liner shall be patched and repaired by taping or the plastic liner shall be replaced. The plastic liner shall be replaced when patches or repairs compromise the impermeability of the material as determined by the Engineer.

Gravel bags shall be replaced when the bag material is ruptured or when the yarn has failed, allowing the bag contents to spill out.

Temporary concrete washout facilities shall be repaired or replaced on the same day the damage occurs. Damage to temporary concrete washout facilities resulting from the Contractor's vehicles, equipment, or operations shall be repaired at the Contractor's expense.

MEASUREMENT AND PAYMENT

Quantities of temporary concrete washout facilities will be measured as units determined from actual count in place.

The contract unit price paid for temporary concrete washout facility shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing a temporary concrete washout facility, complete in place, including excavation and backfill, maintenance, and removal, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.07 TEMPORARY CONCRETE WASHOUT (PORTABLE)

A portable temporary concrete washout shall be furnished, maintained, and removed as specified in the approved Storm Water Pollution Prevention Plan in conformance with "Water Pollution Control" of these special provisions and as directed by the Engineer.

A portable temporary concrete washout shall consist of a commercially available drum at a minimum size of 208-liter or alternate container upon written approval from the Engineer. The drum shall be stenciled "Concrete Waste Material." The letters shall be black and 100 mm in height on a white background. The top of the stenciling shall be 300 mm from the top of the barrel.

PLACEMENT

A portable temporary concrete washout shall be as follows:

A. A portable temporary concrete washout shall be in place prior to placement of concrete and shall be located in the immediate area of the concrete work as approved by the Engineer. The temporary concrete washout shall be located away from construction traffic or public access areas. After initial placement, temporary concrete washout shall be moved as needed for concrete construction work. When the temporary concrete washout is no longer required, as determined by the Engineer, it shall be removed and disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.
B. A sign shall be installed adjacent to each washout at a location determined by the Contractor and approved by the Engineer. Signs shall be installed in conformance with the provisions in Section 12-3.06B, "Portable Signs" of the Standard Specifications. Each portable sign shall consist of a base, framework and a sign panel. The sign panel shall be made out of plywood and shall have a minimum size of 610 mm by 1200 mm. The sign panel shall read "Concrete Washout" with black letters, 150 mm in height, on a white background.
C. The Contractor shall provide sufficient temporary concrete washout capacity to contain liquid and concrete waste generated by washout operations without seepage or spills.

Maintaining the portable temporary concrete washout shall include removing and disposing of concrete waste. Concrete waste material generated shall be removed each day and disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way" of the Standard Specifications.

The Contractor shall provide the name and location of the disposal facility to the Engineer before disposal of solid and liquid concrete waste. The Contractor shall provide verification that the off-site commercial or noncommercial disposal site has a permit issued by the California Regional Water Quality Control Board (RWQCB). If the disposal site is located outside of the State of California, the Contractor shall provide a copy of the permit issued by the state or local agency having jurisdiction over the disposal site.

When relocating or transporting a portable temporary concrete washout, the portable washout shall be properly secured to prevent spilling of concrete waste material.

PAYMENT

The contract lump sum price paid for temporary concrete washout (portable) shall include full compensation for furnishing all labor, materials, tools, equipment, including the sign, and incidentals, and for doing all the work involved in furnishing, placing, maintaining, repairing, replacing, transporting, disposing of concrete waste, and removing the washout, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.08 TEMPORARY FIBER ROLL

Temporary fiber roll shall be furnished, installed, maintained, and later removed at the locations shown on the approved Storm Water Pollution Prevention Plan (SWPPP) in conformance with "Water Pollution Control" of these special provisions, and in conformance with details shown on the plans and these special provisions.

Temporary fiber roll shall be installed on excavation and embankment slopes and other disturbed soil areas, active or nonactive.

Temporary fiber roll shall be one of the water pollution control practices for sediment control. The SWPPP shall include the use of temporary fiber roll.

Temporary fiber roll shall be either Type 1 or Type 2.

MATERIALS

Fiber Roll

Fiber roll shall be either:

1. Constructed with a premanufactured blanket consisting of either wood excelsior, rice or wheat straw, or coconut fibers or a combination of these materials. The blanket shall be between 2.0 m and 2.4 m in width and between 20 m and 29 m in length. Wood excelsior shall be individual fibers, of which 80 percent shall be 150 mm or longer in length. The blanket shall have a photodegradable plastic netting or biodegradable jute, sisal, or coir fiber netting on at least one side. The blanket shall be rolled along the width and secured with jute twine spaced 2 m apart along the full length of the roll and placed 150 mm from the ends of each roll. The finished roll shall be between 200 mm and 250 mm in diameter, a minimum of 6 m in length, and shall weigh a minimum 0.81-kg/m. More than one blanket may be required to achieve the finished roll diameter. When more than one blanket is required, blankets shall be jointed longitudinally with an overlap of 150 mm along the length of the blanket.
2. A premanufactured roll of rice or wheat straw, wood excelsior, or coconut fiber encapsulated within a photodegradable plastic or biodegradable jute, sisal, or coir fiber netting. The netting shall have a minimum durability of one year after installation. The netting shall be secured tightly at each end of the roll. Rolls shall be between 200 mm and 300 mm in diameter. Rolls between 200 mm and 250 mm in diameter shall have a minimum weight of 1.6 kg/m and a minimum length of 6 m. Rolls between 250 mm and 300 mm in diameter shall have a minimum weight of 4.5 kg/m and a minimum length of 3 m.

Stakes

Wood stakes shall be a minimum of 19 mm x 19 mm x 450 mm in size for Type 1 installation, or a minimum of 19 mm x 38 mm x 450 mm in size for Type 2 installation. Wood stakes shall be untreated fir, redwood, cedar, or pine and cut from sound timber. They shall be straight and free of loose or unsound knots and other defects which would render them unfit for the purpose intended. Metal stakes shall not be used.

Rope

Rope shall be biodegradable, such as sisal or manila, with a minimum diameter of 6.35 mm.

INSTALLATION

Temporary fiber roll shall be installed as follows:

1. Temporary fiber roll (Type 1): Furrows shall be constructed to a depth between 50 mm and 100 mm, and to a sufficient width to hold the fiber roll. Stakes shall be installed 600 mm apart along the length of the fiber rolls and stopped at 300 mm from each end of the rolls. Stakes shall be driven to a maximum of 50 mm above, or flush with the top of the roll.
2. Temporary fiber roll (Type 2): Rope and notched stakes shall be used to restrain the fiber rolls against the slope. Stakes shall be driven into the slope until the notch is even with the top of the fiber roll. Rope shall be knotted at

each stake and laced between stakes. After installation of the rope, stakes shall be driven into the slope such that the rope will hold the fiber roll tightly to the slope. Furrows will not be required.

3. Temporary fiber rolls shall be placed as shown on the plans.
4. The bedding area for the fiber roll shall be cleared of obstructions including rocks, clods, and debris greater than 25 mm in diameter before installation.
5. Temporary fiber rolls shall be installed approximately parallel to the slope contour.
6. Temporary fiber rolls shall be installed before the application of other temporary erosion control or soil stabilization materials in the same area.

When no longer required, as determined by the Engineer, temporary fiber rolls shall be removed and disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications. Temporary fiber rolls may be abandoned in place when approved in writing by the Engineer.

Ground disturbances including holes and depressions caused by the installation and removal of the temporary fiber roll shall be backfilled and repaired in conformance with the provisions in Section 15-1.02, "Preservation of Property," of the Standard Specifications.

MAINTENANCE

Temporary fiber rolls shall be maintained to disperse concentrated water runoff and to reduce runoff velocities. Split, torn, or unraveling rolls shall be repaired or replaced. Broken or split stakes shall be replaced. Sagging or slumping fiber rolls shall be repaired with additional stakes or replaced. Locations where rills and other evidence of concentrated runoff have occurred beneath the rolls shall be corrected. Temporary fiber rolls shall be repaired or replaced within 24 hours of identifying the deficiency.

MEASUREMENT AND PAYMENT

Quantities of temporary fiber rolls to be paid for will be determined by the meter measured along the centerline of the installed roll. Where temporary fiber rolls are joined and overlapped, the overlap will be measured as a single installed roll.

The contract price paid per meter for temporary fiber roll shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing temporary fiber rolls, complete in place, including furrow excavation and backfill, and removal, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Damage to temporary fiber rolls resulting from the Contractor's vehicles, equipment, or operations shall be repaired at the Contractor's expense.

The cost of maintaining temporary fiber rolls will be borne equally by the State and the Contractor. The division of cost will be made by determining the cost of maintaining temporary fiber rolls in conformance with the provisions in Section 9-1.03, "Force Account Payment," of the Standard Specifications and paying half of that cost to the Contractor.

Cleanup, repair, removal, disposal, or replacement due to improper installation or the Contractor's negligence will not be considered as included in the cost for performing maintenance.

10-1.09 TEMPORARY FENCE (TYPE ESA)

Temporary fence (Type ESA) shall be furnished, installed, maintained, and later removed in conformance with the details shown on the plans, as specified in these special provisions and as directed by the Engineer.

MATERIALS

Used materials may be installed provided the used materials conform to these special provisions. Materials for temporary fence (Type ESA) shall conform to the following:

High Visibility Fabric

High visibility fabric shall be machine produced, orange colored mesh manufactured from polypropylene or polyethylene. High visibility fabric may be made of recycled materials. Materials shall not contain biodegradable filler materials that can degrade the physical or chemical characteristics of the finished fabric. High visibility fabric shall be fully stabilized ultraviolet resistant, shall be a minimum of 1.22 m in width with a maximum mesh opening of 50 mm x 50 mm. High visibility fabric shall be furnished in one continuous width and shall not be spliced to conform to the specified width dimension.

Posts

Posts for temporary fence (Type ESA) shall be of one of the following:

A. Wood posts shall be fir or pine, shall have a minimum cross section of 50 mm x 50 mm, and a minimum length of 1.6 m. The end of the post to be embedded in the soil shall be pointed. Wood posts shall not be treated with wood preservative.
B. Steel posts shall have a "U", "T", "L" or other cross sectional shape that resists failure by lateral loads. Steel posts shall have a minimum mass per length of 1.1 kg/m and a minimum length of 1.6 m. One end of the steel post shall be pointed and the other end shall have a high visibility colored top.

Fasteners

Fasteners for attaching high visibility fabric to the posts shall be as follows:

A. The high visibility fabric shall be attached to wooden posts with commercial quality nails or staples, or as recommended by the manufacturer or supplier.
B. Tie wire or locking plastic fasteners shall be used for attaching the high visibility fabric to steel posts. Maximum spacing of tie wire or fasteners shall be 600 mm along the length of the steel post.

Signs

The sign legend and dimensions shall be as shown on the plans. The sign shall be weatherproof and fade-proof and may include plastic laminated printed paper affixed to an inflexible weatherproof backer board. The sign panel shall be affixed to the high visibility fabric with tie wire or locking plastic fasteners. The top of the sign panel shall be flush with the top of the high visibility fabric. Sign panels shall be placed at 30 m apart along the length of the temporary fence (Type ESA), and at each end of the fence.

INSTALLATION

Temporary fence (Type ESA) shall be installed as follows:

A. All fence construction activities shall be conducted from outside the ESA as shown on the plans or as staked.
B. Posts shall be embedded in the soil a minimum of 380 mm. Post spacing shall be 2.5 m maximum from center to center and shall at all times support the fence in a vertical position.
C. Temporary fence (Type ESA) shall be constructed prior to clearing and grubbing work, shall enclose the foliage canopy (drip line) of protected plants, and shall not encroach upon visible roots of the plants.

When Type ESA temporary fence is no longer required, as determined by the Engineer, the temporary fence shall become the property of the Contractor and shall be removed and disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications, except when reused as provided in this section.

Holes caused by the removal of temporary fence (Type ESA) shall be backfilled in conformance with the provisions in Section 15-1.02, "Preservation of Property," of the Standard Specifications.

MAINTENANCE

Temporary fence (Type ESA) that is damaged during the progress of the work shall be repaired or replaced by the Contractor the same day the damage occurs.

MEASUREMENT AND PAYMENT

Temporary fence (Type ESA) shall be measured and paid for in the same manner specified for permanent fence as provided in Section 80, "Fences," of the Standard Specifications.

Full compensation for maintaining, removing, and disposing of temporary fence (Type ESA) shall be considered as included in the contract price paid per meter for temporary fence (Type ESA) and no additional compensation will be allowed therefor.

10-1.10 TEMPORARY CONSTRUCTION ENTRANCE

Temporary construction entrances shall be constructed, maintained, and later removed at the locations shown on the approved Storm Water Pollution Prevention Plan (SWPPP) in conformance with "Water Pollution Control" of these special provisions, and in conformance with details shown on the plans and these special provisions.

Temporary construction entrances shall be one of the water pollution control practices for tracking control. The SWPPP shall include the use of temporary construction entrances.

Temporary construction entrances shall be Type 2.

MATERIALS

Temporary Entrance Fabric

Temporary entrance fabric shall be manufactured from polyester, nylon, or polypropylene material, or any combination thereof. Temporary entrance fabric shall be a nonwoven, needle-punched fabric, free of needles which may have broken off during the manufacturing process. Temporary entrance fabric shall be permeable and shall not act as a wicking agent.

Temporary entrance fabric shall be manufactured from virgin, recycled, or a combination of virgin and recycled polymer materials. No virgin or recycled materials shall contain biodegradable filler materials that can degrade the physical or chemical characteristics of the finished fabric. The Engineer may order tests to confirm the absence of biodegradable filler materials in conformance to the requirements in ASTM Designation: E 204 (Fourier Transformed Infrared Spectroscopy-FTIR).

Temporary entrance fabric shall conform to the following requirements:

Specification	Requirements
Mass per unit area, grams per square meter, min. ASTM Designation: D 5261	235
Grab tensile strength (25-mm grip), kilonewtons, min. ASTM Designation: D4632*	0.89
Elongation at break, percent min. ASTM Designation: D4632*	50
Toughness, kilonewtons, min. (percent elongation x grab tensile strength)	53

* or appropriate test method for specific polymer

Rocks

Rocks shall conform to the material quality requirements in Section 72-2.02, "Materials," of the Standard Specifications for shape and for apparent specific gravity, absorption, and durability index. Rocks used for the temporary entrance shall conform to the following sizes:

Square Screen Size (mm)	Percentage Passing	Percentage Retained
150	100	0
75	0	100

Corrugated Steel Panels

Corrugated steel panels shall be prefabricated and shall be pressed or shop welded, with a slot or hooked section to facilitate coupling at the ends of the panels.

INSTALLATION

Temporary construction entrances shall be installed as follows:

1. Before placing the temporary entrance fabric, the areas shall be cleared of all trash and debris. Vegetation shall be removed to the ground level. Trash, debris, and removed vegetation shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.
2. A sump shall be constructed within 6 m of each temporary construction entrance as shown on the plans.
3. Before placing the temporary entrance fabric, the ground shall be graded to a uniform plane. The relative compaction of the top 0.5-m shall be not less than 90 percent. The ground surface shall be free of sharp objects that may damage the temporary entrance fabric, and shall be graded to drain to the sump as shown on the plans.
4. Temporary entrance fabric shall be positioned longitudinally along the alignment of the entrance, as directed by the Engineer.
5. The adjacent ends of the fabric shall be overlapped a minimum length of 300 mm.

6. Rocks to be placed directly over the fabric shall be spread in the direction of traffic, longitudinally and along the alignment of the temporary construction entrance.
7. During spreading of the rocks, vehicles or equipment shall not be driven directly on the fabric. A layer of rocks a minimum 150 mm thick shall be placed between the fabric and the spreading equipment to prevent damage to the fabric.
8. For Type 2 temporary construction entrances, a minimum of 6 coupled panel sections shall be installed for each temporary construction entrance. Before installing the panels, the ground surface shall be cleared of all debris to ensure uniform contact with the ground surface.

Fabric damaged during rock placement shall be repaired by placing a new piece of fabric over the damaged area. The piece of fabric shall be large enough to cover the damaged area and provide a minimum 450-mm overlap on all edges.

Details for a proposed alternative temporary construction entrance or alternative sump shall be submitted to the Engineer for approval at least 7 days before installation. The Contractor may eliminate the sump if approved in writing by the Engineer.

When no longer required as determined by the Engineer, temporary construction entrances shall be removed and disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Ground disturbance, including holes and depressions, caused by the installation and removal of the temporary construction entrance, including the sumps, shall be backfilled and repaired in conformance with the provisions in Section 15-1.02, "Preservation of Property," of the Standard Specifications.

While the temporary construction entrance is in use, pavement shall be cleaned and sediment removed at least once a day, and as often as necessary when directed by the Engineer. Soil and sediment or other extraneous material tracked onto existing pavement shall not be allowed to enter drainage facilities.

MAINTENANCE

The Contractor shall maintain temporary construction entrances throughout the contract or until removed. The Contractor shall prevent displacement or migration of the rock surfacing or corrugated steel panels. Significant depressions resulting from settlement or heavy equipment shall be repaired by the Contractor, as directed by the Engineer.

Temporary construction entrances shall be maintained to minimize tracking of soil and sediment onto existing public roads.

If buildup of soil and sediment deter the function of the temporary construction entrance, the Contractor shall immediately remove and dispose of the soil and sediment, and install additional corrugated steel panels and spread additional rocks to increase the capacity of the temporary construction entrance.

Temporary construction entrances shall be repaired or replaced on the same day the damage occurs. Damage to the temporary construction entrance resulting from the Contractor's vehicles, equipment, or operations shall be repaired at the Contractor's expense.

MEASUREMENT AND PAYMENT

Quantities of temporary construction entrances will be determined from actual count in place.

The contract unit price paid for temporary construction entrance shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing temporary construction entrance, complete in place, including excavation and backfill and removal, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The cost of maintaining the temporary construction entrance will be borne equally by the State and the Contractor. The division of cost will be made be determining the cost of maintaining temporary construction entrance in conformance with the provisions in Section 9-1.03, "Force Account Payment," of the Standard Specifications and paying to the Contractor one-half of that cost.

Cleanup, repair, removal, disposal, or replacement due to improper installation or the Contractor's negligence will not be considered as included in the cost for performing maintenance.

10-1.11 MOVE-IN/MOVE-OUT (TEMPORARY EROSION CONTROL)

Move-in/move-out (temporary erosion control) shall include moving onto the project when an area is ready to receive temporary erosion control as determined by the Engineer, setting up required personnel and equipment for the application of erosion control materials, and moving out all personnel and equipment when temporary erosion control in that area is completed.

When areas are ready to receive applications of temporary erosion control, as determined by the Engineer, the Contractor shall begin erosion control work in that area within 5 working days of being notified by the Engineer.

Attention is directed to the requirements of temporary erosion control specified elsewhere in these special provisions.

Quantities of move-in/move-out (temporary erosion control) will be determined as units from actual count. A move-in followed by a move-out will be considered one unit.

The contract unit price paid for move-in/move-out (temporary erosion control) shall include full compensation for furnishing all labor, materials (excluding temporary erosion control materials), tools, equipment, and incidentals and for doing all the work involved in moving in and removing from the project all personnel and equipment necessary for application of temporary erosion control, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.12 TEMPORARY DRAINAGE INLET PROTECTION

Temporary drainage inlet protection shall be constructed, maintained, and removed at the locations shown on the approved Storm Water Pollution Prevention Plan (SWPPP) in accordance with "Water Pollution Control" of these special provisions, and in accordance with the details shown on the plans and these special provisions.

Temporary drainage inlet protection shall be one of the water pollution control practices for sediment control. The SWPPP shall include the use of temporary drainage inlet protection.

The Contractor shall select the appropriate drainage inlet protection in accordance with the details to meet the conditions around the drainage inlet. Throughout the duration of the contract, the Contractor shall provide protection to meet the changing conditions around the drainage inlet.

Temporary drainage inlet protection shall be Type 3A, 3B, 4A, 4B and 5.

MATERIALS

Erosion Control Blanket

The erosion control blanket shall be a rolled erosion control product (RECP) and shall be classified either as temporary and degradable or long-term and nondegradable, and shall conform to one of the following:

A. Temporary and degradable:

1. Machine produced mats consisting of curled wood excelsior with 80 percent of the fiber 150 mm or longer. The excelsior blanket shall be of consistent thickness with wood fiber evenly distributed over the entire area of the blanket. The top surface of the blanket shall be covered with an extruded photodegradable plastic netting or lightweight nonsynthetic netting. The blanket shall be smolder resistant without the use of chemical additives and shall be nontoxic and noninjurious to plant and animal life. The excelsior blanket shall be furnished in rolled strips with a minimum mass per unit area of 0.40-kg/m^2.
2. Machine produced mats consisting of 70 percent straw and 30 percent coconut fiber with an extruded photodegradable plastic netting or lightweight nonsynthetic netting on the top and bottom surfaces of the blanket. The straw and coconut shall adhere to the netting using thread or glue strip. The straw and coconut blanket shall be of consistent thickness, and straw and coconut fiber shall be evenly distributed over the entire area of the blanket. The straw and coconut fiber blanket shall be furnished in rolled strips with a minimum mass per unit area of 0.27-kg/m^2.
3. Machine produced mats that are 100 percent coir consisting of coconut fiber with an extruded photodegradable plastic netting or lightweight nonsynthetic netting on the top and bottom surfaces of the blanket. The coconut fiber shall adhere to the netting using thread or glue strip. The coconut blanket shall be of consistent thickness, with coconut fiber evenly distributed over the entire area of the blanket. The coconut fiber blanket shall be furnished in rolled strips with a minimum mass per unit area of 0.27-kg/m^2.
4. Machine woven netting that is 100 percent spun coir consisting of coconut fiber with an average open area of 63 percent to 70 percent. Coconut coir netting shall be furnished in rolled strips with a minimum mass per unit area of 0.40-kg/m^2.

B. Long-term and nondegradable:

1. Geotextile blanket shall conform to the provisions for rock slope protection fabric (Type A) in Section 88-1.04, "Rock Slope Protection Fabric," of the Standard Specifications.

Staples

Staples shall be as shown on the plans. An alternative attachment device such as geotextile pins or plastic pegs may be used instead of staples. The Contractor shall submit a sample of the alternative attachment device for the Engineer's approval before installation.

Fiber Roll

A fiber roll shall be one of the following:

A. Constructed with a premanufactured blanket made of one material or a combination of materials consisting of wood excelsior, rice or wheat straw, or coconut fibers. The blanket shall be between 2.0 m and 2.4 m in width and between 20 m and 29 m in length. Wood excelsior shall be individual fibers, of which 80 percent shall be 150 mm or longer in length. The blanket shall have a photodegradable plastic netting or biodegradable jute, sisal, or coir fiber netting on at least one side. The blanket shall be rolled along the width and secured with jute twine spaced 2 m apart along the full length of the roll and placed 150 mm from the ends of each roll. The finished roll shall be between 200 mm and 250 mm in diameter, between 3 m and 6 m in length, and shall weigh at least 0.81-kg/m. More than one blanket may be required to achieve the finished roll diameter. When more than one blanket is required, blankets shall be jointed longitudinally with an overlap of 150 mm along the length of the blanket.
B. A premanufactured roll of rice or wheat straw, wood excelsior, or coconut fiber encapsulated within a photodegradable plastic or biodegradable jute, sisal, or coir fiber netting. The rolls shall be between 200 mm and 250 mm in diameter, between 3 m and 6 m in length, and shall weigh at least 1.6 kg/m. The netting shall have a minimum durability of one year after installation. The netting shall be secured tightly at each end of the roll.

Wood Stakes

Wood stakes shall be a minimum of 19 mm x 19 mm x 450 mm in size for Type 1 installation, or shall be a minimum of 19 mm x 38 mm x 450 mm in size for Type 2 installation. Wood stakes shall be untreated fir, redwood, cedar, or pine and cut from sound timber. They shall be straight and free of loose or unsound knots and other defects which would render them unfit for the purpose intended.

Rope

Rope shall be biodegradable, such as sisal or manila, with a minimum diameter of 6.35 mm.

Gravel-filled Bags

Gravel-filled bag fabric shall be nonwoven polypropylene geotextile or polymer material and shall conform to the following requirements:

Specification	Requirements
Mass per unit area, grams per square meter, minimum. ASTM Designation: D 5261	270
Grab tensile strength (25-mm grip), kilonewtons, minimum. ASTM Designation: D4632*	0.89
Ultraviolet stability, percent tensile strength retained after 500 hours, ASTM Designation: D4355, xenon arc lamp method	70

* or appropriate test method for specific polymer

Gravel-filled bags shall be between 600 mm and 800 mm in length, and between 400 mm and 500 mm in width.

Yarn used for binding gravel bags shall be as recommended by the manufacturer or bag supplier and shall be of a contrasting color.

Gravel shall be between 10 mm and 20 mm in diameter, and shall be clean and free from clay balls, organic matter, and other deleterious materials. The opening of gravel-filled bags shall be secured to prevent gravel from escaping. Gravel-filled bags shall be between 13 kg and 22 kg in mass.

Silt Fence

At the Contractor's option, temporary silt fence shall be prefabricated or constructed with silt fence fabric, posts, and fasteners.

Silt fence fabric shall conform to the following requirements:

Specification	Requirements
Width, mm, min.	900
Grab tensile strength (25-mm grip), kilonewtons, minimum. in each direction ASTM Designation: D 4632 or appropriate test method for specific polymer	0.55
Elongation, percent minimum in each direction ASTM Designation: D 4632 or appropriate test method for specific polymer	15
Permittivity, 1/sec., minimum. ASTM Designation: D 4491	1.5
Flow rate, liters per minute per square meter, minimum. ASTM Designation: D 4491	400
Ultraviolet stability, percent tensile strength retained after 500 hours, minimum. ASTM Designation: D 4355 (xenon-arc lamp and water spray weathering method)	70

Silt fence fabric shall be geotextile manufactured from woven polypropylene or polymer material. Silt fence fabric may be made of recycled materials. No materials shall contain biodegradable filler materials that can degrade the physical or chemical characteristics of the finished fabric. The Engineer may order tests to confirm the absence of biodegradable filler materials in conformance to the requirements in ASTM Designation: E 204.

Posts for temporary silt fences shall be one of the following:

A. Posts shall be untreated fir, redwood, cedar, or pine, shall be cut from sound timber, and shall be straight and free of loose or unsound knots and other defects which would render them unfit for the purpose intended. Wood post shall be a minimum of 34 mm x 40 mm in size, and 4 feet in length. The end of the post to be embedded in the soil shall be pointed.
B. Posts shall be steel and have a "U," "T," "L," or other cross sectional shape that can resist failure from lateral loads. The steel posts shall have a minimum mass per length of 1.1 kg/m and a minimum length of 1.2 m. One end of the steel posts shall be pointed and the other end shall be capped with an orange or red plastic safety cap which fits snugly to the steel post. The Contractor shall submit to the Engineer for approval a sample of the capped steel post before installation.

Fasteners for attaching silt fence fabric to posts shall be as follows:

A. When prefabricated silt fence is used, posts shall be inserted into sewn pockets.
B. Silt fence fabric shall be attached to wooden posts with nails or staples as shown on the plans or as recommended by the manufacturer or supplier. Tie wire or locking plastic fasteners shall be used to fasten the silt fence fabric to steel posts. Maximum spacing of fasteners shall be 200 mm along the length of the steel post.

Foam Barriers

The foam barrier fabric cover and skirt shall be a woven polypropylene fabric with a minimum tensile strength of 0.44-kN, conforming to ASTM Designation: D 4632. The prefabricated fabric shall be high visibility orange in color that is integral to the fabric; painting shall not be allowed. The fabric shall have an ultraviolet stability exceeding 70 percent.

The foam core shall be urethane foam and shall be shaped and dimensioned as shown on the plans.

Adhesive for foam barriers shall be a solvent-free rubber modified asphalt emulsion. The color of the emulsion shall be brown when wet and shall have a drying period of not more than 3 hours.

Anchoring nails or spikes for foam barriers shall be a minimum of 25 mm in length and capable of penetrating concrete or asphalt surfaces.

Sediment Filter Bag

Sediment filter bag fabric shall be geotextile manufactured from woven polypropylene or polymer material. Sediment filter bag fabric may be made from recycled polymer materials. Polymer materials shall not contain biodegradable filler materials and shall conform to the requirements in ASTM Designation: E 204.

Sediment filter bag fabric shall conform to the following requirements:

Specification	Requirements
Grab tensile strength (25-mm grip), kilonewtons, minimum. in each direction ASTM Designation: D 4632 or appropriate test method for specific polymer	1.35
Elongation, percent minimum in each direction ASTM Designation: D 4632 or appropriate test method for specific polymer	15
Permittivity, 1/sec., minimum. ASTM Designation: D 4491	1.5
Flow rate, liters per minute per square meter, minimum. ASTM Designation: D 4491	8140
Ultraviolet stability, percent tensile strength retained after 500 hours, minimum. ASTM Designation: D 4355 (xenon-arc lamp and water spray weathering method)	80

The sediment filter bag shall be sized to fit the catch basin or drainage inlet and shall be complete with lifting loops and dump straps attached at the bottom to facilitate emptying of the sediment filter bag. The sediment filter bags shall have a restraint cord approximately halfway up the bag to keep the sides away from the catch basin walls.

INSTALLATION

Temporary drainage inlet protection shall be installed at drainage inlets in paved and unpaved areas as follows:

A. Temporary drainage inlet protection shall be installed such that ponded runoff does not encroach on the traveled way or overtop the curb or dike. Gravel-filled bags shall be placed to control ponding and prevent runoff from overtopping the curb or dike.
B. The bedding area for the temporary drainage inlet protection shall be cleared of obstructions including rocks, clods, and debris greater than 25 mm in diameter before installation.
C. A temporary linear sediment barrier shall be installed up-slope of the existing drainage inlet and parallel with the curb, dike, or flow line to prevent sediment from entering the drainage inlet.

Erosion Control Blanket and Geotextile Fabric

The erosion control blanket and geotextile fabric shall be secured to the surface of the excavated sediment trap with staples and embedded in a trench adjacent to the drainage inlet. The perimeter edge of the erosion control blanket and geotextile fabric shall be anchored in a trench.

Silt Fence

Silt fence shall be installed along the perimeter of the erosion control blanket or geotextile fabric, with the posts facing the drainage inlet. The trench shall be backfilled and tamped to secure the silt fence fabric in the bottom of the trench.

Gravel-filled Bags

Gravel-filled bags shall be stacked to form a gravel bag barrier. The gravel-filled bags shall be placed so that the bags are tightly abutted and overlap the joints in adjacent rows. A spillway shall be created by removing one or more gravel-filled bags from the upper layer of the gravel bag barrier.

Gravel-filled bags shall only be use within shoulder areas when placed behind temporary railing (Type K).

Fiber Rolls

Fiber rolls shall be placed over the erosion control blanket or geotextile fabric with the ends of the fiber roll abutted tightly together. Fiber rolls shall be secured with stakes installed along the length of the fiber rolls. Stakes shall not be installed within 300 mm of the end of the rolls.

Foam Barriers

Foam barriers shall be installed in individual sections adjacent to existing drainage inlets. Foam barriers shall be securely attached to the pavement according to the angle and spacing shown on the plans. Foam barriers shall be installed flush against the sides of concrete or asphalt concrete curbs, dikes, and pavement with the inner material and fabric cover cut smoothly and evenly to provide a tight flush joint.

Sediment Filter Bags

Sediment filter bags shall be installed by removing the drainage inlet grate, placing the sediment bag in the opening, and replacing the grate to secure the sediment filter bag in place.

MAINTENANCE

Temporary drainage inlet protection shall be maintained to provide sediment holding capacity and to reduce runoff velocities. Temporary drainage inlet protection shall be repaired or replaced immediately after the damage occurs.

Sediment deposits, trash, and debris shall be removed from temporary drainage inlet protection as needed or when directed by the Engineer. Removed sediment shall be deposited within the project limits so that the sediment is not subject to erosion by wind or by water. Trash and debris shall be removed and 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.

At locations where rills and other evidence of concentrated runoff have occurred beneath the drainage inlet protection, the protection shall be adjusted to prevent another occurrence.

Temporary silt fence shall be repaired or replaced when silt fence fabric becomes split, torn, or unraveled. Sagging or slumping silt fence shall be repaired with additional stakes or replaced. Broken or split stakes shall be replaced. Temporary silt fence shall be maintained to provide a sediment holding capacity of approximately 1/3 the height of the silt fence fabric above ground.

Sediment in excess of 50 mm above the surface of the erosion control blanket or geotextile fabric shall be removed.

Sediment deposits shall be removed when the deposit is 1/3 the height of the gravel bag barrier or one half the height of the spillway; whichever is less.

Gravel-filled bags shall be replaced when the bag material ruptures or when the binding fails.

Split, torn, unraveling, sagging, or slumping fiber rolls shall be replaced or repaired.

Foam barriers shall be repaired or replaced when the geotextile fabric cover becomes split, torn, or unraveled. Foam barriers that become detached or dislodged shall be reattached to the pavement. Sediment deposits shall be removed when the deposit reaches 1/3 of the foam barrier height.

Sediment filter bags shall be emptied when the restraint cords are no longer visible. Sediment filter bags shall be emptied by placing 25 mm steel reinforcing bars through the lifting loops. The bag shall be emptied of its contents and rinsed before replacement in the drainage inlet.

REMOVAL

When the temporary drainage inlet protection is no longer required the protection materials shall be removed and 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.

Holes, depressions, or other ground disturbance caused by the removal of the temporary drainage inlet protection shall be backfilled and repaired in accordance with the provisions in Section 15-1.02, "Preservation of Property," of the Standard Specifications.

MEASUREMENT

Quantities of temporary drainage inlet protection will be determined from actual count in place. The protection will be measured one time only and no additional measurement will be recognized.

PAYMENT

The contract unit price paid for temporary drainage inlet protection shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the temporary drainage inlet protection, complete in place, including removal of materials, including cleanup and disposal of retained sediment and debris, and backfilling and repairing holes, depressions and other ground disturbance, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

No additional compensation will be made if the temporary drainage inlet protection changes during the course of construction.

The cost of maintaining temporary drainage inlet protection will be borne equally by the State and the Contractor. The division of cost will be made by determining the cost of maintaining temporary drainage inlet protection in accordance with the provisions in Section 9-1.03, "Force Account Payment," of the Standard Specifications and paying to the Contractor one-half of that cost.

Cleanup, repair, removal, disposal, or replacement due to improper installation, or as a result of the Contractor's negligence will not be considered as included in the cost for performing maintenance.

10-1.13 COOPERATION

Attention is directed to Section 7-1.14, "Cooperation," and Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications and these special provisions.

It is anticipated that work by another contractor (Contract No.11-288804) to Construct New Freeway in San Diego County in San Diego on Route 905 from 1.2 KM East of the Route 805/905 to 0.6 KM East of Cactus Road (KP R9.5 to KP 13.9) may be in progress adjacent to or within the limits of this project during progress of the work on this contract.

It is anticipated that work by another contractor (Contract No.11-232304) to Construct a 4-Lane Freeway, Interchange and off Ramp in San Diego County in San Diego and Chula Vista on Routes 125 and 905 from Route 905 to San Miguel Road (KP 2.7 to KP 16.7 and 905-KP R16.7 to KP R17.9) be in progress adjacent to or within the limits of this project during progress of the work on this contract.

It is anticipated that work by another contractor (Contract No.11-274804) to perform Pavement Rehabilitation in San Diego County in San Diego on Route 905 from 0.3 KM West of the Route 905/5 separation to 0.9 KM East of Route 905/805 Separation and at 0.4 KM West of Harvest Road (KP 4.7 to KP 9.2 and 16.9) may be in progress adjacent to or within the limits of this project during progress of the work on this contract.

10-1.14 PROGRESS SCHEDULE (CRITICAL PATH METHOD)

The Contractor shall submit to the Engineer practicable critical path method (CPM) progress schedules in conformance with these special provisions. Whenever the term "schedule" is used in this section it shall mean CPM progress schedule.

Attention is directed to "Payments" of Section 5 of these special provisions.

The provisions in Section 8-1.04, "Progress Schedule," of the Standard Specifications shall not apply.

DEFINITIONS

The following definitions shall apply to this section:

A. ACTIVITY.—A task, event or other project element on a schedule that contributes to completing the project. Activities have a description, start date, finish date, duration and one or more logic ties.
B. BASELINE SCHEDULE.—The initial schedule representing the Contractor's work plan on the first working day of the project.
C. CONTRACT COMPLETION DATE.—The current extended date for completion of the contract shown on the weekly statement of working days furnished by the Engineer in conformance with the provisions in Section 8-1.06, "Time of Completion," of the Standard Specifications.
D. CRITICAL PATH.—The longest continuous chain of activities for the project that has the least amount of total float of all chains. In general, a delay on the critical path will extend the scheduled completion date.
E. CRITICAL PATH METHOD (CPM).—A network based planning technique using activity durations and the relationships between activities to mathematically calculate a schedule for the entire project.
F. DATA DATE.—The day after the date through which a schedule is current. Everything occurring earlier than the data date is "as-built" and everything on or after the data date is "planned."
G. EARLY COMPLETION TIME.—The difference in time between an early scheduled completion date and the contract completion date.
H. FLOAT.—The difference between the earliest and latest allowable start or finish times for an activity.
I. MILESTONE.—An event activity that has zero duration and is typically used to represent the beginning or end of a certain stage of the project.
J. NARRATIVE REPORT.—A document submitted with each schedule that discusses topics related to project progress and scheduling.
K. NEAR CRITICAL PATH.—A chain of activities with total float exceeding that of the critical path but having no more than 10 working days of total float.
L. SCHEDULED COMPLETION DATE.—The planned project finish date shown on the current accepted schedule.
M. STATE OWNED FLOAT ACTIVITY.—The activity documenting time saved on the critical path by actions of the State. It is the last activity prior to the scheduled completion date.
N. TIME IMPACT ANALYSIS.—A schedule and narrative report developed specifically to demonstrate what effect a proposed change or delay has on the current scheduled completion date.
O. TOTAL FLOAT.—The amount of time that an activity or chain of activities can be delayed before extending the scheduled completion date.
P. UPDATE SCHEDULE.—A current schedule developed from the baseline or subsequent schedule through regular monthly review to incorporate as-built progress and any planned changes.

GENERAL REQUIREMENTS

The Contractor shall submit to the Engineer baseline, monthly update and final update schedules, each consistent in all respects with the time and order of work requirements of the contract. The project work shall be executed in the sequence indicated on the current accepted schedule.

Schedules shall show the order in which the Contractor proposes to carry out the work with logical links between time-scaled work activities, and calculations made using the critical path method to determine the controlling operation or operations. The Contractor is responsible for assuring that all activity sequences are logical and that each schedule shows a coordinated plan for complete performance of the work.

The Contractor shall produce schedules using computer software and shall furnish compatible software for the Engineer's exclusive possession and use. The Contractor shall furnish network diagrams, narrative reports, tabular reports and schedule data as parts of each schedule submittal.

Schedules shall include, but not be limited to, activities that show the following that are applicable to the project:

A. Project characteristics, salient features, or interfaces, including those with outside entities, that could affect time of completion.
B. Project start date, scheduled completion date and other milestones.
C. Work performed by the Contractor, subcontractors and suppliers.
D. Submittal development, delivery, review and approval, including those from the Contractor, subcontractors and suppliers.
E. Procurement, delivery, installation and testing of materials, plants and equipment.
F. Testing and settlement periods.
G. Utility notification and relocation.
H. Erection and removal of falsework and shoring.
I. Major traffic stage switches.
J. Finishing roadway and final cleanup.
K. State-owned float as the predecessor activity to the scheduled completion date.

Schedules shall have not less than 50 and not more than 2000 activities, unless otherwise authorized by the Engineer. The number of activities shall be sufficient to assure adequate planning of the project, to permit monitoring and evaluation of progress, and to do an analysis of time impacts.

Schedule activities shall include the following:

A. A clear and legible description.
B. Start and finish dates.
C. A duration of not less than one working day, except for event activities, and not more than 20 working days, unless otherwise authorized by the Engineer.
D. At least one predecessor and one successor activity, except for project start and finish milestones.
E. Required constraints.
F. Codes for responsibility, stage, work shifts, location and contract pay item numbers.

The Contractor may show early completion time on any schedule provided that the requirements of the contract are met. Early completion time shall be considered a resource for the exclusive use of the Contractor. The Contractor may increase early completion time by improving production, reallocating resources to be more efficient, performing sequential activities concurrently or by completing activities earlier than planned. The Contractor may also submit for approval a cost reduction incentive proposal in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications that will reduce time of construction.

The Contractor may show a scheduled completion date that is later than the contract completion date on an update schedule, after the baseline schedule is accepted. The Contractor shall provide an explanation for a late scheduled completion date in the narrative report that is included with the schedule.

State-owned float shall be considered a resource for the exclusive use of the State. The Engineer may accrue State-owned float by the early completion of review of any type of required submittal when it saves time on the critical path. The Contractor shall prepare a time impact analysis, when requested by the Engineer, to determine the effect of the action in conformance with the provisions in "Time Impact Analysis" specified herein. The Engineer will document State-owned float by directing the Contractor to update the State-owned float activity on the next update schedule. The Contractor shall include a log of the action on the State-owned float activity and include a discussion of the action in the narrative report. The Engineer may use State-owned float to mitigate past, present or future State delays by offsetting potential time extensions for contract change orders.

The Engineer may adjust contract working days for ordered changes that affect the scheduled completion date, in conformance with the provisions in Section 4-1.03, "Changes," of the Standard Specifications. The Contractor shall prepare a time impact analysis to determine the effect of the change in conformance with the provisions in "Time Impact Analysis" specified herein, and shall include the impacts acceptable to the Engineer in the next update schedule. Changes that do not affect the controlling operation on the critical path will not be considered as the basis for a time adjustment. Changes that do affect the controlling operation on the critical path will be considered by the Engineer in decreasing time or granting an

extension of time for completion of the contract. Time extensions will only be granted if the total float is absorbed and the scheduled completion date is delayed one or more working days because of the ordered change.

The Engineer's review and acceptance of schedules shall not waive any contract requirements and shall not relieve the Contractor of any obligation thereunder or responsibility for submitting complete and accurate information. Schedules that are rejected shall be corrected by the Contractor and resubmitted to the Engineer within 5 working days of notification by the Engineer, at which time a new review period of one week will begin.

Errors or omissions on schedules shall not relieve the Contractor from finishing all work within the time limit specified for completion of the contract. If, after a schedule has been accepted by the Engineer, either the Contractor or the Engineer discover that any aspect of the schedule has an error or omission, it shall be corrected by the Contractor on the next update schedule.

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 utilizing the latest hardware and software technology. 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 software and computer system to be furnished shall include the following:

A. A complete computer system, including keyboard, mouse, 610-mm color SVGA flat LCD monitor (1,024x768 pixels), current Intel Pentium IV micro processor chip, or equivalent;
B. Computer operating system software, compatible with the selected processing unit, for Windows XP Pro 2002, or equivalent;
C. Minimum one gigabyte (1000 MB) of random access memory (RAM), or equivalent;
D. A 160 gigabyte minimum hard disk drive, a 1.44 megabyte 90-mm floppy disk drive, 32x speed minimum CD/DVD-RW drive, Ethernet card, two UBCUSB ports, and 56K modem;
E. A color-ink-jet plotter with a minimum 64 Megabyte RAM, capable of 600 dots per inch color, 1200 x 600 dots per inch monochrome, or equivalent. Capable of printing fully legible, time scaled charts, and network diagrams, in four colors, with a minimum size of 914-mm by 1219-mm (E size) and is compatible with the selected system. Plotter paper and ink cartridges will be provided throughout the contract. Plotter shall be HP Designjet 1055cm Plus or equivalent;
F. CPM software shall be the latest version of Primavera Project Planner (P3) unless otherwise accepted by the Engineer;
G. Scheduler Analyzer Pro or equivalent – a suite of programs to assist in the schedule analysis, the latest version for Windows XP Pro 2002, or later and;
H. Microsoft Office software, the latest version for Windows XP Pro 2002, or later, and McAfee Virus software or equivalent.

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 hardware, software and plotter.

The Contractor shall furnish, install, set up, provide licenses for the all software programs, maintain and repair the computer hardware and plotter, and provide software support 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 and three other agents of the Department designated by the Engineer, in the use of the hardware and software to include schedule analysis, reporting and resource allocations. An authorized vendor of Primavera Project Planner shall perform the training.

The Department will compensate the Contractor in conformance with the provisions in Section 4-1.03, "Extra Work," of the Standard Specifications for replacement of software if the original software is damaged, lost or stolen after delivery to the Engineer.

All computer hardware, software and plotter 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. The furnished schedule software shall become the property of the Department and will not be returned to the Contractor. When claims involving contract progress are pending, computer hardware or software shall not be removed until final estimate has been submitted to the Contractor.

NETWORK DIAGRAMS, REPORTS AND DATA

The Contractor shall include the following for each schedule submittal:

A. Two sets of originally plotted, time-scaled network diagrams.
B. Two copies of a narrative report.
C. Two copies of each of 3 sorts of the CPM software-generated tabular reports.
D. One 1.44-megabyte 90 mm (3.5 inch) floppy diskette containing the schedule data.

The time-scaled network diagrams shall conform to the following:

A. Show a continuous flow of information from left to right.
B. Be based on early start and early finish dates of activities.
C. Clearly show the primary paths of criticality using graphical presentation.
D. Be prepared on E-size sheets, 860 mm x 1120 mm (34 inch x 44 inch).
E. Include a title block and a timeline on each page.

The narrative report shall be organized in the following sequence with all applicable documents included:

A. Contractor's transmittal letter.
B. Work completed during the period.
C. Identification of unusual conditions or restrictions regarding labor, equipment or material; including multiple shifts, 6-day work weeks, specified overtime or work at times other than regular days or hours.
D. Description of the current critical path.
E. Changes to the critical path and scheduled completion date since the last schedule submittal.
F. Description of problem areas.
G. Current and anticipated delays:

    1. Cause of delay.
    2. Impact of delay on other activities, milestones and completion dates.
    3. Corrective action and schedule adjustments to correct the delay.

H. Pending items and status thereof:

    1. Permits
    2. Change orders
    3. Time adjustments
    4. Non-compliance notices

I. Reasons for an early or late scheduled completion date in comparison to the contract completion date.

Tabular reports shall be software-generated and provide information for each activity included in the project schedule. Three different reports shall be sorted by (1) activity number, (2) early start and (3) total float. Tabular reports shall be 215 mm x 280 mm (8 1/2 inch x 11 inch) in size and shall include, as a minimum, the following applicable information:

A. Data date
B. Activity number and description
C. Predecessor and successor activity numbers and descriptions
D. Activity codes
E. Scheduled, or actual and remaining durations (work days) for each activity
F. Earliest start (calendar) date
G. Earliest finish (calendar) date
H. Actual start (calendar) date
I. Actual finish (calendar) date
J. Latest start (calendar) date
K. Latest finish (calendar) date
L. Free float (work days)
M. Total float (work days)
N. Percentage of activity complete and remaining duration for incomplete activities.
O. Lags
P. Required constraints

Schedule submittals will only be considered complete when all documents and data have been provided as described above.

PRE-CONSTRUCTION SCHEDULING CONFERENCE

The Contractor shall schedule and the Engineer will conduct a pre-construction scheduling conference with the Contractor's project manager and construction scheduler within 10 working days of the approval of the contract. At this meeting the Engineer will review the requirements of this section of the special provisions with the Contractor.

The Contractor shall submit a general time-scaled logic diagram displaying the major activities and sequence of planned operations and shall be prepared to discuss the proposed work plan and schedule methodology that comply with the requirements of these special provisions. If the Contractor proposes deviations to the construction staging of the project, then the general time-scaled logic diagram shall also display the deviations and resulting time impacts. The Contractor shall be prepared to discuss the proposal.

At this meeting, the Contractor shall additionally submit the alphanumeric coding structure and the activity identification system for labeling the work activities. To easily identify relationships, each activity description shall indicate its associated scope or location of work by including such terms as quantity of material, type of work, bridge number, station to station location, side of highway (such as left, right, northbound, southbound), lane number, shoulder, ramp name, ramp line descriptor or mainline.

The Engineer will review the logic diagram, coding structure, and activity identification system, and provide any required baseline schedule changes to the Contractor for implementation.

BASELINE SCHEDULE

Beginning the week following the pre-construction scheduling conference, the Contractor shall meet with the Engineer weekly until the baseline schedule is accepted by the Engineer to discuss schedule development and resolve schedule issues.

The Contractor shall submit to the Engineer a baseline schedule within 20 working days of approval of the contract. The Contractor shall allow 3 weeks for the Engineer's review after the baseline schedule and all support data are submitted. In addition, the baseline schedule submittal will not be considered complete until the computer software is delivered and installed for use in review of the schedule.

The baseline schedule shall include the entire scope of work and how the Contractor plans to complete all work contemplated. The baseline schedule shall show the activities that define the critical path. Multiple critical paths and near-critical paths shall be kept to a minimum. A total of not more than 50 percent of the baseline schedule activities shall be critical or near critical, unless otherwise authorized by the Engineer.

The baseline schedule shall not extend beyond the number of working days specified in these special provisions. The baseline schedule shall have a data date of the first working day of the contract and not include any completed work to date. The baseline schedule shall not attribute negative float or negative lag to any activity.

If the Contractor submits an early completion baseline schedule that shows contract completion in less than 85 percent of the working days specified in these special provisions, the baseline schedule shall be supplemented with resource allocations for every task activity and include time-scaled resource histograms. The resource allocations shall be shown to a level of detail that facilitates report generation based on labor crafts and equipment classes for the Contractor and subcontractors. The Contractor shall use average composite crews to display the labor loading of on-site construction activities. The Contractor shall optimize and level labor to reflect a reasonable plan for accomplishing the work of the contract and to assure that resources are not duplicated in concurrent activities. The time-scaled resource histograms shall show labor crafts and equipment classes to be utilized on the contract. The Engineer may review the baseline schedule activity resource allocations using Means Productivity Standards or equivalent to determine if the schedule is practicable.

UPDATE SCHEDULE

The Contractor shall submit an update schedule and meet with the Engineer to review contract progress, on or before the first day of each month, beginning one month after the baseline schedule is accepted. The Contractor shall allow 2 weeks for the Engineer's review after the update schedule and all support data are submitted, except that the review period shall not start until the previous month's required schedule is accepted. Update schedules that are not accepted or rejected within the review period will be considered accepted by the Engineer.

The update schedule shall have a data date of the twenty-first day of the month or other date established by the Engineer. The update schedule shall show the status of work actually completed to date and the work yet to be performed as planned. Actual activity start dates, percent complete and finish dates shall be shown as applicable. Durations for work that has been completed shall be shown on the update schedule as the work actually occurred, including Engineer submittal review and Contractor resubmittal times.

The Contractor may include modifications such as adding or deleting activities or changing activity constraints, durations or logic that do not (1) alter the critical path(s) or near critical path(s) or (2) extend the scheduled completion date compared to that shown on the current accepted schedule. The Contractor shall state in writing the reasons for any changes to planned

work. If any proposed changes in planned work will result in (1) or (2) above, then the Contractor shall submit a time impact analysis as described herein.

DESIGN SEQUENCING

The dates specified in Section 1, "Specifications and Plans," of these special provisions, on which the Contractor will be provided the complete design of each project phase, shall be shown as milestones in the baseline schedule, and in subsequent updated and revised schedules.

At the completion of the design for each project phase, the schedule shall be updated showing the actual date the final plans, specifications and estimate of quantities for that phase were provided to the Contractor.

TIME IMPACT ANALYSIS

The Contractor shall submit a written time impact analysis (TIA) to the Engineer with each request for adjustment of contract time, or when the Contractor or Engineer consider that an approved or anticipated change may impact the critical path or contract progress.

The TIA shall illustrate the impacts of each change or delay on the current scheduled completion date or internal milestone, as appropriate. The analysis shall use the accepted schedule that has a data date closest to and prior to the event. If the Engineer determines that the accepted schedule used does not appropriately represent the conditions prior to the event, the accepted schedule shall be updated to the day before the event being analyzed. The TIA shall include an impact schedule developed from incorporating the event into the accepted schedule by adding or deleting activities, or by changing durations or logic of existing activities. If the impact schedule shows that incorporating the event modifies the critical path and scheduled completion date of the accepted schedule, the difference between scheduled completion dates of the two schedules shall be equal to the adjustment of contract time. The Engineer may construct and utilize an appropriate project schedule or other recognized method to determine adjustments in contract time until the Contractor provides the TIA.

The Contractor shall submit a TIA in duplicate within 15 working days of receiving a written request for a TIA from the Engineer. The Contractor shall allow the Engineer 2 weeks after receipt to approve or reject the submitted TIA. All approved TIA schedule changes shall be shown on the next update schedule.

If a TIA submitted by the Contractor is rejected by the Engineer, the Contractor shall meet with the Engineer to discuss and resolve issues related to the TIA. If agreement is not reached, the Contractor will be allowed 15 days from the meeting with the Engineer to give notice in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications. The Contractor shall only show actual as-built work, not unapproved changes related to the TIA, in subsequent update schedules. If agreement is reached at a later date, approved TIA schedule changes shall be shown on the next update schedule. The Engineer will withhold remaining payment on the schedule contract item if a TIA is requested by the Engineer and not submitted by the Contractor within 15 working days. The schedule item payment will resume on the next estimate after the requested TIA is submitted. No other contract payment will be retained regarding TIA submittals.

FINAL UPDATE SCHEDULE

The Contractor shall submit a final update, as-built schedule with actual start and finish dates for the activities, within 30 days after completion of contract work. The Contractor shall provide a written certificate with this submittal signed by the Contractor's project manager and an officer of the company stating, "To my knowledge and belief, the enclosed final update schedule reflects the actual start and finish dates of the actual activities for the project contained herein." An officer of the company may delegate in writing the authority to sign the certificate to a responsible manager.

RETENTION

The Department will retain an amount equal to 25 percent of the estimated value of the work performed during each estimate period in which the Contractor fails to submit an acceptable schedule conforming to the requirements of these special provisions as determined by the Engineer. Schedule retentions will be released for payment on the next monthly estimate for partial payment following the date that acceptable schedules are submitted to the Engineer or as otherwise specified herein. Upon completion of all contract work and submittal of the final update schedule and certification, any remaining retained funds associated with this section, "Progress Schedule (Critical Path Method)", will be released for payment. Retentions held in conformance with this section shall be in addition to other retentions provided for in the contract. No interest will be due the Contractor on retention amounts.

PAYMENT

Progress schedule (critical path method) will be paid for at a lump sum price. The contract lump sum price paid for progress schedule (critical path method) shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, including computer software, and for doing all the work involved in preparing, furnishing, and updating

schedules, and instructing and assisting the Engineer in the use of computer software, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Payments for the progress schedule (critical path method) contract item will be made progressively as follows:

A. A total of 25 percent of the item amount or a total of 25 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon achieving all of the following:

   1. Completion of 5 percent of all contract item work.
   2. Acceptance of all schedules and TIAs required to the time when 5 percent of all contract item work is complete.
   3. Delivery of schedule software to the Engineer.
   4. Completion of required schedule software training.

B. A total of 50 percent of the item amount or a total of 50 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon completion of 25 percent of all contract item work and acceptance of all schedules and TIAs required to the time when 25 percent of all contract item work is complete.
C. A total of 75 percent of the item amount or a total of 75 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon completion of 50 percent of all contract item work and acceptance of all schedules and TIAs required to the time when 50 percent of all contract item work is complete.
D. A total of 100 percent of the item amount or a total of 100 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon completion of all contract item work, acceptance of all schedules and TIAs required to the time when all contract item work is complete, and submittal of the certified final update schedule.

If the Contractor fails to complete any of the work or provide any of the schedules required by this section, the Engineer shall make an adjustment in compensation in conformance with the provisions in Section 4-1.03C, "Changes in Character of Work," of the Standard Specifications for the work not performed. Adjustments in compensation for schedules will not be made for any increased or decreased work ordered by the Engineer in furnishing schedules.

10-1.15 TIME-RELATED OVERHEAD

The Contractor will be compensated for time-related overhead as described below and in conformance with "Force Account Payment" of these special provisions. The Contractor will not be compensated for time-related overhead for delays to the controlling operations caused by the Engineer that occur prior to the first working day, but will be compensated for actual overhead costs incurred, as determined by an independent Certified Public Accountant audit examination and report.

Attention is directed to "Beginning of Work, Time of Completion and Liquidated Damages," "Force Account Payment," and "Progress Schedule (Critical Path Method)" of these special provisions.

The provisions in Section 9-1.08, "Adjustment of Overhead Costs," of the Standard Specifications shall not apply.

Time-related overhead shall consist of those overhead costs, including field and home office overhead, that are in proportion to the time required to complete the work. Time-related overhead shall not include costs that are not related to time, including but not limited to, mobilization, licenses, permits, and other charges incurred only once during the contract. Time-related overhead shall not apply to subcontractors of any tier, suppliers, fabricators, manufacturers, or other parties associated with the Contractor.

Field office overhead expenses include time-related costs associated with the normal and recurring operations of the construction project, and shall not include costs directly attributable to the work of the contract. Time-related costs of field office overhead include, but are not limited to, salaries, benefits, and equipment costs of project managers, general superintendents, field office managers and other field office staff assigned to the project, and rent, utilities, maintenance, security, supplies, and equipment costs of the project field office.

Home office overhead or general and administrative expenses refer to the fixed costs of operating the Contractor's business. These costs include, but are not limited to, general administration, insurance, personnel and subcontract administration, purchasing, accounting, and project engineering and estimating. Home office overhead costs shall exclude expenses specifically related to other contracts or other businesses of the Contractor, equipment coordination, material deliveries, and consultant and legal fees.

The quantity of time-related overhead associated with a reduction in contract time for cost reduction incentive proposals accepted and executed in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications shall be considered a construction cost attributable to the resultant estimated net savings due to the cost reduction incentive.

If the final increased quantity of time-related overhead exceeds 149 percent of the number of working days specified in the Engineer's Estimate, the Contractor shall, within 60 days of the Engineer's written request, submit to the Engineer an audit examination and report performed by an independent Certified Public Accountant of the Contractor's actual overhead costs. The audit examination and report shall depict the Contractor's project and company-wide financial records and shall specify the actual overall average daily rates for both field and home office overhead for the entire duration of the project, and whether the costs have been properly allocated. The rates of field and home office overhead shall exclude unallowable costs as determined in the Federal Acquisition Regulations, 48 CFR, Chapter 1, Part 31.

Independent Certified Public Accountant's audit examinations shall be performed in conformance with the requirements of the American Institute of Certified Public Accountants Attestation Standards. Audit examinations and reports shall determine if the rates of field office overhead and home office overhead are:

A. Allowable in conformance with the requirements of the Federal Acquisition Regulations, 48 CFR, Chapter 1, Part 31.
B. Adequately supported by reliable documentation.
C. Related solely to the project under examination.

Within 20 days of receipt of the Engineer's written request, the Contractor shall make its financial records available for audit by the State for the purpose of verifying the actual rate of time-related overhead specified in the audit submitted by the Contractor. The actual rate of time-related overhead specified in the audit, submitted by the Contractor, will be subject to approval by the Engineer.

If the Engineer requests the independent Certified Public Accountant audit, or if it is requested in writing by the Contractor, the contract item payment rate for time-related overhead, in excess of 149 percent of the number of working days specified in the Engineer's Estimate, will be adjusted to reflect the actual rate.

The cost of performing an independent Certified Public Accountant audit examination and submitting the report, requested by the Engineer, will be borne equally by the State and the Contractor. The division of the cost will be made by determining the cost of providing an audit examination and report in conformance with the provisions of Section 9-1.03B, "Work Performed by Special Forces or Other Special Services," of the Standard Specifications, and paying to the Contractor one-half of that cost. The cost of performing an audit examination and submitting the independent Certified Public Accountant audit report for overhead claims other than for the purpose of verifying the actual rate of time-related overhead shall be entirely borne by the Contractor. The cost of performing an audit examination and submitting the independent Certified Public Accountant audit report to verify actual overhead costs incurred prior to the first working day shall be entirely borne by the Contractor.

The quantity of time-related overhead to be paid will be measured by the working day, designated in the Engineer's Estimate as WDAY. The estimated number of working days is the number of working days, excluding days for plant establishment, as specified in "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions. The quantity of time-related overhead will be increased or decreased only as a result of suspensions or adjustments of contract time which revise the current contract completion date, and which satisfy any of the following criteria:

A. Suspensions of work ordered in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications, except:

    1. Suspensions ordered due to weather conditions being unfavorable for the suitable prosecution of the controlling operation or operations.
    2. Suspensions ordered due to the failure on the part of the Contractor to carry out orders given, or to perform the provisions of the contract.
    3. Suspensions ordered due to factors beyond the control of and not caused by the State or the Contractor, for which the Contractor is granted extensions of time in conformance with the provisions of the third paragraph of Section 8-1.07, "Liquidated Damages," of the Standard Specifications.
    4. Other suspensions that mutually benefit the State and the Contractor.

B. Extensions of contract time granted by the State in conformance with the provisions in the fifth paragraph in Section 8-1.07, "Liquidated Damages," of the Standard Specifications and set forth in approved contract change orders, in conformance with the provisions in Section 4-1.03, "Changes," of the Standard Specifications.
C. Reductions in contract time set forth in approved contract change orders, in conformance with the provisions in Section 4-1.03, "Changes," of the Standard Specifications.

Delays to the controlling operation are categorized as three types: nonexcusable, excusable, or compensable. An accepted progress schedule and approved time impact analysis, as submitted by the Contractor in conformance with "Progress Schedule (Critical Path Method)" of these special provisions, determine the types and durations of delays.

Nonexcusable delay is caused by the fault or performance deficiency of the Contractor, subcontractors at any tier, or suppliers, and no extension of time or additional compensation of loss is allowed. Excusable delay is caused by factors beyond the control and without the fault of the State or the Contractor, and the Contractor is only entitled to an extension of time and no compensation of loss. Compensable delay is caused by the error or omission of the State, and the Contractor is entitled to both an extension of time and compensation of loss. Concurrent delay occurs when two separate delays overlap partially or entirely. Nonexcusable delays concurrent with either excusable or compensable delays are nonexcusable delays. Excusable delays concurrent with compensable delays are excusable delays.

The quantity of time-related overhead will only be adjusted as a result of compensable delays and will not be adjusted as a result of either nonexcusable or excusable delays.

In the event an early completion progress schedule, as defined in "Progress Schedule (Critical Path Method)" of these special provisions, is submitted by the Contractor and approved by the Engineer, the amount of time-related overhead eligible for payment will be based on the total number of working days for the project, in conformance with the provisions in "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions, rather than the Contractor's early completion progress schedule.

The contract price paid per working day for time-related overhead shall include full compensation for time-related overhead, including the Contractor's share of costs of the independent Certified Public Accountant audit of overhead costs requested by the Engineer, as specified in these special provisions, and as directed by the Engineer.

The provisions in Sections 4-1.03B, "Increased or Decreased Quantities," and 4-1.03C, "Changes in Character of the Work," of the Standard Specifications shall not apply to the contract item of time-related overhead.

Full compensation for additional overhead costs incurred during days of inclement weather when the contract work is extended into additional construction seasons due to delays caused by the State shall be considered as included in the time-related overhead paid during the contract working days, and no additional compensation will be allowed therefor.

Full compensation for additional overhead costs involved in performing additional contract item work that is not a controlling operation shall be considered as included in the contract items of work involved and no additional compensation will be allowed therefor.

Full compensation for overhead, other than time-related overhead measured and paid for as specified above, and other than overhead costs included in the markups specified in "Force Account Payment" of these special provisions, shall be considered as included in the various items of work and no additional compensation will be allowed therefor.

Overhead costs incurred by subcontractors of any tier, suppliers, fabricators, manufacturers, and other parties associated with the Contractor shall be considered as included in the various items of work and as specified in Section 9-1.03, “Force Account Payment,” of the Standard Specifications.

For the purpose of making partial payments pursuant to the provisions in Section 9-1.06, "Partial Payments," of the Standard Specifications, the number of working days to be paid for time-related overhead in each monthly partial payment will be the number of working days, specified above to be measured for payment that occurred during that monthly estimate period, including compensable suspensions and right of way delays. Working days granted by contract change order due to extra work or changes in character of the work, will be paid for upon completion of the contract. The amount earned per working day for time-related overhead shall be the lesser of the following amounts:

A. The contract item price.
B. Twenty percent of the original total contract amount divided by the number of working days specified in "Beginning of Work, Time of Completion and Liquidated Damages," of these special provisions.

After the work has been completed, except plant establishment work, as provided in Section 20-4.08, "Plant Establishment Work," of the Standard Specifications, the amount of the total contract item price for time-related overhead not yet paid will be included for payment in the first estimate made after completion of roadway construction work, in conformance with the provisions in Section 9-1.06, "Partial Payments," of the Standard Specifications.

10-1.16 OBSTRUCTIONS

Attention is directed to Section 8-1.10, "Utility and Non-Highway Facilities," and Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

Attention is directed to the existence of certain underground facilities that may require special precautions be taken by the Contractor to protect the health, safety and welfare of workers and of the public. Facilities requiring special precautions include, but are not limited to: conductors of petroleum products, oxygen, chlorine, and toxic or flammable gases; natural gas in pipelines greater than 150 mm in diameter or pipelines operating at pressures greater than 415 kPa (gage); underground

electric supply system conductors or cables, with potential to ground of more than 300 V, either directly buried or in a duct or conduit which do not have concentric grounded or other effectively grounded metal shields or sheaths.

If these facilities are not located on the plans in both alignment and elevation, no work shall be performed in the vicinity of the facilities, except as provided herein for conduit to be placed under pavement, until the owner, or the owner's representative, has located the facility by potholing, probing or other means that will locate and identify the facility. Conduit to be installed under pavement in the vicinity of these facilities shall be placed by the trenching method in conformance with the provisions in "Conduit" of these special provisions. If, in the opinion of the Engineer, the Contractor's operations are delayed or interfered with by reason of the utility facilities not being located by the owner or the owner's representative, the State will compensate the Contractor for the delays to the extent provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications, and not otherwise, except as provided in Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications.

The Contractor shall notify the Engineer and the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to performing any excavation or other work close to any underground pipeline, conduit, duct, wire or other structure. Regional notification centers include, but are not limited to, the following:

Notification Center	Telephone Number
Underground Service Alert-Northern California (USA)	1-800-642-2444 1-800-227-2600
Underground Service Alert-Southern California (USA)	1-800-422-4133 1-800-227-2600

It is anticipated that the following utility facilities will be relocated prior to the dates shown:

Utility	Location	Date
Otay Water District Steel Pipe Encase Exist 300 mm ACP Water Line	"U-2" Extension of Gailes Boulevard	01/30/08

Installation of the following utility facilities will require coordination with the Contractor's operations. The Contractor shall make the necessary arrangements with the utility company, through the Engineer, and shall submit a schedule of work, verified by a representative of the utility company, to the Engineer. The schedule of work shall provide not less than the following number of working days, as defined in Section 8-1.06, "Time of Completion," of the Standard Specifications for the utility company to complete their work:

Utility (address)	Location	Working Days
SDG&E Temporary O/H Electrical Lines	"U- 1, 13 & 14" Britannia Boulevard.	55
SDG&E Remove/Abandon U/G Electrical Lines	"U- 1, 13 & 14" Britannia Boulevard.	50
AT&T Temporary O/H Telephone Lines	"U- 1, 13 & 14" Britannia Boulevard.	40
AT&T Remove U/G	"U- 1, 13 & 14" Britannia Boulevard.	25
Cox Communications Temporary O/H Cable Lines	"U- 1, 13 & 14" Britannia Boulevard.	40
Cox Communications Remove/Abandon U/G Cable Lines	"U- 1, 13 & 14" Britannia Boulevard.	25
SDG&E Temporary 75 mm Gas Main	"U- 1, 13 & 14" Britannia Boulevard.	55
SDG&E Remove/Abandon 75 mm Gas Main	"U- 1, 13 & 14" Britannia Boulevard.	50
SDG&E Relocate U/G Electrical Lines	"U-1" Britannia Boulevard.	50
AT&T Relocate U/G Cable Lines	"U-1" Britannia Boulevard.	30
Cox Communication Relocate U/G Cable Lines	"U-1" Britannia Boulevard.	30
SDG&E Relocate 75 mm Gas Main	"U-1" Britannia Boulevard.	50
SDG&E Relocate U/G Electrical Lines	"U-1" Britannia Boulevard.	55
AT&T Relocate U/G Telephone Lines	"U-1" Britannia Boulevard.	30
Cox Communication Relocate U/G Cable Lines	"U-1" Britannia Boulevard.	35
SDG&E Relocate 75 mm Gas Main	"U-1" Britannia Boulevard.	55
SDG&E Relocate U/G Electrical Lines	"U- 1, 13 & 14" Britannia Boulevard.	60
AT&T Relocate U/G Telephone Lines	"U- 1, 13 & 14" Britannia Boulevard.	35
Cox Communication Relocate U/G Cable Lines	"U- 1, 13 & 14" Britannia Boulevard.	35
SDG&E Relocate 75 mm Gas Main	"U- 1, 13 & 14" Britannia Boulevard.	55
SDG&E Remove temporary O/H Electrical Lines	"U- 1, 13 & 14" Britannia Boulevard.	55
AT&T Remove temporary O/H cable and poles	"U- 1, 13 & 14" Britannia Boulevard.	25
Cox Communication Relocate U/G Cable Lines	"U- 1, 16 & 17" Britannia Boulevard.	30
SDG&E Remove/Abandon temporary 75 mm Gas Main	"U- 1, 13 & 14" Britannia Boulevard.	50

SDG&E Relocate 75 mm Gas Main	"U- 6, 16 & 17" La Media Road.	55
SDG&E Abandon Existing 75 mm Gas Main	"U- 6, 16 & 17" La Media Road.	45
AT&T Relocate U/G for drainage culvert	"U- 6, 16 & 17" La Media Road.	40
AT&T Relocate U/G Telephone Lines	"U- 6, 16 & 17" La Media Road.	40
Cox Communication Relocate U/G Telephone Lines	"U- 6, 16 & 17" La Media Road.	40
Cox Communication Abandon Existing U/G Telephone Lines	"U- 6, 16 & 17" La Media Road.	30
Cox Communication Abandon Existing U/G Telephone Lines	"U- 6, 16 & 17" La Media Road.	30
SDG&E Relocate U/G Electrical Lines	"U- 6, 16 & 17" La Media Road.	55
SDG&E Abandon Existing U/G Electrical Lines	"U- 6, 16 & 17" La Media Road.	60
AT&T Relocate O/H Telephone Lines	"U- 19 & 20" Otay Mesa Road	40
SBC Remove Existing O/H Telephone Lines	"U- 19 & 20" Otay Mesa Road.	30
SDG&E Relocate O/H Electrical Lines	"U-11, 19, 20, 23, 25 & 27" Harvest Road & Route 905.	60
AT&T Relocate U/G Telephone Lines	"U-11, 19, 23, 25 & 27" Route 905.	55
AT&T Temporary Telephone Lines	"U-11" Route 905, Airway Rd. & Harvest Road.	40
SDG&E Abandon/Remove 75 mm Gas Main	"U-11, 29 & 30" Airway Rd. & Harvest Road.	50
SDG&E Relocate 75 mm Gas Main	"U-11, 29 & 30" Airway Rd. & Harvest Road.	55
SDG&E Place first phase of UG Electrical conduit	"U-11, 29 & 30" Airway Rd. & Harvest Road.	55
AT&T Relocate U/G Telephone Lines	"U-11 & 30" Airway Rd. & Harvest Road.	45
AT&T Remove/Abandon Existing U/G Telephone Lines	"U-11 & 30" Airway Rd. & Harvest Road.	25
AT&T Remove/Abandon Existing U/G Telephone Lines	"U-10, 17, 18, 22 & 24" Route 905 La Media Rd.	30
SDG&E Second phase of UG Electrical	"U-11, 29 & 30" Airway Rd. & Harvest Road.	65

In the event that the utility facilities mentioned above are not removed or relocated by the date specified and, if in the opinion of the Engineer, the Contractor's operations are delayed or interfered with by reason of the utility facilities not being removed or relocated by the date specified, the State will compensate the Contractor for the delays to the extent provided in

Section 8-1.09, "Right of Way Delays," of the Standard Specifications, and not otherwise, except as provided in Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications.

10-1.17 MOBILIZATION

Mobilization shall conform to the provisions in Section 11, "Mobilization," of the Standard Specifications.

10-1.18 CONSTRUCTION AREA TRAFFIC CONTROL DEVICES

Flagging, signs, and temporary traffic control devices furnished, installed, maintained, and removed when no longer required shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Category 1 temporary traffic control devices are defined as small and lightweight (less than 45 kg) devices. These devices shall be certified as crashworthy by crash testing, crash testing of similar devices, or years of demonstrable safe performance. Category 1 temporary traffic control devices include traffic cones, plastic drums, portable delineators, and channelizers.

If requested by the Engineer, the Contractor shall provide written self-certification for crashworthiness of Category 1 temporary traffic control devices at least 5 days before beginning any work using the devices or within 2 days after the request if the devices are already in use. Self-certification shall be provided by the manufacturer or Contractor and shall include the following:

A. Date,
B. Federal Aid number (if applicable),
C. Contract number, district, county, route and kilometer post of project limits,
D. Company name of certifying vendor, street address, city, state and zip code,
E. Printed name, signature and title of certifying person; and
F. Category 1 temporary traffic control devices that will be used on the project.

The Contractor may obtain a standard form for self-certification from the Engineer.

Category 2 temporary traffic control devices are defined as small and lightweight (less than 45 kg) devices that are not expected to produce significant vehicular velocity change, but may cause potential harm to impacting vehicles. Category 2 temporary traffic control devices include barricades and portable sign supports.

Category 2 temporary traffic control devices shall be on the Federal Highway Administration's (FHWA) list of Acceptable Crashworthy Category 2 Hardware for Work Zones. This list is maintained by FHWA and can be located at:

http://safety.fhwa.dot.gov/roadway_dept/road_hardware/listing.cfm?code=workzone

The Department also maintains this list at:

http://www.dot.ca.gov/hq/traffops/signtech/signdel/pdf/Category2.pdf

Category 2 temporary traffic control devices that have not received FHWA acceptance shall not be used. Category 2 temporary traffic control devices in use that have received FHWA acceptance shall be labeled with the FHWA acceptance letter number and the name of the manufacturer. The label shall be readable and permanently affixed by the manufacturer. Category 2 temporary traffic control devices without a label shall not be used.

If requested by the Engineer, the Contractor shall provide a written list of Category 2 temporary traffic control devices to be used on the project at least 5 days before beginning any work using the devices or within 2 days after the request if the devices are already in use.

Category 3 temporary traffic control devices consist of temporary traffic-handling equipment and devices that weigh 45 kg or more and are expected to produce significant vehicular velocity change to impacting vehicles. Temporary traffic-handling equipment and devices include crash cushions, truck-mounted attenuators, temporary railing, temporary barrier, and end treatments for temporary railing and barrier.

Type III barricades may be used as sign supports if the barricades have been successfully crash tested, meeting the NCHRP Report 350 criteria, as one unit with a construction area sign attached.

Category 3 temporary traffic control devices shall be shown on the plans or on the Department's Highway Safety Features list. This list is maintained by the Division of Engineering Services and can be found at:

http://www.dot.ca.gov/hq/esc/approved_products_list/HighwaySafe.htm

Category 3 temporary traffic control devices that are not shown on the plans or not listed on the Department's Highway Safety Features list shall not be used.

Full compensation for providing self-certification for crashworthiness of Category 1 temporary traffic control devices and for providing a list of Category 2 temporary traffic control devices used on the project shall be considered as included in the prices paid for the various items of work requiring the use of the Category 1 or Category 2 temporary traffic control devices and no additional compensation will be allowed therefor.

10-1.19 CONSTRUCTION AREA SIGNS

Construction area signs for temporary traffic control shall be furnished, installed, maintained, and removed when no longer required in conformance with the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to "Furnish Sign" of these special provisions.

Attention is directed to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. Type II retroreflective sheeting shall not be used on construction area sign panels. Type III, IV, VII, VIII, or IX retroreflective sheeting shall be used for stationary mounted construction area sign panels.

Attention is directed to "Construction Project Information Signs" of these special provisions regarding the number and type of construction project information signs to be furnished, erected, maintained, and removed and disposed of.

Unless otherwise shown on the plans or specified in these special provisions, the color of construction area warning and guide signs shall have black legend and border on orange background, except W10-1 or W47(CA) (Highway-Rail Grade Crossing Advance Warning) sign shall have black legend and border on yellow background.

Orange background on construction area signs shall be fluorescent orange.

Repair to construction area sign panels will not be allowed, except when approved by the Engineer. At nighttime under vehicular headlight illumination, sign panels that exhibit irregular luminance, shadowing or dark blotches shall be immediately replaced at the Contractor's expense.

The Contractor shall notify the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to commencing excavation for construction area sign posts. The regional notification centers include, but are not limited to, the following:

Notification Center	Telephone Number
Underground Service Alert-Northern California (USA)	(800) 642-2444 (800) 227-2600
Underground Service Alert-Southern California (USA)	(800) 422-4133 (800) 227-2600

Excavations required to install construction area signs shall be performed by hand methods without the use of power equipment, except that power equipment may be used if it is determined there are no utility facilities in the area of the proposed post holes. The post hole diameter, if backfilled with portland cement concrete, shall be at least 100 mm greater than the longer dimension of the post cross-section.

Construction area signs placed within 4.6 m from the edge of the travel way shall be mounted on stationary mounted sign supports as specified in "Construction Area Traffic Control Devices" of these special provisions.

The Contractor shall maintain accurate information on construction area signs. Signs that are no longer required shall be immediately covered or removed. Signs that convey inaccurate information shall be immediately replaced or the information shall be corrected. Covers shall be replaced when they no longer cover the signs properly. The Contractor shall immediately restore to the original position and location any sign that is displaced or overturned, from any cause, during the progress of work.

10-1.20 MAINTAINING TRAFFIC

Maintaining traffic shall conform to the provisions in Sections 7-1.08, "Public Convenience," Section 7-1.09, "Public Safety," and Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications, "Public Safety" of these special provisions and these special provisions.

Attention is directed to "Traffic Plastic Drums" of these special provisions regarding the use of plastic drums in place of portable delineators, cones or Type I or II barricades.

Closure is defined as the closure of a traffic lane or lanes, ramp or connector lanes, within a single traffic control system.

Closures shall conform to the provisions in "Traffic Control System for Lane Closure" of these special provisions.

At locations where falsework pavement lighting or pedestrian openings through falsework are designated, falsework lighting shall be installed in conformance with the provisions in Section 86-6.11, "Falsework Lighting," of the Standard Specifications.

Openings shall be provided through bridge falsework for the use of public traffic at each location where falsework is constructed over the streets or routes listed in the following table. The type, minimum width, height, and number of openings at each location, and the location and maximum spacing of falsework lighting, if required for each opening, shall conform to the requirements in the table. The width of vehicular openings shall be the clear width between temporary railings or other protective work. The spacing shown for falsework pavement lighting is the maximum distance center to center in meters between fixtures.

La Media Road UC

	Number	Width	Height
Vehicle Openings	2	15.9	4.6
Pedestrian Openings	1	1.52	2.44

	Location	Spacing
Falsework Pavement Lighting	L & R	7

(Width and Height in meters)
(R = Right side of traffic. L = Left side of traffic)
(C = Centered overhead)

The exact location of openings will be determined by the Engineer.

Closures are only allowed during the hours shown in the lane requirement charts included in this section "Maintaining Traffic," except for work required under Sections 7-1.08, "Public Convenience," and Section 7-1.09, "Public Safety."

The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

Ramps adjacent to the closed freeway lane may be closed.

The Contractor shall furnish special portable freeway detour signs as shown on the plans to be used on the detour routes as directed by the Engineer.

C43(CA) (FRESH CONCRETE) sign shall be used at the beginning of the pavement slab replacement work area. The sign shall be in place during the entire curing period.

SC6-3(CA) (RAMP CLOSED) sign shall be used to inform motorists of the temporary closing of a connector, entrance ramp or exit ramp for one business day.

SC6-4(CA) (RAMP CLOSED) sign shall be used to inform motorists of the temporary closing of a connector, entrance ramp or exit ramp for more than one business day.

The SC6-3(CA) or SC6-4(CA) signs shall be installed at least 3 days before closing the connector or ramp, but not more than 14 days before the connector or ramp closure. The Contractor shall notify the Engineer at least 5 calendar days before installing the SC6-3(CA) or SC6-4(CA) signs. The SC6-3(CA) or SC6-4(CA) signs shall be stationary mounted at locations shown on the plans and as directed by the Engineer.

Accurate information shall be maintained on the SC6-3(CA) or SC6-4(CA) signs. The SC6-3(CA) or SC6-4(CA) signs, when no longer required, shall be immediately covered or removed.

Personal vehicles of the Contractor's employees shall not be parked on the traveled way or shoulders including sections closed to public traffic.

When work vehicles or equipment are parked on the shoulder within 1.8 m of a traffic lane, the shoulder area shall be closed as shown on the plans.

If minor deviations from the lane requirement charts are required, a written request shall be submitted to the Engineer at least 15 days before the proposed date of the closure. The Engineer may approve the deviations if there is no significant increase in the cost to the State and if the work can be expedited and better serve the public traffic.

Designated legal holidays are: January 1st, the third Monday in February, the last Monday in May, July 4th, the first Monday in September, November 11th, Thanksgiving Day, and December 25th. When a designated legal holiday falls on a Sunday, the following Monday shall be a designated legal holiday. When November 11th falls on a Saturday, the preceding Friday shall be a designated legal holiday.

Full compensation for furnishing, erecting, maintaining, and removing and disposing of the C43(CA), SC6-3(CA), SC6-4(CA), W20-1, W21-5b, and C24(CA) signs, and freeway detour signs, shall be considered as included in the contract lump sum price paid for construction area signs and no additional compensation will be allowed therefor.

Lane Closure Restriction for Designated Legal Holidays

Thu	Fri	Sat	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Sun
x	**H** xx	xx	xx							
x	xx	**H** xx	xx							
	x	xx	**H** xx	xx						
	x	xx	xx	**H** xx						
				x	**H** xx					
					x	**H** xx				
						x	**H** xx	xx		xx

Legends:

	Refer to lane closure charts
x	The full width of the traveled way shall be open for use by public traffic after 0500.
xx	The full width of the traveled way shall be open for use by public traffic.
H	Designated Legal Holiday

REMARKS: This table is to be used concurrently with charts 1-4-11-12-14.

Pedestrian access facilities shall be provided through construction areas within the right of way as shown on the plans and as specified herein. Pedestrian walkways shall be surfaced with asphalt concrete, portland cement concrete or timber. The surface shall be skid resistant and free of irregularities. Hand railings shall be provided on each side of pedestrian walkways as necessary to protect pedestrian traffic from hazards due to construction operations or adjacent vehicular traffic. Protective overhead covering shall be provided as necessary to insure protection from falling objects and drip from overhead structures.

In addition to the required openings through falsework, pedestrian facilities shall be provided during pile driving, footing, wall, and other bridge construction operations. At least one walkway shall be available at all times. If the Contractor's operations require the closure of one walkway, then another walkway shall be provided nearby, off the traveled roadway.

Railings shall be constructed of wood, S4S, and shall be painted white. Railings and walkways shall be maintained in good condition. Walkways shall be kept clear of obstructions.

Full compensation for providing pedestrian facilities shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

Chart No. 1
Road Lane Requirements

County: SD	Direction: NB/SB "La Media Road"	KP: 2.655 PM: 4.272

Closure Limits: Airway Road to RTE 905

FROM HOUR TO HOUR	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	X	X	X	X	X																	X	X	X	
Fridays	X	X	X	X	X																				
Saturdays																									
Sundays																						X	X	X	

Legend:

X	Street may be closed
	No work permitted.

REMARKS:
This chart to be used for falsework erection for two times only, for 14 consecutive days, each time.

Detour SB La Media Road traffic for full road closure
Detour SB La Media Road traffic via westerly on RTE 905 to SB Britania Boulevard thence southerly on Britania Boulevard to EB Airway Road thence easterly on Airway Road to SB La Media Road.

Detour NB La Media Road traffic for full road closure
Detour NB La Media Road traffic via westerly on Airway Road to NB Britania Boulevard thence northerly on Britania Boulevard to EB RTE 905 thence easterly on RTE 905 to La Media Road.

Chart No. 2
Road Lane Requirements

County: SD	Direction: NB/SB "La Media Road"	KP: 2.655 PM: 4.272

Closure Limits: Airway Road to RTE 905

FROM HOUR TO HOUR	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Fridays	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Saturdays	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sundays	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Legend:

1	One lane open in direction of travel

REMARKS: **This chart to be used for one time only for 180 consecutive days.**

Chart No. 3
Road Lane Requirements

County: SD	Direction: EB/WB "Saint Andrews Avenue"	KP: 2.655 PM: 4.272

Closure Limits: At La Media Road

FROM HOUR TO HOUR	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fridays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturdays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sundays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Legend:

X	Street may be closed

REMARKS:
This chart to be used for one time only, for 20 consecutive days.

Detour SB La Media Road to Saint Andrews Avenue
Detour SB La Media Road to Saint Andrews Avenue traffic via westerly on RTE 905 to Otay Mesa Center Road thence southerly on Otay Mesa Center Road to Saint Andrews Avenue.

Detour EB Saint Andrews Avenue to La Media Road
Detour EB Saint Andrews Avenue to La Media Road traffic via westerly on Saint Andrews Avenue to Otay Mesa Center Road thence northerly on Otay Mesa Center Road to RTE 905 thence easterly on RTE 905 to La Media Road.

Chart No. 4
Road Lane Requirements

County: SD	Direction: NB/SB "Britannia Boulevard"	KP: PM:

Closure Limits: Otay Mesa Road to Airway Road

FROM HOUR TO HOUR	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	1	1	1	1	1																	1	1	1	
Fridays	1	1	1	1	1																				
Saturdays				1	1	1	1	1	1																
Sundays				1	1	1	1	1	1													1	1	1	

Legend:

1	One lane open in direction of travel
	No work permitted.

REMARKS:

Chart No. 5
Road Lane Requirements

County: SD	Direction: NB/SB "Britannia Boulevard"	KP: PM:

Closure Limits: Otay Mesa Road to Airway Road

FROM HOUR TO HOUR	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fridays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturdays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sundays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Legend:

X	Street may be closed

REMARKS:

Detour NB / SB Britannia Boulevard traffic for full road closure
Detour NB / SB Britannia Boulevard traffic will be diverted to a temporary four lanes detour constructed between Otay Mesa Road and Airway Road.

Chart No. 6
Road Lane Requirements

County: SD	Direction: NB/SB "Temporary Britannia Boulevard"	KP: PM:

Closure Limits: Otay Mesa Road to Airway Road

FROM HOUR TO HOUR	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Fridays	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Saturdays	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sundays	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Legend:

1	One lane open in direction of travel

REMARKS: **This chart to be used for one time 120 consecutive days only.**

Chart No. 7
Conventional Highway Lane Requirements

County: SD	Route/Direction: Interim 905/EB-WB	KP: R13.9/R18.6 PM: R8.637/R11.557

Closure Limits: 0.6 km east of Cactus Road to 0.3 km west of the Mexico Border

FROM HOUR TO HOUR	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Fridays	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Saturdays	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Sundays	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

Legend:

S	Shoulder closure permitted

REMARKS: **This chart to be used for one time only for (3) three years.**

Chart No. 8
Road Lane Requirements

County: SD	Direction: EB/WB "Otay Mesa Road"	R14.1 KP: R8.8 PM:

Closure Limits: RTE 905 to Sanyo Avenue

FROM HOUR TO HOUR	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Fridays	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Saturdays	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Sundays	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

Legend:

S	Shoulder closure permitted

REMARKS: **This chart to be used for one time only for eight (8) months.**

Chart No. 9
Road Lane Requirements

County: SD	Direction: NB/SB "Sanyo Avenue"	KP: PM:

Closure Limits: Airway Road to Otay Mesa Road

FROM HOUR TO HOUR	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Fridays	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Saturdays	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Sundays	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

Legend:

S	Shoulder closure permitted

REMARKS: **This chart to be used for one time only for eight (8) months.**

Chart No. 10
Road Lane Requirements

County: SD	Direction: EB/WB "Airway Road"	KP: PM:

Closure Limits: 0.3 km W. of Interim RTE 905 to Sanyo Avenue

FROM HOUR TO HOUR	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fridays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Saturdays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sundays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Legend:

X	Street may be closed

REMARKS: **This chart to be used for one time only for three (3) years**.

Detour EB Airway Road
Detour EB Airway Road traffic via westerly on Airway Road to La Media Road thence northerly on La Media Road
to Otay Mesa Road thence easterly on Otay Mesa Road to Sanyo Road thence southerly on Sanyo Road to EB Airway Road.

Detour WB Airway Road
Detour WB Airway Road traffic via westerly on Airway Road to Sanyo Road thence northerly on Sanyo Road to Otay Mesa Road thence westerly on Otay Mesa Road to La Media Road thence southerly on La media Road to Airway Road.

Chart No. 11
Road Lane Requirements

County: SD	Direction: NB/SB "La Media Road"	KP: PM:

Closure Limits: Otay Mesa Road to Airway Road

FROM HOUR TO HOUR	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	X	X	X	X																					
Fridays																						X	X	X	X
Saturdays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sundays	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Legend:

X	Street may be closed
	No work permitted.

REMARKS: **This chart to be used for build small segment of the roadway for one time only.**

Detour NB La Media Road traffic for full road closure
Detour NB La Media Road traffic via easterly on Airway Road to Piper Ranch Road thence northerly on Piper Ranch Road to WB RTE 905 thence westerly on RTE 905 to La Media Road.

Detour SB La Media Road traffic for full road closure
Detour SB La Media Road traffic via easterly on RTE 905 to SB Piper Ranch Road thence southerly on Piper Ranch Road to EB Airway Road thence westerly on Airway Road to SB La Media Road.

Chart No. 12
Conventional Highway Lane Requirements

County: SD	Route/Direction: 905 / EB-WB	KP: R13.9/R18.6 PM: R8.637/R11.557

Closure Limits: 0.6 km east of Cactus Road to 0.3 km west of the Mexico Border

FROM HOUR TO HOUR	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	1	1	1	1	1																	1	1	1	
Fridays	1	1	1	1	1																				
Saturdays				1	1	1	1	1																	
Sundays				1	1	1	1	1	1													1	1	1	

Legend:

1	Provide at least one through traffic lane open in direction of travel
	No work permitted.

REMARKS:

Chart No. 13
Conventional Highway Lane Requirements

County: SD	Route/Direction: 905 / EB-WB	KP: R13.9/R18.6 PM: R8.637/R11.557

Closure Limits: 0.6 km east of Cactus Road to 0.3 km west of the Mexico Border

FROM HOUR TO HOUR	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	S	S	S	S	S				S	S	S	S	S	S	S	S						S	S	S	
Fridays	S	S	S	S	S				S	S	S	S	S	S	S	S									
Saturdays				S	S	S	S	S	S	S	S	S	S	S	S	S									
Sundays				S	S	S	S	S	S	S	S	S	S	S	S	S						S	S	S	

Legend:

S	Shoulder closure permitted
	No work permitted.

REMARKS:

Chart No. 14
Road Lane Requirements

County: SD	Direction: EB/WB "Airway Road"	KP: PM:

Closure Limits: 0.3 km west of Interim RTE 905 to Sanyo Road

FROM HOUR TO HOUR	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays										1	1	1	1	1	1										
Fridays										1	1	1	1	1	1										
Saturdays																									
Sundays																									

Legend:

1	One lane open in direction of travel
	No work permitted.

REMARKS:

Erection and removal of falsework at locations where falsework openings are required shall be undertaken one location at a time. During falsework erection and removal, public traffic in the lanes over which falsework is being erected or removed shall be detoured or stopped as specified in this section, "Maintaining Traffic." Falsework erection shall include adjustments or removal of components that contribute to the horizontal stability of the falsework system**.** Falsework removal shall include lowering falsework, blowing sand from sand jacks, turning screws on screw jacks, and removing wedges.

The Contractor shall have necessary materials and equipment on the site to erect or remove the falsework or over any one opening before detouring or stopping public traffic.

10-1.21 CLOSURE REQUIREMENTS AND CONDITIONS

Closures shall conform to the provisions in "Maintaining Traffic" of these special provisions and these special provisions.

CLOSURE SCHEDULE

By noon Monday, the Contractor shall submit a written schedule of planned closures for the following week period, defined as Sunday noon through the following Sunday noon. Closures involving work (temporary barrier placement and paving operations) that will reduce horizontal clearances, traveled way inclusive of shoulders, to 2 lanes or less shall be submitted not less than 25 days and not more than 125 days before the anticipated start of operation. Closures involving work (pavement overlay, overhead sign installation, falsework and girder erection) that will reduce the vertical clearances available to the public, shall be submitted not less than 25 days and not more than 125 days before the anticipated start of operation.

The Closure Schedule shall show the locations and times of the proposed closures. The Closure Schedule request forms furnished by the Engineer shall be used. Closure Schedules submitted to the Engineer with incomplete or inaccurate information will be rejected and returned for correction and resubmittal. The Contractor will be notified of disapproved closures or closures that require coordination with other parties as a condition of approval.

Closure Schedule amendments, including adding additional closures, shall be submitted by noon to the Engineer, in writing, at least 3 business days in advance of a planned closure. Approval of Closure Schedule amendments will be at the discretion of the Engineer.

The Engineer shall be notified of cancelled closures 2 business days before the date of closure.

Closures that are cancelled due to unsuitable weather may be rescheduled at the discretion of the Engineer.

CONTINGENCY PLAN

A detailed contingency plan shall be prepared for reopening closures to public traffic. If required by "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions, the contingency plan shall be submitted to the Engineer before work at the job site begins. Otherwise, the contingency plan shall be submitted to the Engineer within one business day of the Engineer's request.

LATE REOPENING OF CLOSURES

If a closure is not reopened to public traffic by the specified time, work shall be suspended in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications. No further closures are to be made until the Engineer has accepted a work plan, submitted by the Contractor, that will insure that future closures will be reopened to public traffic at the specified time. The Engineer will have 2 business days to accept or reject the Contractor's proposed work plan. The Contractor will not be entitled to compensation for the suspension of work resulting from the late reopening of closures.

COMPENSATION

The Engineer shall be notified of delays in the Contractor's operations due to the following conditions, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of those conditions, and the Contractor's loss due to that delay could not have been avoided by rescheduling the affected closure or by judicious handling of forces, equipment and plant, the delay will be considered a right of way delay and will be compensated in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications:

1. The Contractor's proposed Closure Schedule is denied and his planned closures are within the time frame allowed for closures in "Maintaining Traffic" of these special provisions, except that the Contractor will not be entitled to compensation for amendments to the Closure Schedule that are not approved.
2. The Contractor is denied a confirmed closure.

Should the Engineer direct the Contractor to remove a closure before the time designated in the approved Closure Schedule, delay to the Contractor's schedule due to removal of the closure will be considered a right of way delay and compensation for the delay will be determined in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

10-1.22 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE

A traffic control system shall consist of closing traffic lanes in conformance with the details shown on the plans, the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications, the provisions under "Maintaining Traffic" and "Construction Area Signs" of these special provisions, and these special provisions.

The provisions in this section will not relieve the Contractor from the responsibility to provide additional devices or take measures as may be necessary to comply with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications.

During traffic stripe operations and pavement marker placement operations using bituminous adhesive, traffic shall be controlled, at the option of the Contractor, with either stationary or moving lane closures. During other operations, traffic shall be controlled with stationary lane closures. Attention is directed to the provisions in Section 84-1.04, "Protection From Damage," and Section 85-1.06, "Placement," of the Standard Specifications.

If components in the traffic control system are displaced or cease to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair the components to the original condition or replace the components and shall restore the components to the original location.

STATIONARY LANE CLOSURE

When lane closures are made for work periods only, at the end of each work period, 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 designated by the Engineer within the limits of the highway right of way.

Each vehicle used to place, maintain and remove components of a traffic control system on multilane highways shall be equipped with a Type II flashing arrow sign which shall be in operation when the vehicle is being used for placing, maintaining or removing the components. Vehicles equipped with Type II flashing arrow sign not involved in placing, maintaining or removing the components when operated within a stationary type lane closure shall only display the caution display mode. The sign shall be controllable by the operator of the vehicle while the vehicle is in motion. The flashing arrow sign shown on the plans shall not be used on the vehicles which are doing the placing, maintaining and removing of components of a traffic control system and shall be in place before a lane closure requiring the sign's use is completed.

One-way traffic shall be controlled through the project in conformance with the plan entitled "Traffic Control System for Lane Closure on Two Lane Conventional Highways" and these special provisions.

Utilizing a pilot car will be at the option of the Contractor. If the Contractor elects to use a pilot car, the cones shown along the centerline on the plan need not be placed. The pilot car shall have radio contact with personnel in the work area. The maximum speed of the pilot car through the traffic control zone shall be 40 kilometers per hour.

MOVING LANE CLOSURE

Flashing arrow signs used in moving lane closures shall be truck-mounted. Flashing arrow signs shall be in the caution display mode when used on 2-lane highways. Changeable message signs used in moving lane closure operations shall conform to the provisions in Section 12-3.12, "Portable Changeable Message Signs," of the Standard Specifications, except the signs shall be truck-mounted. The full operation height of the bottom of the sign may be less than 2.1 m above the ground, but should be as high as practicable.

Truck-mounted attenuators (TMA) for use in moving lane closures shall be any of the following approved models, or equal:

1. Hexfoam TMA Series 3000, Alpha 1000 TMA Series 1000, and Alpha 2001 TMA Series 2001, manufactured by Energy Absorption Systems, Inc., 35 East Wacker Drive, Suite 1100, Chicago, IL 60601:

   1.1. Northern California: Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, telephone (800) 884-8274, FAX (916) 387-9734
   1.2. Southern California: Traffic Control Service, Inc., 1818 E. Orangethorpe, Fullerton, CA 92831-5324, telephone (800) 222-8274, FAX (714) 526-9501

2. Cal T–001 Model 2 or Model 3, manufacturer and distributor: Hexcel Corporation, 11711 Dublin Boulevard, P.O. Box 2312, Dublin, CA 94568, telephone (925) 551–4900
3. Renco Rengard Model Nos. CAM 8–815 and RAM 8–815, manufacturer and distributor: Renco Inc., 1582 Pflugerville Loop Road, P.O. Box 730, Pflugerville, TX 78660–0730, telephone (800) 654–8182

Each TMA shall be individually identified with the manufacturer's name, address, TMA model number, and a specific serial number. The names and numbers shall each be a minimum 13 mm high and located on the left (street) side at the lower front corner. The TMA shall have a message next to the name and model number in 13 mm high letters which states, "The bottom of this TMA shall be _____ mm ± _____ mm above the ground at all points for proper impact performance." A TMA which is damaged or appears to be in poor condition shall not be used unless recertified by the manufacturer. The Engineer shall be the sole judge whether used TMAs supplied under this contract need recertification. Each unit shall be certified by the manufacturer to meet the requirements for TMAs in conformance with the standards established by the Transportation Laboratory.

Approvals for new TMA designs proposed as equal to the above approved models shall be in conformance with the procedures (including crash testing) established by the Transportation Laboratory. For information regarding submittal of new designs for evaluation contact: Transportation Laboratory, 5900 Folsom Boulevard, Sacramento, CA 95819.

New TMAs proposed as equal to approved TMAs or approved TMAs determined by the Engineer to need recertification shall not be used until approved or recertified by the Transportation Laboratory.

PAYMENT

The contract lump sum price paid for traffic control system shall include full compensation for furnishing all labor (except for flagging costs), 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 and for furnishing and operating the pilot car, (including driver, radios, other equipment, and labor required), as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer. Flagging costs will be paid for as provided in Section 12-2.02, "Flagging Costs," of the Standard Specifications.

The adjustment provisions in Section 4-1.03, "Changes," of the Standard Specifications shall not apply to the item of traffic control system. Adjustments in compensation for traffic control system will be made only for increased or decreased traffic control system required by changes ordered by the Engineer and will be made on the basis of the cost of the increased or decreased traffic control necessary. The adjustment will be made on a force account basis as provided in Section 9-1.03, "Force Account Payment," of the Standard Specifications for increased work, and estimated on the same basis in the case of decreased work.

Traffic control system required by work which is classed as extra work, as provided in Section 4-1.03D of the Standard Specifications, will be paid for as a part of the extra work.

10-1.23 TEMPORARY PAVEMENT DELINEATION

Temporary pavement delineation shall be furnished, placed, maintained, and removed in conformance with the provisions in Section 12-3.01, "General," of the Standard Specifications and these special provisions. Nothing in these special provisions shall be construed as reducing the minimum standards specified in the California MUTCD or as relieving the Contractor from the responsibilities specified in Section 7-1.09, "Public Safety," of the Standard Specifications.

GENERAL

When the work causes obliteration of pavement delineation, temporary or permanent pavement delineation shall be in place before opening the traveled way to public traffic. Laneline or centerline pavement delineation shall be provided for traveled ways open to public traffic. On multilane roadways (freeways and expressways) edgeline delineation shall be provided for traveled ways open to public traffic.

The Contractor shall perform the work necessary to establish the alignment of temporary pavement delineation, including required lines or markers. Surfaces to receive application of paint or removable traffic tape 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, or as determined by the Engineer.

Temporary pavement markers, including underlying adhesive, and removable traffic tape that are applied to the final layer of surfacing or existing pavement to remain in place or that 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

When lanelines or centerlines are obliterated and temporary pavement delineation to replace the lines is not shown on the plans, the minimum laneline and centerline delineation to be provided for that area shall be temporary pavement markers placed at longitudinal intervals of not more than 7.3 m. The temporary pavement markers shall be the same color as the laneline or centerline the pavement markers replace. Temporary pavement markers shall be, at the option of the Contractor, one of the temporary pavement markers listed for short term day/night use (14 days or less) or long term day/night use (6 months or less) in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. The temporary

pavement markers shall be placed in conformance with the manufacturer's instructions. Temporary pavement markers for long term day/night use (6 months or less) shall be cemented to the surfacing with the adhesive recommended by the manufacturer, except epoxy adhesive shall not be used to place the temporary pavement markers in areas where removal of the temporary pavement markers will be required.

Temporary laneline or centerline delineation consisting entirely of temporary pavement markers listed for short term day/night use (14 days or less), shall be placed on longitudinal intervals of not more than 7.3 m and shall be used for a maximum of 14 days on lanes opened to public traffic. Before the end of the 14 days the permanent pavement delineation shall be placed. If the permanent pavement delineation is not placed within the 14 days, the Contractor shall replace the temporary pavement markers and provide additional temporary pavement delineation and shall bear the cost thereof. The additional temporary pavement delineation to be provided shall be equivalent to the pattern specified for the permanent pavement delineation for the area, as determined by the Engineer.

TEMPORARY EDGELINE DELINEATION

On multilane roadways (freeways and expressways), when 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:

1. Temporary pavement delineation for right edgelines shall, at the option of the Contractor, consist of either a solid 100-mm wide traffic stripe tape of the same color as the stripe it replaces, traffic cones, portable delineators or channelizers placed at longitudinal intervals not to exceed 30 m.
2. Temporary pavement delineation for left edgelines shall, at the option of the Contractor, consist of either solid 100-mm wide traffic stripe tape of the same color as the stripe it replaces, traffic cones, portable delineators or channelizers placed at longitudinal intervals not to exceed 30 m or temporary pavement markers placed at longitudinal intervals of not more than 1.8 m.

Where removal of the 100-mm wide traffic stripe will not be required, painted traffic stripe conforming to the provisions of "Temporary Traffic Stripe (Paint)" of these special provisions may be used.

The lateral offset for traffic cones, portable delineators or channelizers used for temporary edgeline delineation shall be as determined by the Engineer. If traffic cones or portable delineators are used as temporary pavement delineation for edgelines, the Contractor shall provide personnel to remain at the project site to maintain the cones or delineators during the hours of the day that the portable delineators are in use.

Channelizers used for temporary edgeline delineation shall be the surface mounted type and shall be orange in color. Channelizer bases shall be cemented to the pavement in the same manner provided for cementing pavement markers to pavement in "Pavement Markers" of these special provisions, except epoxy adhesive shall not be used to place channelizers on the top layer of pavement. Channelizers shall be, at the Contractor's option, one of the surface mount types (900 mm) listed in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Temporary edgeline delineation shall be removed when no longer required for the direction of public traffic as determined by the Engineer.

TEMPORARY TRAFFIC STRIPE (PAINT)

The painted temporary traffic stripe shall be complete in place at the location shown before opening the traveled way to public traffic. Removal of painted temporary traffic stripe will not be required.

Temporary painted traffic stripe shall conform to the provisions in "Paint Traffic Stripe and Pavement Marking" of these special provisions, except for payment. At the option of the Contractor, either one or 2 coats shall be applied regardless of whether on new or existing pavement.

TEMPORARY PAVEMENT MARKING (PAINT)

Temporary pavement marking consisting of painted pavement marking shall be applied and maintained at the locations shown on the plans. The painted temporary pavement marking shall be complete in place at the location shown before opening the traveled way to public traffic. Removal of painted temporary pavement marking will not be required.

Temporary painted pavement marking shall conform to the provisions in "Paint Traffic Stripe and Pavement Marking" of these special provisions, except for payment. At the option of the Contractor, either one or 2 coats shall be applied regardless whether on new or existing pavement.

At the Contractor's option, temporary removable pavement marking tape or permanent pavement marking tape listed in "Prequalified and Tested Signing and Delineation Materials" of these special provisions may be used instead of painted temporary pavement markings. When pavement marking tape is used, regardless of which type of tape is placed, the tape will be measured and paid for by the square meter as temporary pavement marking (paint).

TEMPORARY PAVEMENT MARKERS

Temporary pavement markers shall be applied complete in place before opening the traveled way to public traffic.

Temporary pavement markers shall be, at the option of the Contractor, one of the temporary pavement markers for long term day/night use (6 months or less) listed in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Temporary pavement markers shall be placed in conformance with the manufacturer's instructions and shall be cemented to the surfacing with the adhesive recommended by the manufacturer, except epoxy adhesive shall not be used in areas where removal of the pavement markers will be required.

Retroreflective pavement markers conforming to the provisions in "Pavement Markers" of these special provisions may be used in place of temporary pavement markers for long term day/night use (6 months or less) except to simulate patterns of broken traffic stripe. Placement of the retroreflective pavement markers used for temporary pavement markers shall conform to the provisions in "Pavement Markers" of these special provisions except the waiting period provisions before placing the pavement markers on new asphalt concrete surfacing as specified in Section 85-1.06, "Placement," of the Standard Specifications shall not apply and epoxy adhesive shall not be used to place pavement markers in areas where removal of the pavement markers will be required.

MEASUREMENT AND PAYMENT

Temporary traffic stripe and temporary pavement marking shown on the plans will be measured and paid for in the same manner specified for paint traffic stripe and paint pavement marking in Section 84-3.06, "Measurement," and Section 84-3.07, "Payment," of the Standard Specifications.

Temporary pavement markers shown on the plans will be measured and paid for by the unit in the same manner specified for retroreflective pavement markers in Section 85-1.08, "Measurement," and Section 85-1.09, "Payment," of the Standard Specifications.

Full compensation for furnishing, placing, maintaining, and removing the temporary pavement markers (including underlying adhesive, layout (dribble) lines to establish alignment of temporary pavement markers or used for temporary laneline and centerline) 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.

Full compensation for furnishing, placing, maintaining, and removing temporary edgeline delineation 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. The quantity of channelizers used as temporary edgeline delineation will not be included in the quantity of channelizer (surface mounted) to be paid for.

10-1.24 BARRICADE

Barricades shall be furnished, placed and maintained at the locations shown on the plans, specified in the Standard Specifications or in these special provisions or where designated by the Engineer. Barricades shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to "Prequalified and Tested Signing and Delineation Materials" of these special provisions regarding retroreflective sheeting for barricades.

At the time of completion of the project, certain barricades shall be left in place as directed by the Engineer. In addition to the contract unit price or prices paid for the type or types of barricades, the cost of leaving the barricades in place will be paid for at the contract unit price for barricade (left in place).

Construction area sign and marker panels conforming to the provisions in Section 12-3.06, "Construction Area Signs," of the Standard Specifications shall be installed on barricades in a manner determined by the Engineer at the locations shown on the plans.

Sign panels for construction area signs and marker panels installed on barricades shall conform to the provisions in Section 12-3.06A, "Stationary Mounted Signs," of the Standard Specifications.

Full compensation for furnishing, installing, maintaining, and removing construction area signs and marker panels on barricades shall be considered as included in the contract unit price paid for the type of barricade involved and no separate payment will be made therefor.

Barricades shown on the plans as part of a traffic control system will be paid for as provided in "Traffic Control System for Lane Closure" of these special provisions and will not be included in the count for payment of barricades.

10-1.25 PORTABLE CHANGEABLE MESSAGE SIGN

Portable changeable message signs shall be furnished, placed, operated, and maintained at locations shown on the plans or where designated 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. Messages displayed on the portable changeable

message signs shall be as specified on the plans and shall conform to Section 12-3.12 "Portable Changeable Message Signs," of the Standard Specifications and “Maintaining Traffic” of these special provisions."

The Contractor shall have 10 portable changeable message signs on the project at all times.

A portable changeable message sign shall be placed in advance of the first warning sign for each stationary lane closure.

A portable changeable message sign shall be placed before and during ramp and connector closures.

10-1.26 TEMPORARY RAILING

Temporary railing (Type K) shall be placed as shown on the plans, as specified in the Standard Specifications or these special provisions or where ordered by the Engineer and shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Reflectors on temporary railing (Type K) shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Attention is directed to "Public Safety" and "Order of Work" of these special provisions.

Temporary railing (Type K) placed in conformance with the provisions in "Public Safety" of these special provisions will be neither measured nor paid for.

10-1.27 TRAFFIC PLASTIC DRUMS

Traffic plastic drums shall conform to the requirements for traffic control devices in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Traffic plastic drums shall be constructed of low-density polyethylene material and shall be flexible or collapsible upon impact by a vehicle. The traffic plastic drum shall have a weighted base that will separate from the drum. The base shall be of such shape as to preclude rolling upon impact by a vehicle. The base shall be of sufficient weight to maintain the drum in position and upright. The base or external ballast rings shall not exceed 101.6 mm in height, and drum rings shall not exceed 965.2 mm maximum in diameter. The base or external rings placed over and around the drum, resting on the pavement or ground shall contain the ballast for the drums. Ballast for drums shall be sand or water, except sand shall be used in areas susceptible to freezing. The base shall have drain holes to prevent the accumulation of water. Sand bags shall not be used as ballast for drums.

The body of the traffic plastic drum shall be of a fluorescent orange or predominately orange color. Drums shall be a minimum of 914.4 mm in height above the traveled way, and have at least a 457.2 mm minimum width, regardless of orientation.

The markings on drums shall be horizontal, circumferential, alternating orange and white reflective bands 101.6 to 152.4 mm wide. Each drum shall have a minimum of 2 orange and 2 white bands. The top of the uppermost reflective band shall be no lower than 152.4 mm from the top of the drum. Any non-reflective spaces between the bands shall not exceed 50.8 mm in width. The reflective sheeting shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Only one type of traffic plastic drum shall be used on the project. The type of traffic plastic drum proposed for use on the project shall be submitted to the Engineer for approval, prior to placement on the project.

In curvilinear alignment traffic plastic drums shall be used only on one side of the traveled way. Traffic plastic drums shall be placed on the alignment and location shown on the plans, or directed by the Engineer. Traffic plastic drums shall be placed uniformly, straight on tangent alignment and on a true arc on curved alignment. All layout work necessary to place the traffic plastic drums to the proper alignment shall be performed by the Contractor.

If traffic plastic drums are displaced or are not in an upright position, from any cause, the traffic plastic drums shall immediately be replaced or restored to their original location, in an upright position, by the Contractor.

At the option of the Contractor, where portable delineators, cones or Type I or II barricades are specified in the specifications or shown on the plans, traffic plastic drums may be used in place of those portable delineators, cones or Type I or II barricades.

At the completion of the project, traffic plastic drums shall become the property of the Contractor and removed from the site of the work.

Traffic plastic drums shall be installed as shown on the plans when temporary railing (Type K) is placed as required by "Public Safety" of these special provisions.

Traffic plastic drums will be measured as units from actual count of the number of traffic plastic drum designated on the plans or ordered by the Engineer. After initial placement of traffic plastic drums, and if ordered by the Engineer, the traffic plastic drums shall be moved from location to location and the cost thereof will be paid for as extra work as provided in Section 4-1.03D. Traffic plastic drums which are used as part of traffic control system in place of cones, delineators or barricades or which are used in accordance with the requirements of "Public Safety" elsewhere in these special provisions or which are placed in excess of the number specified or shown will not be included in the count of traffic plastic drums to be paid for.

The contract unit price paid for traffic plastic drum shall include full compensation for furnishing all labor, materials (including ballast), tools, equipment, and incidentals, and for doing all the work involved in furnishing, placing, maintaining, repairing, replacing and removing the traffic plastic drum, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.28 CHANNELIZER

Channelizers shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Channelizers shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

At the time of completion of the project, certain channelizers shall be left in place as determined by the Engineer. In addition to the contract unit price paid for channelizer (surface mounted), the cost of leaving the channelizers in place will be paid for at the contract unit price for channelizer (surface mounted) (left in place).

When no longer required for the work as determined by the Engineer, channelizers (except channelizers to be left in place) and underlying adhesive used to cement the channelizer bases to the pavement shall be removed. Removed channelizers and adhesive shall become the property of the Contractor and shall be removed from the site of work.

10-1.29 TEMPORARY CRASH CUSHION MODULE

This work shall consist of furnishing, installing, and maintaining sand filled temporary crash cushion modules in groupings or arrays at each location shown on the plans, as specified in these special provisions or where designated by the Engineer. The grouping or array of sand filled modules shall form a complete sand filled temporary crash cushion in conformance with the details shown on the plans and these special provisions.

Attention is directed to "Public Safety", and "Order of Work" of these special provisions.

Whenever the work or the Contractor's operations establishes a fixed obstacle, the exposed fixed obstacle shall be protected with a sand filled temporary crash cushion. The sand filled temporary crash cushion shall be in place prior to opening the lanes adjacent to the fixed obstacle to public traffic.

Sand filled temporary crash cushions shall be maintained in place at each location, including times when work is not actively in progress. Sand filled temporary crash cushions may be removed during a work period for access to the work provided that the exposed fixed obstacle is 4.6 m or more from a lane carrying public traffic and the temporary crash cushion is reset to protect the obstacle prior to the end of the work period in which the fixed obstacle was exposed. When no longer required, as determined by the Engineer, sand filled temporary crash cushions shall be removed from the site of the work.

At the Contractor's option, the modules for use in sand filled temporary crash cushions shall be either Energite III Inertial Modules, Fitch Inertial Modules or TrafFix Sand Barrels manufactured after March 31, 1997, or equal:

1. Energite III and Fitch Inertial Modules, manufactured by Energy Absorption Systems, Inc., 35 East Wacker Drive, Suite 1100, Chicago, IL 60601:

    1.1. Northern California: Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, telephone (800) 884-8274, FAX (916) 387-9734

    1.2. Southern California: Traffic Control Service, Inc., 1818 E. Orangethorpe, Fullerton, CA 92831-5324, telephone (800) 222-8274, FAX (714) 526-9501

2. TrafFix Sand Barrels, manufactured by TrafFix Devices, Inc., 220 Calle Pintoresco, San Clemente, CA 92672, telephone (949) 361-5663, FAX (949) 361-9205

    2.1. Northern California: United Rentals, Inc., 1533 Berger Drive, San Jose, CA 95112, telephone (408) 287-4303, FAX (408) 287-1929

    2.2. Southern California: Statewide Safety & Sign, Inc., P.O. Box 1440, Pismo Beach, CA 93448, telephone (800) 559-7080, FAX (805) 929-5786

Modules contained in each temporary crash cushion shall be of the same type at each location. The color of the modules shall be the standard yellow color, as furnished by the vendor, with black lids. The modules shall exhibit good workmanship free from structural flaws and objectionable surface defects. The modules need not be new. Good used undamaged modules conforming to color and quality of the types specified herein may be utilized. If used Fitch modules requiring a seal are furnished, the top edge of the seal shall be securely fastened to the wall of the module by a continuous strip of heavy duty tape.

Modules shall be filled with sand in conformance with the manufacturer's directions, and to the sand capacity in kilograms for each module shown on the plans. Sand for filling the modules shall be clean washed concrete sand of

commercial quality. At the time of placing in the modules, the sand shall contain not more than 7 percent water as determined by California Test 226.

Modules damaged due to the Contractor's operations shall be repaired immediately by the Contractor at the Contractor's expense. Modules damaged beyond repair, as determined by the Engineer, due to the Contractor's operations shall be removed and replaced by the Contractor at the Contractor's expense.

Temporary crash cushion modules shall be placed on movable pallets or frames conforming to the dimensions shown on the plans. The pallets or frames shall provide a full bearing base beneath the modules. The modules and supporting pallets or frames shall not be moved by sliding or skidding along the pavement or bridge deck.

A Type R or P marker panel shall be attached to the front of the crash cushion as shown on the plans, when the closest point of the crash cushion array is within 3.6 m of the traveled way. The marker panel, when required, shall be firmly fastened to the crash cushion with commercial quality hardware or by other methods determined by the Engineer.

At the completion of the project, temporary crash cushion modules, sand filling, pallets or frames, and marker panels shall become the property of the Contractor and shall be removed from the site of the work. Temporary crash cushion modules shall not be installed in the permanent work.

Temporary crash cushion modules will be measured by the unit as determined from the actual count of modules used in the work or ordered by the Engineer at each location. Temporary crash cushion modules placed in conformance with the provisions in "Public Safety" of these special provisions and modules placed in excess of the number specified or shown will not be measured nor paid for.

Repairing modules damaged by public traffic will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. Modules damaged beyond repair by public traffic, when ordered by the Engineer, shall be removed and replaced immediately by the Contractor. Modules replaced due to damage by public traffic will be measured and paid for as temporary crash cushion module.

If the Engineer orders a lateral move of the sand filled temporary crash cushions and the repositioning is not shown on the plans, moving the sand filled temporary crash cushion will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications and these temporary crash cushion modules will not be counted for payment in the new position.

The contract unit price paid for temporary crash cushion module shall include full compensation for furnishing all labor, materials (including sand, pallets or frames and marker panels), tools, equipment, and incidentals, and for doing all the work involved in furnishing, installing, maintaining, moving, and resetting during a work period for access to the work, and removing from the site of the work when no longer required (including those damaged by public traffic) sand filled temporary crash cushion modules, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.30 TEMPORARY CRASH CUSHION (ADIEM)

Temporary crash cushion shall be furnished and installed as shown on the plans and in conformance with the provisions in the Standard Specifications and these special provisions.

Attention is directed to "Order of Work" of these special provisions.

Temporary crash cushion shall be an ADIEM-350 as manufactured by Trinity Industries, Inc., and shall include the items detailed for crash cushion shown on the plans.

The successful bidder can obtain the crash cushion from the manufacturer, Trinity Industries, Inc., P.O. Box 99, 950 West 400S, Centerville, Utah 84014, telephone 1-800-772-7976.

The price quoted by the manufacturer for ADIEM-350, FOB Centerville, Utah is $19,995, not including sales tax.

The above price will be firm for orders delivered through March 30, 2008.

The Contractor shall furnish the Engineer one copy of the manufacturer's plan and parts list.

The Contractor shall provide the Engineer with a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance shall certify that the crash cushion conforms to the contract plans and specifications, conforms to the prequalified design and material requirements, and was manufactured in conformance with the approved quality control program.

Temporary crash cushion shall be installed in conformance with the manufacturer's installation instructions.

Surplus excavated material remaining after the crash cushion has been installed shall be disposed of in a uniform manner along the adjacent roadway where designated by the Engineer.

Temporary crash cushion (ADIEM) will be measured by the unit as determined from actual count in place in the completed work.

The Contractor shall have available 2 replacement modules for each temporary crash cushion (ADIEM).

Repairing temporary crash cushion (ADIEM) damaged by public traffic will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. Temporary crash cushion modules (ADIEM) 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 (ADIEM).

If the Engineer orders a lateral move of the temporary crash cushion (ADIEM), and the repositioning is not shown on the plans, moving the temporary crash cushion (ADIEM) will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications and the temporary crash cushion (ADIEM) will not be counted for payment in the new position.

After removal of temporary crash cushion (ADIEM), the contractor shall clean any holes left in the pavement and fill them with cement slurry. The cement slurry shall be in conformance with the provisions in section 19-3.062 "Slurry Cement Backfill" of the Standard Specifications.

The contract unit price paid for temporary crash cushion (ADIEM) shall include full compensation for furnishing all labor, materials (including anchor bolts, nuts, washers, and marker panels), tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing the ADIEM type temporary crash cushion, complete in place, including structure excavation, structure backfill, maintaining, moving, and resetting during a work period for access to the work, and disposing of surplus material, and removing and disposing of temporary crash cushion (ADIEM) upon completion of the work 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 replacement modules shall be considered as included in the contract price paid for the item of work involved and no additional compensation will be allowed therefor.

Full compensation for cleaning any holes and cement slurry placement shall be considered as included in the contract price paid for the item of work involved and no additional compensation will be allowed therefor.

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.

Residue from saw cutting operations shall be removed from the pavement surface by vacuuming or other approved method and shall not be allowed to flow across the pavement nor be left on the surface of the pavement. Residue from saw cutting operations shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Full compensation for conforming to the requirements for the control, removal and disposal of residue resulting from saw cutting operations shall be considered as included in the contract price paid for the item of work involved and no additional compensation will be allowed therefor.

ABANDON CULVERT

Existing culverts, where shown on the plans to be abandoned, shall be abandoned in place or, at the option of the Contractor, the culverts shall be removed and disposed of. Resulting openings into existing structures that are to remain in place shall be plugged with concrete conforming to the provisions in Section 90-10 "Minor Concrete," of the Standard Specifications. The concrete shall contain not less than 300 kg of cementitious material per cubic meter.

Abandoning culverts in place shall conform to the following:

1. Culverts that intersect the side slopes shall be removed to a depth of not less than one meter measured normal to the plane of the finished side slope, before being abandoned.
2. Culverts 300 mm in diameter and larger, shall, at the Contractor's option, be backfilled with either sand, controlled low strength material or slurry cement backfill conforming to the provisions in Section 19-3.062, "Slurry Cement Backfill," of the Standard Specifications by any method acceptable to the Engineer that completely fills the pipe. Sand backfill material shall be clean, free draining, and free from roots and other deleterious substances.
3. The ends of culverts shall be securely closed by a 150 mm thick tight fitting plug or wall of commercial quality concrete.

Culverts shall not be abandoned until their use is no longer required. The Contractor shall notify the Engineer in advance of any intended culvert abandonment.

If the Contractor elects to remove and dispose of a culvert which is specified to be abandoned, as provided herein, backfill specified for the pipe will be measured and paid for in the same manner as if the culvert has been abandoned in place.

Backfill will be measured by the cubic meter determined from the dimensions of the culverts to be abandoned.

The contract price paid per cubic meter for sand backfill shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in backfilling culverts with sand, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Controlled low strength material and slurry cement backfill, if used at the Contractor's option, will be measured and paid for by the cubic meter as sand backfill.

Full compensation for concrete plugs, pipe removal, structure excavation, and backfill shall be considered as included in the contract unit price paid for abandon culvert and no additional compensation will be allowed therefor.

ABANDON INLET

Existing pipe inlets and concrete drainage inlets, where shown on the plans to be abandoned, shall be abandoned.

The top portion of the inlets shall be removed to a depth of 0.3 m below finished grade.

Removed frames and grates shall be disposed of.

REMOVE METAL BEAM GUARD RAILING

Existing metal beam guard railing, where shown on the plans to be removed, shall be removed and disposed of.

Existing concrete anchors or steel foundation tubes shall be completely removed and disposed of. Full compensation for removing concrete anchors shall be considered as included in the contract price paid per meter for remove metal beam guard railing and no separate payment will be made therefor.

Full compensation for removing cable anchor assemblies, terminal anchor assemblies or steel foundation tubes shall be considered as included in the contract price paid per meter for remove metal beam guard railing and no separate payment will be made therefor.

REMOVE PAVEMENT MARKER

Existing pavement markers, including underlying adhesive, and pavement markers, including underlying adhesive, shown on the stage construction and traffic handling sheets of the plans when no longer required for traffic lane delineation as determined by the Engineer, shall be removed and disposed of.

Full compensation for removing and disposing of pavement markers and underlying adhesive, including pavement markers and underlying adhesive shown on the traffic handling sheets of the plans, shall be considered as included in the contract price paid per tonne for asphalt concrete (Type A) and no separate payment will be made therefor.

REMOVE CHAIN LINK FENCE

Existing chain link fence, where shown on the plans to be removed, shall be removed and disposed of.

Full compensation for backfilling and compacting post holes shall be considered as included in the contract price paid per meter for remove chain link fence and no additional compensation will be allowed therefor.

REMOVE YELLOW PAINTED TRAFFIC STRIPE

Yellow painted traffic stripe shall be removed at the locations shown on the plans and as directed by the Engineer.

Attention is directed to "Water Pollution Control" of these special provisions.

Waste from removal of yellow painted traffic stripe contains lead chromate in average concentrations greater than or equal to 5 mg/L Soluble Lead or 1000 mg/kg Total Lead. Yellow painted traffic stripe exists from Station 92+04.979 to Station 93+00.010 on the "BRN1" Line, from Station 98+66.215 to Station 99+73.524 on the "BRN1" Line, from Station 93+40 to Station 97+80 on the "LMD" Line, from Station 98+21 to Station 99+42 on the "LMD" Line, from Station 86+66 to Station 87+71 on the "OM1" Line and from Station 90+00 to Station 98+00 on the "SNY1" Line. Residue produced from the removal of yellow paint contains heavy metals in concentrations that exceed thresholds established by the California Health and Safety Code and Title 22 of the California Code of Regulations. The Contractor shall assume that the residue is not regulated under the Federal Resource Conservation and Recovery Act (RCRA). Yellow paint may produce toxic fumes when heated.

The removed yellow paint shall be disposed of at a Class 1 disposal facility in conformance with the requirements of the disposal facility operator within 30 days after accumulating 100 kg of residue and dust. The Contractor shall make necessary arrangements to test the yellow paint residue as required by the disposal facility and these special provisions. Testing shall include, at a minimum, (1) Total Lead by EPA Method 6010B and Chromium by EPA Method 7000 series, (2) Soluble Lead and Chromium by California Waste Extraction Test, and (3) Soluble Lead and Chromium by Toxicity Characteristic Leaching Procedure. From the first 840 L of waste or portion thereof, if less than 840 L of waste are produced, a minimum of four randomly selected samples shall be taken and analyzed individually. Samples shall not be composited. From each additional 3360 L of waste or portion thereof, if less than 3360 L are produced, a minimum of one additional random sample shall be taken and analyzed. Each sample shall be homogenized prior to analysis by the laboratory performing the analyses. A sample aliquot sufficient to cover the amount necessary for the total and the soluble analyses shall then be taken. This aliquot shall be homogenized a second time and the total and soluble (if necessary) run on this aliquot. The homogenization process shall not include grinding of the samples. The Contractor shall submit the name and location of the disposal facility and analytical laboratory along with the testing requirements to the Engineer not less than 5 days prior to the start of removal of yellow painted traffic stripe. The analytical laboratory shall be certified by the Department of Health Services Environmental Laboratory Accreditation Program for all analyses to be performed. Test results shall be provided to the Engineer for review prior to signing a waste profile as requested by the disposal facility, prior to issuing an EPA identification number, and prior to allowing removal of the waste from the site.

The Contractor shall prepare a project specific Lead Compliance Plan to prevent or minimize worker exposure to lead while handling removed yellow paint residue. Attention is directed to Title 8, California Code of Regulations, Section 1532.1, "Lead," for specific Cal-OSHA requirements when working with lead.

The Lead Compliance Plan shall contain the elements listed in Title 8, California Code of Regulations, Section 1532.1(e)(2)(B). Before submission to the Engineer, the Lead Compliance Plan shall be approved by an Industrial Hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene. The Plan shall be submitted to the Engineer at least 7 days prior to beginning removal of yellow paint.

Prior to removing yellow painted traffic stripe, personnel who have no prior training, including State personnel, shall complete a safety training program provided by the Contractor that meets the requirements of Title 8, California Code of Regulations, Section 1532.1, "Lead," and the Contractor's Lead Compliance Program.

Personal protective equipment, training, and washing facilities required by the Contractor's Lead Compliance Plan shall be supplied to State personnel by the Contractor. The number of State personnel will be 4.

Where grinding or other methods approved by the Engineer are used to remove yellow painted traffic stripe, the removed residue, including dust, shall be contained and collected immediately. Collection shall be by a high efficiency particulate air (HEPA) filter equipped vacuum attachment operated concurrently with the removal operations or other equally effective methods approved by the Engineer. The Contractor shall submit a written work plan for the removal, storage, and disposal of yellow painted traffic stripe to the Engineer for approval not less than 15 days prior to the start of the removal operations. Removal operations shall not be started until the Engineer has approved the work plan.

The removed yellow painted traffic stripe residue shall be stored and labeled in covered containers. Labels shall conform to the provisions of Title 22, California Code of Regulations, Sections 66262.31 and 66262.32. Labels shall be marked with date when the waste is generated, the words "Hazardous Waste," composition and physical state of the waste (for example, asphalt grindings with paint), the word "Toxic," the name and address of the Engineer, the Engineer's telephone number, contract number, and Contractor or subcontractor. The containers shall be a type approved by the United States Department of Transportation for the transportation and temporary storage of the removed residue. The containers shall be handled so that no spillage will occur. The containers shall be stored in a secured fenced enclosure at a location within the project limits until disposal, as approved by the Engineer.

If the yellow painted traffic stripe residue is transported to a Class 1 disposal facility as a hazardous waste, a manifest shall be used, and the transporter shall be registered with the California Department of Toxic Substance Control. The Engineer will obtain the United States Environmental Protection Agency Identification Number and sign all manifests as the generator within 2 working days of receiving sample test results and approving the test methods.

Additional disposal costs for removal residue regulated under RCRA, as determined by test results, will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

Nothing in these special provisions shall relieve the Contractor of the Contractor's responsibilities as specified in Section 7-1.09, "Public Safety," of the Standard Specifications.

The contract lump sum price paid for Lead Compliance Plan shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in preparing the Lead Compliance Plan, including paying the Certified Industrial Hygienist, and for providing personnel protective equipment, training, air monitoring, and medical surveillance, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for providing a written work plan for the removal, storage, and disposal of yellow painted traffic stripe shall be considered as included in the contract prices paid per meter for remove yellow painted traffic stripe and no separate payment will be made therefor.

REMOVE ROADSIDE SIGN

Existing roadside signs, at those locations shown on the plans to be removed, shall be removed and disposed of.

Sign panels shown on the plans shall be salvaged.

Existing roadside signs shall not be removed until replacement signs have been installed or until the existing signs are no longer required for the direction of public traffic, unless otherwise directed by the Engineer.

Full compensation for salvaging sign panels shall be considered as included in the contract unit price paid for remove roadside sign and no separate payment will be made therefor.

Full compensation for salvaging sign panels shall be considered as included in the contract lump sum price paid for clearing and grubbing and no separate payment will be made therefor.

RESET ROADSIDE SIGN

Existing roadside signs, where shown on the plans to be reset, shall be removed and reset.

Each roadside sign shall be reset on the same day that the sign is removed.

Two holes shall be drilled in each existing post as required to provide the breakaway feature shown on the plans.

RELOCATE ROADSIDE SIGN

Existing roadside signs shall be removed and relocated to the new locations shown on the plans.

Each roadside sign shall be installed at the new location on the same day that the sign is removed from its original location.

Two holes shall be drilled in each existing post as required to provide the breakaway feature shown on the plans.

ADJUST INLET

Existing pipe inlets and concrete drainage inlets shall be adjusted as shown on the plans.

Concrete shall be minor concrete conforming to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications. The concrete shall contain not less than 350 kg of cementitious material per cubic meter.

Where inlets are located in areas to be paved or surfaced, no individual structure shall be constructed to final grade until the paving or surfacing has been completed immediately adjacent to the structure.

ADJUST FRAME AND COVER TO GRADE

Frames and covers of existing manholes, junction structures or other facilities shall be adjusted to grade in conformance with the provisions in Section 15-2.05, "Reconstruction," of the Standard Specifications.

REMOVE BASE AND SURFACING

Existing base and bituminous surfacing shown on the plans to be removed, shall be removed to a depth of at least 150 mm below the grade of the existing surfacing. Resulting holes and depressions shall be backfilled with earthy material selected from excavation to the lines and grade established by the Engineer.

Removing base and surfacing will be measured by the cubic meter in the same manner specified for roadway excavation in conformance with the provisions in Section 19, "Earthwork," of the Standard Specifications and will be paid for at the contract price per cubic meter for remove base and surfacing.

COLD PLANE ASPHALT CONCRETE PAVEMENT

Existing asphalt concrete pavement shall be cold planed at the locations and to the dimensions shown on the plans.

The Contractor shall schedule paving operations so that cold planed areas are paved with asphalt concrete within the same work shift.

Planing asphalt concrete pavement shall be performed by the cold planing method. Planing of the asphalt concrete pavement shall not be done by the heater planing method.

Cold planing machines shall be equipped with a cutter head not less than 750 mm in width and shall be operated so that no fumes or smoke will be produced. The cold planing machine shall plane the pavement without requiring the use of a heating device to soften the pavement during or prior to the planing operation.

The depth, width, and shape of the cut shall be as shown on the typical cross sections or as designated by the Engineer. The final cut shall result in a uniform surface conforming to the typical cross sections. The outside lines of the planed area shall be neat and uniform. Planing asphalt concrete pavement operations shall be performed without damage to the surfacing to remain in place.

Planed widths of pavement shall be continuous except for intersections at cross streets where the planing shall be carried around the corners and through the conform lines.

The material planed from the roadway surface, including material deposited in existing gutters or on the adjacent traveled way, shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications. Removal operations of cold planed material shall be concurrent with planing operations and follow within 15 m of the planer, unless otherwise directed by the Engineer.

Cold plane asphalt concrete pavement will be measured by the square meter. The quantity to be paid for will be the actual area of surface cold planed irrespective of the number of passes required to obtain the depth shown on the plans.

The contract price paid per square meter for cold plane asphalt concrete pavement shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in cold planing asphalt concrete surfacing and disposing of planed material, as specified in the Standard Specifications and these special provisions and as directed by the Engineer.

REMOVE CONCRETE

Concrete, where shown on the plans to be removed, shall be removed.

The pay quantities of concrete to be removed will be measured by the cubic meter, measured before and during removal operations.

Where no joint exists between concrete to be removed and concrete to remain in place, the concrete shall be cut on a neat line to a minimum depth of 50 mm with a power driven saw before the concrete is removed.

Where concrete has been removed outside the roadway prism, the backfilled areas shall be graded to drain and blend in with the surrounding terrain.

Concrete to be removed which has portions of the same structure both above and below ground will be considered as concrete above ground for compensation.

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.

Attention is directed to "Order of Work" of these special provisions.

Vegetation shall be cleared and grubbed within the plant removal area shown on the plans prior to the migratory bird nesting season, as specified in these special provisions and as directed by the Engineer.

In areas designated on the plans as plant removal areas, all non-native plants shall be killed and removed prior to the start of grading operations. Non-native plants shall be killed and removed in conformance with the requirement specified in "Roadside Clearing" of these special provisions.

At locations where there is no grading adjacent to a bridge or other structure, clearing and grubbing of vegetation shall be limited to 1.5 m outside the physical limits of the bridge or structure.

Existing vegetation outside the areas to be cleared and grubbed, except as shown on the plans or as specified in these special provisions to be removed, shall be protected from injury or damage resulting from the Contractor's operations.

Activities controlled by the Contractor, except cleanup or other required work, shall be confined within the graded areas of the roadway.

Nothing herein shall be construed as relieving the Contractor of the Contractor's responsibility for final cleanup of the highway as provided in Section 4-1.02, "Final Cleaning Up," of the Standard Specifications.

Full compensation for plant removal shall be considered as included in the contract lump sum price paid for clearing and grubbing and no additional compensation will be made therefore.

Vegetable growth from clearing and grubbing operations may be disposed of in embankments in conformance with the provisions in "Earthwork" of these special provisions.

Attention is directed to "Migratory Birds" of these special provisions.

VEGETATION MOWING AND TREE REMOVAL PRIOR TO THE MIGRATORY BIRD NESTING SEASON

All vegetation within the limits of clearing, except areas shown on the plans as plant removal areas, shall be mowed or cut to a minimum of 100 mm or a maximum of 200 mm from original ground. Soil and roots shall not be scraped or removed. All vegetation stems, branches, and leaves may be left in place as long as the debris does not exceed a height of 600 mm from the original grade when cutting is complete.

Vegetation may be chipped or recut after the initial cutting to achieve depth less than 600 mm.

Trees and plants within the limits of clearing shall be removed.

All trees shall be cut off not more than 0.6-m above the natural ground at any point, or completely removed. All materials shall be left in a neat and finished appearance.

Full compensation for vegetation mowing and tree removal prior to the migratory bird nesting season shall be considered as included in the contract price paid for clearing and grubbing and no additional compensation will be allowed therefor.

10-1.33 WATERING

Developing a water supply and applying watering shall conform to the provisions in Section 17, "Watering," of the Standard Specifications and these special provisions.

Attention is directed to the source or sources of water for use on the project specified in the "Materials Information" handout available to the contractors.

10-1.34 EARTHWORK

Earthwork shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

Foundation treatment shall be constructed as shown on the plans. Relative compaction of 90 percent shall be obtained. The existing material may be removed and recompacted provided that relative compaction of 90 percent is obtained.

Foundation treatment will be measured and paid for as roadway excavation and no additional compensation will be allowed therefor.

Surplus excavated material shall become the property of the Contractor and shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Where a portion of the existing surfacing is to be removed, the outline of the area to be removed shall be cut on a neat line with a power-driven saw to a minimum depth of 50 mm before removing the surfacing. Full compensation for cutting

the existing surfacing shall be considered as included in the contract price paid per cubic meter for roadway excavation and no additional compensation will be allowed therefor.

Reinforcement or metal attached to reinforced concrete rubble placed in embankments shall not protrude above the grading plane. Prior to placement within 0.6-m below the grading plane of embankments, reinforcement or metal shall be trimmed to no greater than 20 mm from the face of reinforced concrete rubble. Full compensation for trimming reinforcement or metal shall be considered as included in the contract prices paid per cubic meter for the types of excavation shown in the Engineer's estimate, or the contract prices paid for furnishing and placing imported borrow or embankment material, as the case may be, and no additional compensation will be allowed therefor.

Settlement periods are required for the roadway embankments at the location earth retaining structures listed in the following table.

Surcharge embankments shall be constructed at or above the grading plane where listed in the following table:

Station	Surcharge Height (meters)	Settlement Period (days)
156+40 to 156+90 "E5" Line	3.3	60

The duration of the required settlement period at each location will be determined by the Engineer. The estimated duration of the settlement periods are listed in the tables of settlement data. The Engineer may order an increase or decrease in any settlement period. An ordered increase or decrease in any settlement period will result in an increase or decrease in the number of contract working days if the settlement period involved is considered to be the current controlling operation in conformance with the provisions in Section 8-1.06, "Time of Completion," of the Standard Specifications. Adjustments of contract time due to increases or decreases in settlement periods will be made by contract change order.

The removal of surcharge material placed as a settlement or surcharge embankment, including material removed to conform to the finished slope lines shown on the plans, will be paid for at the contract price per cubic meter for roadway excavation.

At the locations and to the limits shown on the plans, material below the bottom of bridge footings shall be removed and replaced with lean concrete backfill. Removal of the material will be measured and paid for by the cubic meter as structure excavation (bridge) and furnishing and placing the replacement material will be measured and paid for by the cubic meter as lean concrete backfill.

Lean concrete backfill shall conform to the provisions for slurry cement backfill in Section 19-3.062, "Slurry Cement Backfill," of the Standard Specifications, except that aggregate shall be sand suitable for making commercial quality concrete.

The Contractor shall notify the Engineer in writing not less than 5 working days in advance of excavating below the bottom of bridge footings. The Contractor shall allow 5 working days for the Engineer to inspect and approve the excavation prior to lean concrete backfill.

In the event additional excavation and replacement material are deemed necessary by the Engineer, the extra work will be paid for as provided in Section 4-1.03D of the Standard Specifications.

Geocomposite drain shall conform to the details shown on the plans and the following:

A. Attention is directed to "Engineering Fabrics" under "Materials" of these special provisions.
B. Geocomposite drain shall consist of a manufactured core not less than 6.35 mm thick nor more than 50 mm thick with one or both sides covered with a layer of filter fabric that will provide a drainage void. The drain shall produce a flow rate, through the drainage void, of at least 25 liters per minute per meter of width at a hydraulic gradient of 1.0 and a minimum externally applied pressure of 239 kPa.
C. A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished for the geocomposite drain certifying that the drain produces the required flow rate and complies with these special provisions. The Certificate of Compliance shall be accompanied by a flow capability graph for the geocomposite drain showing flow rates for externally applied pressures and hydraulic gradients. The flow capability graph shall be stamped with the verification of an independent testing laboratory.
D. Filter fabric for the geocomposite drain shall conform to the provisions for fabric for underdrains in Section 88, "Engineering Fabrics," of the Standard Specifications.
E. The manufactured core shall be either a preformed grid of embossed plastic, a mat of random shapes of plastic fibers, a drainage net consisting of a uniform pattern of polymeric strands forming 2 sets of continuous flow channels, or a system of plastic pillars and interconnections forming a semirigid mat.
F. The core material and filter fabric shall be capable of maintaining the drainage void for the entire height of geocomposite drain. Filter fabric shall be integrally bonded to the side of the core material with the drainage void. Core material manufactured from impermeable plastic sheeting having nonconnecting corrugations shall be placed with the corrugations approximately perpendicular to the drainage collection system.

G. The geocomposite drain shall be installed with the drainage void and the filter fabric facing the embankment. The fabric facing the embankment side shall overlap a minimum of 75 mm at all joints and wrap around the exterior edges a minimum of 75 mm beyond the exterior edge. If additional fabric is needed to provide overlap at joints and wrap-around at edges, the added fabric shall overlap the fabric on the geocomposite drain at least 150 mm and be attached thereto.
H. Should the fabric on the geocomposite drain be torn or punctured, the damaged section shall be replaced completely or repaired by placing a piece of fabric that is large enough to cover the damaged area and provide a minimum 150-mm overlap.
I. Plastic pipe shall conform to the provisions for edge drain pipe and edge drain outlets in Section 68-3, "Edge Drains," of the Standard Specifications.
J. Treated permeable base to be placed around the slotted plastic pipe at the bottom of the geocomposite drain shall be cement treated permeable base conforming to the provisions for cement treated permeable base in Section 29, "Treated Permeable Bases," of the Standard Specifications and these special provisions.
K. The treated permeable base shall be enclosed with a high density polyethylene sheet or PVC geomembrane, not less than 250 µm thick, which is bonded with a suitable adhesive to the concrete and geocomposite drain. Surfaces to receive the polyethylene sheet shall be cleaned before applying the adhesive. The treated permeable base shall be compacted with a vibrating shoe type compactor.

If structure excavation or structure backfill for bridges is not otherwise designated by type and payment for the structure excavation or structure backfill has not otherwise been provided for in the Standard Specifications or these special provisions, the structure excavation or structure backfill will be measured and paid for as structure excavation (bridge) or structure backfill (bridge), respectively.

Full compensation for geocomposite drain shall be considered as included in the contract price paid per cubic meter for structural concrete (bridge) and no additional compensation will be allowed therefor.

10-1.35 CONTROLLED LOW STRENGTH MATERIAL

Controlled low strength material shall consist of a workable mixture of aggregate, cementitious materials, and water and shall conform to the provisions for slurry cement backfill in Section 19-3.062, "Slurry Cement Backfill," of the Standard Specifications and these special provisions.

At the option of the Contractor, controlled low strength material may be used as structure backfill for pipe culverts, except that controlled low strength material shall not be used as structure backfill for culverts having a diameter or span greater than 6.1 m.

When controlled low strength material is used for structure backfill, the width of the excavation shown on the plans may be reduced so that the clear distance between the outside of the pipe and the side of the excavation, on each side of the pipe, is a minimum of 300 mm. This minimum may be reduced to 150 mm when the height of cover is less than or equal to 6.1 m or the pipe diameter or span is less than 1050 mm.

Controlled low strength material in new construction shall not be permanently placed higher than the basement soil. For trenches in existing pavements, permanent placement shall be no higher than the bottom of the existing pavement permeable drainage layer. If a drainage layer does not exist, permanent placement in existing pavements shall be no higher than 25 mm below the bottom of the existing asphalt concrete surfacing or no higher than the top of base below the existing portland cement concrete pavement. The minimum height that controlled low strength material shall be placed, relative to the culvert invert, is 0.5 diameter or 0.5 height for rigid culverts and 0.7 diameter or 0.7 height for flexible culverts.

When controlled low strength material is proposed for use, the Contractor shall submit a mix design and test data to the Engineer for approval prior to excavating the trench for which controlled low strength material is proposed for use. The test data and mix design shall provide for the following:

A. A 28-day compressive strength between 345 kPa and 690 kPa for pipe culverts having a height of cover of 6.1 m or less and a minimum 28-day compressive strength of 690 kPa for pipe culverts having a height of cover greater than 6.1 m. Compressive strength shall be determined in conformance with the requirements in ASTM Designation: D 4832.
B. Cement shall be any type of portland cement conforming to the requirements in ASTM Designation: C 150; or any type of blended hydraulic cement conforming to the requirements in ASTM Designation: C 595M or the physical requirements in ASTM Designation: C 1157M. Testing of cement will not be required.
C. Admixtures may be used in conformance with the provisions in Section 90-4, "Admixtures," of the Standard Specifications. Chemical admixtures containing chlorides as Cl in excess of one percent by mass of admixture, as determined in conformance with the requirements of California Test 415, shall not be used. If an air-entraining admixture is used, the maximum air content shall be limited to 20 percent. Mineral admixtures shall be used at the Contractor's option.

Materials for controlled low strength material shall be thoroughly machine-mixed in a pugmill, rotary drum or other approved mixer. Mixing shall continue until the cementitious material and water are thoroughly dispersed throughout the material. Controlled low strength material shall be placed in the work within 3 hours after introduction of the cement to the aggregates.

When controlled low strength material is to be placed within the traveled way or otherwise to be covered by paving or embankment materials, the material shall achieve a maximum indentation diameter of 76 mm prior to covering and opening to public traffic. Penetration resistance shall be measured in conformance with the requirements in ASTM Designation: D 6024.

Controlled low strength material used as structure backfill for pipe culverts will be considered structure backfill for compensation purposes.

10-1.36 DUFF

This work shall consist of excavating, stockpiling, removing from stockpiles, spreading, and compacting duff in conformance with these special provisions.

Duff shall consist of a mixture of existing decomposed, chopped, broken or chipped plant material, leaves, grasses, weeds, and other plant material excavated from areas within the project limits. Existing shrubs and other small plants shall be incorporated into the duff by discing, or by other methods which will break or chop the material into particles not greater than 150 mm in greatest dimension.

When duff is to be excavated to a specified depth, duff may consist of plant material and soil. Rocks and plant material in excess of 150 mm in greatest dimension shall be removed from the excavated duff.

Trash and objectionable material shall be removed from duff excavation sites prior to duff excavation. The trash and objectionable material shall be removed and disposed of outside the highway right of way in conformance with the provisions in Section 7-l.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Duff shall be obtained by excavating the top 150 mm of existing material from proposed excavation and embankment areas and other areas designated on the plans. Duff shall be stockpiled along the top of proposed excavation slopes and along the toe of proposed embankment slopes. When duff cannot be stockpiled outside the slope lines as specified herein, excavated duff material may be stockpiled at other locations when designated by the Engineer.

Upon completion of the grading operations for the excavation and embankment slopes and other areas to receive duff, the duff shall be spread on the areas designated to receive duff. Duff shall be placed to a uniform depth of not less than 50 mm and shall be compacted or stabilized in a manner that retains the material in place on the slopes. Duff shall not be compacted or stabilized to the degree that the duff is not maintained as a viable growing medium.

Duff shall be placed on designated excavation and embankment slopes prior to applying erosion control materials. Erosion control materials shall be furnished and applied as specified in these special provisions.

Duff placed on the finished slopes will be measured by the square meter. The areas of duff will be calculated on the basis of actual or computed slope measurements.

The contract price paid per square meter for duff shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in excavating, stockpiling, removing duff from stockpiles, spreading and compacting or stabilizing duff, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.37 MOVE-IN/MOVE-OUT (EROSION CONTROL)

Move-in/move-out (erosion control) shall include moving onto the project when an area is ready to receive erosion control as determined by the Engineer, setting up all required personnel and equipment for the application of erosion control materials and moving out all personnel and equipment when erosion control in that area is completed.

When areas are ready to receive applications of erosion control (Type 3), (Type 4) and (Type 5), as determined by the Engineer, the Contractor shall begin erosion control work in that area within 5 working days of the Engineer's notification to perform the erosion control work.

Attention is directed to the requirements of erosion control (Type 3), (Type 4) and (Type 5) elsewhere in these special provisions.

Quantities of move-in/move-out (erosion control) will be determined as units from actual count as determined by the Engineer. For measurement purposes, a move-in followed by a move-out will be considered as one unit.

The contract unit price paid for move-in/move-out (erosion control) shall include full compensation for furnishing all labor, materials (excluding erosion control materials), tools, equipment, and incidentals and for doing all the work involved in moving in and removing from the project all personnel and equipment necessary for application of erosion control (Type 3), (Type 4) and (Type 5), as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

No adjustment of compensation will be made for any increase or decrease in the quantities of move-in/move-out (erosion control) required, regardless of the reason for the increase or decrease. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications shall not apply to the item of move-in/move-out (erosion control).

10-1.38 EROSION CONTROL (TYPE 2, TYPE 3, TYPE 4 AND TYPE 5)

Erosion control (Type 2, Type 3, Type 4, and Type 5) includes applying erosion control materials to embankment and excavation slopes and other areas disturbed by construction activities. Erosion control (Type 2, Type 3, Type 4, and Type 5) must comply with Section 20-3, "Erosion Control," of the Standard Specifications and these special provisions.

Apply erosion control (Type 2, Type 3, Type 4, and Type 5) when an area is ready to receive erosion control as determined by the Engineer and under "Move-in/Move-out (Erosion Control)" of these special provisions.

Before applying erosion control materials, prepare soil surface under Section 19-2.05, "Slopes," of the Standard Specifications, except that rills and gullies exceeding 50 mm in depth or width must be leveled. Remove vegetative growth, temporary erosion control materials, and other debris from areas to receive erosion control.

Before applying erosion control materials, the Engineer designates the ground location of erosion control (Type 2, Type 3, Type 4, and Type 5) in increments of one hectare or smaller for smaller areas. Place stakes or other suitable markers at the locations designated by the Engineer. Furnish all tools, labor and materials required to adequately indicate the various locations.

MATERIALS

Materials must comply with Section 20-2, "Materials," of the Standard Specifications and these special provisions.

Seed

Seed must comply with Section 20-2.10, "Seed," of the Standard Specifications. Seed not required to be labeled under the California Food and Agricultural Code shall be tested for purity and germination by a seed laboratory certified by the Association of Official Seed Analysts or by a seed technologist certified by the Society of Commercial Seed Technologists. Measure and mix individual seed species in the presence of the Engineer.

Seed must contain at most 1.0 percent total weed seed by weight.

Deliver seed to the job site in unopened separate containers with the seed tag attached. Containers without a seed tag attached are not accepted. The Engineer takes a sample of approximately 30 g or 60 ml of seed for each seed lot greater than 1 kg.

Seed must comply with the following:

Seed
Erosion Control (Type 2)

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed Per Hectare (Slope Measurement)
Artemisia californica (California Sagebrush)	25	1.0
Deinandra fasciculata (Fascicled Tarplant)	15	3.0
Encelia californica (Bush Sunflower)	30	1.5
Eriogonum fasciculatum (California Buckwheat)	30	3.0
Eriophyllum confertiflorum (Golden Yarrow)	30	0.5
Eschscholzia californica California Poppy	35	0.5
Lotus scoparius (Deerweed)	30	2.0
Lupinus succulentus (Arroyo Lupine)	40	2.0
Nassella pulchra (Purple Needle Grass) (deawned)	30	3.0

Salvia apiana (White Sage)	25	0.5
Salvia mellifera (Black Sage)	25	1.0
Viguiera laciniata (San Diego Sunflower)	25	1.5

Seed
Erosion Control (Type 3)

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed Per Hectare (Slope Measurement)
Ambrosia chenopodifolia (San Diego Bur-sage)	15	5.0
Artemisia californica (California Sagebrush)	45	0.5
Encelia californica (California Encelia)	45	5.0
Eriogonum fasciculatum (California Buckwheat)	35	1.0
Eriophyllum confertiflorum (Golden Yarrow)	35	0.5
Eschscholzia californica California Poppy	60	10.0
Isomeris arborea (Bladderpod)	35	5.0
Lasthenia californica (Dwarf Goldfields)	35	1.0
Lotus scoparius (Deerweed)	35	5
Lupinus succulentus (Arroyo Lupine)	50	15
Nassella pulchra (Purple Needle Grass)	50	15.0

Seed
Erosion Control (Type 4)

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed Per Hectare (Slope Measurement)
Eschscholzia californica California Poppy	60	10.0
Lasthenia californica (Dwarf Goldfields)	35	1.0
Lotus scoparius (Deerweed)	35	5
Lupinus succulentus (Arroyo Lupine)	50	10
Nassella pulchra (Purple Needle Grass)	50	15.0

Seed
Erosion Control (Type 5)

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed Per Hectare (Slope Measurement)
Achnatherum (Stipa) diegonens (San Diego County Needle Grass)	30	3.0
Juncus mexicanus (Mexican Rush)	25	0.5
Leymus triticoides (Beardless Wild Ryegrass)	50	20.0
Nassella pulchra (Purple Needle Grass)	35	15.0
Scirpus acutus var occientalis (Bulrush)	30	5.0
Typha latifolia (Common Cattail)	30	1.0

Seed Sampling Supplies

At the time of seed sampling, provide the Engineer a glassine lined bag and custody seal tag for each seed lot sample.

Commercial Fertilizer

Commercial fertilizer must comply with Section 20-2.02, "Commercial Fertilizer," of the Standard Specifications and have a guaranteed chemical analysis within 2 percent of 6 percent nitrogen, 20 percent phosphoric acid and 20 percent water soluble potash.

Compost

The compost producer must be fully permitted as specified under the California Integrated Waste Management Board, Local Enforcement Agencies and any other State and Local Agencies that regulate Solid Waste Facilities. If exempt from State permitting requirements, the composting facility must certify that it follows guidelines and procedures for production of compost meeting the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7.

The compost producer must be a participant in United States Composting Council's Seal of Testing Assurance program.

Compost may be derived from any single, or mixture of any of the following feedstock materials:

1. Green material consisting of chipped, shredded, or ground vegetation; or clean processed recycled wood products
2. Biosolids
3. Manure
4. Mixed food waste

Compost feedstock materials to reduce weed seeds, pathogens and deleterious materials as specified under Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7, Section 17868.3

Compost must not be derived from mixed municipal solid waste and must be reasonably free of visible contaminates. Compost must not contain paint, petroleum products, pesticides or any other chemical residues harmful to animal life or plant growth. Compost must not possess objectionable odors.

Metal concentrations in compost must not exceed the maximum metal concentrations listed in Title 14, California Code of Regulations, Division 7, Chapter 3.1, Section 17868.2.

Compost must comply with the following:

Physical/Chemical Requirements

Property	Test Method	Requirement
pH	*TMECC 04.11-A, Elastometric pH 1:5 Slurry Method, pH Units	6.0–8.0
Soluble Salts	TMECC 04.10-A, Electrical Conductivity 1:5 Slurry Method dS/m (mmhos/cm)	0-10.0
Moisture Content	TMECC 03.09-A, Total Solids & Moisture at 70+/- 5 deg C, % Wet Weight Basis	N/A
Organic Matter Content	TMECC 05.07-A, Loss-On-Ignition Organic Matter Method (LOI), % Dry Weight Basis	30–65
Maturity	TMECC 05.05-A, Germination and Vigor Seed Emergence Seedling Vigor % Relative to Positive Control	 80 or Above 80 or Above
Stability	TMECC 05.08-B, Carbon Dioxide Evolution Rate mg CO_2-C/g OM per day	8 or below
Particle Size	TMECC 02.02-B Sample Sieving for Aggregate Size Classification % Dry Weight Basis	95% Passing 16 mm 70% Passing 9 mm
Pathogen	TMECC 07.01-B, Fecal Coliform Bacteria < 1000 MPN/gram dry wt.	Pass
Pathogen	TMECC 07.01-B, Salmonella < 3 MPN/4 grams dry wt.	Pass
Physical Contaminants	TMECC 02.02-C, Man Made Inert Removal and Classification: Plastic, Glass and Metal, % > 4mm fraction	Combined Total: < 1.0
Physical Contaminants	TMECC 02.02-C, Man Made Inert Removal and Classification: Sharps (Sewing needles, straight pins and hypodermic needles), % > 4mm fraction	None Detected

*TMECC refers to "Test Methods for the Examination of Composting and Compost," published by the United States Department of Agriculture and the United States Compost Council (USCC).

Before compost application, provide the Engineer with a copy of the compost producer's compost technical data sheet and a copy of the compost producers Seal of Testing Assurance certification. The compost technical data sheet includes:

1. Laboratory analytical test results
2. Directions for product use
3. List of product ingredients

Before compost application, provide the Engineer with a Certificate of Compliance under Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

Stabilizing Emulsion

Stabilizing emulsion must comply with Section 20-2.11, "Stabilizing Emulsion," of the Standard Specifications and these special provisions.

Stabilizing emulsion:

1. Must be in a dry powder form
2. Must be a processed organic adhesive used as a soil tackifier
3. May be reemulsifiable

Bonded Fiber Matrix

Bonded fiber matrix shall be composed of tackifier and fiber as specified below:

A. The tackifier shall conform to the provisions in Section 20-2.11, "Stabilizing Emulsion," of the Standard Specifications and these special provisions. The tackifier shall be nonflammable, non-toxic to aquatic organisms, and shall have no growth or germination inhibiting factors, and shall have an effective life of at least

one year. The tackifier shall be an organic, high viscosity colloidal polysaccharide with activating agents, or a blended hydrocolloid-based binder. Emulsion material (solids) shall not dissolve or disperse upon rewetting. The tackifier shall be bonded to the fiber or prepackaged with the fiber by the manufacturer. The tackifier, including activating agents and additives, shall be a minimum of 10 percent by weight of the fiber.

B. The fiber shall conform to the provisions in Section 20-2.07, "Fiber," of the Standard Specifications and these special provisions. The fiber shall be long strand, whole wood fibers, thermo-mechanically processed from clean, whole wood chips, containing a minimum of 25 percent at 10 mm long, with a minimum of 50 percent retained on a 710 more retained on a 710 µm sieve. The wood chips shall not contain lead paint, printing ink, varnish, petroleum products, seed germination inhibitors, or chlorine bleach. Fiber shall not be produced from sawdust, cardboard, paper, or paper by-products.

C. A coloring agent shall be added to the bonded fiber matrix to contrast with the area on which it is applied. The coloring agent shall not include copper, mercury, or arsenic, and shall be biodegradable and nontoxic.

D. A Certificate of Compliance for bonded fiber matrix shall be furnished to the Engineer in accordance with the provisions in Section 6-1.07, "Certificates of Compliance" of the Standard Specifications. The Certificate of Compliance shall include a list of pollutant indicators and potential pollutants not visually detectable as described under "Sampling and Analysis Plan for Non-Visible Pollutants" in the Storm Water Pollution Prevention Plan and Water Pollution Control Program Preparation Manual of the Storm Water Quality Handbooks issued by the Department.

E. The Contractor shall provide written documentation certifying the bonded fiber matrix was applied in accordance with specified rates, including area of application, time of application, and quantities used.

F. Monitoring for pollutants not visually detectable in storm water is required by the General Construction NPDES Permit for soil amendments, including soil stabilization products.

APPLICATION

Apply erosion control materials in two separate applications in the following sequence:

1. Apply the following mixture with hydroseeding equipment at the rates indicated within 60 minutes after the seed has been added to the mixture:

Application 1 – Erosion Control (Type 2)

Material	Kilograms Per Hectare (Slope Measurement)
Seed	19.5
Bonded Fiber Matrix	2250

Material	Cubic Meter Per Hectare (Slope Measurement)
Compost	1.0

Application 1 – Erosion Control (Type 3)

Material	Kilograms Per Hectare (Slope Measurement)
Seed	63.0
Fiber	1200

Material	Cubic Meter Per Hectare (Slope Measurement)
Compost	3.0

Application 1 – Erosion Control (Type 4)

Material	Kilograms Per Hectare (Slope Measurement)
Seed	41.0
Fiber	1200

Material	Cubic Meter Per Hectare (Slope Measurement)
Compost	3.0

Application 1 – Erosion Control (Type 5)

Material	Kilograms Per Hectare (Slope Measurement)
Seed	44.5
Fiber	1200

Material	Cubic Meter Per Hectare (Slope Measurement)
Compost	3.0

2. Compost may be dry applied at the total of the rates specified in the preceding table and the following table instead of including it as part of the hydro-seeding operations. In areas where the compost is dry applied, all compost for that area must be applied before the next operation.
3. Apply the following mixture with hydro-seeding equipment at the corresponding rates:

Application 2 – Erosion Control (Type 2)

Material	Kilograms Per Hectare (Slope Measurement)
Bonded Fiber Matrix	2250
Commercial Fertilizer	25

Application 2 – Erosion Control (Type 3)

Material	Kilograms Per Hectare (Slope Measurement)
Fiber	800
Commercial Fertilizer	25
Stabilizing Emulsion (Solids)	250

Material	Cubic Meter Per Hectare (Slope Measurement)
Compost	2

Application 2 – Erosion Control (Type 4)

Material	Kilograms Per Hectare (Slope Measurement)
Fiber	800
Commercial Fertilizer	25
Stabilizing Emulsion (Solids)	150

Material	Cubic Meter Per Hectare (Slope Measurement)
Compost	2

Application 2 – Erosion Control (Type 5)

Material	Kilograms Per Hectare (Slope Measurement)
Fiber	800
Commercial Fertilizer	25
Stabilizing Emulsion (Solids)	250

Material	Cubic Meter Per Hectare (Slope Measurement)
Compost	2

The ratio of total water to total stabilizing emulsion or bonded fiber matrix in the mixture must be as recommended by the manufacturer.

Hydraulic application of materials for erosion control (netting) areas shall be applied by hose, from the ground. Erosion control (Type D) materials shall be applied onto the slope face such that the materials are well integrated into the erosion control (netting) and in contact with ground surface. Application shall be perpendicular to the slope face such that erosion control (netting) materials are not damaged or displaced. Erosion control (netting) damaged by the Contractor's operations shall be replaced by the Contractor at the Contractor's expense.

The Engineer may change the rates of erosion control materials to meet field conditions.

MEASUREMENT AND PAYMENT

Compost (erosion control) will be measured by the cubic meter in the vehicle at the point of delivery in conformance with the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications.

Bonded fiber matrix (erosion control) will be measured by the kilogram. The weight will be as determined by the Engineer from marked mass and sack count or from scale weightings.

The contract price paid per cubic meter for compost (erosion control) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying compost for erosion control, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract price paid per kilogram for bonded fiber matrix (erosion control) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying bonded fiber matrix (erosion control), complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.39 FIBER ROLLS

Fiber rolls shall be furnished and installed in conformance with details shown on the plans and these special provisions and as directed by the Engineer.

Fiber rolls shall be installed on excavation and embankment slopes and other disturbed soil areas.

At the option of the Contractor, fiber rolls shall be Type 1 or Type 2.

MATERIALS

Fiber Roll

Fiber roll shall be either:

1. Constructed with a premanufactured blanket consisting of either wood excelsior, rice or wheat straw, or coconut fibers or a combination of these materials. The blanket shall be between 2.0 m and 2.4 m in width and between 20 m and 29 m in length. Wood excelsior shall be individual fibers, of which 80 percent shall be 150 mm or longer in length. The blanket shall have a photodegradable plastic netting or biodegradable jute, sisal, or coir fiber netting on at least one side. The blanket shall be rolled along the width and secured with jute twine spaced 2 m apart along the full length of the roll and placed 150 mm from the ends of each roll. The finished roll shall be between 200 mm and 250 mm in diameter, a minimum of 6 m in length, and shall weigh at least 0.81-kg/m. More than one blanket may be required to achieve the finished roll diameter. When more than one blanket is required, blankets shall be jointed longitudinally with an overlap of 150 mm along the length of the blanket.
2. A premanufactured roll of rice or wheat straw, wood excelsior, or coconut fiber encapsulated within a photodegradable plastic or biodegradable jute, sisal, or coir fiber netting. The netting shall have a minimum durability of one year after installation. The netting shall be secured tightly at each end of the roll. Rolls shall be

between 200 mm and 300 mm in diameter. Rolls between 200 mm and 250 mm in diameter shall have a minimum weight of 1.6 kg/m and a minimum length of 6 m. Rolls between 250 mm and 300 mm in diameter shall have a minimum weight of 4.5 kg/m and a minimum length of 3 m.

Stakes

Wood stakes shall be a minimum of 19 mm x 19 mm x 450 mm in size for Type 1 installation, or a minimum of 19 mm x 38 mm x 450 mm in size for Type 2 installation. Wood stakes shall be untreated fir, redwood, cedar, or pine and cut from sound timber. They shall be straight and free of loose or unsound knots and other defects which would render them unfit for the purpose intended. Metal stakes shall not be used.

Rope

Rope shall be biodegradable, such as sisal or manila, with a minimum diameter of 6.35 mm.

INSTALLATION

Fiber rolls shall be installed as follows:

1. Fiber rolls (Type 1): Furrows shall be constructed to a depth between 50 mm and 100 mm, and to a sufficient width to hold the fiber roll. Stakes shall be installed 600 mm apart along the length of the fiber rolls and stopped at 300 mm from each end of the rolls. Stakes shall be driven to a maximum of 50 mm above, or flush with the top of the roll.
2. Fiber rolls (Type 2): Rope and notched stakes shall be used to restrain the fiber rolls against the slope. Stakes shall be driven into the slope until the notch is even with the top of the fiber roll. Rope shall be knotted at each stake and laced between stakes. After installation of the rope, stakes shall be driven into the slope such that the rope will hold the fiber roll tightly to the slope. Furrows will not be required.
3. Fiber rolls shall be placed as shown on the plans.
4. The bedding area for the fiber rolls shall be cleared of obstructions including rocks, clods, and debris greater than 25 mm in diameter before installation.
5. Fiber rolls shall be installed approximately parallel to the slope contour.
6. Fiber rolls shall be installed before the application of other erosion control or soil stabilization materials in the same area.

If the intended function of the fiber rolls to disperse concentrated water runoff and to reduce runoff velocities is impaired, the Contractor shall take action to repair or replace the fiber rolls. Split, torn, or unraveling rolls shall be repaired or replaced. Broken or split stakes shall be replaced. Sagging or slumping fiber rolls shall be repaired with additional stakes or replaced. Locations where rills and other evidence of concentrated runoff have occurred beneath the rolls shall be corrected. Fiber rolls shall be repaired or replaced within 24 hours of identifying the deficiency.

MEASUREMENT AND PAYMENT

Quantities of fiber rolls to be paid for will be determined by the meter measured along the centerline of the installed roll. Where fiber rolls are joined and overlapped, the overlap will be measured as a single installed roll.

The contract price paid per meter for fiber roll shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing fiber rolls, complete in place, including furrow excavation and backfill, repairing or replacing fiber rolls as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Damage to fiber rolls resulting from the Contractor's vehicles, equipment, or operations shall be repaired at the Contractor's expense.

10-1.40 IRRIGATION CROSSOVERS

Irrigation crossovers shall conform to the provisions in Section 20-5, "Irrigation Systems," of the Standard Specifications and these special provisions.

Conduits shall be placed in open trenches in conformance with the provisions in Section 20-5.03B, "Conduit for Irrigation Crossovers," of the Standard Specifications.

Conduits shall be corrugated high density polyethylene (CHDPE) pipe. Corrugated high density polyethylene pipe shall conform to the requirements in ASTM Designation: F 405 or F 667, or AASHTO Designation: M 252 or M 294 and shall be Type S. Couplings and fittings shall be as recommended by the pipe manufacturer.

Water line crossovers shall conform to the provisions in Section 20-5.03C, "Water Line Crossovers," of the Standard Specifications.

Sprinkler control crossovers shall conform to the provisions in Section 20-5.027D, "Sprinkler Control Crossovers," of the Standard Specifications.

Installation of pull boxes shall conform to the provisions in Section 20-5.027I, "Conductors, Electrical Conduit and Pull Boxes," of the Standard Specifications. When no conductors are installed in electrical conduits, pull boxes for irrigation crossovers shall be installed on a foundation of compacted soil.

10-1.41 WATER SUPPLY LINE (BRIDGE)

Water supply lines identified on the plans as supply line (bridge) shall be of the size shown and shall conform to the details shown on the plans, the provisions in Section 20-5, "Irrigation Systems," of the Standard Specifications, and these special provisions.

GENERAL

Unless otherwise shown on the plans, casings shall be installed at each abutment and shall be extended to the greater of: (1) 1.5 m beyond the approach slab, (2) 1.5 m beyond the end of the adjacent wingwall, or (3) 6 m beyond the abutment.

Working Drawings

The Contractor shall submit complete working drawings for the temporary support of the casing at the abutments to the Offices of Structure Design (OSD) in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications.

For initial review, 5 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to the OSD for final approval and use during construction.

MATERIALS

Pipe and Fittings for Supply Lines Less Than NPS 4

Pipe and fittings for supply lines less than NPS 4 shall conform to the provisions in Section 20-2.15A, "Steel Pipe," of the Standard Specifications.

Air Release Valve Assemblies for Supply Lines Less Than NPS 4

Each air release valve assembly for supply lines less than NPS 4 shall consist of a threaded tee of the same diameter as the supply line or pipe saddle, an NPS 1 ball valve, an automatic air release valve, and a tank vent. The air release valve shall have a cast iron body with stainless steel trim and float, an NPS 1 inlet pipe connection, and a 4.8 mm orifice. The tank vent shall be the size of the air release valve outlet and shall have a double opening facing down with screen cover.

Casing Insulators for Supply Lines Less Than NPS 4

Casing insulators for supply lines less than NPS 4 shall be designed for the size of casing and the supply line shown on the plans. Casing insulators for supply lines shall be high density, injection molded polyethylene, 2-piece construction with cadmium plated nuts and bolts and shall have a nonconductive inner liner. Casing insulators shall be factory constructed to ensure the supply line is centered in the casing to avoid any pipe to pipe contact and shall have at least 2 runners seated on the bottom of the casing.

Pipe End Seals for Supply Lines Less Than NPS 4

Pipe end seals for supply lines less than NPS 4 shall cover the space between the supply line and the end of the casing. Pipe end seals shall be made with 50 mm thick construction grade redwood and cut to fit the supply line.

Expansion Assemblies for Supply Lines Less Than NPS 4

Expansion assemblies for supply lines less than NPS 4 shall be the hose type. Hose shall be medium or heavy weight, oil resistant, flexible, reinforced with a minimum of 2-ply synthetic yarn or steel wire, equipped with steel flanges, and shall have rubber or synthetic rubber cover and tube. The hose and flange assembly shall have the same nominal inside diameter as the supply line and shall be rated for a minimum working pressure of 1.4 MPa. Hoses carrying potable water shall meet Food and Drug Administration standards.

Insulated Flange Connections

Each insulated flange connection shall consist of a dielectric flange gasket, insulating washers, and sleeves held in place with steel bolts and nuts. The gasket shall have a minimum dielectric rating of 500 V/0.025 mm.

Casings

Casings shall be welded steel pipe and shall conform to the provisions in Section 70-1.02B, "Welded Steel Pipe," of the Standard Specifications and these special provisions. Prior to shipping, exterior surfaces of welded steel pipe shall be cleaned and coated in conformance with the requirements in ANSI/AWWA C213, or at the option of the Contractor, cleaned, primed, and coated in conformance with the requirements in ANSI/AWWA C214.

Pipe Wrapping Tape

Wrapping tape for pipe in contact with the earth shall be a pressure sensitive polyvinyl chloride or polyethylene tape with a minimum thickness of 1.27 mm.

Pipe Anchorages for Supply Lines Less Than NPS 4

Each pipe anchorage located halfway between the hose assembly shall consist of a fabricated steel I beam, U bolts, concrete expansion anchors or L anchor bolts, and double nuts suitable for the type and size of pipe installed and shall conform to the details shown on the plans and the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

Concrete Pipe Supports

Each concrete pipe support shall consist of either a precast or cast-in-place concrete pipe cradle, a galvanized steel pipe clamp, anchor bolts, and where shown on the plans, a stainless steel pipe protection shield.

Concrete pipe supports and pipe stops shall conform to the dimensions shown on the plans and shall be constructed of minor concrete and commercial quality wire mesh. Minor concrete shall conform to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications, except that it shall contain not less than 350 kilograms of cementitious material per cubic meter. The concrete for pipe supports and pipe stops shall be moist cured for not less than 3 days.

Steel anchor bolts, nuts, pipe clamps, pipe protection shields, and other fittings shall be suitable for the type and size of the supply line or casing and shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

Epoxy Adhesive

Epoxy adhesive shall conform to the provisions in Section 95, "Epoxy," of the Standard Specifications and one of the following:

A. Section 95-2.01, "Binder (Adhesive), Epoxy Resin Base," for load bearing applications.
B. Section 95-2.04, "Rapid Set Epoxy Adhesive for Pavement Markers."
C. Section 95-2.05, "Standard Set Epoxy Adhesive for Pavement Markers."

INSTALLATION

Water supply lines in bridge structures shall be supported as shown on the plans and in conformance with these special provisions.

If a blockout is provided in the bridge abutment wall for casing, the space between the casing and bridge abutment wall shall be filled with mortar conforming to the provisions in Section 51-1.135, "Mortar," of the Standard Specifications.

When the bridge superstructure is to be prestressed, the space around supply lines through abutments shall not be filled until the prestressing has been completed.

Openings for supply lines through bridge superstructure concrete shall either be formed or shall consist of pipe sleeves.

Expansion joints for supply lines NPS 4 or greater shall be factory adjusted and set at half the expansion capacity and shall be approved by the Engineer prior to installation. Expansion joints shall be connected to the supply line with insulated flange connections.

Cleaning and Closing of Pipe

The interior of the pipe shall be cleaned before installation. Openings shall be capped or plugged as soon as the pipe is installed to prevent the entrance of foreign material. The caps or plugs shall remain in place until the adjacent pipe sections are to be installed.

Wrapping and Coating Pipe

Damaged coating on supply line pipe in contact with the earth shall be wrapped with tape as follows:

A. Pipe to be wrapped shall be thoroughly cleaned and primed as recommended by the tape manufacturer.

B. Tape shall be tightly applied with one-half uniform lap, free from wrinkles and voids to provide not less than a 2.5 mm thickness.
C. Field joints and fittings for wrapped pipe shall be covered by double wrapping 1.27 mm thick tape. Wrapping at joints shall extend a minimum of 150 mm over adjacent pipe coverings. Width of tape for wrapping fittings shall not exceed 50 mm. Adequate tension shall be applied so that the tape will conform closely to the contours of the joint.

TESTING

Water supply lines less than NPS 4 shall be tested in conformance with the provisions in Section 20-5.03H(1), "Method A," of the Standard Specifications, except that the testing period shall be 4 hours minimum with no leakage or pressure drop.

The Contractor shall furnish pipe anchorages to resist thrust forces occurring during testing. Leaks shall be repaired and defective materials shall be replaced by the Contractor at the Contractor's expense.

Pressure testing and necessary repairing of water lines shall be completed prior to backfilling, placing deck slabs over supply lines in box girder cells, or otherwise covering the supply lines.

Each end of the supply line shall be capped prior to and after the testing.

The supply line shall be tested as one unit. The limits of the unit shall be 1.5 m beyond the casing at each end of the bridge.

MEASUREMENT AND PAYMENT

Measurement and payment for supply line (bridge) for each size listed in the Engineer's Estimate shall be made in the same manner as galvanized steel pipe and plastic pipe supply lines in Section 20-5.04, "Measurement," and Section 20-5.05, "Payment," of the Standard Specifications.

Full compensation for furnishing and installing air release valve assemblies, steel hangers, steel brackets and other fittings, casings and casing insulators, pipe end seals, concrete supports, pipe anchorages, concrete pipe stops, pipe wrapping tape, epoxy adhesives, and expansion assemblies; for cleaning, closing, wrapping, and coating pipe; and for pressure testing shall be considered as included in the contract prices paid per meter for the sizes of water supply line (bridge) involved, and no additional compensation will be allowed therefor.

10-1.42 AGGREGATE SUBBASE

Aggregate subbase must comply with Section 25, "Aggregate Subbases," of the Standard Specifications and these special provisions.

Aggregate subbase must be Class 4.

Do not store reclaimed asphalt concrete or aggregate subbase with reclaimed asphalt concrete within 30 m measured horizontally of any culvert, watercourse, or bridge.

Class 4 aggregate subbase must comply with:

Grading (Percentage Passing)

Sieve Sizes	Operating Range	Contract Compliance
150-mm	100	100
100-mm	90-100	87-100
4.75-mm	35-100	30-100
600-µm	0-60	0-65
75-µm	0-20	0-23

Quality

Test	Operating Range	Contract Compliance
Sand Equivalent	25 Min.	22 Min.
Resistance (R-value)	----	60 Min.

If tests show grading or sand equivalent does not comply with the "Operating Range" specifications but complies with the "Contract Compliance" specifications, you may place aggregate subbase for the remainder of that day. Do not start another day's work until tests or other information indicate the next day's material complies with the "Operating Range" specifications.

If tests show grading or sand equivalent does not comply with the "Contract Compliance" specifications, remove the aggregate subbase represented by the tests. If you request and the Engineer approves, that aggregate subbase may remain in place and the Department reduces payment by $3.00 per cubic meter for that aggregate subbase. If the subbase remains in

place and both the grading and sand equivalent do not comply with "Contract Compliance" specifications, the Department only makes one payment reduction.

No single grading or sand equivalent test may represent more than the smaller of 400 m^3 or one day's production.

Instead of Class 4 aggregate subbase, you may place Class 1 aggregate subbase complying with the aggregate grading and quality requirements in Section 25-1.02A, "Class 1, Class 2, and Class 3 Aggregate Subbases," of the Standard Specifications. If you place Class 1 aggregate subbase, do not change back to Class 4 subbase without written approval from the Engineer.

Regardless of the aggregate subbase class supplied, the Department pays for aggregate subbase as Class 4 aggregate subbase.

10-1.43 AGGREGATE BASE

Aggregate base must comply with Section 26, "Aggregate Bases," of the Standard Specifications and these special provisions.

Aggregate base must be Class 2.

Do not store reclaimed asphalt concrete or aggregate base with reclaimed asphalt concrete within 30 m measured horizontally of any culvert, watercourse, or bridge.

10-1.44 ASPHALT CONCRETE

GENERAL

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 grade of asphalt binder to be mixed with aggregate for Type A asphalt concrete, except for dikes, shall be Grade 64-10 conforming to the provisions in Section 92, "Asphalts," of the Standard Specifications.

The grade of asphalt binder to be mixed with aggregate for Type A asphalt concrete dikes shall be Grade PG 70-10 conforming to the provisions in Section 92, "Asphalts," of the Standard Specifications.

The asphalt content of the asphalt mixture will be determined in conformance with the requirements in California Test 379, or in conformance with the requirements in California Test 382.

The amount of asphalt binder used in asphalt concrete placed in dikes, gutters, gutter flares, and overside drains shall be increased one percent by mass of the aggregate over the amount of asphalt binder determined for use in asphalt concrete placed on the traveled way.

The asphalt concrete shall be treated with liquid anti-strip in conformance with "Liquid Anti-Strip Treatment of Asphalt Concrete" of these special provisions.

When portland cement concrete is placed on asphalt concrete base, the finished surface of the asphalt concrete base shall not extend above the grade established by the Engineer. Asphalt concrete base with a surface higher than the grade established by the Engineer shall be cold planed until the surface of asphalt concrete base conforms to the tolerances specified. Cold planing equipment shall be power driven and specifically designed to produce a smooth surface that conforms to the straight edge requirements specified in Section 39-6.03, "Compacting" of the Standard Specifications. Asphalt concrete base with a surface lower than 15 mm below the grade established by the Engineer shall be removed and replaced with asphalt concrete base which complies with requirements of these specifications.

RECLAIMED ASPHALT PAVEMENT

The Contractor may produce asphalt concrete using reclaimed asphalt pavement (RAP). Asphalt concrete produced using RAP shall conform to the provisions for asphalt concrete in this section, "Asphalt Concrete," and these special provisions. The Contractor may substitute RAP for a portion of the virgin aggregate in asphalt concrete in an amount not exceeding 15 percent of the asphalt concrete dry aggregate mass.

RAP shall be processed from asphalt concrete removed from pavement surfaces. RAP shall be stored in stockpiles on smooth surfaces free of debris and organic material. RAP stockpiles shall consist only of homogeneous RAP. The Contractor may process and stockpile RAP throughout the project's life. Processing and stockpiling operations shall prevent material contamination and segregation.

The Contractor shall determine the amount of asphalt binder to be mixed with the combined virgin aggregate and RAP in conformance with the requirements in California Test 367 amended by Lab Procedure-9 (LP-9), "Asphalt Concrete Using Up To 15% Reclaimed Asphalt Pavement (RAP)." LP-9 is available at:

http://www.dot.ca.gov/hq/esc/Translab/fpmlab.htm

At least 21 days before starting production of asphalt concrete using RAP, the Contractor shall submit a proposed asphalt concrete mix design in writing to the Engineer. The mix design submittal shall consist of the following:

A. RAP:

1. Processed stockpile locations.
2. LP-9 test results.
3. Correlation factor for aggregate gradations from California Test 382 and LP-9.
4. Three 32-kg samples of processed RAP representing the material to be used. The three samples shall be split from the sample the Contractor uses to determine the mix design. The Contractor shall obtain and split the samples in conformance with the requirements in California Test 125 and LP-9.
5. The substitution rate for virgin aggregate and percent RAP.

B. Virgin aggregate and supplemental fine aggregate blend:

1. Percent passing values for each sieve size.
2. Aggregate quality tests results.
3. Each aggregate source to be used including producer, location, and California Mine Identification number.
4. Percentage of each aggregate stockpile, cold feed, and hot bin to be used.
5. Gradation of each aggregate stockpile, cold feed, and hot bin to be used.

C. Asphalt binder:

1. Source.
2. Material Safety Data Sheets.

D. Antistrip additives**,** if used:

1. Name of product.
2. Name of manufacturer.
3. Manufacturer's designation and proposed rate.
4. Location and method of addition.
5. Material Safety Data Sheets.

E. Asphalt concrete:

1. A completed mix design that reflects the percent of RAP to be used including the electronic worksheet identified in LP-9.
2. In graphical format, stability and air voids versus asphalt binder percentage of asphalt in conformance with the requirements in CTM 367.

Asphalt concrete production using RAP shall not begin until the Engineer approves the mix design. If the Engineer fails to review the mix design in 21 days, and if, in the opinion of the Engineer, work completion is delayed as a result of the failure to review, the Engineer will adjust payment and contract time in conformance with the requirements in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

If proposing a change in the RAP substitution rate, the Contractor shall notify the Engineer. If the substitution rate changes more than 5 percent by dry aggregate mass in the asphalt concrete mixture, the Contractor shall submit a new mix design.

The aggregate gradation for the asphalt concrete produced with RAP shall be calculated based on the mathematical combination of the virgin aggregate gradation during production and the daily RAP gradation. RAP shall be sampled and gradation shall be determined in conformance with the requirements in LP-9. RAP gradations shall be:

A. Determined daily by the Contractor.
B. Used for the mathematical combination of that day's asphalt concrete production.
C. Reported to the Engineer.

The Contractor shall perform quality control testing of the RAP source each day asphalt concrete using RAP is produced.

The Contractor shall perform quality control testing of the aggregates and the asphalt concrete mixture at least once for every 1000 tonnes of asphalt concrete using RAP produced, but not less than 2 tests per day.

Daily, the Contractor shall submit to the Engineer:

A. Results for RAP gradation and the asphalt binder content in RAP determined in conformance with the requirements in LP-9. The Contractor shall sample RAP from the weighhopper or pugmill.
B. Mathematical calculation of the gradation of the virgin aggregate and RAP aggregate blend.
C. Correlation factor for RAP burn-off determined in conformance with the requirements in LP-9.

RAP proportioning shall conform to the provisions for aggregate proportioning specified in Section 39-3.03, "Proportioning," of the Standard Specifications and these special provisions. The Contractor's mixing equipment shall have a device that safely provides a sample representative of the virgin aggregate and RAP incorporated into the asphalt concrete. The Contractor shall sample in conformance with the requirements in California Test 125 and LP-9.

The temperature of asphalt concrete using RAP shall not exceed 165°C.

If batch mixing is used, RAP shall be kept separate from the virgin aggregate until both ingredients enter the weighhopper or pugmill. After introduction to the pugmill and before asphalt binder is added, the mixing time for the virgin aggregate and RAP shall not be less than 5 seconds. After asphalt binder is added, the mixing time shall not be less than 30 seconds.

If continuous mixing is used, the RAP shall be protected from direct contact with the burner flame with a device such as a shield, separator, or second drum.

PAINT BINDER (TACK COAT)

Paint binder (tack coat) shall be applied to existing surfaces to be surfaced and between layers of asphalt concrete, except when eliminated by the Engineer.

Paint binder (tack coat) shall be, at the option of the Contractor, either slow-setting asphaltic emulsion, rapid-setting asphaltic emulsion or paving asphalt. Slow-setting asphaltic emulsion and rapid-setting asphaltic emulsion shall conform to the provisions in Section 39-4.02, "Prime Coat and Paint Binder (Tack Coat)," and the provisions in Section 94, "Asphaltic Emulsions," of the Standard Specifications. When paving asphalt is used for paint binder, the grade will be determined by the Engineer. Paving asphalt shall conform to the provisions in Section 39-4.02, "Prime Coat and Paint Binder (Tack Coat)," and the provisions in Section 92, "Asphalts," of the Standard Specifications.

Paint binder (tack coat) shall be applied in the liter per square meter range limits specified for the surfaces to receive asphalt concrete in the tables below. The exact application rate within the range will be determined by the Engineer.

Application Rates for Asphaltic Emulsion Paint Binder (Tack Coat) on Asphalt Concrete (except Open Graded) and on Portland Cement Concrete Pavement (PCCP)		
Type of surface to receive paint binder (tack coat)	Slow-Setting Asphaltic Emulsion L/m^2(Note A)	Rapid-Setting Asphaltic Emulsion L/m^2(Note B)
Dense, compact surfaces, between layers, and on PCCP	0.20 – 0.35	0.10 – 0.20
Open textured, or dry, aged surfaces	0.35 – 0.90	0.20 – 0.40

Note A: Slow-setting asphaltic emulsion is asphaltic emulsion diluted with additional water. Water shall be added and mixed with the asphaltic emulsion (containing up to 43 percent water) so the resulting mixture contains one part asphaltic emulsion and not more than one part added water. The water shall be added by the emulsion producer or at a facility that has the capability to mix or agitate the combined blend.

Note B: Undiluted rapid-setting asphaltic emulsion.

Application Rates for Paint Binder (Tack Coat) on Asphalt Concrete (except Open Graded) and on Portland Cement Concrete Pavement (PCCP)	
Type of surface to receive paint binder (tack coat)	Paving Asphalt L/m^2
Dense, compact surfaces, between layers, and on PCCP	0.05 – 0.10
Open textured, or dry, aged surfaces	0.10 – 0.25

When asphaltic emulsion is used as paint binder (tack coat), asphalt concrete shall not be placed until the applied asphaltic emulsion has completely changed color from brown to black.

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.

COMPACTION

Asphalt concrete and asphalt concrete base placed in layers of 45 mm or less in compacted thickness or widths of less than 1.5 m shall be spread and compacted with the equipment and by the methods conforming to the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications. Other asphalt concrete and asphalt concrete base shall be compacted and finished in conformance with the provisions in Section 39 and the following:

A. The provisions in Section 39-5.02, "Compacting Equipment," of the Standard Specifications shall not apply.
B. The Contractor shall furnish a sufficient number of rollers to obtain the compaction specified in these special provisions and the surface finish required by the Standard Specifications and these special provisions.
C. Rollers shall be equipped with pads and water systems that prevent sticking of asphalt mixtures to the pneumatic-tired or steel-tired wheels. A parting agent that will not damage the asphalt mixture may be used.
D. The second paragraph in Section 39-6.01, "General Requirements," of the Standard Specifications shall not apply.
E. Asphalt concrete and asphalt concrete base shall be compacted to obtain the specified relative compaction before the temperature of the mixture drops below 65°C. Additional rolling to achieve the specified relative compaction will not be permitted after the temperature of the mixture drops below 65°C or once the pavement is opened to public traffic. When vibratory rollers are used as finish rollers the vibratory unit shall be turned off.
F. The fifth and seventh through tenth paragraphs of Section 39-6.03, "Compacting," of the Standard Specifications shall not apply.
G. Asphalt concrete and asphalt concrete base shall be compacted to a relative compaction of not less than 96 percent and shall be finished to the lines, grades, and cross section shown on the plans. In-place density of asphalt concrete and asphalt concrete base will be determined before opening the pavement to public traffic.
H. Relative compaction will be determined by California Test 375.
I. If the test results for a quantity of asphalt concrete or asphalt concrete base indicate that the relative compaction is below 96 percent, the Contractor will be notified. Asphalt concrete or asphalt concrete base spreading operations shall not continue until the Contractor has notified the Engineer of the adjustment that will be made in order to meet the specified relative compaction.
J. If the test results for a quantity of asphalt concrete or asphalt concrete base indicate that the relative compaction is less than 96 percent, the asphalt concrete or asphalt concrete base represented by that quantity shall be removed, except as otherwise provided in these special provisions. If requested by the Contractor and approved by the Engineer, asphalt concrete or asphalt concrete base with a relative compaction of 93 percent or greater may remain in place and the Contractor shall pay to the State the amount of reduced compensation for the quantity with relative compaction less than 96 percent and greater than or equal to 93 percent. The Department will deduct the amount of reduced compensation from moneys due, or that may become due, the Contractor under the contract. The amount of reduced compensation the Contractor shall pay to the State will be calculated using the total tonnes in the quantity with relative compaction less than 96 percent and greater than or equal to 93 percent multiplied by the contract price per tonne for asphalt concrete or asphalt concrete base involved multiplied by the following compensation factors:

Relative Compaction (Percent)	Reduced Compensation Factor	Relative Compaction (Percent)	Reduced Compensation Factor
96.0	0.000	94.4	0.062
95.9	0.002	94.3	0.068
95.8	0.004	94.2	0.075
95.7	0.006	94.1	0.082
95.6	0.009	94.0	0.090
95.5	0.012	93.9	0.098
95.4	0.015	93.8	0.108
95.3	0.018	93.7	0.118
95.2	0.022	93.6	0.129
95.1	0.026	93.5	0.142
95.0	0.030	93.4	0.157
94.9	0.034	93.3	0.175
94.8	0.039	93.2	0.196
94.7	0.044	93.1	0.225
94.6	0.050	93.0	0.300
94.5	0.056		

LONGITUDINAL JOINTS

A vertical longitudinal joint of more than 45 mm will not be allowed at any time between adjacent lanes open to public traffic.

Shoulders or median borders adjacent to a lane being paved shall be surfaced prior to opening the lane to public traffic.

The miscellaneous areas to be paid for at the contract price per square meter for place asphalt concrete (miscellaneous area), in addition to the prices paid for the materials involved, shall be limited to the areas listed on the plans.

Aggregate for asphalt concrete dikes and miscellaneous areas shall be in conformance with the provisions for 9.5-mm Maximum grading in Section 39-2.02, "Aggregate," of the Standard Specifications.

If the Contractor selects the batch mixing method, asphalt concrete shall be produced by the automatic batch mixing method in conformance with the provisions in Section 39-3.03A(2), "Automatic Proportioning," of the Standard Specifications.

AUTOMATIC SCREED CONTROL

In addition to the provisions in Section 39-5.01, "Spreading Equipment," of the Standard Specifications, asphalt paving equipment shall be equipped with automatic screed controls and a sensing device or devices.

When placing asphalt concrete to the lines and grades established by the Engineer, the automatic controls shall control the longitudinal grade and transverse slope of the screed. Grade and slope references shall be furnished, installed, and maintained by the Contractor. Should the Contractor elect to use a ski device, the minimum length of the ski device shall be 9 m. The ski device shall be a rigid one piece unit and the entire length shall be utilized in activating the sensor.

When placing the initial mat of asphalt concrete on existing pavement, the end of the screed nearest the centerline shall be controlled by a sensor activated by a ski device not less than 9 m long. The end of the screed farthest from centerline shall be controlled by a sensor activated by a similar ski device or by an automatic transverse slope device set to reproduce the cross slope designated by the Engineer.

When paving contiguously with previously placed mats, the end of the screed adjacent to the previously placed mat shall be controlled by a sensor that responds to the grade of the previously placed mat and will reproduce the grade in the new mat within a 3-mm tolerance. The end of the screed farthest from the previously placed mat shall be controlled in the same way it was controlled when placing the initial mat.

Should the methods and equipment furnished by the Contractor fail to produce a layer of asphalt concrete conforming to the provisions, including straightedge tolerance, of Section 39-6.03, "Compacting," of the Standard Specifications, the paving operations shall be discontinued and the Contractor shall modify the equipment or methods, or furnish substitute equipment.

Should the automatic screed controls fail to operate properly during a day's work, the Contractor may manually control the spreading equipment for the remainder of that day. However, the equipment shall be corrected or replaced with alternative automatically controlled equipment conforming to the provisions in this section before starting another day's work.

AGGREGATE CLEANNESS

The aggregate from each separate bin used for asphalt concrete and asphalt concrete base, Type A, except for the bin containing the fine material, shall have a Cleanness Value of 57 minimum for contract compliance and a value of 65 minimum for operating range as determined by California Test 227, modified as follows:

1. Tests will be performed on the material retained on the 2.36-mm sieve from each bin and will not be a combined or averaged result.
2. Each test specimen will be prepared by hand shaking for 30 seconds, a single loading of the entire sample on a 305-mm diameter, 4.75-mm sieve, nested on top of a 305-mm diameter, 2.36-mm sieve.
3. Where a coarse aggregate bin contains material which will pass the maximum size specified and is retained on a 9.5-mm sieve, the test specimen mass and volume of wash water specified for 25-mm x 4.75-mm aggregate size will be used.
4. Samples will be obtained from the weigh box area during or immediately after discharge from each bin of the batching plant or immediately prior to mixing with asphalt in the case of continuous mixers.
5. The Cleanness Value of the test sample from each of the bins will be separately computed and reported.

At drier-drum and continuous plants with cold feed control, Cleanness Value test samples will be obtained from the discharge of each coarse aggregate storage. An aggregate sampling device shall be provided which will provide a 25-kg sample of each coarse aggregate.

If the results of the Cleanness Value tests do not meet the requirements specified for operating range but meet the contract compliance requirements, placement of the material may be continued for the remainder of that day. However, another day's work may not be started until tests, or other information, indicate to the satisfaction of the Engineer that the next material to be used in the work will comply with the requirements specified for operating range.

If the results of the Cleanness Value tests do not meet the requirements specified for contract compliance, the material which is represented by these tests shall be removed. However, if requested by the Contractor and approved by the Engineer, material having a Cleanness Value of 48 or greater may remain in place and accepted on the basis of a reduced payment for material left in place.

Asphalt concrete or asphalt concrete base that is accepted on the basis of reduced payment will be paid for at the contract prices for the items of asphalt concrete or asphalt concrete base involved multiplied by the following factors:

Test Value	Pay Factor
56	0.90
55	0.85
54	0.80
53	0.75
52	0.70
51	0.65
50	0.60
49	0.55
48	0.50

If asphalt concrete or asphalt concrete base is accepted on the basis of reduced payment due to a Cleanness Value of 48 to 56 and also accepted on the basis of aggregate grading or Sand Equivalent tests not meeting the contract compliance requirements, the reduced payment for Cleanness Value shall apply and payment by the Contractor to the State for asphalt concrete or asphalt concrete base not meeting the contract compliance requirements for aggregate grading or Sand Equivalent shall not apply.

10-1.45 JOINTED PLAIN CONCRETE PAVEMENT

GENERAL

Jointed plain concrete pavement shall be constructed in conformance with the provisions in Section 40, "Portland Cement Concrete Pavement," of the Standard Specifications and these special provisions, and as shown on the plans.

Insert method for forming joints in pavement shall not be used.

PREPAVING CONFERENCE

Supervisory personnel of the Contractor and subcontractors who are to be involved in the concrete paving work shall meet with the Engineer at a prepaving conference, at a mutually agreed time, to discuss methods of accomplishing the paving work.

The Contractor shall provide a facility for the prepaving conference within 5 km of the construction site or at a nearby location agreed to by the Engineer. Attendance at the prepaving conference is mandatory for the Contractor's project superintendent, paving construction foreman, subcontractor's workers, including foremen and personnel performing saw cutting, joint sealing, concrete plant manager, and concrete plant operator. Conference attendees shall sign an attendance sheet provided by the Engineer. Production and placement shall not begin nor proceed unless the above-mentioned personnel have attended the mandatory prepaving conference.

TEST STRIP

At the beginning of paving operations, the Contractor shall construct a test strip of concrete pavement from 200 m to 300 m in length. The paving width for the test strip shall be the same as that intended by the Contractor for production work. The Contractor shall use the same equipment to construct the test strip for the remainder of the paving operations, except as specified in this section. The Contractor shall not begin paving operations until the test strip has been evaluated in conformance with the provisions in Section 40-1.10, "Final Finishing," of the Standard Specifications regarding surface straight edge requirements, and "Profile Index" in this section; for dowel and tie bar alignment verification; concrete quality (except modulus of rupture); and pavement thickness. Additional test strips will be required when:

1. A portion of a test strip fails to conform to the provisions in Section 40-1.10, "Final Finishing," of the Standard Specifications for straight edge requirements;
2. A portion of the test strip fails to conform to profile requirements;
3. The Contractor proposes different paving equipment, including a batch plant, paver, dowel bar inserter, tie bar inserter, tining, or curing equipment;
4. The dowel bar tolerances are not met;
5. The pavement thickness deficiency is greater than 15 mm after grinding; or

6. A change in concrete mix proportions has occurred.

The Contractor shall perform coring of the test strips as part of the dowel and tie bar placement tolerance verification, and pavement thickness verification. The Engineer will select a minimum of six dowel bars that will be cored for each test strip. The Engineer will have the option of selecting up to 6 tie bars that will be cored for each test strip. After removal of cores, voids in concrete pavement shall be cleaned and filled with hydraulic cement grout conforming to the provisions in "Core Drilling for Dowel Placement Alignment Assurance Testing" in this section.

Before mechanical dowel bar inserters are used, the Contractor shall demonstrate that the insertion equipment will not leave surface irregularities such as depressions, dips, or high areas adjacent to the dowel bar insertion point, or voids or segregation around dowel bars.

Before placement of the test strip, the Contractor shall submit a written procedure to locate transverse weakened plane joints that will coincide with the center of the dowel bars being placed and locating the tie bars along the longitudinal joints. This procedure shall be submitted prior to the prepaving conference, and shall describe the control of inadvertent covering of paint markings after applying curing compound, excessive paint spray producing too large a paint dot marking for the accuracy required, misalignment by transferring marking spots, and inadequate staking of joints.

Construction of concrete pavement shall not proceed until the Engineer has completed an evaluation of the test strip. The Engineer shall be allowed 3 days, not including Saturdays, Sundays and legal holidays, to evaluate the test strip. If, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the Engineer not completing the evaluation of the test strip within the time specified, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications. Test strips failing to conform to the specifications for concrete pavement shall be removed. Additional test strips shall be constructed until the Contractor constructs a test strip that conforms to the specifications for concrete pavement. Additional test strips shall conform to the requirements in this section, except the test strip shall be 200 m in length.

Prior to constructing additional test strips, the Contractor shall change methods or equipment to construct a test strip that conforms to the provisions in Section 40-1.10, "Final Finishing," of the Standard Specifications, "Profile Index" of this section, and dowel bar alignment verification, without grinding or other corrective work.

The Engineer may waive the initial test strip if the Contractor proposes to use a batch plant mixer and paving equipment with the same personnel that were satisfactorily used on a Department project within the preceding 12 months. The personnel shall be individuals listed in the prepaving conference used on a preceding Department project.

Materials resulting from the construction and removal of rejected test strips shall become the property of the Contractor and shall be removed and disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

MATERIALS

Concrete

Attention is directed to Section 90, "Portland Cement Concrete," of the Standard Specifications, regarding mix proportions for concrete being determined by the Contractor.

Primary aggregate gradings shall conform to the gradation requirements of Section 90-3, "Aggregate Gradings," of the Standard Specifications. When combined in the proportions determined by the Contractor, the percent passing the 9.5 mm sieve and retained on the 2.36 mm sieve shall not be less than 16 percent of the total aggregate.

The cementitious material content shall not exceed 400 kg/m^3.

Tie Bars

Tie bars shall be deformed reinforcing steel bars conforming to the requirements of ASTM Designation: A 615/A 615M, Grade 280 or 420; ASTM Designation: A 615/A 615M (Grade 280 or 420), A996/A996M or A706/A706M. Tie bars shall be epoxy-coated in conformance with the requirements in ASTM Designation: A 934/A 934M or A 775/A 775M and the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement," of the Standard Specifications, except the epoxy-coating thickness after curing shall be between 175 to 400 micrometers (7 to 16 mils). Fabrication, sampling and jobsite handling shall conform to the requirements in ASTM Designation: D 3963 and the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement," of the Standard Specifications, except the 2 samples shall be 750 mm long. Epoxy-coated tie bars shall not be bent.

Epoxy (Drill and Bond)

Epoxy for bonding tie bars and dowel bars to portland cement concrete shall be a two-component, epoxy-resin, conforming to the requirements of ASTM Designation: C 881, Type V, Grade 3 (Non-Sagging), Class A, B or C. The class used shall be dependent on the internal temperature of the hardened concrete at the time the epoxy is to be applied. Class A shall be used when the internal temperature is below 4°C, but not lower than recommended by the manufacturer. Class B shall be used when the internal temperature is from 4°C to 15°C. Class C shall be used when the internal temperature is

above 15°C, but not higher than recommended by the manufacturer. A Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished with the epoxy. A copy of the manufacturer's recommended installation procedure shall be provided to the Engineer at least 7 days prior to the start of work. Epoxy shall be applied in conformance with the manufacturer's recommendations.

Dowel Bars

Dowel bars shall be plain round smooth, epoxy-coated steel conforming to the requirements in ASTM Designation: A 615/A 615M, Grade 280 or 420, the details shown on the plans and the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement," of the Standard Specifications, except that the two samples required in ASTM Designation D 3963/D 3963M shall be 460 mm long. Epoxy coating of dowel bars shall conform to the provisions in ASTM Designation: A 884/A 884M, Class A, Type 1 or Type 2, except that the bend test shall not apply.

Dowel bars shall be free from burrs or other deformations detrimental to free movement of the bars in the concrete.

Bond Breaker

Dowel bars shall be lubricated with a bond breaker over the entire bar. A bond breaker application of petroleum paraffin based lubricant or white-pigmented curing compound shall be used to coat the dowel bars completely prior to placement. Oil and asphalt based bond breakers shall not be used. Paraffin based lubricant shall be Dayton Superior DSC BB-Coat or Valvoline Tectyl 506 or an approved equal. Paraffin based lubricant shall be factory applied. White pigmented curing compound shall conform to the requirements of ASTM Designation: C 309, Type 2, Class A, and shall contain 22 percent minimum nonvolatile vehicles consisting of at least 50 percent paraffin wax. Curing compound shall be applied in 2 separate applications, the last application not more than 8 hours prior to placement of the dowel bars. Each application of curing compound shall be applied at the approximate rate of one liter per 3.7 m^2.

Dowel Bar Baskets

Dowel bar baskets shall be manufactured with a minimum welded wire gage number of MW 65. Baskets shall be either U-frame or A-frame shape. J-frame shapes shall not be used. Baskets shall be fabricated in conformance with the requirements in ASTM Designation: A 82. Welding of baskets shall conform to the requirements in AASHTO Designation: M 254. A broken weld will be a cause for rejection of the basket. Baskets shall be Class A, Type 1 epoxy-coated in conformance with the requirements in ASTM Designation: A 884/A 884M. Fabrication and job-site handling shall conform to the requirements in ASTM Designation: D 3963 and the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement," of the Standard Specifications, except that sampling of epoxy-coated wire reinforcement will not be required. 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 wire reinforcement certifying that the coated bars conform to the requirements in ASTM Designation: A 884/A 884M and the provisions in Section 52-1.02B, "Epoxy-coated Bar Reinforcement," of the Standard Specifications. The Certificate of Compliance shall include the certifications specified in ASTM Designation: A 884/A 884M and a statement that the coating material has been pre-qualified by acceptance testing performed by the Valley Forge Laboratories, Inc., Devon, Pennsylvania.

Concrete fasteners shall be used for anchoring dowel bar baskets to lean concrete base, asphalt concrete base, asphalt treated permeable base, or cement treated permeable base. Concrete fasteners shall be driven fasteners such as concrete nails, used specifically for fastening to hardened concrete, or asphalt concrete base. Concrete fasteners shall conform to the requirements of ASTM Designation: F 1667. Concrete nails used as fasteners on lean concrete base or asphalt concrete base shall have a minimum shank diameter of 4 mm with a minimum shank length of 64 mm. Concrete nails used as fasteners on asphalt treated or cement treated permeable base shall have a minimum shank diameter of 4 mm with a minimum shank length of 120 mm. Shank length shall be the distance from the point to the bottom of the nail head. Clips and washers shall be commercial quality manufactured for use with dowel bar baskets. The surface of concrete fasteners, clips, and washers shall be either zinc electroplated or galvanized with a minimum coating thickness of 0.005-mm.

Tie Bar Baskets

Tie bar baskets shall be manufactured with a minimum welded wire gage number of MW 65. Baskets shall be either U-frame or A-frame shape. J-frame shapes shall not be used. Tie bar baskets shall be fabricated in conformance with the requirements in ASTM Designation: A 82. Welding of baskets shall conform to the requirements in AASHTO Designation: M 254. A broken weld will be a cause for rejection of the basket. Baskets shall be Class A, Type 1 epoxy-coated in conformance with the requirements in ASTM Designation: A 884/A 884M. Fabrication and job-site handling shall conform to the requirements in ASTM Designation: D 3963 and the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement," of the Standard Specifications, except that sampling of epoxy-coated wire reinforcement will not be required. 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 wire reinforcement certifying that the coated bars conform to the requirements in ASTM

Designation: A 884/A 884M and the provisions in Section 52-1.02B, "Epoxy-coated Bar Reinforcement," of the Standard Specifications. The Certificate of Compliance shall include the certifications specified in ASTM Designation: A 884/A 884M and a statement that the coating material has been pre-qualified by acceptance testing performed by the Valley Forge Laboratories, Inc., Devon, Pennsylvania.

Concrete fasteners shall be used for anchoring tie bar baskets to lean concrete base, asphalt concrete base, asphalt treated permeable base, or cement treated permeable base. Concrete fasteners shall be driven fasteners such as concrete nails, used specifically for fastening to hardened concrete, or asphalt concrete base. Concrete fasteners shall conform to the requirements of ASTM Designation: F 1667. Concrete nails used as fasteners on lean concrete base or asphalt concrete base shall have a minimum shank diameter of 4 mm with a minimum shank length of 64 mm. Concrete nails used as fasteners on asphalt treated or cement treated permeable base shall have a minimum shank diameter of 4 mm with a minimum shank length of 120 mm. Shank length shall be the distance from the point to the bottom of the nail head. Clips and washers shall be commercial quality manufactured for use with tie bar baskets. The surface of concrete fasteners, clips, and washers shall be either zinc electroplated or galvanized with a minimum coating thickness of 0.005-mm.

Reinforcement

Reinforcement shall be epoxy coated and shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications.

Silicone Joint Sealant

Low modulus silicone joint sealant shall be furnished in a one-part silicone formulation. Acid cure sealant shall not be used. The compound shall be compatible with the surface to which it is applied and shall conform to the following requirements:

Property	Test Method	Requirement
Tensile stress, 150% elongation, 7-day cure at 25°± 1°C and 45% to 55% R.H.[e]	ASTM D 412 (Die C)	310 kPa max.
Flow at 25° ± 1°C	ASTM C 639[a]	Shall not flow from channel
Extrusion Rate at 25° ± 1°C	ASTM C 603[b]	75-250 g/min.
Specific Gravity	ASTM D 792 Method A	1.01 to 1.51
Durometer Hardness, at –18°C, Shore A, cured 7 days at 25° ± 1°C	ASTM C 661	10 to 25
Ozone and Ultraviolet Resistance, after 5000 hours	ASTM C 793	No chalking, cracking or bond loss
Tack free at 25° ± 1°C and 45% to 55% R.H.[e]	ASTM C 679	Less than 75 minutes
Elongation, 7 day cure at 25° ± 1°C and 45% to 55% R.H.[e]	ASTM D 412 (Die C)	500 percent min.
Set to Touch, at 25° ± 1°C and 45% to 55% R.H.[e]	ASTM D 1640	Less than 75 minutes
Shelf Life, from date of shipment	—	6 months min.
Bond, to concrete mortar-concrete briquettes, air cured 7 days at 25° ± 1°C	AASHTO T 132[c]	345 kPa min.
Movement Capability and Adhesion, 100% extension at –18°C after, air cured 7 days at 25° ± 1°C, and followed by 7 days in water at 25° ± 1°C	ASTM C 719[d]	No adhesive or cohesive failure after 5 cycles

Notes:

a. ASTM Designation: C 639 Modified (15 percent slope channel A).

b. ASTM Designation: C 603, through 3-mm opening at 345 kPa.

c. Mold briquettes in conformance with AASHTO Designation: T 132, sawed in half and bonded with a 1.5 mm maximum thickness of sealant and tested in conformance with AASHTO Designation: T 132. Briquettes shall be dried to constant mass at 100 ± 5° C.

d. Movement Capability and Adhesion: Prepare 305 mm x 25 mm x 75 mm concrete blocks in conformance with ASTM Designation: C 719. A sawed face shall be used for bond surface. Seal 50 mm of block leaving 12.5 mm on each end of specimen unsealed. The depth of sealant shall be 9.5 mm and the width 12.5-mm.

e. R.H. equals relative humidity.

The silicone joint sealant shall be formulated to cure rapidly enough to prevent flow after application on grades of up to 15 percent.

A Certificate of Compliance for the silicone sealant shall be furnished to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate shall also be accompanied with a certified test report of the results of the required tests performed on the sealant material within the previous 12 months prior to proposed use. The Certificate and accompanying test report shall be provided for each lot of silicone joint sealant prior to use on the project.

Foam Backer Rods

Foam backer rods shall be Type 1, conforming to the requirements of ASTM Designation: D 5249. Foam backer rods shall have a diameter prior to placement at least 25 percent greater than the width of the sawcut and shall be expanded, crosslinked, closed-cell polyethylene foam that is compatible with the joint sealant so that no bond or adverse reaction occurs between the rod and sealant. Hot applied sealant that will melt the foam backer rod shall not be used. The Contractor shall submit a manufacturer's data sheet verifying that the foam backer rod is compatible with the sealant to be used.

Joint Filler Material

Joint filler material shall be preformed expansion joint filler for concrete (bituminous type), conforming to the requirements of ASTM Designation: D 994.

A Certificate of Compliance for the joint filler material shall be furnished to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall be accompanied with a certified test report of the results of the required tests performed on the joint filler material within the previous 12 months prior to proposed use. The certificate and accompanying test report shall be provided for each lot of joint filler material prior to use on the project.

Hydraulic Cement Grout (non-shrink)

Hydraulic cement grout (non-shrink) shall conform to the requirements in ASTM Designation: C 1107. At the Contractor's option, clean, uniformly rounded aggregate filler may be used to extend the grout. The extension of grout shall not exceed 60 percent of the mass of the grout or the maximum amount of grout extension recommended by the manufacturer, whichever is less. The moisture content of the aggregate filler shall not exceed 0.5 percent. Grading of the aggregate filler shall conform to the following:

Sieve Size	Percentage Passing
12.5 mm	100
9.5 mm	85-100
4.75 mm	10-30
2.36 mm	0-10
1.10 mm	0-5

PAVEMENT CONCRETE MIX PROPORTIONS

The Contractor shall determine the mix proportions for pavement concrete. The laboratory used to develop the mix proportions shall meet the requirements of ASTM Designation: C 1077, and shall have current AASHTO accreditation for test methods AASHTO Designation: T 97 or ASTM Designation: C 78, and AASHTO Designation: T 126 or ASTM Designation: C 192.

The minimum cementitious materials content or the maximum water to cementitious materials ratio shall be determined in conformance with the requirements in California Test 559. Trial mixtures shall be made no more than 24 months before field qualification. The minimum cementitious materials content or the maximum water to cementitious materials ratio shall be that determined from the trial mixtures curve to produce a minimum modulus of rupture of 3.9 MPa at 28 days age and 4.5 MPa at 42 days age. To account for variances in materials, production of concrete, and modulus of rupture testing, the Contractor shall include as part of the proposed mix proportions an increase to the cementitious material content or a decrease to the water to cementitious materials ratio, determined from trial mixtures, to ensure that portland cement concrete produced during paving operations conforms to the requirements in "Modulus of Rupture," in this section.

At least 15 days prior to field qualification, the Contractor shall submit the proposed pavement concrete mix proportions with laboratory test reports. Laboratory test reports shall include modulus of rupture determined for each trial mixture at ages of 10, 21, 28 and 42 days in conformance with the applicable portions of California Test 559.

Field Qualification

Field qualification of proposed mix proportions will be required prior to placement of pavement concrete. The Contractor shall perform field qualification and submit certified test data to the Engineer. Field qualification data shall be based upon the proposed use of materials, mix proportions, mixing equipment, procedures and size of batch.

Proposed concrete mix proportions will be field qualified when the test results of five beams from a single batch of concrete indicate the average modulus of rupture is at least 3.9 MPa with no single beam lower than 3.8 MPa at an age of the Contractor's choice but not later than 28 days. Beams shall be tested for modulus of rupture at a minimum of 10, 21, and 28 days of age. Test specimens shall be made and tested in conformance with the requirements in California Test 523.

The certified field qualification test data reports shall include the following:

1. Date of mixing,
2. Mixing equipment and procedures used,
3. Volume of batch in cubic meters and the mass or volume,
4. Type and source of ingredients used,
5. Penetration and slump of the concrete,
6. The air content of the concrete, and
7. The age at time of testing and strength of concrete specimens tested.

Field qualification test data reports shall be signed by a certified representative in charge of the laboratory that performed the tests.

If the Contractor changes a source of supply or proportions, the Contractor shall submit a new proposed mix design and furnish samples from the new source, or sources, at least 60 days prior to their intended use. The new mix proportions shall be trial batched and field qualified, unless, the Engineer determines the change is not substantive. No extension of contract time will be allowed for the time required to perform the sampling, testing, preparing and qualifying new mix proportions for new aggregate sources proposed by the Contractor.

MODULUS OF RUPTURE

The Engineer will test portland cement concrete pavement for modulus of rupture in conformance with the requirements in California Test 523. Acceptance will be on a lot basis. Each lot shall not to exceed 750 m^3 of concrete pavement. The Engineer will determine sample locations. A minimum of six beam specimens shall be made from each sample. Beam specimens will be tested for modulus of rupture at 10, 21, and 28 days. The modulus of rupture for each lot will be calculated by averaging the results of two beams representing that lot tested at 28 days of age. The difference in modulus of rupture between each individual beam result shall not exceed 0.44-MPa.

The Contractor shall perform sampling and testing of beam specimens to determine if concrete pavement has achieved a modulus of rupture of 2.4 MPa when requesting early use of concrete pavement in conformance with the provisions in Section 90-8.03, "Protecting Concrete Pavement," of the Standard Specifications. Beam specimens shall be made and tested in conformance with the requirements in California Test 523.

INSTALLING TIE BARS

Tie bars shall be installed at longitudinal contact joints and longitudinal weakened plane joints as shown on the plans. Contiguous width of new portland cement concrete pavement tied together with tie bars shall not exceed 15 m. Tie bars shall not be installed at joints between portland cement concrete and asphalt concrete pavements.

Tie bars shall be installed at longitudinal joints by one of the following methods:

1. Drilling and bonding tie bars with two-component, epoxy-resin that conforms to this section. Drilled holes shall be cleaned in conformance with the epoxy manufacturer's instructions and shall be dry at the time of placing the epoxy and tie bars. Tie bars will be rotated 180º while being inserted into the epoxy filled holes. Immediately after inserting the tie bars into the epoxy, the tie bars shall be supported as necessary to prevent movement during curing and shall remain undisturbed until the epoxy has cured as specified by the manufacturer instructions. Tie bars that are improperly placed or bonded, as determined by the Engineer, will be rejected. If rejected, new holes shall be drilled and new tie bars shall be placed and securely bonded to the concrete. Rejected tie bars shall be cut flush with the joint face. Exposed ends of tie bars shall be epoxy coated. The center of the new holes shall be offset 75 mm horizontally from the center of the rejected hole to maintain the minimum clearance to the dowel bar. Work necessary to correct improperly bonded tie bars shall be performed at the Contractor's expense.
2. Inserting tie bars into the plastic slipformed concrete before finishing the concrete. Inserted tie bars shall have full contact between the bar and the concrete. When tie bars are inserted through the pavement surface, the concrete over the tie bars shall be reworked and refinished so that there is no evidence on the surface of the completed

pavement that there has been an insertion performed. Loose tie bars shall be replaced by drilling and bonding as described in A above, at the Contractor's expense.

3. Using threaded dowel splice couplers fabricated from deformed bar reinforcement material, free of external welding or machining. Threaded dowel splice couplers shall be accompanied by a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications, and shall be accompanied with installation instructions. Installation of threaded dowel splice couplers shall conform to the requirements of the manufacturer's recommendations.
4. Using tie bar baskets that conform to these special provisions

Tie bars shall be oriented perpendicular to the pavement joint and parallel with the surface of the pavement at mid-slab depth. Tie bar alignment tolerances shall conform to the requirements for dowel bars except embedment length tolerance shall be ±50 mm.

If tie bar baskets are used, they shall be anchored to the base to hold the tie bars at the specified depth and alignment during concrete placement without displacement. A minimum of 8 alternating, equally spaced, concrete fasteners with clips shall be used to anchor each basket (4 per lower runner wire). Temporary spacer wires shall be cut or removed after the baskets are anchored into position before concrete placement. Concrete pavement shall not be placed if the baskets are not in place at least 60 m in advance of the concrete placement operation. The Engineer may waive this requirement upon written request by the Contractor in areas where access is restricted or other construction limitations are encountered. The Contractor shall demonstrate that the baskets are anchored and shall not shift during concrete placement. The Contractor shall provide longer concrete nails than the minimum lengths for the varying bases beneath the portland cement concrete when baskets demonstrate movement.

Full compensation for providing longer concrete nails shall be considered as included in the contract unit price paid per cubic meter for concrete pavement and no additional compensation will be allowed therefor.

DOWEL PLACEMENT

Dowel bars shall be centered on the joint within a tolerance of ±50 mm in the longitudinal direction directly over the contact joint or sawcut for the transverse weakened plane joints, as shown on the plans. Prior to placement of dowel bars, the Contractor shall submit to the Engineer a written procedure to identify the transverse weakened plane joint locations relative to the middle of the dowel bars and the procedure for consolidating concrete around the dowel bars.

Dowel bars shall be placed at transverse weakened plane joints within shoulder areas except at drainage inlets.

Dowel bars shall be placed at longitudinal joints as shown on the plans.

Dowel bars shall be placed as shown on the plans by using dowel bar baskets.

When dowel bar baskets are used, they shall be anchored to the base to hold the dowel bars at the specified depth and alignment during concrete placement without displacement. A minimum of 8 alternating, equally spaced, concrete fasteners with clips shall be used to anchor each 3.6 m dowel bar basket (4 per lower runner wire). At least 10 concrete fasteners shall be used for basket sections greater than 3.6 m and less than or equal to 4.9 m. Temporary spacer wires connecting dowel bar baskets shall be cut or removed after the dowel bar baskets are anchored into position prior to concrete placement. Paving shall be suspended when dowel bar baskets are not in place at least 60 m in advance of the concrete placement operation. The Engineer may waive this requirement upon written request by the Contractor, in areas, where access is restricted, or other construction limitations are encountered. The Contractor shall demonstrate to the Engineer's satisfaction that dowel bar baskets are adequately anchored and not shift during concrete placement. The Contractor shall provide longer concrete nails than the minimum lengths for the varying bases beneath the portland cement concrete when anchored dowel bar baskets demonstrate movement.

Full compensation for providing longer concrete nails shall be considered as included in the contract unit price paid per cubic meter for concrete pavement and no additional compensation will be allowed therefor.

Dowel bar placement at transverse and longitudinal weakened plane joints	
Horizontal offset	±25 mm
Longitudinal translation	±50 mm
Horizontal skew	9 mm
Vertical skew	9 mm
Vertical depth	(d/3 +12 mm) from pavement surface to top of dowel bar or –15 mm below planned placement

Note: d = pavement thickness in mm

CORE DRILLING FOR DOWEL BAR AND TIE BAR PLACEMENT ALIGNMENT ASSURANCE TESTING

Coring to confirm dowel bar and tie bar placement, alignment, and concrete consolidation shall be provided by the Contractor throughout the project, at locations determined by the Engineer. Each day's paving shall be cored within 2 days by performing a minimum of 2 and a maximum of 4 tests for dowel bar placement and position for every 1670 m^2 of doweled pavement or fraction thereof and one test for tie bar placement and position for every 3340 m^2 of pavement with tie bars. One test shall consist of drilling two cores, one on each end of a dowel bar to expose both ends and allow measurement for proper alignment. The minimum core hole diameter shall be 127 mm. If the cores indicate that dowel bars or tie bars are not within the allowable tolerances or if air voids exist surrounding the dowel bars or tie bars, additional cores will be required to determine the limits and severity of unacceptable work.

The holes shall be cored by methods that will not damage the concrete adjacent to the holes. Immediately after coring, the concrete cores shall be submitted to the Engineer for inspection, and the cores shall be identified by the Contractor with a location description.

After removal of cores, core hole voids in concrete pavement shall be cleaned and filled with hydraulic cement grout (non-shrink). After placement of hydraulic cement grout, the material while still plastic shall be finished and textured to match the adjacent pavement surface. The backfill material shall be the same level as the pavement surface.

Water for core drilling operations shall be from a local domestic water supply, and shall contain not more than 1000 parts per million of chlorides as CL, nor more than 1300 parts per million of sulfates as SO_4, nor shall it contain impurities in a sufficient amount to cause discoloration of the concrete or produce etching of the surface.

Water from core drilling operations shall not be permitted to fall on public traffic, to flow across shoulders or lanes occupied by public traffic, or to flow into gutters or other drainage facilities.

Dowel bar and tie bar alignment shall be within the specified tolerances. If dowel bars or tie bars are found to be installed improperly, the paving operations shall not continue until the Contractor has demonstrated to the Engineer that the problem which caused the improper dowel bar or tie bar positioning has been corrected.

Dowel bars in rejected joints shall be replaced by the Contractor by saw cutting on each side of the rejected joint a minimum of 0.9-m, lifting out concrete to be removed, installing new dowel bars at the new transverse joints, installing dowel bars and preformed sponge rubber expansion joint filler along the longitudinal joints, placing concrete, and installing new joints. Preformed sponge rubber expansion joint filler shall conform to the requirements in ASTM Designation: D 1752. New dowel bar holes shall be drilled, not more than 3 mm greater than the dowel bar diameter, by the use of an automatic dowel-drilling rig for the dowels to be installed at the contact joints. Dowel bars shall be placed, as shown on the plans, for the 2 new transverse contact joints. Original exposed tie bars, located within the slab replacement area, shall be cut flush with the lane or pavement edge and dowel bars shall be installed to replace the tie bars at an offset of 75 mm, horizontally from the tie bar location. Holes for dowel bars to be placed along the longitudinal joint shall be drilled, not more than 3 mm greater than the dowel bar diameter, by the use of an automatic dowel-drilling rig for the dowel bars to be installed at the contact joints.

When requested by the Contractor and approved by the Engineer, dowel bars which are more than ±50 mm but less than ±75 mm from being centered directly over the sawcut for the transverse weakened plane joint, may remain in place, and the Contractor shall pay to the State the amount of $32.30 per square meter for the quantity of concrete pavement panels represented by the cores indicating incorrect dowel bar alignment or improper concrete consolidation around dowels. The quantity of concrete pavement area used to determine the amount of payment to the State will be calculated using the panel dimensions for panels adjacent to and inclusive of the joints with incorrect dowel bar alignment or improper concrete consolidation around dowel bars. The Department will reduce compensation from moneys due, or that may become due to the Contractor under the contract. This reduced compensation shall be in addition to other adjustments for incorrect tie bar alignment or improper concrete consolidation around tie bars as specified in these special provisions and for pavement thickness deficiency in conformance with the provisions in Section 40-1.135, "Pavement Thickness," of the Standard Specifications and in addition to other adjustments for deficient Cleanness Value and coarse aggregate grading; and for deficient Sand Equivalent and fine aggregate grading in conformance with the provisions in Section 90-2.02, "Aggregate," of the Standard Specifications.

Tie bars which are not within the specified tolerance for placement and position, as determined from inspection and measurements of cores, may remain in place when requested by the Contractor and approved by the Engineer. The Contractor shall pay to the State the amount of $16.15 per square meter for the quantity of concrete pavement panels represented by the cores indicating incorrect tie bar alignment or improper concrete consolidation around tie bars. The quantity of concrete pavement area used to determine the amount of payment to the State will be calculated using the panel dimensions for panels adjacent to and inclusive of the joints with incorrect tie bar alignment or improper concrete consolidation around tie bars. The Department will reduce compensation from moneys due, or that may become due to the Contractor under the contract. This reduced compensation will be in addition to other adjustments for incorrect dowel bar alignment or improper concrete consolidation around dowel bars as specified in these special provisions and for pavement thickness deficiency in conformance with the provisions in Section 40-1.135, "Pavement Thickness," of the Standard Specifications and in addition to other adjustments for deficient Cleanness Value and coarse aggregate grading; and for

deficient Sand Equivalent and fine aggregate grading in conformance with the provisions in Section 90-2.02, "Aggregate," of the Standard Specifications.

LIQUID JOINT SEALANT INSTALLATION

The joint sealant detail for transverse and longitudinal joints, as shown on the plans, shall apply only to weakened plane joints. Weakened plane joints shall be constructed by the sawing method. Should grinding or grooving be required over or adjacent to joints after sealant has been placed, the joint materials shall be removed and disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications, and replaced at the Contractor's expense. Immediately after sawing, a water wash using less than 0.7 MPa pressure shall be used to remove the slurry from the sawing operation.

Transverse weakened plane joints shall be Type B as shown on the plans. Longitudinal weakened plane joints shall be Type B as shown on the plans.

Seven days after the concrete pavement placement and not more than 4 hours before placing backer rods and joint sealant materials, the joint walls shall be cleaned by the dry sand blast method and other means as necessary to remove from the joint objectionable material such as soil, asphalt, curing compound, paint and rust. Sand blasting shall be performed in at least 2 passes, one for each side of the joint, with the nozzle held at an angle to the joint within 25 to 51 mm of the pavement. After cleaning the joint, traces of sand, dust and loose material shall be removed from and near the joint for a distance along the pavement surfaces of at least 50 mm on each side of the joint by the use of a vacuum device. Surface moisture or dampness shall be removed at the joints by means of compressed air or moderate hot compressed air or other means approved by the Engineer. Drying procedures that leave a residue or film on the joint wall shall not be used. Sandblasting equipment shall have a maximum nozzle diameter size of 6 ± 1-mm and a minimum pressure of 0.62-MPa.

Backer rods shall be installed when the temperature of the portland cement concrete pavement is above the dew point of the air and when the air temperature is 4°C or above. Backer rod shall be installed when the joints to be sealed have been properly patched, cleaned and dried, as determined by the Engineer. Methods of placing backer rod that leave a residue or film on joint walls shall not be used.

Immediately after placement of the backer rod, joint sealant shall be placed in the clean, dry, prepared joints as shown on the plans. The joint sealant shall be applied using a mechanical device with a nozzle shaped to fit inside the joint to introduce the sealant from inside the joint. Adequate pressure shall be applied to the sealant to ensure that the sealant material is extruded evenly and that full continuous contact is made with the joint walls. After application of the sealant, the surface of the sealant shall be recessed as shown on the plans.

Failure of the joint material in either adhesion or cohesion will be cause for rejection of the joint. The finished surface of joint sealant shall conform to the dimensions and allowable tolerances shown on the plans. Rejected joint materials or joint material whose finished surface does not conform to the dimensions shown on the plans, as determined by the Engineer, shall be repaired or replaced, at the Contractor's expense, with joint material that conforms to the requirements.

After each joint is sealed, surplus joint sealer on the pavement surface shall be removed. Traffic shall not be permitted over the sealed joints until the sealant is tack free and set sufficiently to prevent embedment of roadway debris into the sealant.

Longitudinal seals shall be installed before installing transverse seals. Longitudinal seals shall be continuous except at intersections with transverse seals. Transverse seals shall be installed in one continuous piece throughout each transverse joint. After the longitudinal seal is completed and the transverse seal is ready to be installed, a single cut with a sharp instrument or saw shall be made across the longitudinal seal at the middle of the intersection with the transverse seal. After the initial cut of the longitudinal seal, if the longitudinal joint material does not relax enough to allow proper installation of the transverse seal, the longitudinal joint material shall be trimmed precisely to accommodate the transverse seal and form a tight seal between the 2 joints.

An installation machine specifically designed for the installation of preformed compression joint seals shall be used to install the seal at the specified depth without cutting, nicking, or twisting the seal. The installation machine shall install the seal with no more than 4 percent stretch in the installed seal. Hand installation methods of installing seals will not be permitted.

The percentage of stretch shall be determined by laying a length of the preformed compression joint seal material cut to the exact length of the pavement joint to be sealed. The length shall then be measured. The cut length of preformed compression joint seal material shall then be installed in the joint. Excess amount of seal material remaining at the end of the joint shall be measured as the amount of stretch. The measured amount of stretch shall be divided by the original measured length to determine the percentage of stretch.

The completed seal shall not be twisted or have deformities that prevent the seal from making complete continuous contact with the joint walls. Seals installed that are twisted or deformed, or do not make continuous contact with joint walls or with greater than 4 percent stretch of the joint material will be rejected and removed.

CONSTRUCTING TRANSVERSE CONTACT JOINTS

A transverse contact (construction) joint shall be constructed, including dowel bars, at the end of each day's work or where concrete placement is interrupted for more than 30 minutes, to coincide with the next weakened plane joint location.

If sufficient concrete has not been mixed to form a slab to match the next weakened plane joint, when an interruption occurs, the excess concrete shall be removed and disposed of back to the last preceding joint. The cost of removing and disposing of excess concrete shall be at the Contractor's expense. Excess material shall become the property of the Contractor and shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

A metal or wooden bulkhead (header) shall be used to form the joint. The bulkhead shall be designed to accommodate the installation of dowel bars.

CONSTRUCTING TRANSVERSE JOINT CONNECTIONS AND ANCHORS

Concrete pavement joints at transitions to asphalt concrete pavement, pavement end anchors and bridge approach slabs shall conform to the details as shown on the plans. Paint binder shall be applied to the concrete surface that asphalt concrete pavement will contact. Paint binder shall be applied in conformance with the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications.

PROFILE INDEX

The pavement surface shall be profiled, by the Contractor not more than 10 days following concrete placement, in the presence of the Engineer, using a California Profilograph or equivalent in conformance with the requirements in California Test 526, except a blanking band of zero (null) shall be used to determine the Profile Index. Two profiles shall be made within each traffic lane, one meter from and parallel with each lane line.

Profiled pavement shall conform to the following Profile Index requirements:

A. Pavement on tangent alignment and pavement on horizontal curves having a centerline radius of curve 600 m or more shall have a Profile Index of 64 mm or less for each 0.1-km.
B. Pavement on horizontal curves having a centerline radius of curve 300 m or more but less than 600 m and pavement within the superelevation transition of those curves shall have a Profile Index of 128 mm or less for each 0.1-km.

Concrete shoulders shall be profiled. Two profiles shall be made within the shoulder, one meter from and parallel with each edge of the shoulder. Concrete shoulders profiled shall conform to the Profile Index requirements in this section.

Individual high points in excess of 7.5 mm, as determined by measurements of the profilogram in conformance with the requirements in California Test 526, except using a blanking band of zero (null), shall be reduced by grinding in conformance with the requirements in Section 40-1.10, "Final Finishing," of the Standard Specifications until the high points as indicated by reruns of the profilograph do not exceed 7.5 mm.

Pavement grinding shall not be performed before 10 days have elapsed after concrete placement, nor before the concrete has developed a modulus of rupture of at least 3.8 MPa.

CONSTRUCTING WEAKENED PLANE JOINTS (EARLY ENTRY SAW METHOD)

The Contractor may construct weakened plane joints using lighter weight concrete saws (early entry saws) specifically designed for sawing fresh concrete without the use of water. The early entry saws shall be capable of sawing joints within 2 hours of cure time after placement of the concrete pavement without ravelling or tearing, as defined in Section 40-1.08B(1), "Sawing Method," of the Standard Specifications. Joints sawed with early entry saws that develop random cracking shall be removed to the nearest controlled joint and replaced with concrete pavement containing dowel bars and tie bars in conformance with these special provisions and as shown on the plans. The removal and replacement work shall be at the Contractor's expense. Weakened plane joints not sawed within 2 hours of placing concrete pavement shall be sawed by conventional power driven wet-type concrete saws in conformance with the requirements of Section 40-1.08B(1), "Sawing Method," of the Standard Specifications.

Sawed grooves shall be cut to a maximum of 3 mm in width for longitudinal and transverse weakened plane joints made with early entry saws. The minimum depth of cut shall be calculated utilizing the formula in Section 40-1.08B(1), "Sawing Method," of the Standard Specifications except $d = t/4$.

TIE BARS ALONG LONGITUDINAL JOINT FOR SHORT RADIUS CURVES

When paving along short radius curves, the transverse joints shall be maintained in a single continuous straight line across lanes, through the radius point. Tie bars shall maintain minimum clearance from the transverse joint as shown on the plans. If the inside or outside curve of the panel does not allow equal uniform spacing of tie bars at 710 mm between tie bars, then the tie bars shall be equally spaced so that a minimum spacing of 375 mm to a maximum spacing of 710 mm is

maintained between tie bars. Additional tie bars shall be considered as included in the contract price paid per cubic meter for concrete pavement and no additional compensation will be allowed therefore.

If dowel bars are specified along longitudinal joint for short radius curves, then dowel bars shall conform to the requirements of this special provision for tie bars spacing and tolerance.

MEASUREMENT AND PAYMENT

Sealing longitudinal and transverse weakened plane joints in portland cement concrete pavement will be measured by the meter. When a test strip conforms to the specifications for concrete pavement and remains a part of the project paving surface, the sealed pavement joints will be measured and paid for as seal pavement joint.

The contract price paid per meter for seal pavement joint shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in sealing pavement joints complete in place, including sawing, cleaning and preparing the joints in the concrete pavement, furnishing and installing backer rod, repairing and patching spalled or raveled sawed joints, and replacing or repairing rejected joints, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Concrete pavement will be measured by the cubic meter in conformance with the provisions in Section 40-1.13, "Measurement," of the Standard Specifications. No deduction will be made for the volume of epoxy-coated dowel bars, epoxy-coated tie bars and, when used, tie bar baskets with fasteners and dowel bar baskets with fasteners, in the concrete pavement. When a test strip conforms to the specifications for concrete pavement and remains a part of the project paving surface, the concrete will be measured and paid for as concrete pavement.

The contract price paid per cubic meter for concrete pavement shall include full compensation for furnishing all labor, materials (including cementitious material in the amount determined by the Contractor), tools, equipment, and incidentals, and for doing all the work involved in constructing the portland cement concrete pavement complete in place, including furnishing and placing epoxy-coated dowel bars, epoxy-coated tie bars and, when used, any tie bar baskets and dowel bar baskets with fasteners, submittal to the Engineer all test data for determination of mix proportions of concrete for concrete pavement and for providing the facility, Contractor personnel and all the work involved in arranging and holding the prepaving conference, for constructing and repairing all joints; for performing all profile checks for Profile Index and furnishing final profilograms to the Engineer; for grooving and grinding required for final finishing; and for removing, and replacing pavement for deficient thickness, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for drilling holes and bonding tie bars with epoxy resin shall be considered as included in the contract price paid per cubic meter for concrete pavement and no additional compensation will be allowed therefor.

Full compensation for coring test strips for evaluation by the Engineer and for back-filling core holes with hydraulic cement grout when the test strip remains in place as part of the concrete pavement; and for constructing, coring and removing and disposing of test strips that are rejected shall be considered as included in the contract price paid per cubic meter for concrete pavement and no additional compensation will be allowed therefor.

Full compensation for core drilling for dowel bar or tie bar alignment and backfilling with hydraulic cement grout shall be considered as included in the contract price per cubic meter for concrete pavement and no additional compensation will be allowed therefor.

If the initial cores show that dowel bars or tie bars are out of alignment tolerances and the Engineer orders additional dowel bar or tie bar coring, full compensation for drilling the additional cores shall be considered as included in the contract price per cubic meter for concrete pavement and no additional compensation will be allowed therefor.

If the initial cores show that dowel bars or tie bars are within alignment tolerances and the Engineer orders more dowel bar coring the additional cores will be paid for as extra work in conformance with the provisions in Section 4-1.03D, "Extra Work," of the Standard Specifications.

Full compensation for drilling holes and bonding dowel bars with epoxy resin shall be considered as included in the contract price paid per cubic meter for concrete pavement and no additional compensation will be allowed therefore.

Full compensation for furnishing and placing epoxy coated reinforcement for transition end panel shall be considered as included in the contract price paid per cubic meter for concrete pavement and no additional compensation will be allowed therefore.

Full compensation for furnishing and placing paint binder (tack coat) for transition end panel shall be considered as included in the contract price paid per cubic meter for concrete pavement and no additional compensation will be allowed therefore.

Rigid Pavement Smoothness

Pavement smoothness will be determined by the Contractor on the final paved surface course and prior to placement of any surface treatment (if specified). Contractor shall profilograph the final paved surface in accordance with California Test 526, except a zero (null) blanking band shall be used for determining the Profile Index, PI_0. In addition, straightedge provisions in Section 40-1.10 "Final Finishing" of the Standard Specifications, shall apply as specified herein.

Traffic lanes as defined in Section 1-1.46 of the Standard Specifications shall be profiled. Two profiles shall be obtained within each traffic lane, one meter from and parallel to each lane line, as defined in Section 84-1.01, "Description" of the Standard Specifications.

Testing with the California Profilograph or equivalent will not be required for the following areas of the pavement surface, but these areas shall conform to the straightedge requirements in Section 40-1.10 "Final Finishing" of the Standard Specifications:

a. Pavement on horizontal curves with a centerline radius of curvature of less than 300 m and pavement within the superelevation transition on those curves.
b. Bridge decks and their approach slabs that are not part of the concrete paving contract.
c. Pavement for exit ramp termini, truck weigh stations, and ramps and connectors with steep grades or high rates of superelevation in excess of 6%.
d. Pavement sections of city or county streets and roads, turn lanes, collector lanes, and areas around manholes or drainage transitions.
e. Acceleration and deceleration lanes for at-grade intersections.
f. Shoulders and miscellaneous gore areas.
g. Pavement surface within one meter from and parallel to the joint between the pavement and the existing curbs, gutters, or existing pavement.
h. Pavement surface within 4 m of a transverse joint that separates the new pavement from a structure deck, an approach slab, or an existing pavement not constructed under the contract.
i. Non-monolithically paved shoulders.
j. First 30 m of paving during the day.

The contractor shall correct all pavement surfaces noted above that do not meet the requirements of Section 40-1.10 "Final Finishing" of the Standard Specifications by means of grinding in accordance with Section 42-2, "Grinding," of the Standard Specifications.

Calibration and Certification

The Contractor shall provide and operate a California type profilograph or equivalent, to determine the pavement profile. If the contractor's profilograph utilizes a mechanical recorder, the Contractor shall provide an electronic scanner to reduce the profilogram.

The Contractor's operator shall be trained and certified to operate the profilograph equipment as required by CTM 526.

Profilograph Test Procedure

The profilograph operations shall be in consideration of the lane closure requirements specified in "Maintaining Traffic" of these special provisions. In the event that initial profiles are not made prior to opening the pavement to public traffic, the initial runs of the profilograph shall be made the next day that traffic control is permitted for the area to be profiled or as stated elsewhere in these special provision or the Standard Specifications. Each day that profilograph testing is performed, the Engineer and Contractor shall agree to the start location of the pavement sections to be tested and verify that the pavement surface is clean of any objects or foreign material prior to testing.

Pavement shall be profiled in the presence of the Engineer. The Contractor shall notify the Engineer 48 hours in advance of any profilograph testing. If the Engineer elects to not be present, the Contractor may perform the test with written approval of the Engineer, and the absence of the Engineer shall be noted on the profilogram.

Stationing shall be noted on the profilogram in increments not to exceed 100 meters. Station referencing will be used to accurately locate vertical deviations greater than 7.5 mm. All station references shall reflect the actual project stationing.

The profilogram shall be labeled with the following information:

A. Project number (District EA)
B. County and route number
C. Stationing
D. Operator's name
E. Test date
F Test number
G. Traffic direction
H. Traffic lane
I Test wheel path
J. Test direction
K Direction of paving

The Contractor shall submit profilograms and an electronic file of the profile data to the Engineer within two working days of the initial profiling of the final surface course. In addition, the Contractor shall provide the Engineer with a table of the profile index of the left wheel path, right wheel path and the average of the two wheel paths for each 0.1 km section. Any section where corrections are made will be retested to verify that the corrections met the pavement smoothness requirements in Table A. The Contractor shall also submit profilograms and an electronic file of the profile data to the Engineer within two days of any subsequent profiling for verification of corrections. All corrections and profiling shall be done prior to placement of surface treatment if specified.

Pavement Smoothness Evaluation

The Contractor shall determine a PI_0 for each section of the final pavement surface course. A pavement section is defined as 0.1 km in length of a traffic lane. The PI_0 for each section will be the average of the PI_0 values for the two wheel paths. A partial section, which is less than 0.1 km, as a result of an interruption of the continuous pavement surface (i.e. bridge approaches, cessation of daily operations, etc.), is subject to the same evaluation of the PI_0 as a whole section. The PI_0 for a partial section shall be adjusted to reflect a 0.1 km section.

The pavement sections so profiled shall conform to the Pavement Smoothness Requirements in Table A.

Table A Pavement Smoothness Requirements			
Average PI_0 for each 0.1 km Section			
Incentive Range	Acceptable Range	Disincentive Range	Correction Range
<30 mm	30.0–45.0 mm	45.1–60.0 mm	>60 mm

Evaluation for Quality Assurance

The Engineer will use the results of the profile testing for pavement smoothness to evaluate whether the paving methods and equipment used by the Contractor are meeting the smoothness requirements specified in Table A..

The Contractor shall submit profilograms and an electronic file to the Engineer within one working day of the initial profiling of the first 2 kilometers paved. If the initial value of PI_0 for this 2-km section of pavement is greater than 60 mm, the paving operation will be suspended until the Contractor develops a plan that is approved by the Engineer to improve the paving methods and equipment.

Corrective Actions

Each 0.1 km section of pavement will be evaluated using average PI_0 of the profilograms for both wheel paths to determine areas where corrective action is needed for pavement not meeting smoothness requirements in Table A.

All areas within each separate wheel path having individual deviations (high points) in excess of 7.5 mm in a length of 7.62 m or less shall be corrected regardless of the PI_0 value. After correction, the section shall be retested to verify compliance with this requirement.

Pavement profiles having an initial PI_0 which fall under the "Correction Range" of the Pavement Smoothness Requirements shall be corrected to the "Acceptable Range." For PI_0 indexes that fall in the "Disincentive Range" the contractor has the option of correcting to the "Acceptable Range" or taking the disincentive pay adjustment in Table B. The Contractor will not be allowed to make corrections to pavements for the purpose of gaining the incentive pay adjustment.

The Contractor shall furnish the Engineer with a proposed written corrective action plan for correction for any 0.1 km section in order to meet the Smoothness Criteria Requirements in Table A. The Contractor shall submit the proposed written corrective action plan to the Engineer within five working days from the submittal of the profilogram to the Engineer. Within three working days, the Engineer will review the submitted proposal and either accept or reject it and ask for a new proposal. If rejected, the Contractor shall prepare a new proposal for corrective work within 2 working days.

When profile corrective action is required, the Contractor shall use one or more of the following corrective methods:

A. Grinding in accordance with Section 42.02, "Grinding," of the Standard Specifications.
B. Removing and replacing the entire pavement thickness.

The corrective action performed by the Contractor shall be applied to the entire lane width. When completed, the entire lane width shall have uniform texture and appearance, with the beginning and ending of the corrected area squared normal to the centerline of the paved surface. Corrective action shall be at the Contractor's expense.

The Engineer may perform profilograph testing on the surface for monitoring and comparison purposes. If it is determined that the Contractor’s certified test results are inaccurate, the Engineer may require the Contractor to recalibrate

the profilograph equipment and retest the surface in question. Furthermore, furnishing inaccurate test results may result in decertification of the Contractor's certified operator.

The final profilograms that indicate the pavement surface is within the PI_0 specified and the electronic data for the final profilograms shall become the property of the State and shall be delivered to the Engineer prior to acceptance of the contract. The Contractor shall also provide to the Engineer a table showing the profile index for the left wheel path, the right wheel path and the average of both wheel paths for each 0.1 km section.

Payment

Payment for performing all profilograph tests for PI_0 and furnishing the final profilograms to the Engineer, for any applicable incentive or disincentive payment adjustments, and for performing all corrective work to the pavement surface, shall be included in the contract price paid per cubic meter for concrete pavement, and no separate payment shall be made therefor.

Any contract price adjustments (incentives or disincentives) shall be based on the initial PI_0 determined for each 0.1 km section of pavement prior to performing any diamond grinding corrective work. If the Contractor elects to remove and replace any sections, the Contractor shall be paid the price adjustment that corresponds to the initial PI_0 obtained on the pavement sections after removal and replacement.

Areas that are ineligible for pay adjustments or excluded from profilograph testing shall not be subject to pay adjustments.

Payment for pavement smoothness will be determined by the Engineer based solely on the average value of PI_0 for both wheel paths for each 0.1 km section of each traffic lane for the entire project length other than the excluded areas. Payment will be based on pay adjustments defined in Table B.

Table B
Pay Adjustment for PCC Pavement Smoothness

Avg PI_0 (mm) for each 0.1 km Section	Pay Adjustment per 0.1 km Section
<10.0	+$900
10.1-15.0	+$600
15.1 20.0	+$300
20.1-25.0	+$300
25.1-30.0	+$300
30.1-35.0	$0
35.1-40.0	$0
40.1-45.0	$0
45.1-50.0	-$200
50.1-55.0	-$200
55.1-60.0	-$200
60.1-65.0	-$400
65.1-70.0	-$400
70.1-75.0	-$400
75.1-80.0	-$400
80.1-85.0	-$400
85.1-90.0	-$400
>90	-$800

10-1.46 EXIT RAMP TERMINI

Portland cement concrete pavement at exit ramp termini shall be constructed as shown on the plans and as provided in Section 40, "Portland Cement Concrete Pavement," of the Standard Specifications.

10-1.47 PILING

GENERAL

Piling shall conform to the provisions in Section 49, "Piling," of the Standard Specifications, and these special provisions.

Unless otherwise specified, welding of any work performed in conformance with the provisions in Section 49, "Piling," of the Standard Specifications, shall be in conformance with the requirements in AWS D1.1.

Foundation recommendations are included in the "Information Handout" available to the Contractor as provided for in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

Attention is directed to "Welding" of these special provisions.

CAST-IN-DRILLED-HOLE CONCRETE PILES

Cast-in-drilled-hole concrete piling shall conform to the provisions in Section 49-4, "Cast-In-Place Concrete Piles," of the Standard Specifications and these special provisions.

The provisions of "Welding" of these special provisions shall not apply to temporary steel casings.

Cast-in-drilled-hole concrete piles 600 mm in diameter or larger may be constructed by excavation and depositing concrete under slurry.

Materials

Concrete deposited under slurry shall have a nominal penetration equal to or greater than 90 mm. Concrete shall be proportioned to prevent excessive bleed water and segregation.

Concrete deposited under slurry shall contain not less than 400 kg of cementitious material per cubic meter.

The combined aggregate grading used in concrete for cast-in-drilled-hole concrete piling shall be either the 25-mm maximum grading, the 12.5-mm maximum grading, or the 9.5-mm maximum grading and shall conform to the requirements in Section 90-3 "Aggregate Gradings," of the Standard Specifications.

Mineral Slurry

Mineral slurry shall be mixed and thoroughly hydrated in slurry tanks, and slurry shall be sampled from the slurry tanks and tested before placement in the drilled hole.

Slurry shall be recirculated or continuously agitated in the drilled hole to maintain the specified properties.

Recirculation shall include removal of drill cuttings from the slurry before discharging the slurry back into the drilled hole. When recirculation is used, the slurry shall be sampled and tested at least every 2 hours after beginning its use until tests show that the samples taken from the slurry tank and from near the bottom of the hole have consistent specified properties. Subsequently, slurry shall be sampled at least twice per shift as long as the specified properties remain consistent.

Slurry that is not recirculated in the drilled hole shall be sampled and tested at least every 2 hours after beginning its use. The slurry shall be sampled midheight and near the bottom of the hole. Slurry shall be recirculated when tests show that the samples taken from midheight and near the bottom of the hole do not have consistent specified properties.

Slurry shall also be sampled and tested prior to final cleaning of the bottom of the hole and again just prior to placing concrete. Samples shall be taken from midheight and near the bottom of the hole. Cleaning of the bottom of the hole and placement of the concrete shall not start until tests show that the samples taken from midheight and near the bottom of the hole have consistent specified properties.

Mineral slurry shall be tested for conformance to the requirements shown in the following table:

MINERAL SLURRY		
PROPERTY	REQUIREMENT	TEST
Density (kg/m^3) - before placement in the drilled hole - during drilling - prior to final cleaning - immediately prior to placing concrete	1030* to 1110* 1030* to 1200*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/liter) bentonite attapulgite	29 to 53 29 to 42	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	8 to 10.5	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning - immediately prior to placing concrete	less than or equal to 4.0	Sand API 13B-1 Section 5
*When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 32 kg/m^3. Slurry temperature shall be at least 4 degrees Celsius when tested.		

Any caked slurry on the sides or bottom of hole shall be removed before placing reinforcement. If concrete is not placed immediately after placing reinforcement, the reinforcement shall be removed and cleaned of slurry, the sides of the drilled hole cleaned of caked slurry, and the reinforcement again placed in the hole for concrete placement.

Synthetic Slurry

Synthetic slurries shall be used in conformance with the manufacturer's recommendations and these special provisions. The following synthetic slurries may be used:

PRODUCT	MANUFACTURER
SlurryPro CDP	KB Technologies Ltd. Suite 216 735 Broad Street Chattanooga, TN 37402 (800) 525-5237
Super Mud	PDS Company c/o Champion Equipment Company 8140 East Rosecrans Ave. Paramount, CA 90723 (562) 634-8180
Shore Pac GCV	CETCO Drilling Products Group 1350 West Shure Drive Arlington Heights, IL 60004 (847) 392-5800

Inclusion of a synthetic slurry on the above list may be obtained by meeting the Department's requirements for synthetic slurries. The requirements can be obtained from the Office of Structure Design, P.O. Box 942874, Sacramento, CA 94274-0001.

Synthetic slurries listed may not be appropriate for a given site.

Synthetic slurries shall not be used in holes drilled in primarily soft or very soft cohesive soils as determined by the Engineer.

A manufacturer's representative, as approved by the Engineer, shall provide technical assistance for the use of their product, shall be at the site prior to introduction of the synthetic slurry into a drilled hole, and shall remain at the site until released by the Engineer.

Synthetic slurries shall be sampled and tested at both mid-height and near the bottom of the drilled hole. Samples shall be taken and tested during drilling as necessary to verify the control of the properties of the slurry. Samples shall be taken and tested when drilling is complete, but prior to final cleaning of the bottom of the hole. When samples are in conformance with the requirements shown in the following tables for each slurry product, the bottom of the hole shall be cleaned and any loose or settled material removed. Samples shall be obtained and tested after final cleaning with steel reinforcement in place and just prior to placing concrete.

SlurryPro CDP synthetic slurries shall be tested for conformance to the requirements shown in the following table:

SLURRYPRO CDP KB Technologies Ltd.		
PROPERTY	REQUIREMENT	TEST
Density (kg/m^3) - during drilling - prior to final cleaning - just prior to placing concrete	 less than or equal to 1075* less than or equal to 1025*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/liter) - during drilling -prior to final cleaning - just prior to placing concrete	 53 to 127 less than or equal to 74	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	6 to 11.5	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning - just prior to placing concrete	 less than or equal to 0.5	Sand API 13B-1 Section 5
*When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 32 kg/m^3. Slurry temperature shall be at least 4 degrees Celsius when tested.		

Super Mud synthetic slurries shall be tested for conformance to the requirements shown in the following table:

SUPER MUD PDS Company		
PROPERTY	REQUIREMENT	TEST
Density (kg/m^3) - prior to final cleaning - just prior to placing concrete	less than or equal to 1025*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/liter) - during drilling - prior to final cleaning - just prior to placing concrete	34 to 64 less than or equal to 64	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	8 to 10.0	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning -just prior to placing concrete	less than or equal to 0.5	Sand API 13B-1 Section 5
*When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 32 kg/m^3. Slurry temperature shall be at least 4 degrees Celsius when tested.		

Shore Pac GCV synthetic slurries shall be tested for conformance to the requirements shown in the following table:

Shore Pac GCV CETCO Drilling Products Group		
PROPERTY	REQUIREMENT	TEST
Density (kg/m^3) - prior to final cleaning - just prior to placing concrete	less than or equal to 1025*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/liter) - during drilling - prior to final cleaning - just prior to placing concrete	35 to 78 less than or equal to 60	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	8.0 to 11.0	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning -just prior to placing concrete	less than or equal to 0.5	Sand API 13B-1 Section 5
*When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 32 kg/m^3. Slurry temperature shall be at least 4 degrees Celsius when tested.		

Water Slurry

At the option of the Contractor water may be used as slurry when casing is used for the entire length of the drilled hole. Water slurry shall be tested for conformance to the requirements shown in the following table:

WATER SLURRY		
PROPERTY	REQUIREMENT	TEST
Density (kg/m^3) - prior to final cleaning - just prior to placing concrete	1017 *	Mud Weight (Density) API 13B-1 Section 1
Sand Content (percent) - prior to final cleaning -just prior to placing concrete	less than or equal to 0.5	Sand API 13B-1 Section 5
*When approved by the Engineer, salt water slurry may be used, and the allowable densities may be increased up to 32 kg/m^3.		

Construction

The Contractor shall submit a placing plan to the Engineer for approval prior to producing the test batch for cast-in-drilled-hole concrete piling and at least 10 working days prior to constructing piling. The plan shall include complete descriptions, details, and supporting calculations as listed below:

A. Requirements for all cast-in-drilled hole concrete piling:

1. Concrete mix design, certified test data, and trial batch reports.
2. Drilling or coring methods and equipment.
3. Proposed method for casing installation and removal when necessary.
4. Plan view drawing of pile showing reinforcement and inspection pipes, if required.
5. Methods for placing, positioning, and supporting bar reinforcement.
6. Methods and equipment for accurately determining the depth of concrete and actual and theoretical volume placed, including effects on volume of concrete when any casings are withdrawn.
7. Methods and equipment for verifying that the bottom of the drilled hole is clean prior to placing concrete.
8. Methods and equipment for preventing upward movement of reinforcement, including the Contractor's means of detecting and measuring upward movement during concrete placement operations.

B. Additional requirements when concrete is placed under slurry:

1. Concrete batching, delivery, and placing systems, including time schedules and capacities therefor. Time schedules shall include the time required for each concrete placing operation at each pile.
2. Concrete placing rate calculations. When requested by the Engineer, calculations shall be based on the initial pump pressures or static head on the concrete and losses throughout the placing system, including anticipated head of slurry and concrete to be displaced.
3. Suppliers' test reports on the physical and chemical properties of the slurry and any proposed slurry chemical additives, including Material Safety Data Sheet.
4. Slurry testing equipment and procedures.
5. Methods of removal and disposal of excavation, slurry, and contaminated concrete, including removal rates.
6. Methods and equipment for slurry agitating, recirculating, and cleaning.

In addition to compressive strength requirements, the consistency of the concrete to be deposited under slurry shall be verified before use by producing a test batch. The test batch shall be produced and delivered to the project under conditions and in time periods similar to those expected during the placement of concrete in the piles. Concrete for the test batch shall

be placed in an excavated hole or suitable container of adequate size to allow for testing as specified herein. Depositing of test batch concrete under slurry will not be required. In addition to meeting the specified nominal penetration, the test batch shall meet the following requirements:

A. For piles where the time required for each concrete placing operation, as submitted in the placing plan, will be 2 hours or less, the test batch shall demonstrate that the proposed concrete mix design achieves either a penetration of at least 50 mm or a slump of at least 125 mm after twice that time has elapsed.
B. For piles where the time required for each concrete placing operation, as submitted in the placing plan, will be more than 2 hours, the test batch shall demonstrate that the proposed concrete mix design achieves either a penetration of at least 50 mm or a slump of at least 125 mm after that time plus 2 hours has elapsed.

The time period shall begin at the start of placement. The concrete shall not be vibrated or agitated during the test period. Penetration tests shall be performed in conformance with the requirements in California Test 533. Slump tests shall be performed in conformance with the requirements in ASTM Designation: C 143. Upon completion of testing, the concrete shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The concrete deposited under slurry shall be carefully placed in a compact, monolithic mass and by a method that will prevent washing of the concrete. Concrete deposited under slurry need not be vibrated. Placing concrete shall be a continuous operation lasting not more than the time required for each concrete placing operation at each pile, as submitted in the placing plan, unless otherwise approved in writing by the Engineer. The concrete shall be placed with concrete pumps and delivery tube system of adequate number and size to complete the placing of concrete in the time specified. The delivery tube system shall consist of one of the following:

A. A tremie tube or tubes, each of which are at least 250 mm in diameter, fed by one or more concrete pumps.
B. One or more concrete pump tubes, each fed by a single concrete pump.

The delivery tube system shall consist of watertight tubes with sufficient rigidity to keep the ends always in the mass of concrete placed. If only one delivery tube is utilized to place the concrete, the tube shall be placed near the center of the drilled hole. Multiple tubes shall be uniformly spaced in the hole. Internal bracing for the steel reinforcing cage shall accommodate the delivery tube system. Tremies shall not be used for piles without space for a 250-mm tube.

Spillage of concrete into the slurry during concrete placing operations shall not be allowed. Delivery tubes shall be capped with a watertight cap, or plugged above the slurry level with a good quality, tight fitting, moving plug that will expel the slurry from the tube as the tube is charged with concrete. The cap or plug shall be designed to be released as the tube is charged. The pump discharge or tremie tube shall extend to the bottom of the hole before charging the tube with concrete. After charging the delivery tube system with concrete, the flow of concrete through a tube shall be induced by slightly raising the discharge end. During concrete placement, the tip of the delivery tube shall be maintained as follows to prevent reentry of the slurry into the tube. Until at least 3 m of concrete has been placed, the tip of the delivery tube shall be within 150 mm of the bottom of the drilled hole, and then the embedment of the tip shall be maintained at least 3 m below the top surface of the concrete. Rapid raising or lowering of the delivery tube shall not be permitted. If the seal is lost or the delivery tube becomes plugged and must be removed, the tube shall be withdrawn, the tube cleaned, the tip of the tube capped to prevent entrance of the slurry, and the operation restarted by pushing the capped tube 3 m into the concrete and then reinitiating the flow of concrete.

When slurry is used, a fully operational standby concrete pump, adequate to complete the work in the time specified, shall be provided at the site during concrete placement. The slurry level shall be maintained within 300 mm of the top of the drilled hole.

A log of concrete placement for each drilled hole shall be maintained by the Contractor when concrete is deposited under slurry. The log shall show the pile location, tip elevation, dates of excavation and concrete placement, total quantity of concrete deposited, length and tip elevation of any casing, and details of any hole stabilization method and materials used. The log shall include a 215 mm x 280 mm sized graph of the concrete placed versus depth of hole filled. The graph shall be plotted continuously throughout placing of concrete. The depth of drilled hole filled shall be plotted vertically with the pile tip oriented at the bottom and the quantity of concrete shall be plotted horizontally. Readings shall be made at least at each 1.5 m of pile depth, and the time of the reading shall be indicated. The graph shall be labeled with the pile location, tip elevation, cutoff elevation, and the dates of excavation and concrete placement. The log shall be delivered to the Engineer within one working day of completion of placing concrete in the pile.

After placing reinforcement and prior to placing concrete in the drilled hole, if drill cuttings settle out of the slurry, the bottom of the drilled hole shall be cleaned. The Contractor shall verify that the bottom of the drilled hole is clean.

If temporary casing is used, concrete placed under slurry shall be maintained at a level at least 1.5 m above the bottom of the casing. The withdrawal of casings shall not cause contamination of the concrete with slurry.

Material resulting from using slurry shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Acceptance Testing and Mitigation

Vertical inspection pipes for acceptance testing shall be provided in all cast-in-drilled-hole concrete piles that are 600 mm in diameter or larger, except when the holes are dry or when the holes are dewatered without the use of temporary casing to control ground water.

Inspection pipes shall be Schedule 40 polyvinyl chloride pipes with a nominal inside diameter of 50 mm. Each inspection pipe shall be capped top and bottom and shall have watertight couplers to provide a clean, dry and unobstructed 50-mm diameter clear opening from 1.0 m above the pile cutoff down to the bottom of the reinforcing cage.

Inspection pipes shall be placed around the pile, inside the outermost spiral or hoop reinforcement, and 75 mm clear of the vertical reinforcement, at a uniform spacing not exceeding 840 mm measured along the circle passing through the centers of inspection pipes. A minimum of 2 inspection pipes per pile shall be used. When the vertical reinforcement is not bundled and each bar is not more than 26 mm in diameter, inspection pipes may be placed 50 mm clear of the vertical reinforcement. The inspection pipes shall be placed to provide the maximum diameter circle that passes through the centers of the inspection pipes while maintaining the clear spacing required herein. The pipes shall be installed in straight alignment, parallel to the main reinforcement, and securely fastened in place to prevent misalignment during installation of the reinforcement and placing of concrete in the hole.

The Contractor shall log the location of the inspection pipe couplers with respect to the plane of pile cut off, and these logs shall be delivered to the Engineer upon completion of the placement of concrete in the drilled hole.

After placing concrete and before requesting acceptance tests, each inspection pipe shall be tested by the Contractor in the presence of the Engineer by passing a 48.3-mm diameter rigid cylinder 610 mm long through the complete length of pipe. If the 48.3-mm diameter rigid cylinder fails to pass any of the inspection pipes, the Contractor shall attempt to pass a 32.0-mm diameter rigid cylinder 1.375 m long through the complete length of those pipes in the presence of the Engineer. If an inspection pipe fails to pass the 32.0-mm diameter cylinder, the Contractor shall immediately fill all inspection pipes in the pile with water.

The Contractor shall replace each inspection pipe that does not pass the 32.0-mm diameter cylinder with a 50.8-mm diameter hole cored through the concrete for the entire length of the pile. Cored holes shall be located as close as possible to the inspection pipes they are replacing and shall be no more than 150 mm inside the reinforcement. Coring shall not damage the pile reinforcement. Cored holes shall be made with a double wall core barrel system utilizing a split tube type inner barrel. Coring with a solid type inner barrel will not be allowed. Coring methods and equipment shall provide intact cores for the entire length of the pile concrete. The coring operation shall be logged by an Engineering Geologist or Civil Engineer licensed in the State of California and experienced in core logging. Coring logs shall include complete descriptions of inclusions and voids encountered during coring, and shall be delivered to the Engineer upon completion. Concrete cores shall be preserved, identified with the exact location the core was recovered from within the pile, and made available for inspection by the Engineer.

Acceptance tests of the concrete will be made by the Engineer, without cost to the Contractor. Acceptance tests will evaluate the homogeneity of the placed concrete. Tests will include gamma-gamma logging. Tests may also include crosshole sonic logging and other means of inspection selected by the Engineer. The Contractor shall not conduct operations within 8.0 m of the gamma-gamma logging operations. The Contractor shall separate reinforcing steel as necessary to allow the Engineer access to the inspection pipes to perform gamma-gamma logging or other acceptance testing. After requesting acceptance tests and providing access to the piling, the Contractor shall allow 3 weeks for the Engineer to conduct these tests and make determination of acceptance if the 48.3-mm diameter cylinder passed all inspection pipes, and 4 weeks if only the 32.0-mm diameter cylinder passed all inspection pipes. Should the Engineer fail to complete these tests within the time allowance, and if in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in inspection, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

All inspection pipes and cored holes in a pile shall be dewatered and filled with grout after notification by the Engineer that the pile is acceptable. Placement and removal of water in the inspection pipes shall be at the Contractor’s expense. Grout shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. The inspection pipes and holes shall be filled using grout tubes that extend to the bottom of the pipe or hole or into the grout already placed.

If acceptance testing performed by the Engineer determines that a pile does not meet the requirements of the specifications, then that pile will be rejected and all depositing of concrete under slurry or concrete placed using temporary casing for the purpose of controlling groundwater shall be suspended until written changes to the methods of pile construction are approved in writing by the Engineer.

The Contractor shall submit to the Engineer for approval a mitigation plan for repair, supplementation, or replacement for each rejected cast-in-drilled-hole concrete pile, and this plan shall conform to the provisions in Section 5-1.02, "Plans and

Working Drawings," of the Standard Specifications. Prior to submitting this mitigation plan, the Engineer will hold a repair feasibility meeting with the Contractor to discuss the feasibility of repairing rejected piling. The Engineer will consider the size of the defect, the location of the defect, and the design information and corrosion protection considerations for the pile. This information will be made available to the Contractor, if appropriate, for the development of the mitigation plan. If the Engineer determines that it is not feasible to repair the rejected pile, the Contractor shall not include repair as a means of mitigation and shall proceed with the submittal of a mitigation plan for replacement or supplementation of the rejected pile.

If the Engineer determines that a rejected pile does not require mitigation due to structural, geotechnical, or corrosion concerns, the Contractor may elect to 1) repair the pile per the approved mitigation plan, or 2) not repair anomalies found during acceptance testing of that pile. For such unrepaired piles, the Contractor shall pay to the State, $400 per cubic meter for the portion of the pile affected by the anomalies. The volume, in cubic meters, of the portion of the pile affected by the anomalies, shall be calculated as the area of the cross-section of the pile affected by each anomaly, in square meters, as determined by the Engineer, multiplied by the distance, in meters, from the top of each anomaly to the specified tip of the pile. If the volume calculated for one anomaly overlaps the volume calculated for additional anomalies within the pile, the calculated volume for the overlap shall only be counted once. In no case shall the amount of the payment to the State for any such pile be less than $400. The Department may deduct the amount from any moneys due, or that may become due the Contractor under the contract.

Pile mitigation plans shall include the following:

A. The designation and location of the pile addressed by the mitigation plan.
B. A review of the structural, geotechnical, and corrosion design requirements of the rejected pile.
C. A step by step description of the mitigation work to be performed, including drawings if necessary.
D. An assessment of how the proposed mitigation work will address the structural, geotechnical, and corrosion design requirements of the rejected pile.
E. Methods for preservation or restoration of existing earthen materials.
F. A list of affected facilities, if any, with methods and equipment for protection of these facilities during mitigation.
G. The State assigned contract number, bridge number, full name of the structure as shown on the contract plans, District-County-Route-Kilometer Post, and the Contractor's (and Subcontractor's if applicable) name on each sheet.
H. A list of materials, with quantity estimates, and personnel, with qualifications, to be used to perform the mitigation work.
I. The seal and signature of an engineer who is licensed as a Civil Engineer by the State of California.

For rejected piles to be repaired, the Contractor shall submit a pile mitigation plan that contains the following additional information:

A. An assessment of the nature and size of the anomalies in the rejected pile.
B. Provisions for access for additional pile testing if required by the Engineer.

For rejected piles to be replaced or supplemented, the Contractor shall submit a pile mitigation plan that contains the following additional information:

A. The proposed location and size of additional piling.
B. Structural details and calculations for any modification to the structure to accommodate the replacement or supplemental piling.

All provisions for cast-in-drilled-hole concrete piling shall apply to replacement piling.

The Contractor shall allow the Engineer 3 weeks to review the mitigation plan after a complete submittal has been received.

Should the Engineer fail to review the complete pile mitigation submittal within the time specified, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the pile mitigation plan, an extension of time commensurate with the delay in completion of the work thus caused will be granted in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

When repairs are performed, the Contractor shall submit a mitigation report to the Engineer within 10 days of completion of the repair. This report shall state exactly what repair work was performed and quantify the success of the repairs relative to the submitted mitigation plan. The mitigation report shall be stamped and signed by an engineer that is licensed as a Civil Engineer by the State of California. The mitigation report shall show the State assigned contract number, bridge number, full name of the structure as shown on the contract plans, District-County-Route-Kilometer Post, and the Contractor (and Subcontractor if applicable) name on each sheet. The Engineer will be the sole judge as to whether a

mitigation proposal is acceptable, the mitigation efforts are successful, and to whether additional repairs, removal and replacement, or construction of a supplemental foundation is required.

10-1.48 PRESTRESSING CONCRETE

Prestressing concrete shall conform to the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications and these special provisions.

The details shown on the plans for cast-in-place prestressed box girder bridges are based on a bonded full length draped tendon prestressing system. For these bridges the Contractor may, in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications, propose an alternative prestressing system utilizing bonded partial length tendons provided the proposed system and associated details meet the following requirements:

A. The proposed system and details shall provide moment and shear resistances at least equal to those used for the design of the structure shown on the plans.
B. The concrete strength shall not be less than that shown on the plans.
C. Not less than 35 percent of the total prestressing force at any section shall be provided by full length draped tendons.
D. Anchorage blocks for partial length tendons shall be located so that the blocks will not interfere with the placement of the utility facilities shown on the plans or of any future utilities to be placed through openings shown on the plans.
E. Temporary prestressing tendons, if used, shall be detensioned, and the temporary ducts shall be filled with grout before completion of the work. Temporary tendons shall be either removed or fully encased in grout before completion of the work.
F. All details of the proposed system, including supporting checked calculations, shall be included in the drawings submitted in conformance with the provisions in Section 50-1.02, "Drawings," of the Standard Specifications.

Moments and shears for loads used in the design shown on the plans will be made available to the Contractor upon written request to the Engineer.

10-1.49 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 an alternative construction method for reinforced concrete members unless otherwise specified.

Neoprene strip shall be furnished and installed at abutment backwall joint protection in conformance with the details shown on the plans, the provisions in the Standard Specifications, and these special provisions.

Furnishing and installing neoprene strip shall conform to the requirements for strip waterstops as provided in Section 51-1.145, "Strip Waterstops," of the Standard Specifications, except that the protective board will not be required.

Forms used to support the deck of cast-in-place box girders for the following structures may remain in place, provided the portions of the forms that obstruct access openings or conflict with utility facilities are removed, the forming system employed leaves no sharp projections into the cells or voids, and forms between hinges and 1.5 m beyond access openings adjacent to hinges are removed:

Britania Blvd Overcrossing (Bridge Number 57-1144)

Materials for access opening covers in soffits of new cast-in-place concrete box girder bridges shall conform to the provisions for materials in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

DECK CRACK TREATMENT

When methacrylate resin work is to be conducted within 31 meters of a residence, business, or public space, including sidewalks under a structure, the Contractor shall notify the public at least 7 days before starting work and monitor airborne emissions during the work. Public notification and monitoring of airborne emissions shall conform to the following:

A. The public safety plan required in Section 51-1.17A, "Deck Crack Treatment," of the Standard Specifications shall include a copy of the notification letter and a list of addresses and locations where the letter will be delivered and posted. The letter shall state the methacrylate resin work locations, dates, times, and what to expect. The letter shall be delivered to each residence and each business within 31 meters of the methacrylate resin work. The letter shall be delivered to local fire and police responders, and it shall be posted at the job site.
B. The public safety plan shall include an airborne emissions monitoring plan prepared by a certified industrial hygienist and a copy of the hygienist's certification. Airborne emissions shall be monitored at a minimum of 4

points including the point of mixing, the point of application, and the point of nearest public contact, as determined by the Engineer. At the completion of methacrylate resin work, a report by the certified industrial hygienist with results of the airborne emissions monitoring plan shall be submitted to the Engineer.

FALSEWORK

Falsework shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Temporary crash cushion modules, as shown on the plans and conforming to the provisions in "Temporary Crash Cushion Module" of these special provisions, shall be installed at the approach end of temporary railings which are located less than 4.6 m from the edge of a traffic lane. For 2-way traffic openings, temporary crash cushion modules shall be installed at the departing end of temporary railings which are located less than 1.8 m from the edge of a traffic lane.

The Contractor's engineer who signs the falsework drawings shall also certify in writing that the falsework is constructed in conformance with the approved drawings and the contract specifications prior to placing concrete. This certification shall include performing any testing necessary to verify the ability of the falsework members to sustain the stresses required by the falsework design. The engineer who signs the drawings may designate a representative to perform this certification. Where falsework contains openings for railroads, vehicular traffic, or pedestrians, the designated representative shall be qualified to perform this work, shall have at least three years of combined experience in falsework design or supervising falsework construction, and shall be registered as a Civil Engineer in the State of California. For other falsework, the designated representative shall be qualified to perform this work and shall have at least three years of combined experience in falsework design or supervising falsework construction. The Contractor shall certify the experience of the designated representative in writing and provide supporting documentation demonstrating the required experience if requested by the Engineer.

Welding and Nondestructive Testing

Welding of steel members, except for previously welded splices and except for when fillet welds are used where load demands are less than or equal to 175 N/mm for each 3 mm of fillet weld, shall conform to AWS D1.1 or other recognized welding standard. The welding standard to be utilized shall be specified by the Contractor on the working drawings. Previously welded splices for falsework members are defined as splices made prior to the member being shipped to the project site.

Splices made by field welding of steel beams at the project site shall undergo nondestructive testing (NDT). At the option of the Contractor, either ultrasonic testing (UT) or radiographic testing (RT) shall be used as the method of NDT for each field weld and any repair made to a previously welded splice in a steel beam. Testing shall be performed at locations selected by the Contractor. The length of a splice weld where NDT is to be performed, shall be a cumulative weld length equal to 25 percent of the original splice weld length. The cover pass shall be ground smooth at the locations to be tested. The acceptance criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional NDT shall be performed on the repaired sections. The NDT method chosen shall be used for an entire splice evaluation including any required repairs.

For all field welded splices, the Contractor shall furnish to the Engineer a letter of certification which certifies that all welding and NDT, including visual inspection, are in conformance with the specifications and the welding standard shown on the approved working drawings. This letter of certification shall be signed by an engineer who is registered as a Civil Engineer in the State of California and shall be provided prior to placing any concrete for which the falsework is being erected to support.

For previously welded splices, the Contractor shall determine and perform all necessary testing and inspection required to certify the ability of the falsework members to sustain the stresses required by the falsework design. This welding certification shall (1) itemize the testing and inspection methods used, (2) include the tracking and identifying documents for previously welded members, (3) be signed by an engineer who is registered as a Civil Engineer in the State of California, (4) and shall be provided prior to erecting the members.

COST REDUCTION INCENTIVE PROPOSALS FOR CAST-IN-PLACE PRESTRESSED BOX GIRDER BRIDGES

Except as provided herein, cast-in-place prestressed box girder bridges shall be constructed in conformance with the details shown on the plans and the provisions in Section 50, "Prestressing Concrete," and Section 51, "Concrete Structures," of the Standard Specifications.

If the Contractor submits cost reduction incentive proposals for cast-in-place prestressed box girder bridges, the proposals shall be in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications and these special provisions.

The Engineer may reject any proposal which, in the Engineer's judgment, may not produce a structure which is at least equivalent to the planned structure.

At the time the cost reduction incentive proposal (CRIP) is submitted to the Engineer, the Contractor shall also submit 4 sets of the proposed revisions to the contract plans, design calculations, and calculations from an independent checker for all changes involved in the proposal, including revisions in camber, predicted deck profile at each construction stage, and falsework requirements to the Office of Structure Design, Documents Unit, P.O. Box 942874, Sacramento, CA 94274-0001 (1801 30th Street, Sacramento, CA 95816), telephone (916) 227-8230. When notified in writing by the Engineer, the Contractor shall submit 12 sets of the CRIP plan revisions and calculations to the Office of Structure Design for final approval and use during construction. The calculations shall verify that all requirements are satisfied. The CRIP plans and calculations shall be signed by an engineer who is registered as a Civil Engineer in the State of California.

The CRIP plans shall be either 279 mm x 432 mm, or 559 mm x 864 mm in size. Each CRIP plan sheet and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Kilometer Post. Each CRIP plan sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

Within 3 weeks after final approval of the CRIP plan sheets, one set of the corrected good quality prints on 75-g/m^2 (minimum) bond paper, 559 mm x 864 mm in size, of all CRIP plan sheets prepared by the Contractor for each CRIP shall be furnished to the Office of Structure Design, Documents Unit.

Each CRIP shall be submitted prior to completion of 25 percent of the contract working days and sufficiently in advance of the start of the work that is proposed to be revised by the CRIP to allow time for review by the Engineer and correction by the Contractor of the CRIP plans and calculations without delaying the work. The Contractor shall allow a minimum of 8 weeks for the review of a CRIP. In the event that several CRIPs are submitted simultaneously, or an additional CRIP is submitted for review before the review of a previously submitted CRIP has been completed, the Contractor shall designate the sequence in which the CRIPs are to be reviewed. In this event, the time to be provided for the review of any proposal in the sequence shall be not less than the review time specified herein for that proposal, plus 2 weeks for each CRIP of higher priority which is still under review.

Should the review not be complete by the date specified in the Contractor's CRIP, or such other date as the Engineer and Contractor may subsequently have agreed to in writing and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in review of CRIP plans and calculations, an extension of time commensurate with the delay in completion of the work thus caused will be granted as provided in Section 8-1.07, "Liquidated Damages," of the Standard Specifications except that the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications shall not apply.

Permits and approvals required of the State have been obtained for the structures shown on the plans. Proposals which result in a deviation in configuration may require new permits or approvals. The Contractor shall be responsible for obtaining the new permits and approvals before the Engineer will reach a decision on the proposal. Delays in obtaining permits and approvals will not be reason for granting an extension of contract time.

All proposed modifications shall be designed in conformance with the bridge design specifications and procedures currently employed by the Department. The proposal shall include all related, dependent or incidental changes to the structure and other work affected by the proposal. The proposal will be considered only when all aspects of the design changes are included for the entire structure. Changes, such as but not limited to, additional reinforcement and changes in location of reinforcement, necessary to implement the CRIP after approval by the Engineer, shall be made at the Contractor's expense.

Modifications may be proposed in (1) the thickness of girder stems and deck slabs, (2) the number of girders, (3) the deck overhang dimensions as specified herein, (4) the amount and location of reinforcing steel, (5) the amount and location of prestressing force in the superstructure, and (6) the number of hinges, except that the number of hinges shall not be increased. The strength of the concrete used may be increased but the strength employed for design or analysis shall not exceed 42 MPa.

Modifications proposed to the minimum amount of prestressing force which must be provided by full length draped tendons are subject to the provisions in "Prestressing Concrete" of these special provisions.

No modifications will be permitted in (1) the foundation type, (2) the span lengths or (3) the exterior dimensions of columns or bridge superstructure, except that the overhang dimension from face of exterior girder to the outside edge of roadway deck may be uniformly increased or decreased by 25 percent on each side of the box girder section. Fixed connections at the tops and bottoms of columns shown on the plans shall not be eliminated.

The Contractor shall be responsible for determining construction camber and obtaining the final profile grade as shown on the plans.

The Contractor shall reimburse the State for the actual cost of investigating CRIPs for cast-in-place prestressed box girder bridges submitted by the Contractor. The Department will deduct this cost from any moneys due, or that may become due the Contractor under the contract, regardless of whether or not the proposal is approved or rejected.

SLIDING BEARINGS

Sliding bearings consisting of elastomeric bearing pads lubricated with grease and covered with sheet metal shall conform to the following requirements:

A. Grease shall conform to the requirements of Military Specification: MIL-S-8660. A uniform film of grease shall be applied to the upper surface of the pads prior to placing the sheet metal.
B. Sheet metal shall be commercial quality galvanized sheet steel. The sheet metal shall be smooth and free of kinks, bends, or burrs.
C. Construction methods and procedures shall prevent grout or concrete seepage into the sliding bearing assembly.

ELASTOMERIC BEARING PADS

Elastomeric bearing pads shall conform to the provisions in Section 51-1.12H, "Elastomeric Bearing Pads," of the Standard Specifications and these special provisions.

MEASUREMENT AND PAYMENT

Measurement and payment for concrete in structures shall conform to the provisions in Section 51-1.22, "Measurement," and Section 51-1.23, "Payment," of the Standard Specifications and these special provisions.

Full compensation for furnishing and installing access opening covers in soffits of new cast-in-place box girder bridges shall be considered as included in the contract price paid per cubic meter for structural concrete, bridge and no separate payment will be made therefor.

Full compensation for public notification and airborne monitoring for deck crack treatment shall be considered as included in the contract price paid per cubic meter for structural concrete, bridge, and no additional compensation will be allowed therefor.

10-1.50 STRUCTURE APPROACH SLABS (TYPE N) AND (TYPE EQ)

This work shall consist of constructing reinforced concrete approach slabs, structure approach drainage system, and treated permeable base at structure approaches in conformance with the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

GENERAL

Attention is directed to "Engineering Fabrics" of these special provisions.

STRUCTURE APPROACH DRAINAGE SYSTEM

Geocomposite Drain

Geocomposite drain shall consist of a manufactured core not less than 6.35 mm thick nor more than 50 mm thick with one or both sides covered with a layer of filter fabric that will provide a drainage void. The drain shall produce a flow rate through the drainage void of at least 25 liters per minute per meter of width at a hydraulic gradient of 1.0 and a minimum externally applied pressure of 168 kPa.A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished for the geocomposite drain certifying that the drain complies with these special provisions. The Certificate of Compliance shall be accompanied by a flow capability graph for the geocomposite drain showing flow rates and the externally applied pressures and hydraulic gradients. The flow capability graph shall be stamped with the verification of an independent testing laboratory.

Filter fabric for the geocomposite drain shall conform to the provisions for filter fabric for underdrains in Section 88, "Engineering Fabrics," of the Standard Specifications.

The manufactured core shall be either a preformed grid of embossed plastic, a mat of random shapes of plastic fibers, a drainage net consisting of a uniform pattern of polymeric strands forming 2 sets of continuous flow channels, or a system of plastic pillars and interconnections forming a semirigid mat.

The core material and filter fabric shall be capable of maintaining the drainage void for the entire height of geocomposite drain. Filter fabric shall be integrally bonded to the side of the core material with the drainage void. Core material manufactured from impermeable plastic sheeting having non-connecting corrugations shall be placed with the corrugations approximately perpendicular to the drainage collection system.

The geocomposite drain shall be installed with the drainage void and the filter fabric facing the embankment. The fabric facing the embankment side shall overlap a minimum of 75 mm at all joints and wrap around the exterior edges a minimum of 75 mm beyond the exterior edge. If additional fabric is needed to provide overlap at joints and wraparound at edges, the added fabric shall overlap the fabric on the geocomposite drain at least 150 mm and be attached thereto.

Should the fabric on the geocomposite drain be torn or punctured, the damaged section shall be replaced completely or repaired by placing a piece of fabric that is large enough to cover the damaged area and provide a 150 mm overlap.

Plastic Pipe

Plastic pipe shall conform to the provisions for pipe for edge drains and edge drain outlets in Section 68-3, "Edge Drains," of the Standard Specifications.

Drainage Pads

Concrete for use in drainage pads shall be minor concrete, except the concrete shall contain not less than 300 kilograms of cementitious material per cubic meter.

Treated Permeable Base At Bottom Of Geocomposite Drains

Treated permeable base to be placed around the slotted plastic pipe at the bottom of geocomposite drains shall conform to the provisions in "Treated Permeable Base Under Approach Slab." If asphalt treated permeable base is used, it shall be placed at a temperature of not less than 82°C nor more than 110°C.

The filter fabric to be placed over the treated permeable base at the bottom of geocomposite drains shall conform to the provisions for filter fabric for edge drains in Section 88, "Engineering Fabrics," of the Standard Specifications.

ENGINEERING FABRICS

Filter fabric to be placed between the structure approach embankment material and the treated permeable base shall conform to the provisions for filter fabric for edge drains in Section 88, "Engineering Fabrics," of the Standard Specifications and these special provisions.

The subgrade to receive the filter fabric, immediately prior to placing, shall conform to the compaction and elevation tolerance specified for the material involved.

Filter fabric shall be aligned, handled, and placed in a wrinkle-free manner in conformance with the manufacturer's recommendations.

Adjacent borders of the filter fabric shall be overlapped from 300 to 450 mm or stitched. The preceding roll shall overlap the following roll in the direction the material is being spread or shall be stitched. When the fabric is joined by stitching, it shall be stitched with yarn of a contrasting color. The size and composition of the yarn shall be as recommended by the fabric manufacturer. The number of stitches per 25 mm of seam shall be 5 to 7.

Equipment or vehicles shall not be operated or driven directly on the filter fabric.

TREATED PERMEABLE BASE UNDER APPROACH SLAB

Treated permeable base under structure approach slabs shall consist of constructing either an asphalt treated permeable base or a cement treated permeable base in accordance with Section 29, "Treated Permeable Bases," of the Standard Specifications and these special provisions.

The type of treatment to be used shall be at the option of the Contractor.

The Contractor shall notify the Engineer in writing, not less than 30 days prior to the start of placing the treated permeable base, which type of treated permeable base will be furnished. Once the Contractor has notified the Engineer of the selection, the type to be furnished shall not be changed without a prior written request to do so and approval thereof in writing by the Engineer.

Asphalt treated permeable base shall be placed at a temperature of not less than 93°C nor more than 121°C. Material stored in excess of 2 hours shall not be used in the work.

Asphalt treated permeable base material may be spread in one layer. The base material shall be compacted with a vibrating shoe type compactor or rolled with a roller weighing at least 1.3 tonnes but no more than 4.5 tonnes. Rolling shall begin as soon as the mixture has cooled sufficiently to support the weight of the rolling equipment without undue displacement.

Cement treated permeable base material may be spread in one layer. The base material shall be compacted with either a vibrating shoe type compactor or with a steel-drum roller weighing at least 1.3 tonnes but no more than 4.5 tonnes. Compaction shall begin within one-half hour after the spreading operation and shall consist of 2 complete coverages of the treated material.

APPROACH SLABS

Concrete for use in approach slabs shall contain not less than 400 kilograms of cementitious material per cubic meter.

The steel angle at the concrete barrier joint shall conform to the provision in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

Structure approach slabs shall be cured for not less than 5 days prior to opening to public traffic, unless, at the option of the Contractor, the structure approach slabs are constructed using concrete with a nonchloride Type C chemical admixture conforming to these special provisions.

Structure approach slabs shall be cured for not less than 5 days prior to opening to public traffic, unless, at the option of the Contractor, the structure approach slabs are constructed using concrete with a nonchloride Type C chemical admixture.

Portland cement for use in concrete using a nonchloride Type C chemical admixture shall be Type II or Type III conforming to the provisions in Section 90-2.01, "Cementitious Materials," of the Standard Specifications. Mortar containing the Type II portland cement to be used and Ottawa sand shall not contract in air more than 0.053 percent when tested in conformance with California Test 527.

The nonchloride Type C chemical admixture, approved by the Engineer, shall conform to the requirements in ASTM Designation: C 494/C 494M and Section 90-4, "Admixtures," of the Standard Specifications.

The concrete with nonchloride Type C chemical admixture shall be prequalified prior to placement in conformance with the provisions for prequalification of concrete specified by compressive strength in Section 90-9.01, "General," of the Standard Specifications and the following:

A. Immediately after fabrication of the 5 test cylinders, the cylinders shall be stored in a temperature medium of 21°C ± 1.5°C until the cylinders are tested.
B. The 6-hour average strength of the 5 test cylinders shall not be less than 5.85 MPa. Not more than 2 test cylinders shall have a strength of less than 5.5 MPa.

Building paper shall be commercial quality No. 30 asphalt felt.

Polyvinyl chloride (PVC) conduit used to encase the abutment tie rod shall be of commercial quality.

The top surface of approach slabs shall be finished and treated in conformance with the provisions for decks in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications. Edges of slabs shall be edger finished.

Approach slabs shall be cured with pigmented curing compound (1) in conformance with the provisions for curing structures in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications.

Structure approach slabs constructed using concrete with a nonchloride Type C chemical admixture shall be cured for not less than 6 hours prior to opening to public traffic. The curing period shall be considered to begin at the start of discharge of the last truckload of concrete to be used in the slab.

If the ambient temperature is below 18°C during the curing period for approach slabs using concrete with a nonchloride Type C chemical admixture, an insulating layer or blanket shall be used to cover the surface. The insulating layer or blanket shall have an R-value rating given in the table below. At the Contractor's option, a heating tent may be used in lieu of or in combination with the insulating layer or blanket.

Temperature Range During Curing Period	R-value, minimum
13°C to 18°C	1
7°C to 13°C	2
4°C to 7°C	3

JOINTS

Hardboard and expanded polystyrene shall conform to the provisions in Section 51-1.12D, "Sheet Packing, Preformed Pads, and Board Fillers," of the Standard Specifications.

Type AL joint seals shall conform to the provisions in Section 51-1.12F, "Sealed Joints" of the Standard Specifications. The sealant may be mixed by hand-held, power-driven agitators and placed by hand methods.

The pourable seal between the steel angle and concrete barrier shall conform to the requirements for Type A and AL seals in Section 51-1.12F(3), "Materials and Installation," of the Standard Specifications. The sealant may be mixed by hand-held, power-driven agitators and placed by hand methods. Immediately prior to placing the seal, the joint shall be thoroughly cleaned, including abrasive blast cleaning of the concrete surfaces, so that all foreign material and concrete spillage are removed from all joint surfaces. Joint surfaces shall be dry at the time the seal is placed.

MEASUREMENT AND PAYMENT

Structural concrete, approach slab (Type N) and structural concrete, approach slab (Type EQ) will be measured and paid for in conformance with the provisions in Section 51-1.22, "Measurement," and Section 51-1.23, "Payment," of the Standard Specifications and these special provisions.

Full compensation for the structure approach drainage system including geocomposite drain, plastic pipe, and drainage pads, treated permeable base, filter fabric, woven tape fabric, miscellaneous metal, and pourable seals shall be considered as included in the contract price paid per cubic meter for structural concrete, approach slab of the type shown in the Engineer's Estimate, and no additional compensation will be allowed therefor.

10-1.51 SEALING JOINTS

Joints in concrete bridge decks and joints between concrete structures and concrete approach slabs shall be sealed in conformance with the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

Where polyurethane seals are shown on the plans, a silicone sealant conforming to the provisions in Section 51–1.12F, "Sealed Joints," of the Standard Specifications may be used.

When ordered by the Engineer, a joint seal larger than called for by the Movement Rating shown on the plans shall be furnished and installed. Payment to the Contractor for furnishing the larger seal and for saw cutting the increment of additional depth of groove required will be determined as provided in Section 4-1.03, "Changes," of the Standard Specifications.

10-1.52 ARCHITECTURAL SURFACE (TEXTURED CONCRETE)

Architectural texture for concrete surfaces shall conform to the details shown on the plans and the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Architectural textures listed below are required at concrete surfaces shown on the plans:

A. Fractured rib texture.
B. Architectural texture (stamped concrete).

The fractured rib texture shall be an architectural texture simulating the appearance of straight ribs of concrete with a fractured concrete texture imparted to the raised surface between the ribs. Grooves between ribs shall be continuous with no apparent curves or discontinuities. Variation of the groove from straightness shall not exceed 6 mm for each 3 m of groove. The architectural texture shall have random shadow patterns. Broken concrete at adjoining ribs and groups of ribs shall have a random pattern. The architectural texture shall not have secondary patterns imparted by shadows or repetitive fractured surfaces.

The architectural texture (stamped concrete) shall simulate a formed relief constructed to the dimensions and shapes shown on the plans. Corners at the intersection of plane surfaces shall be sharp and crisp without easing or rounding. A Class 1 surface finish shall be applied to the architectural texture.

TEST PANEL

A test panel at least 1.25 m x 1.25 m in size shall be successfully completed at a location approved by the Engineer before beginning work on architectural textures. The test panel shall be constructed and finished with the materials, tools, equipment and methods to be used in constructing the architectural texture. If ordered by the Engineer, additional test panels shall be constructed and finished until the specified finish, texture and color are obtained, as determined by the Engineer.

The test panel approved by the Engineer shall be used as the standard of comparison in determining acceptability of architectural texture for concrete surfaces.

FORM LINERS

Form liners shall be used for textured concrete surfaces and shall be installed in conformance with the manufacturer's recommendations, unless other methods of forming textured concrete surfaces are approved by the Engineer. Form liners shall be manufactured from an elastomeric material or a semi-elastomeric polyurethane material by a manufacturer of commercially available concrete form liners. No substitution of other types of formliner material will be allowed. Form liners shall leave crisp, sharp definition of the architectural surface. Recurring textural configurations exhibited by repeating, recognizable shadow patterns shall be prevented by proper casting of form liner patterns. Textured concrete surfaces with such recurring textural configurations shall be reworked to remove such patterns as approved by the Engineer or the concrete shall be replaced.

Form liners shall have the following properties:

Description	ASTM Designation:	Range
Elastomeric material		
Shore A hardness	D 2240	20 to 65
Tensile strength (MPa)	D 412	0.9 to 6.2
Semi-elastomeric polyurethane		
Shore D hardness	D 2240	55 to 65
Tensile strength (MPa)	D 2370	18 minimum

Cuts and tears in form liners shall be sealed and repaired in conformance with the manufacturer's recommendations. Form liners that are delaminated from the form shall not be used. Form liners with deformations to the manufactured surface caused by improper storage practices or any other reason shall not be used.

Form liners shall extend the full length of texturing with transverse joints at 2.5 m minimum spacing. Small pieces of form liners shall not be used. Grooves shall be aligned straight and true. Grooves shall match at joints between form liners. Joints in the direction of grooves in grooved patterns shall be located only in the depressed portion of the textured concrete. Adjoining liners shall be butted together without distortion, open cracks or offsets at the joints. Joints between liners shall be cleaned before each use to remove any mortar in the joint.

Adhesives shall be compatible with the form liner material and with concrete. Adhesives shall be approved by the liner manufacturer. Adhesives shall not cause swelling of the liner material.

RELEASING FORM LINERS

Products and application procedures for form release agents shall be approved by the form liner manufacturer. Release agents shall not cause swelling of the liner material or delamination from the forms. Release agents shall not stain the concrete or react with the liner material. For reliefs simulating fractured concrete or wood grain surfaces the application method shall include the scrubbing method using a natural bristle scrub brush in the direction of grooves or grain The release agent shall coat the liner with a thin film. Following application of form release agent, the liner surfaces shall be cleaned of excess amounts of agent using compressed air. Buildup of form release agent caused by the reuse of a liner shall be removed at least every 5 uses.

Form liners shall release without leaving particles or pieces of liner material on the concrete and without pulling or breaking concrete from the textured surface. The concrete surfaces exposed by removing forms shall be protected from damage.

CURING

Concrete surfaces with architectural texture shall be cured only by the forms-in-place or water methods. Seals and curing compounds shall not be used.

MEASUREMENT AND PAYMENT

Architectural texture will be measured and paid for by the square meter.

The contract price paid per square meter for architectural texture of the types listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in architectural texture, complete in place, including test panels, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.53 REINFORCEMENT

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

The Department's mechanical splices prequalified list can be found at the following internet site:

http://www.dot.ca.gov/hq/esc/approved_products_list/

The provisions of "Welding Quality Control" of these special provisions shall not apply to resistance butt welding.

MEASUREMENT AND PAYMENT

Measurement and payment for reinforcement in structures shall conform to the provisions in Section 52-1.10, "Measurement," and Section 52-1.11, "Payment," of the Standard Specifications and these special provisions.

10-1.54 HEADED BAR REINFORCEMENT

Headed bar reinforcement shall consist of bar reinforcement with heads attached to one or both ends. The type of headed bar reinforcement to be used on this project shall be on the Department's current prequalified list prior to use, and shall conform to the provisions of Section 52, "Reinforcement," of the Standard Specifications, the details shown on the plans.

The Department maintains a list of prequalified headed bar reinforcement types. The prequalified list can be obtained by contacting the Transportation Laboratory and is available at the Department's internet site at:

http://www.dot.ca.gov/hq/esc/approved_products_list/

GENERAL

Prior to manufacturing, the Contractor shall submit to the Engineer the manufacturer's Quality Control (QC) manual for the fabrication of headed bar reinforcement. As a minimum, the QC manual shall include the following:

A. The pre-production procedures for the qualification of materials and equipment.
B. The methods and frequencies for performing QC procedures during production.
C. The calibration procedures and calibration frequency for all equipment.
D. A system for the identification and tracking of all friction welds. The system shall have provisions for permanently identifying each weld and the parameters used to perform it.
E. The welding procedure specification (WPS) for friction welded headed bar reinforcement.
F. A system for marking headed bar reinforcement.

The provisions of "Welding Quality Control" of these special provisions shall not apply to headed bar reinforcement.

The Contractor shall perform inspection and testing prior to, during, and after manufacturing headed bar reinforcement and as necessary to ensure that materials and workmanship conform to the requirements of the specifications.

A daily production log for the manufacture of headed bar reinforcement shall be maintained by the manufacturer for each production lot. 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, and manufacturing records, including tracking and production parameters for welds or forgings. The data from the daily production log shall be available to the Engineer upon request.

A production lot of headed bar reinforcement is defined as 150 reinforcing bars, or fraction thereof, of the same bar size, with heads of the same size and type, and manufactured by the same method, produced from bar material of a single heat number and head material of a single heat number. If one reinforcing bar has a head on both ends, it will be counted as two reinforcing bars for the purposes of establishing and testing production lots. 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 Contractor shall furnish Certificates of Compliance accompanied by a copy of the mill test report, the Production Tests Reports specified herein, and the corresponding daily production logs to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each shipment of headed bar reinforcement delivered to the jobsite.

Welding, welder qualifications, and inspection of welding shall conform to the requirements for friction welding in ANSI/AWS C6.1.

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 reinforcement. The parameters to be recorded shall include friction welding force, forge force, rotational speed, friction upset distance and time, and forge upset distance and time. The data from this in-process monitoring shall be recorded and preserved by the manufacturer until acceptance of the contract and shall be provided to the Engineer upon request.

PRODUCTION TESTS

Production tests shall be performed at the Contractor's expense, at an independent qualified testing laboratory, and in the presence of the Engineer, unless otherwise directed in writing. The independent qualified testing laboratory used to perform the testing of headed bar reinforcement samples shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors who will provide other services or materials for the project, and shall have the following:

A. A tensile testing machine capable of breaking the largest size of reinforcing bar to be tested.
B. Operators who have received formal training for performing the testing requirements of ASTM Designation: A 970/A 970M.
C. A record of annual calibration of testing equipment performed by an independent third party that has 1) standards that are traceable to the National Institute of Standards and Technology, and 2) a formal reporting procedure, including published test forms.

The Engineer shall be notified in writing when any lots of headed bar reinforcement are ready for testing. The notification shall include the number of lots to be tested and the location where the tests are to be conducted. After notification has been received, test samples will be randomly selected by the Engineer from each production lot of headed bar reinforcement which is ready for shipment to the jobsite. If epoxy coating is required, test samples will be taken after the headed bar reinforcement has been prepared for epoxy coating. The Engineer will be at the testing site within a maximum of one week after receiving written notification that the samples are at the testing site and ready for testing. In the event the Engineer fails to be present at the testing site within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by failure of the Engineer to be present at the testing site, the Contractor will be compensated for any resulting loss in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

A minimum of 3 samples from each production lot shall be tested. One tensile test shall be conducted on each sample.

Tensile tests shall conform to the requirements specified in ASTM Designation: A 970/A 970M, Section 7, except that at rupture, there shall be visible signs of necking in the reinforcing bar 1) at a minimum distance of one bar diameter away from the head to bar connection for friction welded headed bar reinforcement, or 2) outside the affected zone for integrally forged headed bar reinforcement.

The affected zone for integrally forged headed bar reinforcement is the portion of the reinforcing bar where any properties of the bar, including the physical, metallurgical, or material characteristics, have been altered during the manufacturing process.

If one of the test specimens fails to meet the specified requirements, one retest shall be performed on one additional sample, selected by the Engineer, from the same production lot. If the additional test specimen, or if more than one of the original test specimens fail to meet these requirements, all headed bar reinforcement in the lot represented by the tests will be rejected in conformance with the provisions in Section 6-1.04, "Defective Materials," of the Standard Specifications.

A Production Test Report for all testing performed on each lot shall be prepared by the independent testing laboratory and submitted to the Engineer as specified herein. The report shall be signed by an engineer who represents the laboratory and is registered as a Civil Engineer in the State of California. The report shall include the following information for each set: contract number, bridge number, lot number, bar size, type of headed bar reinforcement, physical conditions of test sample, any notable defects, limits of affected zone, location of visible necking area, and the ultimate strength of each headed bar.

MEASUREMENT AND PAYMENT

Quantities of headed bar reinforcement will be measured as units determined from the number of heads shown on the plans or as directed by the Engineer.

The contract unit price paid for headed bar reinforcement shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing headed 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.

Bar reinforcement to be used in the manufacture of headed bar reinforcement and placing the completed headed bar reinforcement into the work will be measured and paid for as specified in Section 52, "Reinforcement," of the Standard Specifications, except that the lengths to be used in the computation of calculated masses of the bar reinforcement shall be the entire length of the completed headed bar, including heads.

10-1.55 STEEL STRUCTURES

Construction of steel structures shall conform to the provisions in Section 55, "Steel Structures," of the Standard Specifications and these special provisions.

Attention is directed to "Welding" in Section 8, "Materials," of these special provisions.
The following substitutions of high-strength steel fasteners shall be made:

METRIC SIZE SHOWN ON THE PLANS	SIZE TO BE SUBSTITUTED
ASTM Designation: A 325M (Nominal bolt diameter (mm))	ASTM Designation: A 325 (Nominal bolt diameter (inch))
13, 12.70, or M12	1/2
16, 15.88, or M16	5/8
19, 19.05, or M20	3/4
22, 22.22, or M22	7/8
24, 25, 25.40, or M24	1
29, 28.58, or M27	1 1/8
32, 31.75, or M30	1 1/4
38, 38.10, or M36	1 1/2

MATERIALS

High-strength fastener assemblies and other bolts attached to structural steel with nuts and washers shall be zinc-coated. When direct tension indicators are used in these assemblies, the direct tension indicator and all components of the fastener assembly shall be zinc-coated by the mechanical deposition process.

ROTATIONAL CAPACITY TESTING PRIOR TO SHIPMENT TO JOB SITE

Rotational capacity tests shall be performed on all lots of high-strength fastener assemblies prior to shipment of these lots to the project site. Zinc-coated assemblies shall be tested after all fabrication, coating, and lubrication of components has been completed. One hardened washer shall be used under each nut for the tests.

The requirements of this section do not apply to high-strength cap screws or high-strength bolts used for slip base plates.

Each combination of bolt production lot, nut lot, and washer lot shall be tested as an assembly.

A rotational capacity lot number shall be assigned to each combination of lots tested. Each shipping unit of fastener assemblies shall be plainly marked with the rotational capacity lot number.

Two fastener assemblies from each rotational capacity lot shall be tested.

The following equipment, procedure, and acceptance criteria shall be used to perform rotational capacity tests on and determine acceptance of long bolts. Fasteners are considered to be long bolts when full nut thread engagement can be achieved when installed in a bolt tension measuring device:

A. Long Bolt Test Equipment:

1. Calibrated bolt tension measuring device with adequate tension capacity for the bolts being tested.
2. Calibrated dial or digital torque wrench. Other suitable tools will be required for performing Steps 7 and 8 of the Long Bolt Test Procedure. A torque multiplier may be required for large diameter bolts.
3. Spacer washers or bushings. When spacer washers or bushings are required, they shall have the same inside diameter and equal or larger outside diameter as the appropriate hardened washers conforming to the requirements in ASTM Designation: F436.
4. Steel beam or member, such as a girder flange or cross frame, to which the bolt tension measuring device will be attached. The device shall be accessible from the ground.

B. Long Bolt Test Procedure:

1. Measure the bolt length. The bolt length is defined as the distance from the end of the threaded portion of the shank to the underside of the bolt head.
2. Install the nut on the bolt so that 3 to 5 full threads of the bolt are located between the bearing face of the nut and the underside of the bolt head. Measure and record the thread stickout of the bolt. Thread stickout is determined by measuring the distance from the outer face of the nut to the end of the threaded portion of the shank.
3. Insert the bolt into the bolt tension measuring device and install the required number of washers, and additional spacers as needed, directly beneath the nut to produce the thread stickout measured in Step 2 of this procedure.
4. Tighten the nut using a hand wrench to a snug-tight condition. The snug tension shall not be less than the Table A value but may exceed the Table A value by a maximum of 2 kips.

Table A

High-Strength Fastener Assembly Tension Values to Approximate Snug-Tight Condition	
Bolt Diameter (inches)	Snug Tension (kips)
1/2	1
5/8	2
3/4	3
7/8	4
1	5
1 1/8	6
1 1/4	7
1 3/8	9
1 1/2	10

5. Match-mark the assembly by placing a heavy reference start line on the face plate of the bolt tension measuring device which aligns with 1) a mark placed on one corner of the nut, and 2) a radial line placed across the flat on the end of the bolt, or on the exposed portions of the threads of tension control bolts. Place an additional mark on the outside of the socket that overlays the mark on the nut corner such that this mark will be visible while turning the nut. Make an additional mark on the face plate, either 2/3 of a turn, one turn, or 1 1/3 turn clockwise from the heavy reference start line, depending on the bolt length being tested as shown in Table B.

Table B

Required Nut Rotation for Rotational Capacity Tests[a,b]	
Bolt Length (measured in Step 1)	Required Rotation (turn)
4 bolt diameters or less	2/3
Greater than 4 bolt diameters but no more than 8 bolt diameters	1
Greater than 8 bolt diameters, but no more than 12 bolt diameters[c]	1 1/3
(a) Nut rotation is relative to bolt, regardless of the element (nut or bolt) being turned. For bolts installed by 1/2 turn and less, the tolerance shall be plus or minus 30 degrees; for bolts installed by 2/3 turn and more, the tolerance shall be plus or minus 45 degrees. (b) Applicable only to connections in which all material within grip of the bolt is steel. (c) When bolt length exceeds 12 diameters, the required rotation shall be determined by actual tests in a suitable tension device simulating the actual conditions.	

6. Turn the nut to achieve the applicable minimum bolt tension value listed in Table C. After reaching this tension, record the moving torque, in foot-pounds, required to turn the nut, and also record the corresponding bolt tension value in pounds. Torque shall be measured with the nut in motion. Calculate the value, T (in ft-lbs), where T=[(the measured tension in pounds) x (the bolt diameter in inches) / 48 in/ft].

Table C

Minimum Tension Values for High-Strength Fastener Assemblies	
Bolt Diameter (inches)	Minimum Tension (kips)
1/2	12
5/8	19
3/4	28
7/8	39
1	51
1 1/8	56
1 1/4	71
1 3/8	85
1 1/2	103

7. Turn the nut further to increase bolt tension until the rotation listed in Table B is reached. The rotation is measured from the heavy reference line made on the face plate after the bolt was snug-tight. Record this bolt tension.
8. Loosen and remove the nut and examine the threads on both the nut and bolt.

C. Long Bolt Acceptance Criteria:

1. An assembly shall pass the following requirements to be acceptable: 1) the measured moving torque (Step 6) shall be less than or equal to the calculated value, T (Step 6), 2) the bolt tension measured in Step 7 shall be greater than or equal to the applicable turn test tension value listed in Table D, 3) the nut shall be able to be removed from the bolt without signs of thread stripping or galling after the required rotation in Step 7 has been achieved, 4) the bolt does not shear from torsion or fail during the test, and 5) the assembly does not seize before the final rotation in Step 7 is reached. Elongation of the bolt in the threaded region between the bearing face of the nut and the underside of the bolt head is expected and will not be considered a failure. Both fastener assemblies tested from one rotational capacity lot shall pass for the rotational capacity lot to be acceptable.

Table D

Turn Test Tension Values	
Bolt Diameter (inches)	Turn Test Tension (kips)
1/2	14
5/8	22
3/4	32
7/8	45
1	59
1 1/8	64
1 1/4	82
1 3/8	98
1 1/2	118

The following equipment, procedure, and acceptance criteria shall be used to perform rotational capacity tests on and determine acceptance of short bolts. Fasteners are considered to be short bolts when full nut thread engagement cannot be achieved when installed in a bolt tension measuring device:

A. Short Bolt Test Equipment:

1. Calibrated dial or digital torque wrench. Other suitable tools will be required for performing Steps 7 and 8 of the Short Bolt Test Procedure. A torque multiplier may be required for large diameter bolts.
2. Spud wrench or equivalent.
3. Spacer washers or bushings. When spacer washers or bushings are required, they shall have the same inside diameter and equal or larger outside diameter as the appropriate hardened washers conforming to the requirements in ASTM Designation: F436.

4. Steel plate or girder with a hole to install bolt. The hole size shall be 1.6 mm greater than the nominal diameter of the bolt to be tested. The grip length, including any plates, washers, and additional spacers as needed, shall provide the proper number of threads within the grip, as required in Step 2 of the Short Bolt Test Procedure.

B. Short Bolt Test Procedure:

1. Measure the bolt length. The bolt length is defined as the distance from the end of the threaded portion of the shank to the underside of the bolt head.
2. Install the nut on the bolt so that 3 to 5 full threads of the bolt are located between the bearing face of the nut and the underside of the bolt head. Measure and record the thread stickout of the bolt. Thread stickout is determined by measuring the distance from the outer face of the nut to the end of the threaded portion of the shank.
3. Install the bolt into a hole on the plate or girder and install the required number of washers and additional spacers as needed between the bearing face of the nut and the underside of the bolt head to produce the thread stickout measured in Step 2 of this procedure.
4. Tighten the nut using a hand wrench to a snug-tight condition. The snug condition shall be the full manual effort applied to the end of a 305 mm long wrench. This applied torque shall not exceed 20 percent of the maximum allowable torque in Table E.

Table E

Maximum Allowable Torque for High-Strength Fastener Assemblies	
Bolt Diameter (inches)	Torque (ft-lbs)
1/2	145
5/8	285
3/4	500
7/8	820
1	1220
1 1/8	1500
1 1/4	2130
1 3/8	2800
1 1/2	3700

5. Match-mark the assembly by placing a heavy reference start line on the steel plate or girder which aligns with 1) a mark placed on one corner of the nut and 2) a radial line placed across the flat on the end of the bolt or on the exposed portions of the threads of tension control bolts. Place an additional mark on the outside of the socket that overlays the mark on the nut corner such that this mark will be visible while turning the nut. Make 2 additional small marks on the steel plate or girder, one 1/3 of a turn and one 2/3 of a turn clockwise from the heavy reference start line on the steel plate or girder.
6. Using the torque wrench, tighten the nut to the rotation value listed in Table F. The rotation is measured from the heavy reference line described in Step 5 made after the bolt was snug-tight. A second wrench shall be used to prevent rotation of the bolt head during tightening. Measure and record the moving torque after this rotation has been reached. The torque shall be measured with the nut in motion.

Table F

Nut Rotation Required for Turn-of-Nut Installation[a,b]	
Bolt Length (measured in Step 1)	Required Rotation (turn)
4 bolt diameters or less	1/3
(a) Nut rotation is relative to bolt, regardless of the element (nut or bolt) being turned. For bolts installed by 1/2 turn and less, the tolerance shall be plus or minus 30 degrees. (b) Applicable only to connections in which all material within grip of the bolt is steel.	

7. Tighten the nut further to the 2/3-turn mark as indicated in Table G. The rotation is measured from the heavy reference start line made on the plate or girder when the bolt was snug-tight. Verify that the radial line on the bolt end or on the exposed portions of the threads of tension control bolts is still in alignment with the start line.

Table G

Required Nut Rotation for Rotational Capacity Test	
Bolt Length (measured in Step 1)	Required Rotation (turn)
4 bolt diameters or less	2/3

8. Loosen and remove the nut and examine the threads on both the nut and bolt.

C. Short Bolt Acceptance Criteria:

1. An assembly shall pass the following requirements to be acceptable: 1) the measured moving torque from Step 6 shall be less than or equal to the maximum allowable torque from Table E, 2) the nut shall be able to be removed from the bolt without signs of thread stripping or galling after the required rotation in Step 7 has been achieved, 3) the bolt does not shear from torsion or fail during the test, and 4) the assembly shall not seize before the final rotation in Step 7 is reached. Elongation of the bolt in the threaded region between the bearing face of the nut and the underside of the bolt head will not be considered a failure. Both fastener assemblies tested from one rotational capacity lot shall pass for the rotational capacity lot to be acceptable.

INSTALLATION TENSION TESTING AND ROTATIONAL CAPACITY TESTING AFTER ARRIVAL ON THE JOB SITE

Installation tension tests and rotational capacity tests on high-strength fastener assemblies shall be performed by the Contractor prior to acceptance or installation and after arrival of the fastener assemblies on the project site. Installation tension tests and rotational capacity tests shall be performed at the job-site, in the presence of the Engineer, on each rotational capacity lot of fastener assemblies.

The requirements of this section do not apply to high-strength cap screws or high-strength bolts used for slip base plates.

Installation tension tests shall be performed on 3 representative fastener assemblies in conformance with the provisions in Section 8, "Installation," of the RCSC Specification. For short bolts, Section 8.2, "Pretensioned Joints," of the RCSC Specification shall be replaced by the "Pre-Installation Testing Procedures," of the "Structural Bolting Handbook," published by the Steel Structures Technology Center, Incorporated.

The rotational capacity tests shall be performed in conformance with the requirements for rotational capacity tests in "Rotational Capacity Testing Prior to Shipment to Job Site" of these special provisions.

At the Contractor's expense, additional installation tension tests, tests required to determine job inspecting torque, and rotational capacity tests shall be performed by the Contractor on each rotational capacity lot, in the presence of the Engineer, if 1) any fastener is not used within 3 months after arrival on the jobsite, 2) fasteners are improperly handled, stored, or subjected to inclement weather prior to final tightening, 3) significant changes are noted in original surface condition of threads, washers, or nut lubricant, or 4) the Contractor's required inspection is not performed within 48 hours after all fasteners in a joint have been tensioned.

Failure of a job-site installation tension test or a rotational capacity test will be cause for rejection of unused fasteners that are part of the rotational capacity lot.

When direct tension indicators are used, installation verification tests shall be performed in conformance with Appendix Section X1.4 of ASTM Designation: F959, except that bolts shall be initially tensioned to a value 5 percent greater than the minimum required bolt tension.

SURFACE PREPARATION

For all bolted connections, the contact surfaces and inside surfaces of bolt holes shall be cleaned and coated before assembly in conformance with the provisions for cleaning and painting structural steel of these special provisions.

SEALING

The perimeter around all direct tension indicator gaps shall be completely sealed with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II. The sealant shall be gray in color and have a minimum thickness of 1.3 mm. If painting is required, the sealing compound shall be applied prior to painting.

When zinc-coated tension control bolts are used, the sheared end of each fastener shall be completely sealed with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II. The sealant shall be gray in color and shall have a minimum thickness of 1.3 mm. The sealant shall be applied to a clean sheared surface on the same day that the splined end is sheared off.

WELDING

Table 2.2 of AWS D1.5 is superseded by the following table:

Base Metal Thickness of the Thicker Part Joined, mm	Minimum Effective Partial Joint Penetration Groove Weld Size, * mm
Over 6 to 13 inclusive	5
Over 13 to 19 inclusive	6
Over 19 to 38 inclusive	8
Over 38 to 57 inclusive	10
Over 57 to 150 inclusive	13
Over 150	16

* Except the weld size need not exceed the thickness of the thinner part

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.

Backing for welds, subject to computed stresses, that is 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 type 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 welded joint with which the backing is to be used.

The requirement of conformance with AWS D1.5 shall not apply to work conforming to Section 56-1, "Overhead Sign Structures," or Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications.

10-1.56 SIGN STRUCTURES

Sign structures and foundations for overhead signs shall conform to the provisions in Section 56-1, "Overhead Sign Structures," of the Standard Specifications, "Steel Structures" of these special provisions, and the following requirements.

Before commencing fabrication of sign structures, the Contractor shall submit 2 sets of working drawings to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The working drawings shall include sign panel dimensions, span lengths, post heights, anchorage layouts, proposed splice locations, a snugging and tensioning pattern for anchor bolts and high strength bolted connections, and details for permanent steel anchor bolt templates. The working drawings shall be supplemented with a written quality control program that includes methods, equipment, and personnel necessary to satisfy the requirements specified herein.

Working drawings shall be 559 mm x 864 mm or 279 mm x 432 mm in size and each drawing and calculation sheet shall include the State assigned designations for the sign structure type and reference as shown on the contract plans, District-County-Route-Kilometer Post, and contract number.

The Engineer shall have 20 working days to review the sign structure working drawings after a complete submittal has been received. No fabrication or installation of sign structures shall be performed until the working drawings are approved in writing by the Engineer.

Should the Engineer fail to complete the review within the time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the sign structure working drawings, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Steel bolts not designated on the plans as high-strength (HS) or stainless steel shall be for general applications and shall conform to the requirements in ASTM Designation: A 307.

A permanent steel template shall be used to maintain the proper anchor bolt spacing.

One top nut, one leveling nut, and 2 washers shall be provided for the upper threaded portion of each anchor bolt.

Flatness of surfaces of 1) base plates that are to come in contact with concrete, grout, or washers and leveling nuts, and 2) plates in high-strength bolted connections, shall conform to the requirements in ASTM Designation: A 6/A 6M.

No holes shall be made in members unless the holes are shown on the plans or are approved in writing by the Engineer.

Longitudinal seam welds shall have 60 percent minimum penetration, except that within 150 mm of circumferential welds, longitudinal seam welds shall be complete joint penetration (CJP) groove welds. In addition, longitudinal seam welds on structures having telescopic pole segment splices shall be CJP groove welds on the female end for a length on each end equal to the designated slip fit splice length plus 150 mm.

Steel members used for overhead sign structures shall receive nondestructive testing (NDT) in conformance with AWS D1.1 and the following:

A.

Weld Location	Weld Type	Minimum Required NDT
Splice welds around the perimeter of tubular sections, poles, and arms.	CJP groove weld with backing ring	100% UT[a] or RT[b]
Longitudinal seam welds	CJP or PJP[c] groove weld	Random 25% MT[d]
Longitudinal seam welds within 150 mm of a circumferential splice.	CJP groove weld	100% UT or RT
Welds attaching base plates, flange plates, or pole or mast arm plates, to poles or arm tubes.	CJP groove weld with backing ring and reinforcing fillet	t> 4.5 mm: 100%UT and MT t< 4.5 mm: 100% MT after root weld pass & final weld pass t = pole or arm thickness
	External (top) fillet weld for socket-type connections	100% MT

[a] ultrasonic testing
[b] radiographic testing
[c] partial joint penetration
[d] magnetic particle testing

B. The acceptance and repair criteria for UT of welded joints where any of the members are less than 8 mm thick or where tubular sections are less than 325 mm in diameter, shall conform to the requirements in AWS D1.1, Section 6.13.3.1. A written procedure approved by the Engineer shall be used when performing this UT. These written procedures shall conform to the requirements in AWS D1.1, Annex K. The acceptance and repair criteria for other welded joints receiving UT shall conform to the requirements in AWS D1.1, Section 6, Table 6.3 for cyclically loaded nontubular connections.

C. The acceptance and repair criteria for radiographic or real time image testing shall conform to the requirements of AWS D1.1 for tensile stress welds.

D. For longitudinal seam welds, the random locations for NDT will be selected by the Engineer. The cover pass shall be ground smooth at the locations to be tested. If repairs are required in a portion of a tested weld, the repaired portion shall receive NDT, and additional NDT shall be performed on untested portions of the weld. The additional NDT shall be performed on 25 percent of that longitudinal seam weld. After this additional NDT is performed, and if more repairs are required, then that entire longitudinal seam weld shall receive NDT.

Circumferential welds and base plate to post welds may be repaired only one time without written permission from the Engineer.

All ferrous metal parts of tubular sign structures shall be galvanized and shall not be painted.

Full compensation for furnishing anchor bolt templates and for testing of welds shall be considered as included in the contract price paid per kilogram for furnish sign structure and no additional compensation will be allowed therefor.

10-1.57 ROADSIDE SIGNS

Roadside signs shall be furnished and installed at the locations shown on the plans or where designated by the Engineer and in conformance with the provisions in Section 56-2, "Roadside Signs," of the Standard Specifications and these special provisions.

The Contractor shall furnish roadside sign panels in conformance with the provisions in "Furnish Sign" of these special provisions.

Wood posts shall be pressure treated after fabrication in conformance with the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling," of the Standard Specifications and AWPA Use Category System: UC4A, Commodity Specification A or B.

10-1.58 HABITAT RESTORATION SIGN

Habitat restoration signs shall be furnished and installed at the locations shown, in conformance with the details shown on the plans and as directed by the Engineer.

Habitat restoration signs shall consist of sign panels, and sign panel mounting hardware.

Habitat restoration signs shall conform to Section 56-2, "Roadside Signs," of the Standard Specifications and these special provisions.

Habitat restoration signs shall be measured by the unit, as determined from the actual count in place.

The contract unit price paid for habitat restoration sign shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing habitat restoration sign, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.59 FURNISH SIGN

Signs shall be fabricated and furnished in accordance with details shown on the plans, the Traffic Sign Specifications, and these special provisions.

Traffic Sign Specifications for California sign codes are available for review at:

http://www.dot.ca.gov/hq/traffops/signtech/signdel/specs.htm

Traffic Sign Specifications for signs referenced with Federal MUTCD sign codes can be found in Standard Highway Signs Book, administered by the Federal Highway Administration, which is available for review at:

http://mutcd.fhwa.dot.gov/ser-shs_millennium.htm

Information on cross-referencing California sign codes with the Federal MUTCD sign codes is available at:

http://www.dot.ca.gov/hq/traffops/signtech/signdel/specs.htm

Temporary or permanent signs shall be free from blemishes that may affect the serviceability and detract from the general sign color and appearance when viewing during daytime and nighttime from a distance of 8 m. The face of each finished sign shall be uniform, flat, smooth, and free of defects, scratches, wrinkles, gel, hard spots, streaks, extrusion marks, and air bubbles. The front, back, and edges of the sign panels shall be free of router chatter marks, burns, sharp edges, loose rivets, delaminated skins, excessive adhesive over spray and aluminum marks.

QUALITY CONTROL FOR SIGNS

The requirements of "Quality Control for Signs" in this section shall not apply to construction area signs.

No later than 14 days before sign fabrication, the Contractor shall submit a written copy of the quality control plan for signs to the Engineer for review. The Engineer will have 10 days to review the quality control plan. Sign fabrication shall not begin until the Engineer approves the Contractor's quality control plan in writing. The Contractor shall submit to the Engineer at least 3 copies of the approved quality control plan. The quality control plan shall include, but not be limited to the following requirements:

A. Identification of the party responsible for quality control of signs,
B. Basis of acceptance for incoming raw materials at the fabrication facility,

C. Type, method and frequency of quality control testing at the fabrication facility,
D. List (by manufacturer and product name) of process colors, protective overlay film, retroreflective sheeting and black non-reflective film,
E. Recommended cleaning procedure for each product, and
F. Method of packaging, transport and storage for signs.

No legend shall be installed at the project site. Legend shall include letters, numerals, tildes, bars, arrows, route shields, symbols, logos, borders, artwork, and miscellaneous characters. The style, font, size, and spacing of the legend shall conform to the Standard Alphabets published in the FHWA Standard Highway Signs Book. The legend shall be oriented in the same direction in accordance with the manufacturer's orientation marks found on the retroreflective sheeting.

On multiple panel signs, legend shall be placed across joints without affecting the size, shape, spacing, and appearance of the legend. Background and legend shall be wrapped around interior edges of formed panel signs as shown on plans to prevent delamination.

The following notation shall be placed on the lower right side of the back of each sign where the notation will not be blocked by the sign post or frame:

A. PROPERTY OF STATE OF CALIFORNIA,
B. Name of the sign manufacturer,
C. Month and year of fabrication,
D. Type of retroreflective sheeting, and
E. Manufacturer's identification and lot number of retroreflective sheeting.

The above notation shall be applied directly to the aluminum sign panels in 6-mm upper case letters and numerals by die-stamp and applied by similar method to the fiberglass reinforced plastic signs. Painting, screening, or engraving the notation will not be allowed. The notation shall be applied without damaging the finish of the sign.

Signs with a protective overlay film shall be marked with a dot of 10 mm diameter. The dot placed on white border shall be black, while the dot placed on black border shall be white. The dot shall be placed on the lower border of the sign before application of the protective overlay film and shall not be placed over the legend and bolt holes. The application method and exact location of the dot shall be determined by the manufacturer of the signs.

For sign panels that have a minor dimension of 1220 mm or less, no splice will be allowed in the retroreflective sheet except for the splice produced during the manufacturing of the retroreflective sheeting. For sign panels that have a minor dimension greater than 1220 mm, only one horizontal splice will be allowed in the retroreflective sheeting.

Unless specified by the manufacturer of the retroreflective sheeting, splices in retroreflective sheeting shall overlap by a minimum of 25 mm. Splices shall not be placed within 50 mm from edges of the panels. Except at the horizontal borders, the splices shall overlap in the direction from top to bottom of the sign to prevent moisture penetration. The retroreflective sheeting at the overlap shall not exhibit a color difference under the incident and reflected light.

Signs exhibiting a significant color difference between daytime and nighttime shall be replaced immediately.

Repairing sign panels will not be allowed except when approved by the Engineer.

The Department will inspect signs at the Contractor's facility and delivery location, and in accordance with Section 6, "Control of Materials," of the Standard Specifications. The Engineer will inspect signs for damage and defects before and after installation.

Regardless of kind, size, type, or whether delivered by the Contractor or by a common carrier, signs shall be protected by thorough wrapping, tarping, or other methods to ensure that signs are not damaged by weather conditions and during transit. Signs shall be dry during transit and shipped on palettes, in crates, or tier racks. Padding and protective materials shall be placed between signs as appropriate. Finished sign panels shall be transported and stored by method that protects the face of signs from damage. The Contractor shall replace wet, damaged, and defective signs.

Signs shall be stored in dry environment at all times. Signs shall not rest directly on the ground or become wet during storage. Signs, whether stored indoor or outdoor, shall be free standing. In areas of high heat and humidity signs shall be stored in enclosed climate-controlled trailers or containers. Signs shall be stored indoor if duration of the storage will exceed 30 days.

Screen processed signs shall be protected, transported and stored as recommended by the manufacturer of the retroreflective sheeting.

When requested, the Contractor shall provide the Engineer test samples of signs and materials used at various stages of production. Sign samples shall be 300 mm x 300 mm in size with applied background, letter or numeral, and border strip.

The Contractor shall assume the costs and responsibilities resulting from the use of patented materials, equipment, devices, and processes for the Contractor's work.

SHEET ALUMINUM

Alloy and temper designations for sheet aluminum shall be in accordance with ASTM Designation: B209.

The Contractor shall furnish the Engineer a Certificate of Compliance in accordance to Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for the sheet aluminum.

Sheet aluminum shall be pretreated in accordance to ASTM Designation: B449. Surface of the sheet aluminum shall be cleaned, deoxidized, and coated with a light and tightly adherent chromate conversion coating free of powdery residue. The conversion coating shall be Class 2 with a mass between 108 mg/m^2 and 377 mg/m^2, and an average mass of 269 mg/m^2. Following the cleaning and coating process, the sheet aluminum shall be protected from exposure to grease, oils, dust, and contaminants.

Sheet aluminum shall be free of buckles, warps, dents, cockles, burrs, and defects resulting from fabrication.

Base plate for standard route marker shall be die cut.

RETROREFLECTIVE SHEETING

The Contractor shall furnish retroreflective sheeting for sign background and legend in accordance with ASTM Designation: D4956 and "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Retroreflective sheeting shall be applied to sign panels as recommended by the retroreflective sheeting manufacturer without stretching, tearing, and damage.

Class 1, 3, or 4 adhesive backing shall be used for Type II, III, IV, VII, VIII, and IX retroreflective sheeting. Class 2 adhesive backing may also be used for Type II retroreflective sheeting. The adhesive backing shall be pressure sensitive and fungus resistant.

When the color of the retroreflective sheeting determined from instrumental testing is in dispute, the Engineer's visual test will govern.

PROCESS COLOR AND FILM

The Contractor shall furnish and apply screened process color, non-reflective opaque black film, and protective overlay film of the type, kind, and product that are approved by the manufacturer of the retroreflective sheeting.

The Contractor shall furnish the Engineer a Certificate of Compliance in accordance to Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for the screened process color, non-reflective opaque black film, and protective overlay film.

The surface of the screened process color shall be flat and smooth. When the screened process colors determined from the instrumental testing in accordance to ASTM Designation: D4956 are in dispute, the Engineer's visual test will govern.

The Contractor shall provide patterns, layouts, and set-ups necessary for the screened process.

The Contractor may use green, red, blue, and brown reverse-screened process colors for background and non-reflective opaque black film or black screened process color for legend. The coefficient of retroreflection for reverse-screened process colors on white retroreflective sheeting shall not be less than 70 percent of the coefficient of retroreflection specified in ASTM Designation: D4956.

The screened process colors and non-reflective opaque black film shall have the same outdoor weatherability as that of the retroreflective sheeting.

After curing, screened process colors shall withstand removal when tested by applying 3M Company Scotch Brand Cellophane Tape No. 600 or equivalent tape over the color and removing with one quick motion at 90°angle.

SINGLE SHEET ALUMINUM SIGN

Single sheet aluminum signs shall be fabricated and furnished with or without frame. The Contractor shall furnish the sheet aluminum in accordance to "Sheet Aluminum" of these special provisions. Single sheet aluminum signs shall be fabricated from sheet aluminum alloy 6061-T6 or 5052-H38.

Single sheet aluminum signs shall not have a vertical splice in the sheet aluminum. For signs with depth greater than 1220 mm, one horizontal splice will be allowed in the sheet aluminum.

Framing for single sheet aluminum sign shall consist of aluminum channel or rectangular aluminum tubing. The framing shall have a length tolerance of ±3 mm. The face sheet shall be affixed to the frame with rivets of 5-mm diameter. Rivets shall be placed within the web of channels and shall not be placed less than 13 mm from edges of the sign panels. Rivets shall be made of aluminum alloy 5052 and shall be anodized or treated with conversion coating to prevent corrosion. The exposed portion of rivets on the face of signs shall be the same color as the background or legend where the rivets are placed.

Finished signs shall be flat within a tolerance of ±3 mm per meter when measured across the plane of the sign in all directions. The finished signs shall have an overall tolerance within ±3 mm of the detailed dimensions.

Aluminum channels or rectangular aluminum tubings shall be welded together with the inert gas shielded-arc welding process using E4043 aluminum electrode filler wires as shown on the plans. Width of the filler shall be equal to wall thickness of smallest welded channel or tubing.

LAMINATED PANEL SIGN

Laminated panel signs shall consist of two sheet aluminum laminated to a honeycomb core and extruded aluminum frame to produce flat and rigid panels of 25.4-mm or 63.5-mm nominal thickness.

The face of laminated panel signs shall be fabricated from sheet aluminum alloy 6061-T6 or 5052-H32 of 1.6-mm thickness. The back of laminated panel signs shall be fabricated from sheet aluminum alloy 3003-H14 of 1.0-mm thickness. The Contractor shall furnish sheet aluminum as provided in "Sheet Aluminum" of these special provisions.

The core material shall be phenolic impregnated kraft paper honeycomb and fungus resistant in accordance to Military Specification MIL-D-5272. The honeycomb cell size shall be 13 mm. Weight of the kraft paper shall be 300 g/m^2 and impregnated minimum 18 percent by weight.

A laminating adhesive that can produce a resilient oil and water-resistant bond shall be used to adhere the extruded aluminum frame and the honeycomb core to the sheet aluminum. Edge and interior delamination occur when a 0.25-mm thick feeler gauge of 13 mm in length can be inserted into a depth of more than 13 mm between the extruded aluminum frame and the sheet aluminum. Laminated panel sign with delamination will be rejected.

Laminated panels shall be able to resist a wind load of 161 kg/m^2 for the following simple span lengths with a bending safety factor of 1.25:

Panel Type	Nominal Panel Thickness	Simple Span Length
A	25.4 mm	2.7 m
B	25.4 mm	2.7 m
	63.5 mm	4.42 m
H	63.5 mm	4.42 m

The tensile strength of laminated panels shall be at least 138 kPa when tested in accordance with the following modification and with ASTM Designations: C297 and C481, Cycle B after aging. Instead of spraying with hot water, the specimen shall be totally immersed in 70°C hot water. When requested by the Engineer or the Transportation Laboratory, at least one test sample of 300 mm x 300 mm in size shall be taken for every 186 m^2 of the panel production cycle or of the total factory production order, whichever occurs first.

Rivets used to secure the sheet aluminum to the perimeter frame shall be fabricated from aluminum alloy 5052 and annodized or treated with a conversion coating to prevent corrosion. Size of the aluminum rivets shall be 5 mm in diameter and placed at the corners of the laminated panels. Color of the exposed portion of the rivets shall be the same color as the sign background or legend on which the rivets are placed. Rivets or stainless steel screws shall be placed in holes drilled during fabrication in the perimeter frame.

On laminated multiple panel signs, a closure H-Section shall be placed in the top channel of the bottom panel. Perimeter frame of adjoining panel shall accommodate the closure H-Section in the closed position.

For signs with a depth of 1524 mm or less, the laminated panels shall be fabricated with no horizontal joints, splices or seams. For signs with a depth of greater than 1524 mm, the laminated panels may be fabricated in two panels.

The face of laminated panels shall be flat with a tolerance of ±8 mm per meter when measured across the plane of each panel in all directions. Where laminated panels adjoin, the gap between adjoining edges from one corner to the other corner shall not deviate by more than 1 mm. Non-adjoining edges from one corner to the other corner shall not deviate by more than 3 mm from a straight plane. The front and back sheet aluminum shall be flush with the perimeter frame. The panel edges shall be smooth.

Laminated panel signs shall be within +3 mm or -13 mm of the detailed dimensions. The difference in length between adjoining panels of multiple panel signs shall not be greater than 13 mm.

Overhead laminated panel signs shall be Type A and have a nominal thickness of 25.4 mm.

For overhead laminated signs with a length of 7315 mm or less, the laminated panels shall be fabricated with no vertical joints, splices or seams. For signs with a length of greater than 7315 mm, the length of each adjoining panel shall be as determined by the Engineer or as shown on the plans.

The perimeter frame of Type A overhead laminated panels shall be connected by self-tapping hex head stainless steel screws. Sealant shall be placed at the corners of the perimeter frame to prevent moisture penetration. The perimeter frame of Type A panels shall consist of extruded channel edges on the vertical sides and consist of modified "H" section extrusion on the horizontal sides. The modified "H" section extrusion acts as an integral retainer track for affixing the bolts to provide blind fastening of panels to the structure support.

The Contractor shall furnish mounting hardware for overhead laminated panel signs, such as closure H-sections, clamps, bolts, nuts, and washers. The clamps shall be cast aluminum alloy with a minimum tensile strength of 170 MPa. Bolt torque used for installing clamps shall not exceed 12 N-m.

MEASUREMENT AND PAYMENT

Furnishing signs (except for construction area signs) will be measured by the square meter to the nearest 0.10-m2, of the sign panel types installed in place.

Installation of sign panels will be measured and paid for as per Sections 56-2.05, "Measurement," and 56-2.06, "Payment," of the Standard Specifications except all references to State-furnished materials is deleted.

The contract price paid per square meter for furnish sign of the types specified in the Engineer's estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in fabricating and furnishing the signs, including removable sign panel frame and fastening hardware, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.60 PREPARE AND PAINT CONCRETE

This work shall consist of preparing and painting concrete barrier and slope paving color band surfaces, where shown on the plans, and in conformance with these special provisions.

Materials

The paint shall be a light-stable, alkali-resistant, acrylic latex or acrylic latex copolymer emulsion, commercially manufactured for use as an exterior concrete coating. The paint shall conform to the provisions in Section 91-4.05, "Paint: Acrylic Emulsion, Exterior White and Light and Medium Tints," of the Standard Specifications.

The paint shall be formulated and applied so that the color of the coated concrete matches the following, or equivalent:

LOCATION	Company	Color	Color Number
BritaniaBlvd OC	Frazee	Write Red	AC120R K-16
La Media Road UC	Frazee	Serengeti Sun	AC108Y K-12
Airway Road UC	Frazee	Sun Coast	AC103Y

Test Panel

A test panel at least 1.25 m x 1.25 m in size shall be successfully completed at each location and approved by the Engineer before beginning work on painting concrete. Test panels shall be constructed, finished, and painted with the materials, tools, equipment, personnel, and methods to be used in constructing, finishing, and painting the concrete surfaces. If ordered by the Engineer, additional test panels shall be constructed and finished until the specified finish, texture, and color are obtained, as determined by the Engineer.

Test panels approved by the Engineer shall be used as the standard for comparison in determining acceptability of painting for concrete surfaces.

The Contractor shall submit to the Engineer, not less than one week prior to initial application of the concrete coating to a test panel, a copy of the manufacturer's recommendations and written application instructions.

Surface Preparation

New concrete surfaces to be painted shall be cured in conformance with the provisions in Section 90-7.03, "Curing Structures," of the Standard Specifications.

Concrete surfaces to be painted shall be prepared in conformance with the requirements of SSPC-SP 13, "Surface Preparation of Concrete," of the Structural Steel Painting Council. After concrete surface preparation is complete, the Contractor shall clean all concrete surfaces to be painted by water rinsing as defined in Section 59-1.03, "Application," of the Standard Specifications.

Painting Concrete

The coating shall be applied per the manufacturer's recommendations and in conformance with the requirements of SSPC-SP 11,"Guide for Coating Concrete," of the Structural Steel Painting Council.

Any damaged areas shall be repaired in the same manner as the original surface preparation and paint application.

Measurement and Payment

Concrete surfaces to be prepared and painted will be measured by the square meter. Measurement will be determined along the surface of the actual areas painted.

The contract price paid per square meter for prepare and paint concrete shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in preparing of and applying paint to concrete surfaces, complete in place, including construction of test panels and repairing damaged areas, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.61 ALTERNATIVE PIPE

Alternative pipe culverts shall conform to the provisions in Section 62, "Alternative Culverts," of the Standard Specifications and these special provisions.

SPIRAL RIB PIPE

Spiral rib pipe shall conform to the provisions in "Corrugated Metal Pipe" of these special provisions, except for profile and fabrication requirements.

Spiral rib pipe shall, at the option of the Contractor, consist of either (1) three rectangular ribs spaced midway between seams with ribs 19 mm wide by 19 mm high at a maximum rib pitch of 191 mm, (2) two rectangular ribs and one half-circle rib equally spaced between seams with ribs 19 mm wide by 25 mm high at a maximum rib pitch of 292 mm. The half-circle rib diameter shall be spaced midway between the rectangular ribs or (3) two rectangular ribs equally spaced between seams with ribs 19 mm wide by 25 mm high at a maximum rib pitch of 213 mm. Rib pitch measured at right angles to the direction of the ribs may vary ±13 mm.

Corrugated steel spiral rib pipe shall be fabricated by a continuous helical lock seam fabricated in conformance with the provisions in Section 66-3.03C(1), "Fabrication by Continuous Lock Seam," of the Standard Specifications.

Corrugated aluminum spiral rib pipe shall be fabricated by a continuous helical lock seam fabricated in conformance with the provisions in Section 66-2.03B, "Fabrication by Continuous Helical Lock Seam," of the Standard Specifications.

Coupling bands for spiral rib pipe shall conform to the provisions in Section 66-1.07, "Coupling Bands," of the Standard Specifications. A coupling band shown on the plans or approved by the Engineer in conformance with the provisions in Section 61-1.02, "Performance Requirements for Culvert and Drainage Pipe Joints," of the Standard Specifications, for use on a pipe corrugation of 68 mm x 13 mm for corrugated metal pipe may be used on spiral rib pipe having 68 mm x 13 mm rerolled annular ends. The width of band (W) for hat bands for pipe sizes larger than 1200 mm in diameter shall be 95 mm.

Concrete backfill for alternative culverts shall be constructed in conformance with the provisions in Section 66-1.045, "Concrete Backfill," of the Standard Specifications and will be measured and paid for in conformance with the provisions in Section 66-4, "Measurement and Payment," of the Standard Specifications and the following:

A. The quantity of concrete backfill to be paid for, regardless of the kind of culvert and wall thickness of the culvert installed, will be based on the dimensions shown on the plans and the installation of reinforced concrete pipe with the least wall thickness shown in AASHTO Designation: M 170M for the Class of pipe designated.

10-1.62 PLASTIC PIPE

Plastic pipe shall conform to the provisions in Section 64, "Plastic Pipe," of the Standard Specifications.

10-1.63 REINFORCED CONCRETE PIPE

Reinforced concrete pipe shall conform to the provisions in Section 65, "Reinforced Concrete Pipe," of the Standard Specifications and these special provisions.

Where embankment will not be placed over the top of the pipe, a relative compaction of not less than 85 percent shall be required below the pipe spring line for pipe installed using Method 1 backfill in trench, as shown on Standard Plan A62D. Where the pipe is to be placed under the traveled way, a relative compaction of not less than 90 percent shall be required unless the minimum distance between the top of the pipe and the pavement surface is the greater of 1.2 m or one half of the outside diameter of the pipe.

Except as otherwise designated by classification on the plans or in the specifications, joints for culvert and drainage pipes shall conform to the plans or specifications for standard joints.

When reinforced concrete pipe is installed in conformance with the details shown on Standard Plan A62DA, the fifth paragraph of Section 19-3.04, "Water Control and Foundation Treatment," of the Standard Specifications shall not apply.

When solid rock or other unyielding material is encountered at the planned elevation of the bottom of the bedding, the material below the bottom of the bedding shall be removed to a depth of 1/50 of the height of the embankment over the top of the culvert, but not less than 150 mm nor more than 300 mm. The resulting trench below the bottom of the bedding shall be backfilled with structure backfill material in conformance with the provisions in Section 19-3.06, "Structure Backfill," of the Standard Specifications.

The excavation and backfill below the planned elevation of the bottom of the bedding will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

The Outer Bedding shown on Standard Plan A62DA shall not be compacted prior to placement of the pipe.

10-1.64 OVERSIDE DRAIN

Alternative pipe downdrains shall conform to the provisions in Section 69, "Overside Drains," of the Standard Specifications for the kind of alternative pipe downdrain installed and these special provisions.

Plastic pipe for overside drains shall be Type S corrugated high density polyethylene or ribbed polyvinyl chloride pipe conforming to the provisions in Section 64, "Plastic Pipe," of the Standard Specification.

Plastic pipe joints shall conform to the provisions in Section 61-1.02, "Performance Requirements for Culvert and Drainage Pipe Joints," of the Standard Specifications for downdrain joints, except that the alternatives selected for plastic pipe joint restrainer assemblies shown on the plans shall serve in lieu of the tensile strength requirements. The joint overlap requirements for integral joints shall conform to the requirements for positive joints.

Plastic pipe joint restrainer assembly, Alternative A, when used shall be installed immediately below the pipe bell.

Polyvinyl chloride pipe shall not be used unless the overside drain is covered for the entire length of the overside drain.

Plastic pipe overside drains shall be installed with the bell end of the pipe facing uphill.

10-1.65 MISCELLANEOUS FACILITIES

Corrugated steel pipe riser and Grate 900R, concrete flared end section, alternative flared end section, Class 4 concrete (backfill), and reinforced concrete pipe riser shall conform to the provisions in Section 70, "Miscellaneous Facilities," of the Standard Specifications.

10-1.66 GRATED LINE DRAIN

This work shall consist of furnishing and installing precast grated line drain, with necessary fittings, coupling systems, frames, grates and associated items as shown on the plans and in conformance with these special provisions.

The interior surface of the grated line drain, below the level of the frame and grate and associated connections, shall be smooth. Grated line drain channel sections shall be manufactured of monolithic polymer concrete with no side extensions.

Monolithic polymer concrete shall be made from a composition of aggregate and polyester resin or vinylester resin and shall have the following properties when tested as follows:

PROPERTY	ASTM TEST METHOD	VALUE
Tensile Strength, MPa	C 307	10 min.
Compressive Strength, MPa	C 579	80 min.
Bending Strength, MPa	C 580	20 min.
Moisture Absorption, %	C 140	0.5 max.
Chemical Resistance	C 267	Pass
Freeze/Thaw, number of cycles w/o weight loss	C 666	1600 min.

The manufacturer of the grated line drain shall furnish the Engineer a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

Grated line drain frames and grates shall be manufactured of ductile iron conforming to the provisions in Section 75-1.02, "Miscellaneous Iron and Steel," of the Standard Specifications. The frames and grates need not be galvanized or coated with asphalt paint. Bolts, nuts, frame anchors, and other connecting hardware shall conform to the provisions in Section 75-1.02, "Miscellaneous Iron and Steel," of the Standard Specifications.

Frames and grates, when installed in conformance with the manufacturer's recommendations and these special provisions, shall be classified as heavy duty (112 kN proof load) when tested in accordance with Commercial Item Description A-A-60005 for "Frames, Covers, Gratings, Steps, Manhole, Sump and Catch Basin." Frames and grates shall be matchmarked in pairs before delivery to the work and grates shall fit into the frames without rocking.

Frames shall be secured to the surrounding concrete backfill with steel anchoring rods as shown on the plans. Other methods may be used to secure the frame to the concrete backfill or grated line drain wall provided that a minimum pullout resistance of 10 kN per meter of length of grated line drain frame is maintained.

Grates and frames shall be one piece or the grates shall be removable. Removable grates shall be held in place by locking devices that are tamper resistant. Removable grates shall provide a minimum repetitive pullout resistance of 5 kN per meter of length after completion of 1000 hours of salt spray testing in conformance with the requirements in ASTM Designation: B 117. When a combination of one piece frame and grate and removable grates are used, the locations of the removable grates shall be shown on the plans.

Except for grates installed within designated pedestrian paths of travel, grates shall accept inflow of runoff through openings. The openings shall consist of a minimum of 60 percent of the total top surface area of the grate, with individual openings or slots having a dimension not greater than 50 mm measured in the direction of the grated line drain flow line.

Grates installed within designated pedestrian paths of travel shall be certified as conforming to the requirements of the "Americans with Disabilities Act."

Grated line drains shall be installed in trenches excavated to the lines and grades established by the Engineer. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the grated line drain.

Grated line drains shall be installed and jointed in conformance with the manufacturer's recommendations.

Grated line drains shall be installed to the lines and grades with sections closely jointed and secured to ensure that no separation of the line drains occurs during backfilling.

The frame or grate of the grated line drain shall not extend above the level of the surrounding concrete backfill.

Grated line drains shall be connected to new or existing drainage facilities as shown on the plans.

Excavation and backfill shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications.

Backfill for the grated line drains shall be either minor concrete or Class 3 concrete conforming to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications. Minor concrete shall contain not less than 300 kg of cementitious material per cubic meter.

Concrete backfill shall be placed in the trench as shown on the plans. Concrete backfill shall be placed against undisturbed material at the sides and bottom of the trench and in a manner that will prevent floating or shifting of the grated line drain and voids in, or segregation of, the concrete. Foreign material which falls into the trench, before or during placement of the concrete, shall be immediately removed. Where necessary, earth plugs shall be constructed and compacted at the ends of the planned concrete backfill to contain the concrete within the trench.

Concrete backfill shall be finished flush with the adjacent surfacing.

The surface of the concrete shall be textured with a broom or burlap drag to produce a durable skid-resistant surface.

The length the grated line drain to be paid for will be the length measured by the meter along the pavement surface as designated by the Engineer. No payment will be made for grated line drain placed in excess of the designated length.

The contract price paid per meter for grated line drain shall include full compensation for furnishing all labor, materials (including frames and grates), tools, equipment, and incidentals, and for doing all the work involved in installing grated line drains, complete in place, including excavation and backfill, connecting grated line drains to new or existing facilities, concrete collars, reinforcement, and other connecting devices, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.67 SLOPE PROTECTION

Slope protection shall be placed or constructed in conformance with the provisions in Section 72, "Slope Protection," of the Standard Specifications and these special provisions.

Rock slope protection fabric shall be woven or nonwoven type fabric, Type A or Type B, at the option of the Contractor.

10-1.68 SLOPE PAVING (STAMPED CONCRETE)

Slopes under the ends of bridges, where shown on the plans, shall be paved in conformance with the provisions in Section 72-6, "Slope Paving," of the Standard Specifications and these special provisions.

Shotcrete shall not be used as an alternative construction method for slope paving.

Attention is directed to the "Prepare and Paint Concrete," elsewhere in these special provisions.

Stamped concrete texture shall conform to "Architectural Surface (Textured Concrete)" of these special provisions.

Full compensation for stamped concrete texture of slope paving shall be considered as included in the contract price paid per square meter for slope paving (stamped concrete) and no separate payment will be allowed therefor.

Prior to placing the permanent slope paving, the Contractor shall construct a test panel at least 1.2 m by 1.8 m at the site for approval by the Engineer. The test panel shall be constructed of the same materials as are proposed for the permanent work and shall be finished and cured as specified for the permanent work. Additional test panels shall be constructed as necessary until a panel is produced which conforms to the requirements herein, before constructing other slope paving.

10-1.69 MISCELLANEOUS CONCRETE CONSTRUCTION

Minor concrete (miscellaneous construction), minor concrete (gore paving), minor concrete (texture paving), and minor concrete (raised median) shall conform to the details shown on the plans, the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications and these special provisions, and as directed by the Engineer.

Where shown on the plans, minor concrete (texture paving) will be required for minor concrete (miscellaneous construction) and minor concrete (gore paving) work.

Minor concrete (gore paving), shall have reinforcing bar of the size and type shown on the plans and conforming to the provisions in Section 52, "Reinforcement," of the Standard Specifications, shall be placed in the textured paving areas as shown on the plans.

Curb ramp detectable warning surface shall consist of raised truncated domes constructed or installed on curb ramps in conformance with the details shown on the plans and these special provisions. At the option of the Contractor, the detectable warning surface shall be prefabricated, cast-in-place, or stamped into the surface of the curb ramp. The color of the detectable warning surface shall be yellow conforming to Federal Standard 595B, Color No. 33538.

Prefabricated detectable warning surface shall be in conformance with the requirements established by the Department of General Services, Division of State Architect and be attached in conformance with the manufacturer's recommendations.

Cast-in-place and stamped detectable warning surfaces shall be painted in conformance with the provisions in Section 59-6, "Painting Concrete," of the Standard Specifications.

The finished surfaces of the detectable warning surface shall be free from blemishes.

Prior to constructing the cast-in-place or stamping the detectable warning surface, the Contractor shall demonstrate the ability to produce a detectable warning surface conforming to the details shown on the plans and these special provisions by constructing a 600-mm by 600-mm test panel.

The manufacturer shall provide a written 5-year warranty for prefabricated detectable warning surfaces, guaranteeing replacement when there is defect in the dome shape, color fastness, sound-on-cane acoustic quality, resilience, or attachment. The warranty period shall begin upon acceptance of the contract.

Full compensation for constructing or furnishing and installing curb ramp detectable warning surfaces shall be considered as included in the contract price paid per cubic meter for minor concrete (miscellaneous construction) and no separate payment will be made therefor.

Minor concrete (gore paving) will be measured and paid for in the same manner specified for minor concrete (miscellaneous construction) in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications.

If the Contractor elects to use the curing compound method for curing concrete for minor concrete (miscellaneous construction), the curing compound shall be curing compound (6) conforming to the provisions in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications.

The curing compound shall be applied in a manner that will provide a complete coating of all exposed faces of the concrete surface.

MINOR CONCRETE (TEXTURED PAVING)

Minor concrete (textured paving) shall consist of coloring the concrete and stamping a pattern into the surface of the concrete at the locations shown on the plans. The color shall closely resemble Davis manufacturer's color "Sandstone." The color shall be integral, chemically inert, fade resistant mineral oxide or synthetic type.

Samples of the colors specified for textured paving are available for review by prospective bidders at the office of the Department of Transportation, District 11 4050 Taylor Street, San Diego, CA 92110.

A test panel at least 1.25 m x 1.25 m in size shall be successfully completed at a location approved by the Engineer before beginning work for minor concrete (textured paving) to demonstrate the textured paving, including curing and finishing compounds and shall be submitted to the Engineer for written approval.

Minor concrete (textured paving) shall not be placed on the project prior to approval by the Engineer of the samples prepared and submitted by the Contractor. In the event more than one test panel of textured paving to be placed is required by the Engineer, each additional test panel will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

The pattern type and color of concrete for minor concrete (textured paving) shall be placed at the locations shown on the plans, struck off and compacted until a layer of mortar is brought to the surface. The concrete shall be screeded to the required grade and cross section and floated to a uniform surface.

The forming tools for the minor concrete (textured paving) shall be applied to form the patterned surfaces while the concrete is still in the plastic stage of set.

Minor concrete (textured paving) areas shall be cured by the curing compound method. The curing compound shall be curing compound (6) conforming to the provisions in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications.

For payment purposes, the area in square meters of minor concrete (textured paving) will be determined from horizontal measurements of the finished textured paving.

The contract price paid per square meter for minor concrete (textured paving) shall include full compensation for furnishing all labor, materials (including color but excluding concrete), tools, equipment, and incidentals, and for doing all the work involved in constructing textured paving, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.70 MISCELLANEOUS IRON AND STEEL

Miscellaneous iron and steel shall conform to the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications.

10-1.71 MISCELLANEOUS METAL (BRIDGE)

Miscellaneous metal (bridge) shall conform to the provisions for miscellaneous bridge metal in Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

Miscellaneous metal (bridge) shall consist of the miscellaneous bridge metal items listed in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications, and the following:

A. Curtain wall cover plates

10-1.72 BRIDGE DECK DRAINAGE SYSTEM

Bridge deck drainage systems shall conform to the provisions for miscellaneous bridge metal in Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

Self-tapping screws used for sleeve connections shall be hex-head stainless steel, installed in holes drilled to fit the self-tapping screws, conforming to the requirements of ASTM Designation: A 276, Type 304.

At the Contractor's option, fiberglass pipes and fittings with the same diameter and minimum bend radius as those shown on the plans, may be substituted for welded steel pipe in deck drain systems.

Fiberglass pipe and fittings shall conform to the requirements in ASTM Designation: D 2996, and shall have a minimum short-term rupture strength of 207 MPa. The adhesive type recommended by the manufacturer shall be used for joining pipe and fittings. Fiberglass pipe not enclosed in a box girder cell or encased in concrete shall be manufactured from ultraviolet-resistant resin pigmented with concrete-gray color, or be coated with a concrete-gray resin-rich exterior coating. Paint shall not be used. Fiberglass pipe treated with ultraviolet protection shall withstand a minimum of 2500 hours of accelerated weathering when tested in conformance with the requirements in ASTM Designation: G 154. Lamps shall be UV-B (313 nm wavelength). The resting cycle shall be 4 hours of ultraviolet exposure at 60°C, and then 4 hours of condensate exposure at 50°C. After testing, the surface of the pipe shall exhibit no fiber exposure, crazing, or checking, and only a slight chalking or color change.

Support spacing for fiberglass pipe shall be the same as shown on the plans for welded steel pipe. Pipe supports shall have a width of not less than 38 mm.

A Certificate of Compliance for fiberglass pipe and fittings shall be furnished to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance shall include all laboratory test results conforming to the provisions specified herein.

For drainage piping NPS 8 or smaller, which is: (1) enclosed in a box girder cell and exposed for a length not greater than 6 m within the cell, or (2) encased in concrete, the Contractor shall have the option of substituting polyvinyl chloride (PVC) plastic pipe and fittings, with the same diameter and minimum bend radius as shown on the plans, for welded steel pipe.

The PVC plastic pipe and fittings shall be Schedule 40 conforming to the requirements of ASTM Designations: D 1785. The maximum support spacing for PVC plastic pipe shall be 2 m.

Couplings used to connect fiberglass pipe to steel shall be threaded or flanged. The sleeve connections shown on the plans shall not be used for fiberglass pipe.

If fiberglass pipe is substituted for welded steel pipe, the quantity of drainage piping will be computed on the basis of the dimensions and details shown on the plans, and no change in the quantities to be paid for will be made because of the use of fiberglass pipe.

Bridge deck drainage systems will be measured and paid for by the kilogram in the same manner specified for miscellaneous metal (bridge) in Section 75-1.06, "Measurement," and Section 75-1.07, "Payment," of the Standard Specifications.

10-1.73 CHAIN LINK FENCE

Chain link fence shall be Type CL-1.8 and shall conform to the provisions in Section 80, "Fences," of the Standard Specifications.

The chain link fabric shall be 9-gage (3.76 mm), Type IV, Class B bonded vinyl coated fabric (black), conforming to the requirements in AASHTO Designation: M 181.

The bottom 0.6 meters of the chain link fence used for wildlife fence shall be buried as shown on the plans.

10-1.74 MARKERS AND DELINEATORS

Markers and delineators shall conform to the provisions in Section 82, "Markers and Delineators," of the Standard Specifications and these special provisions.

Markers and delineators on flexible posts shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. Flexible posts shall be made from a flexible white plastic which shall be

resistant to impact, ultraviolet light, ozone, and hydrocarbons. Flexible posts shall resist stiffening with age and shall be free of burns, discoloration, contamination, and other objectionable marks or defects which affect appearance or serviceability.

Retroreflective sheeting for metal and flexible target plates shall be the retroreflective sheeting designated for channelizers, markers, and delineators conforming to the requirements in ASTM Designation: D 4956-95 and in conformance with the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Guard railing delineators shall be installed as shown on the plans.

Guard railing delineators shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Guard railing delineators will be measured by the unit determined from actual count of delineators used in the work or ordered by the Engineer.

The contract unit price paid for guard railing delineators shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in guard railing delineators, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.75 METAL BEAM GUARD RAILING

Metal beam guard railing shall be constructed in conformance with the provisions in Section 83-1, "Railings," of the Standard Specifications and these special provisions.

Attention is directed to "Order of Work" of these special provisions.

Line posts shall be wood, steel, or plastic. Blocks shall be wood or plastic.

Attention is directed to "Markers and Delineators" of these special provisions.

ALTERNATIVE IN-LINE TERMINAL SYSTEM

Alternative in-line terminal system shall be furnished and installed as shown on the plans and in conformance with these special provisions.

The allowable alternatives for an in-line terminal system shall consist of one of the following or a Department approved equal.

(1) TERMINAL SYSTEM (TYPE SKT) - Terminal system (Type SKT) shall be a SKT 350 Sequential Kinking Terminal manufactured by Road Systems, Inc., located in Big Spring, Texas, and shall include items detailed for terminal system (Type SKT) shown on the plans. The SKT 350 Sequential Kinking Terminal can be obtained from the distributor, Universal Industrial Sales, P.O. Box 699, Pleasant Grove, UT 84062, Telephone (801) 785–0505 or from the distributor, Gregory Highway Products, 4100 13th Street, S.W., Canton, OH 44708, Telephone (330) 477–4800.

(2) TERMINAL SYSTEM (TYPE ET) - Terminal system (Type ET) shall be an ET-2000 PLUS (4-tube system) extruder terminal as manufactured by Trinity Industries, Inc., and shall include items detailed for terminal system (Type ET) shown on the plans. The ET-2000 PLUS (4-tube system) extruder terminal can be obtained from the manufacturer, Trinity Industries, Inc., P.O. Box 99, 950 West 400S, Centerville, UT 84014, Telephone (800) 772–7976.

The Contractor shall provide the Engineer with a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance shall certify that the terminal systems furnished conform to the contract plans and specifications, conform to the prequalified design and material requirements, and were manufactured in conformance with the approved quality control program.

Terminal systems shall be installed in conformance with the manufacturer's installation instructions and these requirements. Each terminal system installed shall be identified by painting the type of terminal system in neat black letters and figures 60 mm high on the backside of the rail element between system posts numbers 4 and 5.

For terminal system (Type ET) the steel foundation tubes with soil plates attached shall be, at the Contractor's option, either driven, with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 100 mm thick and each layer shall be moistened and thoroughly compacted. The wood terminal posts shall be inserted into the steel foundation tubes by hand and shall not be driven. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 65°C or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

For terminal system (Type SKT) the soil tubes shall be, at the Contractor's option, driven with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 100 mm thick and each layer shall be moistened and thoroughly compacted. Wood posts shall be

inserted into the steel foundation tubes by hand. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 65°C or less. The edges of the wood posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

Surplus excavated material remaining after the terminal system has been installed shall be disposed of in a uniform manner along the adjacent roadway where designated by the Engineer.

The contract unit price paid for alternative in-line terminal system shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing alternative in-line terminal system, complete in place, including excavation, backfill and disposal of surplus material, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

ALTERNATIVE FLARED TERMINAL SYSTEM

Alternative flared terminal system shall be furnished and installed as shown on the plans and in conformance with these special provisions.

The allowable alternatives for a flared terminal system shall consist of one of the following or a Department approved equal.

(1) TERMINAL SYSTEM (TYPE FLEAT) - Terminal system (Type FLEAT) shall be a Flared Energy Absorbing Terminal 350 manufactured by Road Systems, Inc., located in Big Spring, Texas, and shall include items detailed for terminal system (Type FLEAT) shown on the plans. The Flared Energy Absorbing Terminal 350 can be obtained from the distributor, Universal Industrial Sales, P.O. Box 699, Pleasant Grove, UT 84062, Telephone (801) 785–0505 or from the distributor, Gregory Highway Products, 4100 13th Street, S.W., Canton, OH 44708, Telephone (330) 477–4800.

(2) TERMINAL SYSTEM (TYPE SRT) - Terminal system (Type SRT) shall be an SRT-350 Slotted Rail Terminal (8-post system) as manufactured by Trinity Industries, Inc., and shall include items detailed for terminal system (Type SRT) shown on the plans. The SRT-350 Slotted Rail Terminal (8-post system) can be obtained from the manufacturer, Trinity Industries, Inc., P.O. Box 99, 950 West 400S, Centerville, UT 84014, Telephone (800) 772–7976.

The Contractor shall provide the Engineer with a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance shall certify that the terminal systems furnished conform to the contract plans and specifications, conform to the prequalified design and material requirements, and were manufactured in conformance with the approved quality control program.

Terminal systems shall be installed in conformance with the manufacturer's installation instructions and these requirements. Each terminal system installed shall be identified by painting the type of terminal system in neat black letters and figures 60 mm high on the backside of the rail element between system posts numbers 4 and 5.

For terminal system (Type SRT), the steel foundation tubes with soil plates attached shall be, at the Contractor's option, either driven, with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 100 mm thick and each layer shall be moistened and thoroughly compacted. The wood terminal posts shall be inserted into the steel foundation tubes by hand and shall not be driven. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 65°C or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

For terminal system (Type FLEAT), the soil tubes shall be, at the Contractor's option, driven with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 100 mm thick and each layer shall be moistened and thoroughly compacted. Wood posts shall be inserted into the steel foundation tubes by hand. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 65°C or less. The edges of the wood posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

Surplus excavated material remaining after the terminal system has been installed shall be disposed of in a uniform manner along the adjacent roadway where designated by the Engineer.

The contract unit price paid for alternative flared terminal system shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing alternative flared terminal system, complete in place, including excavation, backfill and disposal of surplus material, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.76 CHAIN LINK RAILING

Chain link railing shall conform to the provisions in Section 83-l, "Railings," of the Standard Specifications and these special provisions.

The chain link fabric shall be 9-gage (3.76 mm), Type IV, Class B, bonded vinyl coated fabric, conforming to the requirements in AASHTO Designation: M 181.

The strength of the bond between the coating material and steel of the bonded vinyl coated chain link fabric shall be equal to or greater than the cohesive strength of the polyvinyl chloride (PVC) coating material.

10-1.77 CABLE RAILING

Cable railing shall conform to the provisions in Section 83-1, "Railings," of the Standard Specifications.

10-1.78 CONCRETE BARRIER

Concrete barriers shall conform to the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

Attention is directed to "Prepare and Paint Concrete" elsewhere in these special provisions.

Concrete barrier (Type 736A MOD) will be measured and paid for as concrete barrier (Type 736 MOD).

10-l.79 CONCRETE BARRIER (TYPE K)

Concrete barrier (Type K) shall consist of precast units conforming to the provisions for temporary railing (Type K) in Section 12-3.08, "Temporary Railing (Type K)," of the Standard Specifications, except that removable panels shall not be used and the concrete barrier (Type K) shall remain in place at the completion of the contract.

Temporary railing (Type K) reflectors on concrete barrier (Type K) shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. When concrete barrier (Type K) is placed in the median the spacing of barrier reflectors shall be placed to match spacing of raised pavement markers on the adjacent median edge line pavement delineation.

Full compensation for furnishing and installing temporary railing (Type K) reflectors on concrete barrier (Type K) shall be considered as included in the contract price paid per meter for concrete barrier (Type K) and no additional compensation will be allowed therefor.

10-1.80 THRIE BEAM BARRIER

Thrie beam barrier shall conform to the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

Attention is directed to "Order of Work" of these special provisions.

10-1.81 TRANSITION RAILING (TYPE WB)

Transition railing (Type WB) shall be furnished and installed in conformance with details shown on the plans, the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

The 10-gage rail elements shall conform to the requirements of Class B, Type 1 thrie beam guard railing as shown in AASHTO Designation: M 180. End caps shall conform to the requirements of Class A, Type 1 thrie beam guard railing as shown in AASHTO Designation: M 180.

Surplus excavated material remaining after the transitional railing (Type WB) has been constructed shall be disposed of in a uniform manner along the adjacent roadway where designated by the Engineer.

The contract unit price paid for transition railing (Type WB) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing transition railing (Type WB), complete in place, including drilling holes for wood posts, driving posts, backfill, and disposal of surplus material, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.82 TRANSITION RAILING (TYPE STB)

Transition railing (Type STB) shall be furnished and installed in conformance with details shown on the plans, the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

The 10-gage rail elements shall conform to the requirements of Class B, Type 1 thrie beam guard railing as shown in AASHTO Designation: M 180. End caps shall conform to the requirements of Class A, Type 1 thrie beam guard railing as shown in AASHTO Designation: M 180.

Surplus excavated material remaining after the transitional railing (Type STB) has been constructed shall be disposed of in a uniform manner along the adjacent roadway where designated by the Engineer.

The contract unit price paid for transition railing (Type STB) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing transition railing (Type STB), complete in place, including drilling holes for wood posts, driving posts, backfill, and disposal of surplus material, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.83 TRANSITION RAILING (TYPE DTB)

Transition railing (Type DTB) shall be furnished and installed in conformance with details shown on the plans, the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

The 10-gage rail elements shall conform to the requirements of Class B, Type 1 thrie beam guard railing as shown in AASHTO Designation: M 180. End caps shall conform to the requirements of Class A, Type 1 thrie beam guard railing as shown in AASHTO Designation: M 180.

Surplus excavated material remaining after the transitional railing (Type DTB) has been constructed shall be disposed of in a uniform manner along the adjacent roadway where designated by the Engineer.

The contract unit price paid for transition railing (Type DTB) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing transition railing (Type DTB), complete in place, including drilling holes for wood posts, driving posts, backfill, and disposal of surplus material, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.84 CRASH CUSHION (TYPE CAT)

Crash cushion (Type CAT) shall be furnished and installed as shown on the plans and in conformance with these special provisions.

Crash cushion (Type CAT) shall be a CAT-350 Crash Cushion Attenuating Terminal as manufactured by Trinity Industries, Inc., and shall include all the items detailed for crash cushion (Type CAT) shown on the plans.

Arrangements have been made to ensure that any successful bidder can obtain the CAT-350 Crash Cushion Attenuating Terminal from the manufacturer, Trinity Industries, Inc., P.O. Box 99, 950 West 400S, Centerville, UT 84014, Telephone 1-800-772-7976. The price quoted by the manufacturer for the CAT-350 Crash Cushion Attenuating Terminal, FOB Centerville, Utah is $3,300, not including sales tax.

The above price will be firm for orders delivered through March 30, 2008.

The Contractor shall provide the Engineer with a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance shall certify that crash cushion (Type CAT) conforms with the contract plans and specifications, conforms to the prequalified design and material requirements, and was manufactured in conformance with the approved quality control program.

The crash cushion (Type CAT) shall be installed in conformance with the manufacturer's installation instructions and these requirements. The steel foundation tubes with soil plates attached, shall be, at the Contractor's option, either driven, with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 100 mm thick and each layer shall be moistened and thoroughly compacted. Wood posts shall be inserted into the steel foundation tubes by hand. Before the wood posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 65°C or less. The edges of the wood posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

Surplus excavated material remaining after the crash cushion (Type CAT) have been constructed shall be disposed of in a uniform manner along the adjacent roadway where designated by the Engineer.

Crash cushion (Type CAT) will be measured as units determined from actual count in place in the completed work.

The contract unit prices paid for crash cushion (Type CAT) backup shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing crash cushion (Type CAT), complete in place, including excavation, backfill, and disposal of surplus material, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.85 CRASH CUSHION (REACT)

Crash cushion (REACT) shall be furnished and installed as shown on the plans and in conformance with the provisions in the Standard Specifications and these special provisions.

Crash cushion (REACT) shall be a multiple recoverable type, manufactured by Energy Absorption Systems, Inc. Crash cushion (REACT) and additional components shall conform to the descriptions as follows:

Contract Item Description	Manufacturer's Product Description
Crash Cushion (REACT 9CBB)	REACT 350.9 Concrete Side Mount

The successful bidder can obtain from the following distributors the crash cushion (REACT) manufactured by Energy Absorption Systems, Inc. at 35 East Wacker Drive, Suite 1100, Chicago, IL 60601:

1. Northern California: Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, telephone (800) 884-8274, FAX (916) 387-9734
2. Southern California: Traffic Control Service, Inc., 1818 E. Orangethorpe, Fullerton, CA 92831-5324, telephone (800) 222-8274, FAX (714) 526-9501

The price quoted by the manufacturer for Crash Cushion (REACT 9CBB), FOB Pell City, Alabama is $33,819, not including sales tax.

The above prices will be firm for orders placed within 30 days of contract award, and provided delivery is accepted within 90 days after the order is placed.

The price quoted for crash cushion (REACT 9CBB) includes the concrete anchorage devices, but does not include the concrete anchor slab or the concrete backup block.

Crash cushion shall be installed in conformance with the manufacturer's recommendations.

Concrete anchorage devices used for attaching the crash cushion to the base slab shall be limited to those which have been provided by the manufacturer.

The concrete anchor slab and backup block shall conform to the provisions in Section 51, "Concrete Structures," and Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

The concrete anchor slab and backup block shall be constructed of concrete containing not less than 350 kg of cementitious material per cubic meter.

The Contractor shall furnish the Engineer one copy of the manufacturer's plan and parts list for each model installed.

The Contractor shall provide the Engineer with a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance shall certify that crash cushion conforms with the contract plans and specifications, and conforms to the prequalified design and material requirements.

Crash cushion will be measured by the unit as determined from actual count in place in the completed work.

The contract unit prices paid for crash cushion (REACT 9CBB) shall include full compensation for furnishing all labor, materials (including anchor bolts, nuts, washers, and marker panels), tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing the crash cushions, complete in place, including structure excavation, structure backfill, and concrete anchor slab and backup block with bar reinforcing steel, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.86 THERMOPLASTIC TRAFFIC STRIPE AND PAVEMENT MARKING

Thermoplastic traffic stripes (traffic lines) and pavement markings shall be applied in conformance with the provisions in Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

Thermoplastic material shall be free of lead and chromium, and shall conform to the requirements in State Specification PTH-02ALKYD.

Retroreflectivity of the thermoplastic traffic stripes and pavement markings shall conform to the requirements in ASTM Designation: D 6359-99. White thermoplastic traffic stripes and pavement markings shall have a minimum initial retroreflectivity of 250 $mcd \cdot m^{-2} \cdot lx^{-1}$. Yellow thermoplastic traffic stripes and pavement markings shall have a minimum initial retroreflectivity of 150 $mcd \cdot m^{-2} \cdot lx^{-1}$.

Where striping joins existing striping, as shown on the plans, the Contractor shall begin and end the transition from the existing striping pattern into or from the new striping pattern a sufficient distance to ensure continuity of the striping pattern.

Thermoplastic traffic stripes shall be applied at the minimum thickness and application rate as specified below. The minimum application rate is based on a solid stripe of 100 mm in width.

Minimum StripeThickness (mm)	Minimum Application Rate (kg/m)
2.5	0.5

Thermoplastic traffic stripes and pavement markings shall be free of runs, bubbles, craters, drag marks, stretch marks, and debris.

At the option of the Contractor, permanent traffic striping and pavement marking tape conforming to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions may be placed instead of the thermoplastic traffic stripes and pavement markings specified herein. Permanent tape, if used, shall be installed in conformance with the manufacturer's specifications.

If permanent tape is placed instead of thermoplastic traffic stripes and pavement markings, the tape will be measured and paid for by the meter as thermoplastic traffic stripe and by the square meter as thermoplastic pavement marking.

10-1.87 PAINT TRAFFIC STRIPE

Painted traffic stripes (traffic lines), including traffic stripes shown on the stage construction and traffic handling plan sheets, shall be applied in conformance with the provisions in Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

Attention is directed to "Order Of Work," and "Remove Traffic Stripes and Pavement Markings" of these special provisions.

Traffic stripe and pavement marking placed as shown on the stage construction and traffic handling plan sheets shall be removed when no longer required for traffic handling as determined by the Engineer.

Traffic stripe paint shall conform to the requirements in State Specification No. PTWB-01.

The color of the painted traffic stripes shall conform to the requirements in ASTM Designation: D 6628-01.

Retroreflectivity of the paint traffic stripes shall conform to the requirements in ASTM Designation: D 6359-99. White painted traffic stripes and pavement markings shall have a minimum initial retroreflectivity of 250 $mcd \cdot m^{-2} \cdot lx^{-1}$. Yellow painted traffic stripes shall have a minimum initial retroreflectivity of 150 $mcd \cdot m^{-2} \cdot lx^{-1}$.

At the option of the Contractor, permanent traffic striping tape conforming to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions may be placed instead of painted traffic stripes. Permanent tape, if used, shall be placed in conformance with the manufacturer's specifications.

If permanent tape is placed instead of painted traffic stripes, the tape will be measured and paid for by the meter as paint traffic stripe of the number of coats designated in the Engineer's Estimate.

Where striping joins existing striping, as shown on the plans, the Contractor shall begin and end the transition from the existing striping pattern into or from the new striping pattern a sufficient distance to ensure continuity of the striping pattern.

10-1.88 PAVEMENT MARKERS

Pavement markers, including pavement markers shown on the stage construction sheets of the plans, shall be placed in conformance with the provisions in Section 85, "Pavement Markers," of the Standard Specifications and these special provisions.

Attention is directed to "Remove Pavement Markers" of these special provisions regarding removal of pavement markers shown on the stage construction sheets of the plans.

The sixth paragraph of Section 85-1.06, "Placement," of the Standard Specifications shall not apply to the pavement markers shown on the stage construction sheets of the plans.

Epoxy adhesive shall not be used to place pavement markers as shown on the stage construction sheets in areas where removal of the markers will be required.

Attention is directed to "Traffic Control System For Lane Closure" of these special provisions regarding the use of moving lane closures during placement of pavement markers with bituminous adhesive.

The Contractor shall furnish the Engineer certificates of compliance for the pavement markers in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

Retroreflective pavement markers shall be marked as abrasion resistant on the body of the markers.

SECTION 10-2 HIGHWAY PLANTING AND IRRIGATION SYSTEMS

10-2.01 GENERAL

The work performed in connection with highway planting and irrigation systems shall conform to the provisions in Section 20, "Erosion Control and Highway Planting," of the Standard Specifications and these special provisions.

The Contractor shall notify the Engineer not less than 72 hours prior to requiring initial access to the existing irrigation controllers. When the Engineer determines that access to the controllers is required at other times, arrangements will be made to provide this access.

COST BREAK-DOWN

The Contractor shall furnish the Engineer a cost break-down for the contract lump sum items of highway planting and irrigation system. Cost break-down tables shall be submitted to the Engineer for approval within 15 working days after the

contract has been approved. Cost break-down tables will be approved, in writing, by the Engineer before any partial payment will be made for the applicable items of highway planting and irrigation system involved.

Attention is directed to "Time-Related Overhead" of these special provisions regarding compensation for time-related overhead.

Cost break-downs shall be completed and furnished in the format shown in the samples of the cost break-downs included in this section. Line item descriptions of work shown in the samples are the minimum to be submitted. Additional line item descriptions of work may be designated by the Contractor. If the Contractor elects to designate additional line item descriptions of work, the quantity, value and amount for those line items shall be completed in the same manner as for the unit descriptions shown in the samples. The line items and quantities given in the samples are to show the manner of preparing the cost break-downs to be furnished by the Contractor.

The Contractor shall determine the quantities required to complete the work shown on the plans. The quantities and their values shall be included in the cost break-downs submitted to the Engineer for approval. The Contractor shall be responsible for the accuracy of the quantities and values used in the cost break-downs submitted for approval.

The sum of the amounts for the line items of work listed in each cost break-down table for highway planting and for irrigation system work shall be equal to the contract lump sum price bid for Highway Planting and Irrigation System, respectively. Overhead and profit, except for time-related overhead, shall be included in each individual line item of work listed in a cost break-down table.

No adjustment in compensation will be made in the contract lump sum prices paid for highway planting and irrigation system due to differences between the quantities shown in the cost break-downs furnished by the Contractor and the quantities required to complete the work as shown on the plans and as specified in these special provisions.

Individual line item values in the approved cost break-down tables will be used to determine partial payments during the progress of the work and as the basis for calculating an adjustment in compensation for the contract lump sum items of highway planting and irrigation system due to changes in line items of work ordered by the Engineer. When the total of ordered changes to line items of work increases or decreases the lump sum price bid for either Highway Planting or Irrigation System by more than 25 percent, the adjustment in compensation for the applicable lump sum item will be determined in the same manner specified for increases and decreases in the total pay quantity of an item of work in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications.

HIGHWAY PLANTING COST BREAK-DOWN

Contract No. 11-091824

UNIT DESCRIPTION	UNIT	APPROXIMATE QUANTITY	VALUE	AMOUNT
ROADSIDE CLEARING	LS	LUMP SUM		
CULTIVATE	M2	13,250		
SOIL AMENDMENT (COMPOST (GREEN MATERIAL))	M3	995		
PLANT (GROUP A)	EA	7980		
PLANT (GROUP H)	EA	190		
PLANT (GROUP M)	EA	1200		
MULCH	M3	128		
COMMERCIAL FERTILIZER (PACKETS)	EA	8170		
SEEDING	HA	1.32		

TOTAL _____

IRRIGATION SYSTEM COST BREAK-DOWN

Contract No. 11-091824

UNIT DESCRIPTION	UNIT	APPROXIMATE QUANTITY	VALUE	AMOUNT
CONTROL AND NEUTRAL CONDUCTORS	LS	LUMP SUM		
20 STATION SOLAR IRRIGATION CONTROLLER	EA	1		
IRRIGATION CONTROLLER ENCLOSURE	EA	1		
40 MM BACKFLOW PREVENTER ASSEMBLY	EA	1		
BACKFLOW PREVENTER ASSEMBLY ENCLOSURE	EA	1		
20 MM QUICK COUPLER VALVE	EA	3		
40 MM PRESSURE REDUCING VALVE	EA	1		
40 MM REMOTE CONTROL VALVE	EA	19		
40 MM GATE VALVE	EA	3		
50 MM COPPER PIPE (TYPE K) HARD DRAWN	M	3		
25 MM PLASTIC PIPE (SUPPLY LINE) (PR-200)	M	1170		
32 MM PLASTIC PIPE (SUPPLY LINE) (PR-200)	M	555		
40 MM PLASTIC PIPE (SUPPLY LINE) (PR-200)	M	200		
50 MM PLASTIC PIPE (SUPPLY LINE) (PR-200)	M	1580		
65 MM PLASTIC PIPE (SUPPLY LINE) (PR-200)	M	406		
SPRINKLER (TYPE A-7)	EA	147		

TOTAL _____

10-2.02 (BLANK)

10-2.03 (BLANK)

10-2.04 HIGHWAY PLANTING

The work performed in connection with highway planting shall conform to the provisions in Section 20-4, "Highway Planting," of the Standard Specifications and these special provisions.

HIGHWAY PLANTING MATERIALS

Cuttings (Plant Group H)

Cutting work shall consist of obtaining, transporting and planting cactus cuttings in conformance with the provisions in Section 20-4, "Highway Planting," of the Standard Specifications and these special provisions.

At the Contractor's option, cuttings shall be either rooted in soil medium or bare rooted.

Prior to planting, an area 600 mm in diameter shall be cleared of weed growth at each proposed plant (cutting) location. Pesticides shall not be used for weed control within the 600-mm diameter area.

Cuttings shall conform to the provisions in Section 20-2.13, "Plants" and Section 20-4.05, "Planting" of the Standard Specifications, these special provisions and as directed by the Engineer.

Cuttings shall also comply with the following:

A. Cuttings shall be 300 mm minimum size.
B. Cuttings shall be planted a minimum of 25 mm deep or deep enough to support the cutting in an upright position.

Soil Amendment

Soil amendment shall be compost (green material) and shall conform to the requirements for "Compost (Green Material)" of these special provisions.

Compost (Green Material)

Compost (green material) shall be woody material. Woody materials shall consist of chipped, shredded or ground green materials such as shrubs, tree trimmings or clean processed wood products. Compost (green material) shall be obtained from suppliers permitted by the California Integrated Waste Management Board.

Deleterious materials such as rocks, glass, plastics, metals, clods, weeds, weed seeds, coarse objects, sticks larger than the specified particle size, salts, paint, petroleum products, pesticides or other chemical residues that would be harmful to plant or animal life shall not exceed 0.1-percent of the mulch volume. Chipping shall include shredding, grinding or other methods used to reduce mulch materials to the specified size.

Compost (green material) shall be processed and have reached an internal temperature of 56˚C for a minimum of 15 consecutive days. During the processing period, the green material shall have been turned a minimum of 5 times and shall have been cured for 90 days thereafter.

Compost (green material) shall be a maximum screening size of 16 mm.

Mulch

Mulch shall be wood chips.

Commercial Fertilizer (Packets)

Commercial fertilizer (packet) shall be slow or controlled release and shall be in a biodegradable packet form. The packet shall gradually release nutrients over a 12-month period. Each packet shall have a mass of 10 g ± 1 g and shall have the following guaranteed chemical analysis:

Ingredient	Percentage
Nitrogen	20
Phosphoric Acid	10
Water Soluble Potash	5

ROADSIDE CLEARING

Prior to preparing planting areas, and seeding areas, or commencing irrigation trenching operations for planting areas, trash and debris shall be removed from the entire highway right of way within the project limits.

In addition to removing trash and debris, the project area shall be cleared as specified herein:

A. All non-native plant species shall be killed and removed within the entire highway right of way, within the project limits. The non-native plant species to be killed and removed include but are not limited to, castor bean, fennel, pampas grass, and tamarisk.

Non-native plants shall be killed and removed as follows:

A. All seed stalks and flower heads shall be bagged for disposal immediately after being removed and before transport through the project limits.
B. All above ground plant mass shall be cut and removed prior to removal of stumps, roots or rhizomes.
C. Plant stumps, roots or rhizomes may be removed by chemical or mechanical means. Chemical and mechanical removal shall be performed as follows:

    1. Chemical removal shall include cutting plants off 50 mm above the ground and applying pesticide immediately (within one minute) to the cut.
    2. Mechanical removal shall include removing the entire root crown or mass and rhizomes. Plant or root pieces shall not be left in or on the soil following removal.

D. Removed material shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

After the initial roadside clearing is complete, additional roadside clearing work shall be performed as necessary to maintain the areas, as specified above, in a neat appearance until the start of the plant establishment period. This work shall include the following:

A. Trash and debris shall be removed.
B. Rodents shall be controlled.
C. Weed growth and non-native plants shall be killed before they reach the seed stage of growth or exceed 150 mm in length, whichever occurs first, except for weeds in wild flower seeding areas to be mowed.
D. Weeds in plant basins, including basin walls, shall be removed by hand pulling, after the plants have been planted.

Weed Control

Weed control shall also conform to the following:

A. All weeds and non-native plants shall be killed with glyphosate.
B. Tumbleweeds shall be removed by hand pulling before the tumbleweeds reach a height of 150 mm.
C. Removed weeds and non-native plant material shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Roadside clearing work shall not include work required to be performed as clearing and grubbing as specified in Section 16, "Clearing and Grubbing," of the Standard Specifications.

PESTICIDES

Pesticides used to control weeds shall conform to the provisions in Section 20-4.026, "Pesticides," of the Standard Specifications. Except as otherwise provided in these special provisions, pesticide use shall be limited to the following materials:

Glyphosate

Glyphosate shall be used to kill all weeds and non-native plant material.

If the Contractor elects to request the use of other pesticides on this project, the request shall be submitted, in writing, to the Engineer not less than 15 days prior to the intended use of the other pesticides. Except for the pesticides listed in these special provisions, no pesticides shall be used or applied without prior written approval of the Engineer.

Pesticides shall not be applied within the limits of the plant basins. Pesticides shall not be applied in a manner that allows the pesticides to come in contact with the foliage and woody parts of the plants.

CULTIVATE

Areas shown on the plans to be cultivated shall be cultivated to a depth of between 150 mm and 200 mm.

Immediately prior to cultivation, soil amendment shall be added to the areas to be cultivated. Soil amendment shall be added at the rate shown on the plans. Soil amendment shall be thoroughly mixed with the soil.

After cultivation is complete and the irrigation systems have been installed and the plant holes have been excavated and backfilled, no further planting work shall be done in the cultivated areas for a period of 15 days, except the soil shall be kept sufficiently moist to germinate weeds. Weeds that germinate shall be killed.

PLANTING

Commercial fertilizer packets shall be placed in the backfill of each plant at the time of planting and at the rate shown on the Plant List to within 150 to 200 mm of the soil surface and approximately 25 mm from the roots. When more than one fertilizer packet is required per plant, the packets shall be distributed evenly around the root ball.

Attention is directed to "Irrigation Systems Functional Test" of these special provisions regarding functional tests of the irrigation systems. Planting shall not be performed in an area until the functional test has been completed for the irrigation system serving that area.

SEEDING

Seeding shall conform to the provisions in Section 20-3, "Erosion Control," of the Standard Specifications and these special provisions.

Seeding work shall consist of scarifying the soil, and dry applying native seed to areas shown on the plans as "Seeding."

Seeding materials shall not be applied prior to November 1 or after March 1. If seeding work cannot be performed prior to the start of plant establishment and within the above specified time limit, then the work shall be performed during the plant establishment period when directed by the Engineer.

Prior to application the Engineer will designate the ground location of Seeding in increments of one hectare or smaller for smaller areas by directing the placing of stakes or other suitable markers. The Contractor shall furnish all labor, materials and transportation required to adequately indicate the various locations.

Site Preparation

Immediately prior to planting seeding areas, trash and debris shall be removed, and weeds shall be killed with a pesticide and mowed as close to the ground as possible. Removal of mowed material will be required. After mowing and just prior to seed application, seeding areas shall be scarified to a minimum depth of 25 mm.

Attention is directed to "Pesticides," of these special provisions.

Removed trash and debris and mowed material shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Materials shall conform to the provisions in Section 20-2, "Materials," of the Standard Specifications and these special provisions.

Seed

Seed shall conform to the provisions in Section 20-2.10, "Seed," of the Standard Specifications. Individual seed species shall be measured and mixed in the presence of the Engineer.

Seed not required to be labeled under the California Food and Agricultural Code shall be tested for purity and germination by a seed laboratory certified by the Association of Official Seed Analysts or by a seed technologist certified by the Society of Commercial Seed Technologists.

Seed shall contain not more than 1.0 percent total weed seed by weight.

Seed shall be delivered to the job site in unopened separate containers with the seed tag attached so that seed samples can be taken. Containers without seed tags attached will not be accepted. For each seed lot greater than 1 kg, a sample of approximately 30 g or 60 ml of seed will be taken from the seed lot by the Engineer.

Seed shall consist of the following:

SEED

Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed Per Hectare (Slope Measurement)
Anemopsis californica (Yerba Mansa)	30	0.5
Artemisia douglasiana (California Mugwort)	25	0.5
Artemisia palmeri (Tall Sagebrush)	25	0.5
Oenothera elata hookeri (California Evening Primrose)	40	1.0
Pluchea purpurascens (Marsh Fleabane)	30	0.5

APPLICATION

Wild flower seed shall be applied at the rate of 3.0 kg per hectare (slope measurement).

Seed shall be incorporated into the soil to a maximum depth of 6 mm by raking, dragging or drilling.

PLANT ESTABLISHMENT WORK

The plant establishment period shall be Type 2 and shall not be less than 250 working days.

If seeding cannot be performed within the time limits specified under "Wild Flower Seeding" of these special provisions and the Engineer determines that the work except seeding and plant establishment work has been completed, the Engineer will notify the Contractor in writing of the start of the plant establishment period.

Seeding not performed prior to the start of the plant establishment period shall be performed during the plant establishment period. The work involved in preparing areas to receive seeding and applying seed shall be in conformance with the provisions in "Seeding" of these special provisions.

Attention is directed to "Relief From Maintenance and Responsibility" in these special provisions regarding relief from maintenance and protection.

During the plant establishment period, the Engineer and the Contractor or his supervisory representative shall hold monthly meetings at the project site to evaluate the plant establishment work.

During the plant establishment period, the plants shall be watered utilizing the automatic solar irrigation controller. A watering schedule appropriate for the season shall be submitted in writing to the Engineer during the first week of March, June, September and November for use during the plant establishment period. The approved watering schedule shall be entered into the controllers by the Contractor.

Weeds within plant basins, including basin walls shall be controlled by hand pulling.

Weeds outside of plant basins, and within the entire limits where planting work is performed shall be controlled by killing and removing. Weeds shall be killed and removed before they reach the seed stage of growth or exceed 150 mm in height, whichever occurs first. Removed weeds, trash and debris shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Materials Outside the Highway Right of Way," of the Standard Specifications.

At the option of the Contractor, plants of a larger container size than those originally specified may be used for replacement plants during the first 125 working days of the plant establishment period. The use of plants of a larger container size than those originally specified for replacement plants shall be at the Contractor's expense.

After 125 working days of the plant establishment period have been completed, replacement of plants, shall be No. 1 size for liner size plants; No. 5 size for No. 1 size plants; and other plant replacement plants shall be the same size as originally specified.

Wye strainers on backflow preventers shall be cleaned at least 15 days prior to the completion of the plant establishment period.

The final inspection shall be performed in conformance with the provisions in Section 5-1.13, "Final Inspection," of the Standard Specifications and shall be completed a minimum of 20 working days before the estimated completion of the contract.

VALVE BOXES

Valve boxes shall conform to the provisions in Section 20-2.24, "Valve Boxes," of the Standard Specifications, except as otherwise provided herein.

Covers for concrete valve boxes shall be glass fiber reinforced plastic, plastic, or concrete.

Covers for plastic valve boxes shall be glass fiber reinforced plastic or plastic.

Valve box covers shall be equipped with a locking mechanism.

Valve boxes with plastic covers shall be identified on the top surface of the covers by branding the appropriate abbreviations for the irrigation facilities contained in the valve boxes as shown on the plans. Valve boxes that contain remote control valves shall be identified by the appropriate letters and numbers (controller and station numbers). The letters and numbers shall be 50 mm in height.

Valve boxes with glass fiber reinforced plastic or concrete covers shall be identified on the top surface of the covers by labels containing the appropriate abbreviation for the irrigation facility contained in the valve box as shown on the plans. Valve boxes that contain remote control valves shall be identified by the appropriate letters and numbers (controller and station numbers). Labels for valve boxes shall conform to the provisions in Section 20-5.03F, "Valves and Valve Boxes," of the Standard Specifications.

Label material shall be plate plastic.

GATE VALVES

Gate valves shall be as shown on the plans and in conformance with the provisions in Section 20-2.28, "Gate Valves," of the Standard Specifications and these special provisions.

Gate valves shall have a solid bronze or brass wedge.

ELECTRIC AUTOMATIC IRRIGATION COMPONENTS

Irrigation Controllers

Irrigation controllers shall be solar automatic irrigation controllers conforming to the following:

A. Photovoltaic 20-station irrigation controllers, photovoltaic power system, computer with lockable, waterproof, vandal resistant case, shall be manufactured as one complete unit.
B. All power will be provided by an internal photovoltaic system. Power shall be available for continuous 24-hour operation under the minimum light equivalent to 25 percent of ambient light at 55 degrees latitude.
C. The computer liquid-crystal display will be powered by a 9-volt battery key mechanism.
D. The irrigation controller shall have an output digital control pulse at 3.5-volts, which will operate a valve solenoid actuator within 300 meter distance.
E. Irrigation controller shall be fully automatic and capable of operating a complete one day to 39 day cycle, scheduling up to 16 totally independent programs, each having its own start time, day cycle, assigned stations, duration, and program time. Each station shall be capable of 1 minute to 5 hours and 59 minutes increments with separate setting for hours and minutes.
F. Irrigation controller shall have an emergency program backup system with a user-defined fail-safe program and system parameters that are stored in non-erasable memory.
G. Irrigation controller shall be installed on a vertical mounting tube, mounted as shown on the plans and in conformance with the manufacturer's recommendations.
H. Low voltage control and neutral conductors and splice connectors shall be manufactured by the same company.
I. The watering time of each station shall be displayed on the face of the control panel.

Electric Remote Control Valves

Electric remote control valves shall conform to the provisions in Section 20-2.23, "Control Valves," of the Standard Specifications and the following:

A. Valves shall be glass filled nylon, brass, or bronze construction.
B. Valves shall be angle pattern (bottom inlet) or straight pattern (side inlet) as shown on the plans.
C. Valves solenoids for (solar) controller shall be DC latching and operate on 3.5 V.

Pull Boxes

Pull box installations shall conform to the provisions in Section 20-5.027I, "Conductors, Electrical Conduits and Pull Boxes," of the Standard Specifications.

Conductors

Low voltage, as used in this section "Conductors," shall mean 36 V or less.

Low voltage control and neutral conductors in pull boxes and valve boxes, at irrigation controller terminals, and at splices shall be marked as follows:

A. Conductor terminations and splices shall be marked with adhesive backed paper markers or adhesive cloth wrap-around markers, with clear, heat-shrinkable sleeves sealed over the markers.

B. Non-spliced conductors in pull boxes and valve boxes shall be marked with clip-on, "C" shaped, white extruded polyvinyl chloride sleeves. Marker sleeves shall have black, indented legends of uniform depth with transparent overlays over the legends and "chevron" cuts for alignment of 2 or more sleeves.

Markers for the control conductors shall be identified with the appropriate number or letter designations of irrigation controllers and station numbers. Markers for neutral conductors shall be identified with the appropriate number or letter designations of the irrigation controllers.

The color of low voltage neutral and control conductor insulation, except for the striped portions, shall be homogeneous throughout the entire thickness of the insulation.

Insulation for conductors may be UL listed polyethylene conforming to UL44 test standards with a minimum insulation thickness of 1.05 mm for wire sizes 10AWG and smaller.

Relief from maintenance and responsibility for electric automatic irrigation components will be granted in conformance with "Relief from Maintenance and Responsibility" of these special provisions. Before the Engineer grants relief from maintenance and responsibility, the functional test specified in Section 20-5.027J, "Testing," of the Standard Specifications shall be satisfactorily completed, and the manufacturer's written instructions shall be provided to the Engineer on the use and adjustment of the installed irrigation controllers.

IRRIGATION SYSTEMS FUNCTIONAL TEST

Functional tests for the irrigation controllers and associated automatic irrigation systems shall conform to the provisions in Section 20-5.027J, "Testing," of the Standard Specifications and these special provisions.

Tests shall demonstrate to the Engineer, through one complete cycle of the irrigation controllers in the automatic mode, that the associated automatic components of the irrigation systems operate properly. If automatic components of the irrigation systems fail a functional test, these components shall be repaired at the Contractor's expense and the testing repeated until satisfactory operation is obtained.

Associated automatic components shall include, but not be limited to remote control valves.

Upon completion of work on an irrigation system, including correction of deficiencies and satisfactory functional tests for the systems involved, the plants to be planted in the area watered by the irrigation system may be planted provided the planting areas have been prepared as specified in these special provisions.

PIPE

Copper Pipe

Copper pipe shall seamless, Type K, hard drawn tubing.

Copper pipe supply lines installed between water meters and backflow preventer assemblies shall be installed not less than 450 mm below finished grade, measured to the top of the pipe.

Plastic Pipe

Plastic pipe supply lines shall be polyvinyl chloride (PVC) 1120 or 1220 pressure rated pipe with the minimum pressure rating (PR) shown on the plans.

Plastic pipe supply lines less than 100 mm in diameter shall have solvent cemented type joints. Primers shall be used on the solvent cemented type joints.

Fittings for plastic pipe supply lines with a pressure rating (PR) of 315 shall be Schedule 80.

WATER METER

Water meters for the irrigation systems will be furnished and installed by the serving utility at the locations shown on the plans.

The Contractor shall make the arrangements and pay the costs and fees required by the serving utility.

The Otay Water District has established a fee of $35,000.00 for furnishing and installing a water meter. If, at the time of installation, this fee has been changed, the State will take a credit for the reduction in the fee, or the State will pay the difference for the increase in the fee. The credit or payment will be taken or paid on the first monthly progress payment made after the meter is installed. The Contractor shall furnish the Engineer with a copy of the invoice for the installation fee.

Attention is directed to Section 20-4.06, "Watering," of the Standard Specifications. The Contractor shall make the arrangements for furnishing and applying water until the water meters have been installed by the serving utility.

The quantity of water meters will be measured by the unit as determined from actual count in place.

The contract unit price paid for water meter shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing water meters, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

BACKFLOW PREVENTER ASSEMBLIES

Backflow preventers shall conform to the provisions in Section 20-2.25, "Backflow Preventers," of the Standard Specifications and these special provisions.

Backflow preventers shall have current approval from the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research (USC Foundation).

Before backflow preventer assembly installation, the Contractor shall provide the Engineer with the portion of the USC Foundation "List of Approved Backflow Prevention Assemblies" showing type of assembly, manufacturer's name, model number, edition of the manual under which the assembly was approved, approval date and the last renewal date.

The "List of Approved Backflow Prevention Assemblies" is available to Foundation Members. Membership information to join the USC Foundation is available at:

http://www.usc.edu/dept/fccchr/membership.html

Questions concerning the USC Foundation "List of Approved Backflow Prevention Assemblies" can be answered by calling the Foundation at toll free (866) 545-6340.

Pressure loss through the backflow preventers shall not exceed the following:

BACKFLOW PREVENTER SIZE (millimeters)	FLOW RATE (Liters per minute)	PRESSURE LOSS (kPa)
40	206	62

Backflow preventer assemblies shall be painted with a minimum of 2 applications of a commercial quality enamel paint. The color of the paint shall be light brown.

BACKFLOW PREVENTER ASSEMBLY ENCLOSURE

Enclosures shall be fabricated of structural steel angles and flattened expanded metal and shall be installed over backflow preventer assemblies on a portland cement concrete pad as shown on the plans and in conformance with these special provisions.

Metal for sides, ends and top panels shall be fabricated from No. 9 expanded metal. The flattened expanded metal openings shall be approximately 20 mm by 45 mm in size.

Expanded metal panels shall be attached to the steel frames by a series of welds, not less than 6.4 mm in length and spaced not more than 100 mm on centers, along the edges of the enclosure.

Padlocks will be State-furnished in accordance with "State-furnished Materials" of these special provisions.

Enclosures shall be galvanized, after fabrication, in conformance with the provisions in Section 75-1.05, "Galvanizing," of the Standard Specifications.

Concrete for the concrete pad shall conform to Section 90-10, "Minor Concrete," of the Standard Specifications.

Hold down bolt assemblies shall be galvanized and shall be installed when the portland cement concrete pad is still plastic. Nuts shall be hexagonal and washers shall be the lock type.

Enclosures shall be painted with one application of a commercial quality pre-treatment, vinyl wash primer and a minimum of one application of a commercial quality, exterior enamel for metal. The finish color shall be light brown.

All parts of the backflow preventer assembly enclosure, including hold down assemblies, may be constructed of stainless steel instead of standard steel materials specified above. Stainless steel enclosures shall conform to the provisions herein except galvanizing, priming and painting shall not be required. Stainless steel enclosures shall be powder coated a light brown color by the manufacturer.

The minimum clearance between the backflow preventer assembly and the backflow preventer assembly enclosure shall be 50 mm.

IRRIGATION CONTROLLER ASSEMBLY ENCLOSURE

Enclosures shall be fabricated of structural steel angles and flattened expanded metal and shall be installed over irrigation controllers on a portland cement concrete pad as shown on the plans and in conformance with these special provisions.

Metal for sides, ends and top panels shall be fabricated from No. 9 expanded metal. The flattened expanded metal openings shall be approximately 20 mm by 45 mm in size.

Expanded metal panels shall be attached to the steel frames by a series of welds, not less than 6.4 mm in length and spaced not more than 100 mm on centers, along the edges of the enclosure.

Padlocks will be State-furnished in accordance with "State-furnished Materials" of these special provisions.

Enclosures shall be galvanized, after fabrication, in conformance with the provisions in Section 75-1.05, "Galvanizing," of the Standard Specifications.

Concrete for the concrete pad shall conform to Section 90-10, "Minor Concrete," of the Standard Specifications.

Hold down bolt assemblies shall be galvanized and shall be installed when the portland cement concrete pad is still plastic. Nuts shall be hexagonal and washers shall be the lock type.

Enclosures shall be painted with one application of a commercial quality pre-treatment, vinyl wash primer and a minimum of one application of a commercial quality, exterior enamel for metal. The finish color shall be light brown.

All parts of the irrigation controller enclosure, including hold down assemblies, may be constructed of stainless steel instead of standard steel materials specified above. Stainless steel enclosures shall conform to the provisions herein except galvanizing, priming and painting shall not be required. Stainless steel enclosures shall be powder coated a light brown color by the manufacturer.

The minimum clearance between the irrigation controller and the irrigation controller enclosure shall be 50 mm.

TESTING NEW BACKFLOW PREVENTERS

New backflow preventers shall be tested for proper operation in conformance with the provisions in Section 20-5.03J, "Check and Test Backflow Preventers," of the Standard Specifications and these special provisions.

Tests for new backflow preventers shall be satisfactorily completed after installation and before operation of the irrigation systems.

New backflow preventers shall be retested one year after the satisfactory completion of the previous test, and each year thereafter until the plant establishment period is completed. An additional test shall be provided not more than 10 days prior to acceptance of the contract.

SPRINKLERS

Sprinklers shall conform to the type, pattern, material, and operating characteristics listed in the "Sprinkler Schedule" shown on the plans.

PRESSURE REDUCING VALVE

Pressure reducing valves shall consist of pressure reducing valves, pressure gages, valve boxes with wire mesh and gravel or crushed rock, fittings ,and pipe as shown on plans.

Pressure reducing valves shall be the spring diaphragm type, manufactured of bronze or cast iron construction, hydraulically operated and pilot controlled, and shall have flanged or threaded pipe connections. Pressure reducing valves with threaded connections shall be installed with unions on the inlet side of the valves. Pressure reducing valves shall not have internal filter screens.

Pressure gages for pressure reducing valves shall be hermetically sealed with neoprene and shall have watertight polycarbonate cases and covers with molded clear polycarbonate windows. Gages shall be 50 mm in diameter, calibrated from 0 kPa to 1103 kPa, and have black aluminum pointers that contrast with gage faces and have brass stems. Internal gage parts shall be brass and phosphor bronze.

Pressure reducing valves shall have an adjustable discharge pressure range of 172 kPa to 517 kPa.

FINAL IRRIGATION SYSTEM CHECK

A final check of new irrigation facilities shall be performed not more than 40 working days and not less than 30 working days prior to acceptance of the contract.

The length of watering cycles using potable water measured by water meters for the final check of irrigation facilities will be determined by the Engineer.

Remote control valves connected to new irrigation controllers shall be checked for automatic performance when the controllers are in automatic mode.

Unsatisfactory performance of irrigation facilities installed or modified by the Contractor shall be repaired and rechecked at the Contractor's expense until satisfactory performance is obtained, as determined by the Engineer.

Nothing in this section "Final Irrigation System Check" shall relieve the Contractor of full responsibility for making good or repairing defective work or materials found before the formal written acceptance of the entire contract by the Director.

Full compensation for checking the irrigation systems prior to the acceptance of the contract shall be considered as included in the contract lump sum price paid for plant establishment work and no additional compensation will be allowed therefor.

SECTION 10-3. SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

10-3.01 DESCRIPTION

Traffic signals and lighting, lighting and sign illumination, ramp metering systems, traffic monitoring stations, fiber optic communication system, signal and lighting (city street), lighting (city streets) and sprinkler control conduit (bridge) shall conform to the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and these special provisions.

Traffic monitoring station installations shall be performed approximately at the following locations:

A. Location 1- Westbound and eastbound Route 905 "E4", approximately at Station 175+90.
B. Location 2- Westbound and eastbound Route 905 "E6", approximately at Station 193+15.
C. Location 3- Westbound and eastbound Route 905 "E6", approximately at Station 200+35.

Lighting equipment is included in the following structures:

A. Britannia Blvd. Overcrossing – Bridge No. 57-1144.
B. La Media Undercrossing – Bridge No. 57-1145L/R.
C. Airway Road Undercrossing – Bridge No. 57-1148L/R.

Fiber optic communication conduit is included in the following structures:

A. Britannia Blvd. Overcrossing – Bridge No. 57-1144.
B. La Media Undercrossing – Bridge No. 57-1145L.
C. Airway Road Undercrossing – Bridge No. 57-1148L.

Sprinkler control conduit is included in the following structures:

A. La Media Road Undercrossing – Bridge No. 57-1145L/R.
B. Airway Road Undercrossing – Bridge No. 57-1148L/R.

Traffic signal work shall be performed at the following locations:

A. Location 1 - Eastbound Route 905 on-ramp and Britannia Blvd.
B. Location 2 - Westbound Route 905 off ramp and Britannia Blvd.
C. Location 3 –Britannia Blvd. and Otay Mesa Road.
D. Location 4 – Eastbound Route 905 on-ramp and La Media Road.
E. Location 5 - Westbound Route 905 on-ramp and La Media Road.

Traffic signal (City locations) work shall be performed at the following locations:

A. Location 1 – Otay Mesa Road and Sanyo Avenue.
B. Location 2 – Otay Mesa Road and Detour.
C. Location 3 - Airway Road and Britannia Blvd.

Remove existing traffic signal system work shall be performed at the intersection of Otay Mesa Road and Airway Road.

Ramp metering system work shall be performed at the following locations:

A. Location 1 – Eastbound Route 905 on-ramp from Britannia Blvd.
B. Location 2 – Eastbound Route 905 on-ramp from La Media Road.
C. Location 3 – Westbound "LMD5" Route 905 on-ramp from La Media Road.
D. Location 4 – Westbound "LMD2" Route 905 on-ramp from La Media Road.
E. Location 5 - Westbound Route 905 on-ramp from Siempre Viva Road.

10-3.02 COST BREAK-DOWN

Cost break-downs shall conform to the provisions in Section 86-1.03, "Cost Break-Down," of the Standard Specifications and these special provisions.

The Engineer shall be furnished a cost break-down for each contract lump sum item of work described in this Section 10-3.

The cost break-down shall be submitted to the Engineer for approval of those lump sum items provided in the individual design sequencing packages that have signed electrical plan sheets within 15 days after the individual design sequencing packages have been provided to the Contractor. The cost break-down shall be approved, in writing, by the Engineer before any partial payment for the items of electrical work will be made.

Attention is directed to "Overhead" of these special provisions regarding compensation for time-related overhead.

Cost break-downs shall be completed and furnished in the format shown in the samples of the cost break-downs included in this section.

The sum of the amounts for the line items of work listed in each cost break-down table below for electrical work shall be equal to the contract lump sum price bid for each lump sum electrical item. Overhead and profit, except for time-related overhead, shall be included in each individual line item of work listed in a cost break-down table.

Individual line item values in the approved cost break-down tables will be used to determine partial payments during the progress of the work and as the basis for calculating an adjustment in compensation for the items within the cost breakdowns of for each lump sum electrical item due to changes ordered by the Engineer.

The following are the quantity break-down for the contract lump sum items of electrical system. The quantity break-downs are included in these specifications for the Contractor to use for bidding purposes in the absence of signed electrical plans. Preparation of electrical plans will be completed after approval of the project.

The following quantity break-downs for contract lump sum items for electrical systems shall be provided by the Contractor:

A. Remove Existing Signal System shall be at the intersection of Otay Mesa Rd and Airway Rd. Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

REMOVE EXISTING SIGNAL SYSTEM	**DESCRIPTION**	**UNIT**	**APPROXIMATE QUANTITY**	**PRICE**	**AMOUNT**
Remove signal standards and equipment [RC]	Type 29	EA	1		
	Type 26	EA	3		
RC pull box [RC]		EA	15		
Controller assembly [RS]	Model 170	EA	1		
TDC [RC]		EA	1		
			TOTAL		

B. Signal and lighting (Location 1) shall be for the Eastbound Route 905 on-ramp and Britannia Blvd. Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

SIGNAL AND LIGHTING (LOCATION 1)	UNIT DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Signal heads and mountings	SV-2-T	EA	2		
	TV-1-T	EA	1		
	MAS	EA	3		
	MAT	EA	3		
	SP-1-T	EA	4		
	TV-2-T	EA	3		
	SV-1-T	EA	2		
Signal standards with foundation	Type 1-A (2.4 m OR 3 m)	EA	2		
	Type 61-5, 19.8 SMA	EA	1		
	Type 24-4, 12.2 SMA	EA	1		
	Type 19-4, 10,7 SMA	EA	1		
	Type 15TS	EA	1		
Pull box	No. 5 or 6	EA	12		
Detectors	Loops	EA	6		
	Preformed	EA	3		
	PPB	EA	4		
Video detection	VDU	EA	3		
	VIS	EA	3		
	Video Display	EA	1		
	Ethernet Communication card	EA	1		
Conduits	Size 53	M	500		
	Size 103	M	300		
Conductors	#8	M	480		
Cables	DLC	M	1,500		
	3CSC	M	200		
	12CSC	M	600		
	OCC	M	100		
	EVC	M	200		
	Video Cable	M	200		
Install controller cabinet (including foundation)	SF Model 170	EA	1		
Luminaires	200 W HPS	EA	4		
Miscellaneous	Install Sign	EA	3		
			TOTAL		

C. Signal and lighting (Location 2) shall be for the Westbound Route 905 off ramp and Britannia Blvd. Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

SIGNAL AND LIGHTING (LOCATION 2)	UNIT DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Signal heads and mountings	SV-1-T	EA	3		
	TV-1-T	EA	3		
	MAS	EA	2		
	MAT	EA	3		
	SP-1-T	EA	4		
Signal standards with foundation	Type 1-A (2.4 m OR 3 m)	EA	3		
	Type 61-5, 19.8 SMA	EA	1		
	Type 24-4, 12.2 SMA	EA	1		
	Type 19-4, 10.7 SAM	EA	1		
Pull box	No. 5 or 6	EA	12		
Detectors	Loops	EA	6		
	Preformed	EA	3		
	PPB	EA	4		
Video detection	VDU	EA	3		
	VIS	EA	3		
	Video display	EA	1		
	Ethernet communication card	EA	1		
Conduits	Size 53	M	500		
	Size 103	M	300		
Conductors	#8	M	480		
Cables	DLC	M	1,500		
	3CSC	M	200		
	12CSC	M	600		
	OCC	M	100		
	EVC	M	200		
	Video Cable	M	200		
Install controller cabinet (including foundation)	SF Model 170	EA	1		
Luminaires	200 W HPS	EA	3		
Miscellaneous					
	TDC	EA	1		
	Install sign	EA	3		
			TOTAL		

D. Signal and lighting (Location 3) shall be for the Otay Mesa Road and Britannia Blvd. Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

SIGNAL AND LIGHTING (LOCATION 3)	UNIT DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Signal heads and mountings	SV-1-T	EA	1		
	TV-2-T	EA	1		
	MAS	EA	2		
	MAT	EA	1		
	SP-1-T	EA	1		
Signal standards with foundation	Type 1-A (3 m)	EA	1		
	Type 29-4, 10.7 SMA	EA	1		
	Type 15TS	EA	1		
Remove signal poles and appurtenances [RS]	Type 26	EA	1		
	Type 15	EA	1		
Pull box	No. 5 or 6	EA	10		
Detectors	Loops	EA	3		
	PPB	EA	2		
Video detection	VDU	EA	2		
	VIS	EA	2		
	Video display	EA	1		
	Ethernet communication card	EA	1		
Conduits	Size 53	M	300		
	Size 103	M	200		
Conductors	#8	M	480		
Cables	DLC	M	1500		
	3CSC	M	200		
	12CSC	M	600		
	OCC	M	100		
	EVC	M	200		
	Video cable	M	200		
Luminaires	310W HPS	EA	2		
Miscellaneous	Install sign	EA	3		
			TOTAL		

E. Signal and lighting (Location 4) shall be for the Eastbound Route 905 on-ramp and La Media Road. Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

SIGNAL AND LIGHTING (LOCATION 4)	UNIT DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Signal heads and mountings	SV-1-T	EA	1		
	SV-2-T	EA	2		
	TV-1-T	EA	1		
	MAS	EA	2		
	MAT	EA	3		
	SP-1-T	EA	2		
	TV-2-T	EA	1		
Signal standards with foundation	Type 1-A (2.4 m OR Type 3 m)	EA	2		
	Type 61A-5, 19.2 SMA	EA	1		
	Type 26A-4, 12.2 SMA	EA	1		
	Type 19A-4, 10.7 SMA	EA	1		
Pull box	No. 5 or 6	EA	12		
Detectors	Loops	EA	10		
	PPB	EA	2		
Video detection	VDU	EA	3		
	VIS	EA	3		
	Video display	EA	1		
	Ethernet communication card	EA	1		
Conduits	Size 53	M	500		
	Size 103	M	300		
Conductors	#8	M	480		
Cables	DLC	M	1,500		
	3CSC	M	200		
	12CSC	M	600		
	OCC	M	100		
	EVC	M	200		
	Video Cable	M	200		
Install controller cabinet (including foundation)	SF Model 332	EA	1		
Luminaires	310W HPS	EA	3		
Miscellaneous	Install Sign	EA	3		
			TOTAL		

F. Signal and lighting (Location 5) shall be for the Westbound Route 905 on-ramp and La Media Road. Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

SIGNAL AND LIGHTING (LOCATION 5)	UNIT DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Signal heads and mountings	SV-1-T	EA	2		
	SV-2-T	EA	2		
	TV-1-T	EA	2		
	MAS	EA	5		
	MAT	EA	4		
	SP-1-T	EA	4		
	TV-2-T	EA	1		
Signal standards with foundation	Type 1-A (2.4 m OR Type 3 m)	EA	3		
	Type 61-5, SMA 19.8	EA	1		
	Type 29-5, SMA 16.8	EA	1		
	Type 19-4, SMA 13.7	EA	1		
	Type 24-4, SMA 12.2	EA	1		
Pull box	No. 5 or 6	EA	13		
Detectors	Loops		12		
	PPB	EA	4		
Video Detection	VDU	EA	4		
	VIS	EA	4		
	Video Display	EA	1		
	Ethernet Communication card	EA	1		
Conduits	Size 53	M	500		
	Size 103	M	300		
Conductors	#8	M	480		
Cables	DLC	M	1,500		
	3CSC	M	200		
	12CSC	M	600		
	OCC	M	100		
	EVC	M	200		
	Video cable	M	200		
Install controller assembly (including foundation)	SF Model 170	EA	1		
Luminaires	200 W HPS	EA	4		
Miscellaneous	Install sign	EA	4		
			TOTAL		

G. Signal and lighting (City Street Location 1) shall be located at Otay Mesa Rd and Sanyo Ave. Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

SIGNAL AND LIGHTING (CITY LOCATION 1)	UNIT DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Signal heads and mountings	SV-2-T	EA	1		
	TV-1-T	EA	1		
	MAS	EA	3		
	MAT	EA	1		
	SP-1-T	EA	4		
	TV-2-T	EA	3		
	SV-1-T	EA	2		
Signal standards with foundation	Type 1-A (2.4 m OR 3 m)	EA	1		
	Type 26-4, SMA 12.2	EA	1		
	Type 19-4, SMA 12.2	EA	1		
	Type 17-3, SMA 10.7	EA	1		
	Type 15TS	EA	1		
Pull box	No. 5 or 6	EA	12		
Detectors	Loops	EA	9		
	PPB	EA	4		
Video detection	VDU	EA	3		
	VIS	EA	3		
	Video Display	EA	1		
	Ethernet communication card	EA	1		
Conduits	Size 53	M	500		
	Size 103	M	300		
Conductors	#8	M	480		
Cables	DLC	M	1,500		
	3CSC	M	200		
	12CSC	M	600		
	OCC	M	100		
	EVC	M	200		
	Video Cable	M	200		
Install controller assembly (including foundation)	SF Model 170	EA	1		
Luminaires	200 W HPS	EA	3		
Miscellaneous	Install Sign	EA	3		
			TOTAL		

H. Signal and lighting (City Street Location 2) shall be located at Otay Mesa Rd and Detour. Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

SIGNAL AND LIGHTING (CITY LOCATION 2)	UNIT DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Signal heads and mountings	SV-2-T	EA	1		
	MAS	EA	2		
	MAT	EA	2		
	SP-1-T	EA	1		
Signal standards with foundation	Type 26-4, SMA 12.2	EA	1		
	Type 18-3 SMA 10.7	EA	1		
Relocate signal pole and equipment	Type 30	EA	1		
Detectors	PPB	EA	1		
Pull box	No. 5 or 6	EA	12		
Relocate video detection	VIS	EA	1		
Conduits	Size 53	M	150		
	Size 103	M	100		
Conductors	#8	M	200		
Cables	DLC	M	1200		
	3CSC	M	200		
	12CSC	M	600		
	EVC	M	200		
	Video Cable	M	100		
Luminaires	200 W HPS	EA	1		
Miscellaneous	Install Sign	EA	2		
Salvage signal standards and equipment [RS]	Type 61A	EA	1		
	Type 29A	EA	1		
	Type 29	EA	3		
	Type 26	EA	1		
	Type 18	EA	1		
	Type 30	EA	1		
	Type 15	EA	1		
Pull box [RC]		EA	20		
Controller assembly [RS]	Model 170	EA	1		
TDC [RC]		EA	1		
			TOTAL		

I. Signal and lighting (City Street Location 3) shall be located at Airway Rd and Britannia Blvd. Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

SIGNAL AND LIGHTING (CITY LOCATION 3)	UNIT DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Pull boxes	No. 5 or 6	EA	4		
	RC	EA	2		
Detectors	Loops	EA	1		
Conduits	Size 53	M	300		
Cables	DLC	M	200		
	SIC	M	300		
	#8	M	50		
			TOTAL		

J. Lighting (City Street) shall be installed on Bridge No.57-1144-Britannia Blvd. Overcrossing, Bridge No.57-1145-La Media Road Undercrossing and Bridge No.57-1148-Airway Road, Britannia Blvd., Airway Road. Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

LIGHTING (CITY STREET)	DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Lighting standards (foundation included)	Type 15	EA	26		
Relocate lighting standard	Type 15	EA	3		
Luminaires	200W HPS	EA	29		
Soffit fixtures	100W HPS	EA	18		
Pull boxes	No. 5 or 6	EA	60		
	9 or 9A	EA	10		
Conduit	Size 53	M	1,260		
Conductors	#6	M	1,000		
	#8	M	4,000		
			TOTAL		

K. Lighting and sign illumination shall be installed along Route 905 between stations 163+80 "E4" and 210+81.7 "E2". Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

LIGHTING AND SIGN ILLUMINATION	UNIT DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Lighting standards (foundation included)	Type 30	EA	22		
Relocate lighting standard	Type 30	EA	3		
Luminaires	ISL (85W) Sign	EA	50		
	310W-HPS	EA	22		
Pull boxes	No. 5 or 6	EA	150		
	No. 5(T) or 6(T)	EA	30		
	9A	EA	30		
Conduit	Size 53	M	9,000		
	Size 78	M	750		
Conductors	#6	M	19,000		
	#8	M	8,500		
	#10	M	850		
	#4	M	850		
	#14	M	850		
Expansion joints	X	EA	14		
Service equipment enclosure	Type III-B	EA	5		
	Type III-C	EA	2		
Sign Control		EA	19		
			TOTAL		

L. Ramp metering system (Location 1) shall be for the eastbound Route 905 on-ramp at Britannia Blvd. Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

RAMP METERING SYSTEM (LOCATION 1)	DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Signal standards (foundation included)	Type 1-A (3 m)	EA	3		
	Type 15TS	EA	1		
Signal heads and mountings	SV-1-T	EA	3		
	TV-1-T	EA	2		
	TV-2-T	EA	1		
Pull boxes	No. 5 or 6	EA	12		
	No. 5(T) or 6(T)	EA	13		
Detectors	Loops	EA	28		
Conduit	Size 53	M	680		
	Size 78	M	160		
Conductors	#8	M	1200		
	#14	M	700		
Cables	DLC	M	3100		
	12CSC	M	60		
	9CSC	M	100		
	OCC	M	600		
Controller foundations	Model 334	EA	1		
Install controller assembly (including foundation)	SF Model 170	EA	1		
Luminaires	310W HPS	EA	1		
			TOTAL		

M. Ramp metering system (Location 2) shall be for the eastbound Route 905 on-ramp "LMD4" at La Media Road. Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

RAMP METERING SYSTEM (LOCATION 2)	DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Signal standards (foundation included)	Type 1-A (3 m)	EA	3		
	Type 15TS	EA	1		
Signal heads and mountings	SV-1-T	EA	3		
	TV-1-T	EA	2		
	TV-2-T	EA	1		
Pull boxes	No. 5 or 6	EA	10		
	No. 5(T) or 6(T)	EA	5		
Detectors	Loops	EA	20		
Conduit	Size 53	M	500		
	Size 78	M	100		
Conductors	#8	M	840		
	#14	M	440		
Cables	DLC	M	600		
	9CSC	M	80		
	OCC	M	440		
Install controller assembly (including foundation)	SF Model 170	EA	1		
Luminaires	200 W HPS	EA	1		
			TOTAL		

N. Ramp metering system (Location 3) shall be for the westbound Route 905 on-ramp from Siempre Viva Road. Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

RAMP METERING SYSTEM (LOCATION 5)	UNIT DESCRIPTION		QUANTITY	PRICE	AMOUNT
Signal standards (foundation included)	Type 1-A (3 m)	EA	3		
	Type 15TS	EA	1		
Signal heads and mountings	SV-1-T	EA	3		
	TV-1-T	EA	2		
	TV-2-T	EA	1		
Pull Boxes	No. 5 or 6	EA	8		
	No. 5(T) or 6(T)	EA	9		
Cables	DLC	M	2000		
	9CSC	M	120		
	OCC	M	400		
Conductors	#14	M	360		
	#8	M	800		
Conduit	53C	M	230		
	78C	M	100		
Luminaires	200 W HPS	EA	1		
Miscellaneous	TDC	EA	1		
			TOTAL		

O. Traffic Monitoring Station (Location 1) shall be installed on westbound and eastbound Route 905 "E4", approximately at Station 175+90. Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

TRAFFIC MONITORING STATION (LOCATION 1)	DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Pull boxes	No. 5 or 6	EA	2		
	No. 5(T) or 6(T)	EA	4		
Detectors	Loops	EA	12		
Conduit	Size 53	M	40		
	Size 78	M	120		
Conductors	#8	M	40		
Cables	DLC	M	1,000		
Install controller assembly (including foundation)	SF Model 170	EA	1		
			TOTAL		

P. Traffic Monitoring Station (Location 2) shall be installed on westbound and eastbound Route 905 "E6", approximately at Station 193+15. Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

TRAFFIC MONITORING STATION (LOCATION 2)	DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Pull boxes	No. 5 or 6	EA	2		
	No. 5(T) or 6(T)	EA	4		
Detectors	Loops	EA	12		
Conduit	Size 53	M	40		
	Size 78	M	120		
Conductors	#8	M	40		
Cables	DLC	M	1,200		
Install controller assembly (including foundation)	SF Model 170	EA	1		
			TOTAL		

Q. Traffic Monitoring Station (Location 3) shall be installed on westbound and eastbound Route 905 "E6", approximately at Station 200+35. Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

TRAFFIC MONITORING STATION (LOCATION 3)	DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Pull boxes	No. 5 or 6	EA	2		
	No. 5(T) or 6(T)	EA	4		
Detectors	Loops	EA	12		
Conduit	Size 53	M	100		
	Size 78	M	120		
Conductors	#8	M	80		
Cables	DLC	M	1800		
Install controller assembly (including foundation)	Model 170	EA	1		
Miscellaneous	TDC	EA	1		
			TOTAL		

R. Fiber optic communication system shall be installed along Route 905 approximately between stations 167+00 "E4" and 203+80 "E6". Signed electrical plans will be provided to the Contractor detailing the location of measurable components as detailed in the following table:

FIBER OPTIC COMMUNICATION SYSTEM	UNIT DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
CCTV standard (foundation included)	CCTV 40	EA	3		
Pull box	6(E)(T)	EA	20		
	Vaults	EA	7		
Conduits	MDCS (8)	M	6300		
	MDCS (8)-(bridge)	M	200		
	53	M	2200		
Conductors	FO12	M	2600		
	FO84	M	14600		
	OCC	M	3500		
	Camera cable	M	80		
FO pigtail	SMFO SC pigtails	EA	162		
FO jumper	Simplex SMFO SC/SC jumper	EA	61		
CU jumper	CAT 5e Pptch cable	EA	65		
CU cable	Serial data cable	EA	21		
	Phone cable	EA	19		
Roadside cabinet (including foundation)	Model 334 (CCTV)	EA	3		
	Type G M	EA	1		
Miscellaneous	Fiber optic splices	EA	300		
	Fiber optic splice closures	EA	6		
	Ethernet hub	EA	7		
	FDU	EA	12		
	Delineators	EA	40		
	Switch	EA	4		
	SECU	EA	30		
	EEP	EA	8		
	EES	EA	7		
	DS3 ROUTER	EA	1		
	Multipoint media	EA	2		
	Media converter	EA	16		
	Video encoder	EA	4		
	Cabinet shelves (for S/F cabinets)	EA	18		
	Camera (CCTV)	EA	3		
			TOTAL		

10-3.03 MAINTAINING EXISTING AND TEMPORARY ELECTRICAL SYSTEMS

Traffic signal system shutdowns shall be limited to periods allowed for lane closures listed or specified in "Maintaining Traffic" of these special provisions.

10-3.04 FOUNDATIONS

Reinforced cast-in-drilled-hole concrete pile foundations for traffic signal and lighting standards shall conform to the provisions in "Piling" of these special provisions except for payment.

Where cast-in-drilled-hole concrete pile foundations are to be constructed in slag aggregate embankments, the diameter of the pile shall be increased to provide a minimum of 75 mm of concrete cover over the reinforcing steel.

Full compensation for the increased diameter of cast-in-drilled-hole concrete pile foundations in slag aggregate embankments, including additional portland cement concrete, and increased drilling and placement costs shall be considered as included in the contract lump sum price paid for the item requiring the cast-in-drilled-hole concrete pile foundation and no additional compensation will be allowed therefor.

10-3.05 STANDARDS, STEEL PEDESTALS, AND POSTS

Standards, steel pedestals, and posts for traffic signal and lighting standards shall conform to the provisions in Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, "Steel Structures" of these special provisions, and the following requirements.

Steel bolts not designated on the plans as high-strength (HS) or stainless steel shall be for general applications and shall conform to the requirements in ASTM Designation: A 307.

The sign mounting hardware shall be installed at the locations shown on the plans.

Handhole reinforcement rings for standards, steel pedestals, and posts shall be continuous around the handholes.

Type 1 standards shall be assembled and set with the handhole on the downstream side of the pole in relation to traffic or as shown on the plans.

10-3.06 CONDUIT

Conduit to be installed underground shall be Type 3 unless otherwise specified. Pull ropes for empty conduits for future use shall be a soft fiber type of not less than 12 mm diameter.

The conduit in a foundation and between a foundation and the nearest pull box shall be Type 3.

Conduit to be installed in concrete barrier shall be Type 3.

Conduit sizes shown on the plans and specified in the Standard Specifications and these special provisions are referenced to metallic type conduit. When rigid non-metallic conduit is required or allowed, the nominal equivalent industry size shall be used as shown in the following table:

Size Designation for Metallic Type Conduit	Equivalent Size for Rigid Non-metallic Conduit
21	20
27	25
41	40
53	50
63	65
78	75
103	100

When Type 3 conduit is placed in a trench (not in pavement or under portland cement concrete sidewalk), after the bedding material is placed and the conduit is installed, the trench shall be backfilled with commercial quality concrete, containing not less than 250 kg of portland cement per cubic meter, to not less than 100 mm above the conduit before additional backfill material is placed.

Multiduct conduit system (MDCS) trench and backfill requirements shall be as shown on the plans and as described in these special provisions.

After conductors have been installed, the ends of conduits terminating in pull boxes, vaults, service equipment enclosures, and in controller cabinets shall be sealed with an approved type of sealing compound.

All conduits shall be cleaned with a mandrel or cylindrical soft bristled brush and blown out with compressed air until all foreign material is removed immediately prior to sealing empty conduits or installing cables. Cleaning shall be performed in the presence of the Engineer. The ends of conduits shall be sealed with an approved sealing compound. The ends of multiduct conduit system shall be sealed with sealing plugs as described in these special provisions.

At those locations where conduit is required to be installed under pavement and existing underground facilities require special precautions in conformance with the provisions in "Obstructions" of these special provisions, conduit shall be placed by the "Trenching in Pavement Method" in conformance with the provisions in Section 86-2.05C, "Installation," of the Standard Specifications and with the details shown for "T" trench on ES-5D.

At the option of the Contractor, the final 0.6-m of conduit entering a pull box in a reinforced concrete structure may be Type 4.

10-3.07 MULTIDUCT CONDUIT SYSTEM

Where multiduct conduit system (MDCS) is shown on the plans or on the cost break down of these special provisions, the system shall be of the following types as shown on the plans:

A. A Type 3 Size 103 conduit with four Size 25 (I.D. nominal) conduits contained therein. Joints shall be keyed to mate the enclosed conduits.
B. Size 32 (nominal) high density polyethylene conduits grouped in quantities of not less than four conduits. Requirements for high density polyethylene conduits are described in "High Density Polyethylene Conduit," in these special provisions.

All new MDCS conduits shall be cleaned with a mandrel or cylindrical soft bristled brush and blown out with compressed air until all foreign material is removed immediately prior to sealing empty conduits or installing cables. Cleaning shall be performed in the presence of the Engineer. The ends of conduits shall be sealed with an approved sealing compound. The ends of multiduct conduit system shall be sealed with sealing plugs as described in these special provisions.

Size 103 conduit on bridge structures shall be fiberglass unless otherwise shown on the plans except that the conduit contained within size 103 conduits may be Type 3.

Size 103 conduits (and conduits contained within) and Size 32 conduits shall be either all individually factory color coded or all orange. Straight segments of Type 3 multiduct conduit shall be nominal 6 m lengths.

Joints shall be solvent welded or sealed with a gasket as recommended by the manufacturer. Joints shall lock together or be provided with a seating mark to verify proper assembly.

Bends in Type 3 conduits shall be rigid factory assembled sections designed to fit the system.

The conduit bend radius in Type 3 conduits shall not be less than 1.8 meters.

Multiduct conduit system (MDCS) trench and backfill requirements shall be as shown on the plans and as described in these special provisions.

10-3.08 FIBERGLASS CONDUIT

At locations shown on plans, where multiduct conduit system is to be installed on bridges, fiberglass conduit shall be used and shall conform to the details shown on the plans, and in these special provisions.

Fiberglass Conduit

Fiberglass conduit and components shall comply with the specifications in ANSI/NEMA Standards Publication TC-14A or TC-14B. All fiberglass conduit components shall be free of defects including delaminations, foreign inclusions, etc. All fiberglass conduit components shall be nominally uniform (as commercially practical) in color, density, and physical properties. Fiberglass conduit shall be straight and the ends shall be cut square and true. The Contractor shall purchase all fiberglass conduit and other fiberglass conduit system components from the same manufacturer to insure component to component compatibility.

Fiberglass conduit shall be manufactured in 6 m minimum lengths.

Fiberglass conduit components shall include compatible fittings, adapters, expansion joints, and factory bends at nominal radii of 600 mm, 900 mm, 1200 mm.

All fiberglass conduit system components shall be produced from heat cured, corrosion resistant epoxy resin and continuous fiberglass rovings. All materials shall be manufactured for use at temperatures from -40°C to 110°C. All fiberglass conduit components shall be manufactured using a homogeneously dispersed UV inhibitor. When exposed to direct diurnal sunlight, the UV inhibitor shall prevent the degradation of all physical material properties, except for surface cosmetic appearance. Materials shall contain no halogens above trace levels and shall be fire resistant.

Joints shall be water tight and withstand a minimum 4450 N of pullout tension.

For all sizes of fiberglass conduit, under a load of 400 N/m of conduit, the deflection of the inside diameter shall not exceed 5 percent.

The minimum impact resistance values for the fiberglass conduit shall be as follows when measured as described in ASTM D2444-70, using a 9 kg tup "B" with a 50 mm radius nose:

Size 53 conduit	133 N
Size 78 conduit	222 N
Size 103 conduit	356 N

10-3.09 HIGH DENSITY POLYETHYLENE CONDUIT

GENERAL

High density polyethylene (HDPE) conduit for communications applications shall conform to the details shown on the plans, these special provisions, and as directed by the Engineer.

MATERIAL

High density polyethylene conduit shall be manufactured from high density polyethylene virgin compounds.

High density polyethylene compounds used in the manufacture of communication conduit shall conform to the following Cell Classifications specified in ASTM Designation: D 3350:

Property	Cell Classification
Density	3
Melt Index	3 or 4
Flexural modulus	4 or 5
Tensile strength	4
Environmental stress crack resistance	3
Hydrostatic design basis	0, 1, 2, 3 or 4
Ultraviolet stabilizer	C[b]

b - HDPE Resin shall contain not less than 2 ± 0.5 percent carbon black ultraviolet stabilizer

CONDUIT

High density polyethylene conduit size (nominal trade inside diameter) and location shall be as shown on the plans. Conduit shall be the smooth interior wall type.

High density polyethylene conduit shall be suitable for cable and conductor installation methods as described in Section 86 of the Standard Specifications, and in "Air Blown Method" as described in these special provisions.

High density polyethylene conduit color shall be black with orange colored stripe. Orange colored stripe shall consist of not less than 2 stripes, with longitudinal orientation, evenly spaced.

Conduit shall contain carbon black ultraviolet shielding suitable for the conduit to sustain unprotected outdoor exposure for at least one year.

Conduit shall be continuously marked with clear, distinctive and permanent markings at intervals not greater than 2 meters. The marking shall be in a contrasting color to the conduit color. The height of the marking shall be approximately 2.5 mm or larger. Conduit marking information shall include, as a minimum, the following information:

A. Nominal Size
B. Dimension Ratio (DR)
C. Manufacturer Name and Product/Model Number
D. Material Code
E. Plant Identification
F. Production Date
G. Cell Classification

Coils and reels shall have sequential measurement markings every meter.

High density polyethylene conduit shall be DR 9 per ASTM D 3035 for controlled outside diameter.

High density polyethylene conduit shall be IPS outside diameter controlled in accordance with the manufacturer's production tolerances. The wall thickness of DR or SDR sized conduit shall be in accordance with the manufacturer's production tolerances.

High density polyethylene conduit shall meet or exceed the following:

PROPERTY	TEST METHOD (ASTM unless shown otherwise)	UNIT	VALUE (Nominal)
Material Classification	D 3350		PE33 or PE34
Density	D 1505	g/cm^3	0.941
Flow Rate	D 1238	g/10 Min.	0.40
Flexural Modulus	D 790	MPa	552
Tensile Strength	D 638	MPa	20.6
Environmental Stress Crack Resistance	D 1693	Hours	Meet Cell Classification 3
HDB @ 23°C	D 2837	MPa	Meet Cell Classification 0, 1, 2, 3 or 4
UV Stabilizer	D 1603	%C	not less than 2
Hardness	D 2240	Shore D	60-68
Elongation	D 638 (50.8 mm/Min)	%, minimum	750
Brittleness Temperature	D 746	°C	<-75
Vicat Softening Temperature	D 1525	°C	123

JOINING OF CONDUIT

Conduit shall be joined by heat fusion. Heat fusion (includes electrofusion) of high density polyethylene conduit shall be by methods recommended by the conduit manufacturer, and with equipment approved for the purpose. Equipment shall not expose conduit to direct flame. Heat fusion shall be performed by conduit manufacturer certified or authorized personnel. A minimum of 2 test fusions, by each fusion operator, shall be demonstrated to the Engineer prior to performing fusion operations on any high density polyethylene conduit to be installed.

Where high density polyethylene conduit is shown on the plans to join Type 3 conduit, mechanical fittings designed for joining polyethylene conduit to another material may be used. Mechanical fittings shall be pressure rated at not less than 400 kPa, and fully thrust restrained such that the fitting does not disjoin under longitudinal load of up to350 N.

INSTALLATION

High density polyethylene conduit shall be installed at underground locations only.

In addition to the conduit installation methods for Type 3 Conduit, as described in Section 86 of the Standard Specifications and in these special provisions, high density polyethylene conduit may be installed by Horizontal Directional Drilling (HDD) (per ASTM F1962 "Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacle, Including River Crossings") or "Directional Boring Method" as described in these special provisions. Where there is a difference or conflict between requirements, the higher of the two standards shall apply.

Conduit bends, except factory bends, shall have a radius of not less than the manufacturer's recommended minimum bend radius. Where factory bends are not used, conduit shall be bent, without crimping or flattening, using the longest radius practicable.

Bending of high density polyethylene conduit shall be by methods recommended by the conduit manufacturer, and with equipment approved for the purpose. Equipment shall not expose conduit to direct flame.

Attention is directed to "Conduit" in these special provisions regarding cleaning and sealing conduit.

The ends of high density polyethylene conduit shall be capped until the installation of cable is started.

A pull rope, conforming to Section 86-2.05C, "Installation," of the Standard Specifications shall be installed in conduits which are to receive future conductors.

CERTIFICATES OF COMPLIANCE, MATERIALS RECEIVING INSPECTION AND MANUFACTURER'S DATA

In conformance with the provisions in Section 6-1.07, "Certificates of Compliance," a Certificate of Compliance shall be furnished to the Engineer for each type of high density polyethylene conduit furnished. The certificate shall also certify that the high density polyethylene conduit complies with the requirements of these special provisions, and shall include the resin material Cell Classification, unit mass of pipe, average pipe stiffness and date of manufacture.

Conduit, when delivered to the site, which exhibits damage in excess of 10% of the conduit wall thickness may be rejected by the Engineer. Conduit exhibiting damage which does not meet the manufacturer's recommendations for usable conduit may also be rejected by the Engineer. Conduit sections may be repaired if approved by the Engineer. Replacement or repair of rejected conduit shall be at the Contractor's expense.

Two copies of the manufacturer's product technical specification information shall be furnished to the Engineer at least two weeks subsequent to the start of the scheduled delivery.

Two copies of the manufacturer's test data for the delivered shipment shall be furnished to the Engineer at the time of the delivery.

10-3.10 AIR BLOWN METHOD

At the Contractor's option, installation of cable into conduit, ducts or subducts may be performed using an "Air Blown Method."

The "Air Blown Method" shall be an installation method that uses a mechanical device combined with a high speed flow of compressed air to place cables into conduits, ducts or subducts.

The "Air Blown Method" shall conform to the following:

The method shall install cable without exceeding the cable manufacturers' tensile and compressive strength ratings.

The mechanical device shall be used to provide a pushing force on the cable into the conduit.

The cable installation equipment shall also have, at minimum, the following features:

A. Controls to regulate the flow rate of compressed air entering the conduit, duct or subduct, and any hydraulic or pneumatic pressure applied to the cable.
B. Safety shutoff valves to disable the system in the event of sudden changes in pneumatic or hydraulic pressure.
C. Measuring device to determine the speed of the cable during installation and the length of the cable installed.

Information on the proposed "Air Blown Method" shall be submitted to the Engineer. The submittal shall include, but not be limited to, the following items:

A. Project description;
B. List or plan sheet marked to identify the conduits and cables involved;
C. Equipment description and specifications;
D. Manufacturer's test data covering the performance of the equipment and cable stress in a typical installation using cable equivalent to cable to be installed on this project; and
E. User/Installer Manual for the equipment and installation procedures.

Within 30 days after the approval of the contract, the Contractor shall submit 2 copies of the proposed "Air Blown Method" to the Engineer. The Contractor shall allow 7 days for the Engineer to review the proposed "Air Blown Method." If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the proposed "Air Blown Method" 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 proposed "Air Blown Method," 2 additional copies of the proposed "Air Blown Method" incorporating the required changes shall be submitted to the Engineer. Minor changes or clarifications to the initial submittal may be made and attached as amendments to the proposed "Air Blown Method." In order to allow construction activities to proceed, the Engineer may conditionally approve, in writing, the proposed "Air Blown Method" while minor revisions or amendments are being completed.

The submitted "Air Blown Method" shall not be used until it has been approved in writing by the Engineer.

SEALING PLUG

Except as otherwise noted, multiduct conduit system and Size 103 conduits shall have their ends sealed with commercial preformed plugs which prevent the passage of gas, dust and water into the multiduct conduit system and Size 103 conduits.

Sealing plugs shall be removable and reusable. Plugs sealing conduit, conductor or cable shall be the split type that permits installation or removal without removing conductors or cables. Sealing plugs shall be capable of withstanding a pressure of 34.5 kPa.

Sealing plugs that seal MDCS (Size 103) shall seal the conduit and all enclosed conduits simultaneously with one self contained assembly having an adjustable resilient filler of neoprene or silicone rubber clamped between backing ends and compressed with stainless steel hardware.

Sealing plugs that seal the Size 25 or Size 32 conduits of MDCS shall seal each conduit individually with appropriate sizes and configuration to accommodate either empty conduit or those containing cable. Suitable sealing between the varying size cables and the plugs shall be provided by inserting split neoprene or silicone adapting sleeves, used singularly or in multiples, within the body of the plugs, or an equivalent method approved by the Engineer.

A sealing plug that seals an empty conduit shall have an eye or other type of capturing device (on the side of the plug that enters the conduit) to attach onto the pull rope so the pull rope will be easily accessible when the plug is removed.

TRACER WIRE

Tracer wire shall be provided and placed inside the MDCS conduit. The wire shall be placed in the uppermost conduit.

Tracer wire shall be No. 8 stranded, minimum, copper conductor with Type TW, THW, RHW, or USE insulation. The tracer wire shall form a mechanically and electrically continuous line throughout the length of the trench. A minimum of 1.5 m of slack shall be extended into each pull box and fiber optic vault from each direction.

Tracer wire may be spliced at intervals of not less than 150 m.

WARNING TAPE

Warning tape shall be provided and placed in the trench over conduits as shown on the plans. The warning tape shall be 100 mm wide with bold printed black letters of approximately 19 mm on bright orange color background, and contain the printed warning "CAUTION CALTRANS FIBER OPTIC LINE BURIED BELOW", repeated at approximately 800 mm intervals.

The printed warning shall be non-erasable and shall be rated to last with the tape for a minimum of 40 years.

The construction of the warning tape shall be such that it will not delaminate when it is wet. It shall be resistant to insects, acid, alkaline and other corrosive elements in the soil. It shall have a minimum of 712 N tensile strength per 150 mm wide strip and shall have a minimum of 700 percent elongation before breakage.

SLURRY CEMENT BACKFILL

The slurry cement backfill for the installation of multiduct conduit system or other conduit as shown on the plans shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

The size of the aggregate shall not be larger than 9.5 mm.

The concrete shall be pigmented a medium to dark, red or orange color by the addition of commercial quality cement pigment to the concrete mix. The red or orange concrete pigment shall be LM Scofield Company; Orange Chromix Colorant; Davis Colors; or equal.

Full compensation for furnishing and incorporating the cement pigment to achieve the color required shall be considered as included in the contract price or prices paid for the conduit involved and no separate payment will be made therefor.

10-3.11 DIRECTIONAL BORING METHOD

Where jacking and drilling is the required installation method, conduits may be installed by the directional boring method. Directional boring shall not be used at other locations unless approved by the Engineer. All pull boxes or vaults shall be located at the locations shown on the plans.

Minimum depth of conduit below finished grade in pavement areas shall be 2.5 m.

A listing of materials (composition and strength) and methods used in directional boring shall be submitted for the Engineer's review.

The diameter of the boring tool shall not exceed 1.5 times the outside diameter of the conduit. Mineral slurry or wetting solution shall only be used to lubricate the boring tool and to stabilize the soil surrounding the boring path. Mineral slurry or wetting solution shall be water based and environmentally safe.

Residue from directional boring operations shall be handled in the same manner as residue from slot cutting operations described in Section 86-5.01A(5), "Installation Details," of the Standard Specifications.

The directional boring equipment shall have directional control of the boring tool and have an electronic boring tool location detection system. During operation, the directional boring equipment shall be able to determine the location of the tool both horizontally and vertically.

The directional boring equipment shall be equipped with a tension measuring device that indicates the amount of tension exerted on conduit during conduit pulling operations.

Slurry cement backfill and warning tape, as shown on the plans for trench installations of conduit, are not required where the directional boring method is used. Tracer wire shall be attached to the uppermost conduit prior to conduit installation. Continuity of the tracer wire shall be verified after installation.

A representative of the Contractor must be in direct charge and control of the directional boring operation at all times.

The Engineer shall be notified in writing 2 working days in advance of starting directional boring operations. The location and equipment to be used in the boring operation shall be included in the advance notice to the Engineer. Directional boring shall only be performed in the presence of the Engineer unless otherwise notified in writing by the Engineer.

Full compensation for directional boring shall be considered as included in the contract price or prices paid for the conduit involved and no additional compensation will be allowed therefor.

TRENCH DELINEATOR

Trench delineator shall consist of a flexible post conforming to the provisions in Section 82, "Markers and Delineators," of the Standard Specifications and these special provisions.

Delineators on flexible posts shall be as specified in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. Flexible posts shall be made from a flexible white plastic which shall be resistant to impact, ultraviolet light, ozone, and hydrocarbons. Flexible posts shall resist stiffening with age and shall be free of burns, discoloration, contamination, and other objectionable marks or defects which affect appearance or serviceability.

Flexible posts shall be installed at locations shown on the plans directly above fiber optic conduit (in the same trench) offset enough to not hit the warning tape.

The flexible post may be installed by placing it in the trench prior to backfilling and compacting or by placing it in a 450 mm steel anchor sleeve that is driven into the ground prior to installing the flexible post. The flexible post and anchor shall have locking tabs that prevent the removal of the flexible post from the anchor sleeve.

Flexible posts shall extend a minimum of 0.9 m and a maximum of 1.2 m above ground and a minimum of 450 mm and a maximum of 600 mm below ground.

The message on the flexible post shall be black text on orange non-reflective background, shall be located at the top of the post, and shall face approaching traffic. The message shall read: "WARNING, FIBER OPTIC CABLE". Below this message shall be a smaller message that reads: "BEFORE EXCAVATING OR IN AN EMERGENCY CALL CALTRANS, SAN DIEGO, CA (619) 688-6785".

10-3.12 PULL BOXES

Grout shall not be placed in the bottom of pull boxes.

Where the sump of an existing pull box is disturbed by the Contractor's operation, the sump shall be reconstructed as shown on Standard Plan ES-8.

10-3.13 FIBER OPTIC VAULT

Fiber optic vault, cover and extensions (if required) shall be of the sizes and details shown on the plans and shall be precast of non-PCC material. Non-PCC material shall be resistant to fire, chemicals and ultraviolet exposure. The non-PCC material shall show no appreciable change in physical properties with exposure to the weather. Non-PCC material shall be dense and free of voids or porosity.

Covers shall be the non-skid type. Cover marking shall be "CALTRANS FIBER OPTICS" on each cover. Each cover shall have inset lifting pull slots. Cover hold down bolts or cap screws and nuts shall be of brass, stainless steel, or other non-corroding metal material.

A reinforced concrete encasement ring shall be poured around the collar of the fiber optic vault as shown on the plans. The concrete for encasement ring shall contain not less than 325 kg of cement per cubic meter.

Fiber optic vaults and covers shall be rated for AASHTO HS 20-44 loads and be installed as detailed and where shown on the plans.

Hanger assemblies shall consist of not less than 3 hangers evenly distributed. Hangers shall be made of a non-corroding material and be free of any sharp edges. Hanger assembly shall be provided for a minimum of eight fiber optic cables and be securely fastened to the side wall with the slack fiber optic cable neatly coiled.

The Contractor shall not install additional fiber optic vaults over those shown on the plans without the Engineer’s written approval.

10-3.14 CONDUCTORS AND WIRING

Splices of conductors shall be insulated with heat-shrink tubing of the appropriate size after thoroughly painting the spliced conductors with electrical insulating coating.

Heat-shrink tubing shall be heated as recommended by the manufacturer.

10-3.15 CATEGORY 5E CABLE

Category 5E cable shall be the unshielded, outdoor rated, non-gel filled type, and shall meet the requirements of TIA/EIA 568B.2, Category 5E Cable, and the following:

A. The cable shall contain 8 conductors, each of which shall be No. 24 , minimum, solid bare copper conductors. Each conductor shall be insulated with polyolefin, polyethylene, polyvinyl chloride or fluorinated ethylene propylene material. Conductors shall be in twisted pairs. Color coding shall distinguish each pair: blue, blue/white; brown, brown/white; green, green/white; orange, orange/white.
B. The cable jacket shall be rated for a minimum of 300 V and 60°C and shall be polyvinyl chloride, polyethylene, polyolefin or fluorinated ethylene propylene. The jacket shall be black, gray, or blue. The jacket shall be marked as

required by NEMA. The jacket shall be marked at not more than every meter with the cable identification: manufacturer's name, product identification, number of conductors and conductor size, and voltage and temperature ratings. Cable length markings may be sequentially alternated with the cable identification markings at not more than every other meter.

C. The finished outside diameter of the cable shall not exceed 13 mm.
D. The cable run between components shall be continuous without splices. A minimum of one meter of slack shall be provided at each pull box, junction box or vault, and a minimum of 3 m at each cabinet. The ends of category 5E cable shall be terminated with appropriate RJ-type connectors as necessary to connect the equipment shown on the plans, or shall be terminated with crimped and soldered spade type terminals at terminal blocks where shown on the plans.
E. Category 5E Certified installations are required for installed lengths of less than 100 m of finished cable.

10-3.16 FIBER OPTIC COMMUNICATION CABLE PLANT

FIBER OPTICS GLOSSARY

Breakout.--The cable "breakout" is produced by; (1) removing the jacket just beyond the last tie-wrap point, (2) exposing 1 to 2 meters of the cable buffers, aramid strength yarn and central fiberglass strength member, and (3) cutting the aramid yarn, central strength member and the buffer tubes to expose the individual glass fibers for splicing or connection to the appropriate device.

Connector.--A mechanical device used to align and join two fibers together to provide a means for attaching to and decoupling from a transmitter, receiver, or another fiber (patch panel).

Connectorized.--The termination point of a fiber after connectors have been affixed.

Couplers.--Couplers are devices which mate fiber optic connectors to facilitate the transition of optical light signals from one connector into another. They are normally located within FDFs mounted in panels. They may also be used unmounted, to join two simplex fiber runs.

Fiber Distribution Frame (FDF).--A rack mounted system that consists of a standard equipment rack, fiber routing guides, horizontal jumper troughs and Fiber Distribution Unit (FDU).

The FDF serves as the "home" for the passive fiber optic components from cable breakout, for connection by jumpers, to the electronics.

Fiber Distribution Unit (FDU)--Is an enclosure or rack-mountable unit containing both a patch panel with couplers and a splice tray(s).

F/O.--Fiber optic.

FOIP.--Fiber optic inside plant cable.

FOP.--Fiber optic outside plant cable.

FOTP.--Fiber optic test procedure(s) as defined by EIA/TIA standards.

Jumper.--A short fiber optic cable that has connectors installed on both ends, and is typically used for connection within a FDF.

Light Source.--Portable fiber optic test equipment that, in conjunction with a power meter, is used to perform end-to-end attenuation testing. It contains a stabilized light source operating at the designed wavelength of the system under test.

Link.--A passive section of the system, the ends of which are to be connected to active components. A link may include splices and couplers. For example, a video link may be from a F/O transmitter to a video multiplexer (MUX).

Link Loss Budget.--A calculation of the overall permissable attenuation from the fiber optic transmitter (source) to the fiber optic receiver (detector).

Loose Tube Cable.--Type of cable construction in which fibers are placed in filled buffer tubes to isolate them from outside forces (stress). A flooding compound is applied to the interstitial cable core to prevent water migration and penetration. This type of cable is primarily for outdoor applications.

Optical Time Domain Reflectometer (OTDR).--Fiber optic test equipment (similar in appearance to an oscilloscope) that is used to measure the total amount of power loss between two points and the corresponding distance. It provides a visual and printed display of the relative location of system components such as fiber sections, splices and connectors and the losses that are attributed to each component or defect in the fiber.

Patchcord.--A short jumper used to join two Connector Module Housing (CMH) couplers or a CMH and an active device (electronics).

Pigtail.--Short fiber optic cable that has a connector installed on only one end.

Plenum Cable.--NEC approved cable installed in air plenums (the area between a drop ceiling and the floor above it) without the use of conduit.

Power Meter.--Portable fiber optic test equipment that, in conjunction with a light source, is used to perform end-to-end attenuation testing. It contains a detector that is sensitive to light at the designed wavelength of the system under test. Its display indicates the amount of power injected by the light source that arrives at the receiving end of the link.

Riser Cable.--NEC approved cable installed in a riser (a vertical shaft in a building connecting one floor to another).

Segment.--A section of F/O cable that is not connected to any active device and may or may not have splices per the design.

Splice.--The permanent joining of fiber ends to matching fibers.

Splice Closure.--Normally installed in a splice vault, a splice closure is an environmentally sealed container used to organize and protect splice trays. The container allows splitting or routing of fiber cables from multiple locations.

Splice Module Housing (SMH).--The SMH stores splice trays as well as pigtails and short cable lengths.

Splice Tray.--A container used to organize and protect spliced fibers.

Splice Vault.--A splice vault is used to house splice closures.

Storage Cabinet.--Designed for holding excess cable slack for protection. The storage cabinet allows the user flexibility in equipment location and the ability to pull cable back for resplicing.

Tight Buffered, Non-Breakout Cable (Tight Buffer Cable).--Type of cable construction where each glass fiber is tightly buffered (directly coated) with a protective thermoplastic coating to 900 µm (compared to 250 µm for loose tube fibers). Increased buffering is desirable over loose tube cables because of its resulting ease of handling and connectorization (increased physical flexibility, smaller bend radius requirements), and ability to meet NEC flammability requirements.

FIBER OPTIC OUTSIDE PLANT CABLE

GENERAL

Each fiber optic outside plant cable (FOP) for this project shall be all dielectric, non-gel water blocking materials, duct type, with loose buffer tubes and shall conform to these special provisions. Cables with singlemode fibers shall contain singlemode (SM) dual-window (1310 nm and 1550 nm) fibers in the quantities shown below and on the plans. The optical fibers shall be contained within loose buffer tubes. The loose buffer tubes shall be stranded around an all dielectric central member. Aramid yarn or fiberglass shall be used as a primary strength member, and a polyethylene outside jacket shall provide for overall protection.

All fiber optic (F/O) cable on this project shall be from the same manufacturer, who is regularly engaged in the production of this material.

The cable shall comply with all the requirements of the United States Department of Agriculture Rural Utilities Service specifications RUS-PE-90 an as described in these Special Provisions.

FIBER CHARACTERISTICS

Each optical fiber shall be glass and consist of a doped silica core surrounded by concentric silica cladding. All fibers in the buffer tube shall be usable fibers, and shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of these specifications. The required fiber grade SM shall reflect the maximum individual fiber attenuation, to guarantee the required performance of each and every fiber in the cable.

The coating shall be a dual layered, UV cured acrylate. The coating shall be mechanically or chemically strippable without damaging the fiber.

The cable shall comply with the optical and mechanical requirements over an operating temperature range of -40°C to +70°C. The cable shall be tested in accordance with EIA-455-3A (FOTP-3), "Procedure to Measure Temperature Cycling Effects on Optical Fiber, Optical Cable, and Other Passive Fiber Optic Components." The change in attenuation at extreme operational temperatures (-40°C to +70°C) for singlemode fiber shall not be greater than 0.20 dB/km, with 80 percent of the measured values no greater than 0.10 dB/km. The singlemode fiber measurement is made at 1550 nm.

For all fibers the attenuation specification shall be a maximum attenuation for each fiber over the entire operating temperature range of the cable.

Singlemode fibers within the finished cable shall meet the requirements in the following table:

Fiber Characteristics Table	
Parameters	Singlemode
Type	Step Index
Core diameter	8.3 µm (nominal)
Cladding diameter	125 µm ±1.0 µm
Core to Cladding Offset	≤0.8 µm
Coating Diameter	250 µm ±15 µm
Cladding Non-circularity defined as: [1-(min. cladding dia ÷ max. cladding dia.)]x100	≤1.0%
Proof/Tensile Test	345 MPa, min.
Attenuation: (-40°C to +70°C) @1310 nm @1550 nm	 ≤0.4 dB/km ≤0.3 dB/km
Attenuation at the Water Peak	≤2.1 dB/km @ 1383 ±3 nm
Chromatic Dispersion: Zero Dispersion Wavelength Zero Dispersion Slope	 1301.5 to 1321.5 nm ≤0.092 ps/(nm^2∗km)
Maximum Dispersion:	≤3.3 ps/(nm∗km) for 1285 – 1330 nm <18 ps/(nm∗km) for 1550 nm
Cut-Off Wavelength	<1250 nm
Mode Field Diameter (Petermann II)	9.3 ±0.5 µm at 1300 nm 10.5 ±1.0 µm at 1550 nm

COLOR CODING

Optical fibers shall be distinguishable from others in the same buffer tube by means of color coding according to the following:

1. Blue (BL)	7. Red (RD)
2. Orange (OR)	8. Black (BK)
3. Green (GR)	9. Yellow (YL)
4. Brown (BR)	10. Violet (VL)
5. Slate (SL)	11. Rose (RS)
6. White (WT)	12. Aqua (AQ)

The colors shall be targeted in accordance with the Munsell color shades and shall meet EIA/TIA-598 "Color Coding of Fiber Optic Cables."

The color formulation shall be compatible with the fiber coating and the buffer tube filling compound, and be heat stable. It shall not fade or smear or be susceptible to migration and it shall not affect the transmission characteristics of the optical fibers and shall not cause fibers to stick together.

CABLE CONSTRUCTION

General.--The fiber optic cable shall consist of, but not be limited to, the following components:

A. Buffer tubes
B. Central member
C. Filler rods
D. Stranding
E. Core and cable flooding
F. Tensile strength member
G. Ripcord
H. Outer jacket

Buffer tubes.--Loose buffer tubes shall provide clearance between the fibers and the inside of the tube to allow for expansion without constraining the fiber. The fibers shall be loose or suspended within the tubes and shall not adhere to the inside of the tube. Each buffer tube shall contain 6 or 12 fibers.

The loose buffer tubes shall be extruded from a material having a coefficient of friction sufficiently low to allow free movement of the fibers. The material shall be tough and abrasion resistant to provide mechanical and environmental protection of the fibers, yet designed to permit safe intentional "scoring" and breakout, without damaging or degrading the internal fibers.

Buffer tube shall have a non-gel water-blocking material used to prevent water intrusion and migration. The filling compound shall be non-toxic and dermatologically safe to exposed skin. It shall be chemically and mechanically compatible with all cable components, non-nutritive to fungus, non-hygroscopic and electrically non-conductive. The filling compound shall be free from dirt and foreign matter and shall be readily removable with conventional nontoxic solvents.

Buffer tubes shall be stranded around a central member by a method that will prevent stress on the fibers when the cable jacket is placed under strain, such as the reverse oscillation stranding process.

Each buffer tube shall be distinguishable from other buffer tubes in the cable by means of color coding as specified above for fibers.

Central Member.--The central member which functions as an anti-buckling element shall be a glass reinforced plastic rod with similar expansion and contraction characteristics as the optical fibers and buffer tubes. A linear overcoat of low density polyethylene shall be applied to the central member to achieve the optimum diameter to provide the proper spacing between buffer tubes during stranding.

Filler rods.--Fillers may be included in the cable to lend symmetry to the cable cross-section where needed. Filler rods shall be solid medium or high density polyethylene. The diameter of filler rods shall be the same as the outer diameter of the buffer tubes.

Stranding.--Completed buffer tubes shall be stranded around the overcoated central member using stranding methods, lay lengths and positioning such that the cable shall meet mechanical, environmental and performance specifications. A polyester binding shall be applied over the stranded buffer tubes to hold them in place. Binders shall be applied with sufficient tension to secure the buffer tubes to the central member without crushing the buffer tubes. The binders shall be non-hygroscopic, non-wicking (or rendered so by the flooding compound), and dielectric with low shrinkage.

Core and Cable Flooding.--The cable core interstices shall be filled with a polyolefin based compound to prevent water ingress and migration. The flooding compound shall be homogeneous, non-hygroscopic, electrically non-conductive, and non-nutritive to fungus. The compound shall also be nontoxic, dermatologically safe and compatible with all other cable components.

Tensile Strength Member.--Tensile strength shall be provided by high tensile strength aramid yarns or fiberglass which shall be helically stranded evenly around the cable core and shall not adhere to other cable components.

Ripcord.--The cable shall contain at least one ripcord under the jacket for easy sheath removal.

Outer jacket.--The jacket shall be free of holes, splits, and blisters and shall be medium or high density polyethylene (PE), or medium density cross-linked polyethylene with minimum nominal jacket thickness of 1000±76 µm. Jacketing

material shall be applied directly over the tensile strength members and flooding compound and shall not adhere to the aramid strength material. The polyethylene shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus.

The jacket or sheath shall have clear, distinctive and permanent markings showing the manufacturer's name, the words "Optical Cable", the number of fibers, "SM", year of manufacture, and sequential measurement markings every meter. The actual length of the cable shall be within -0/+1 percent of the length marking. The marking shall be in a contrasting color to the cable jacket. The height of the marking shall be approximately 2.5 mm.

GENERAL CABLE PERFORMANCE SPECIFICATIONS

The F/O cable shall withstand water penetration when tested with a one meter static head or equivalent continuous pressure applied at one end of a one meter length of filled cable for one hour. No water shall leak through the open cable end. Testing shall be done in accordance with EIA-455-82 (FOTP-82), "Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable."

Crush resistance of the finished F/O cables shall be 220 N/cm applied uniformly over the length of the cable without showing evidence of cracking or splitting when tested in accordance with EIA-455-41 (FOTP-41), "Compressive Loading Resistance of Fiber Optic Cables." The average increase in attenuation for the fibers shall be ≤0.10 dB at 1550 nm (singlemode) for a cable subjected to this load. The cable shall not exhibit any measurable increase in attenuation after removal of load. Testing shall be in accordance with EIA455-41 (FOTP-41), except that the load shall be applied at the rate of 3 mm to 20 mm per minute and maintained for 10 minutes.

The cable shall withstand 25 cycles of mechanical flexing at a rate of 30 ±1 cycles/minute. The average increase in attenuation for the fibers shall be ≤0.20 dB at 1550 nm (singlemode) at the completion of the test. Outer cable jacket cracking or splitting observed under 10x magnification shall constitute failure. The test shall be conducted in accordance with EIA-455-104 (FOTP-104), "Fiber Optic Cable Cyclic Flexing Test," with the sheave diameter a maximum of 20 times the outside diameter of the cable. The cable shall be tested in accordance with Test Conditions I and II of (FOTP-104).

The cable shall withstand 20 impact cycles with total impact energy of 5.9 Nm. The average increase in attenuation for the fibers shall be ≤0.20 dB at 1550 nm (singlemode). The cable jacket shall not exhibit evidence of cracking or splitting. The test shall be conducted in accordance with EIA-455-25 (FOTP-25), "Impact Testing of Fiber Optic Cables and Cable Assemblies."

The finished cable shall withstand a tensile load of 2700 N without exhibiting an average increase in attenuation of greater than 0.20 dB. The test shall be conducted in accordance with EIA-455-33 (FOTP-33), "Fiber Optic Cable Tensile Loading and Bending Test." The load shall be applied for one-half hour in Test Condition II of the EIA-455-33 (FOTP-33) procedure.

PACKAGING AND SHIPPING REQUIREMENTS

Documentation of compliance to the required specifications shall be provided to the Engineer prior to ordering the material.

Attention is directed to "Fiber Optic Testing," in these special provisions.

The completed cable shall be packaged for shipment on reels. The cable shall be wrapped in a weather and temperature resistant covering. Both ends of the cable shall be sealed to prevent the ingress of moisture.

Each end of the cable shall be securely fastened to the reel to prevent the cable from coming loose during transit. Four meters of cable length on each end of the cable shall be accessible for testing.

Each cable reel shall have a durable weatherproof label or tag showing the manufacturer's name, the cable type, the actual length of cable on the reel, the Contractor's name, the contract number, and the reel number. A shipping record shall also be included in a weatherproof envelope showing the above information and also include the date of manufacture, cable characteristics (size, attenuation, bandwidth, etc.), factory test results, cable identification number and any other pertinent information.

The minimum hub diameter of the reel shall be at least thirty times the diameter of the cable. The F/O cable shall be in one continuous length per reel with no factory splices in the fiber. Each reel shall be marked to indicate the direction the reel should be rolled to prevent loosening of the cable.

Two copies of the installation procedures and technical support information shall be furnished to the Engineer at least two weeks subsequent to the start of the scheduled delivery.

10-3.17 FIBER OPTIC LABELING

GENERAL

All fiber optic cables shall be labeled in a permanent and consistent manner. All labels shall be made of a material designed for permanent labeling. All labels shall be mechanically marked with permanent ink on non-metal type labels, or embossed lettering on metal type labels; hand written labels shall not be used. Metal tags shall be constructed of stainless steel. Metal tags are required for use on fiber optic cables. Use of non-metal label materials shall be only as approved by the

Engineer. At vaults and other underground locations, all labels and imprinting shall be weatherproof. Labels shall be affixed per the manufacturer's recommendations in a manner that will not cause damage to the cable, or fiber.

CABLE IDENTIFICATION

Identification used for labeling of the fiber optic and copper cables will be provided to the Contractor by the Engineer. The quantity of characters will not be more than 40 for cables and not more than 20 for individual or fibers.

LABEL PLACEMENT

Fiber Optic Cables.--All cables shall be labeled at all terminations, even if no connections or splices are made, and at all splice vault entrance and exit points.

Cable to Cable Splices.--The cable shall be labeled at entry to splice enclosure.

Cable to Fiber Distribution Units.--The cable shall be labeled at entry to the FDU. Only one cable shall be terminated in each FDU. The FDU shall be labeled on the face of the FDU. Individual connections shall be clearly marked on the face of the FDU in the designated area as directed by the Engineer.

Fibers.--Fiber labels shall be placed next to the connectors of the individual fibers.

Jumpers.--Equipment to FDU Jumpers shall be labeled at both ends. FDU to FDU jumpers shall be labeled at each end.

Pigtails.--Pigtails shall be labeled at the connector.

10-3.18 FIBER OPTIC CABLE INSTALLATION

Installation procedures shall be in conformance with the procedures specified by the cable manufacturer for the specific cable being installed. Mechanical aids may be used, provided that a tension measuring device is placed in tension to the end of the cable, and the allowable tension does not exceed the manufacturers recommended pulling tension. A calibrated break-away feature shall be employed to work in tandem with the tension measuring device and limit excessive tension by disengaging when a set tension is exceeded.

When mechanical aids are proposed for use in pulling fiber optic cable, information on the proposed methods, the time frames and requirements for submittal, review and approval, and the conditions for use of the proposed method shall conform to the requirements for information submitted as required for a proposed "Air Blown Method" as described in "Air Blown Method," in these special provisions.

Except when the "Air Blown Method" is used, F/O cable shall be installed using a cable pulling lubricant recommended by the F/O cable or the conduit manufacturer and a non-abrasive pull tape conforming to the provisions described under "MDCS" in these special provisions.

Splices shall be limited to locations as shown on the plans and as directed by the Engineer.

During cable installation, the bend radius shall be maintained at not less than twenty times the outside diameter of the cable. Stress relief component shall be installed at the entrance to FDU as recommended by the manufacturer

F/O cable shall be installed without splices except where specifically allowed on the plans or described in these special provisions. A minimum of 15 m of slack shall be provided at each vault without a cable splice. At fiber optic splices, a minimum of 9 m of each cable exiting the closure shall be stored in the vault.

Unless shown or provided otherwise, only one F/O cable shall be installed in each conduit.

10-3.19 FIBER OPTIC SPLICING

Unless otherwise allowed, F/O cable splices shall be fusion type. The mean splice loss shall not exceed 0.07 dB per splice. The mean splice loss shall be obtained by measuring the loss through the splice in both directions and then averaging the resultant values.

The field splices shall connect the fibers of the two F/O cable lengths together. These splices shall be placed in a splice tray and these splice tray(s) shall then be placed in the splice closure.

Fibers of the same buffer tube, but not being spliced shall be placed in a splice tray along side spliced fibers. Buffer tubes that do not require enclosed fibers to be spliced shall not be disturbed and placed in the splice closure.

The termination splices shall connect the F/O cable span ends with pigtails. The termination splices shall be placed in a splice tray and the splice tray(s) shall then be placed in the fiber distribution unit (FDU). The individual fibers shall be looped one full turn within the splice tray to avoid micro bending. A 50 mm minimum bend radius shall be maintained during installation and after final assembly in the optical fiber splice tray. Each bare fiber shall be individually restrained in a splice tray. The optical fibers in buffer tubes and the placement of the bare optical fibers in the splice tray shall be such that there is no discernible tensile force on the optical fiber.

All splices shall be protected with a metal reinforced thermal shrink sleeve.

All fiber optic cables shall be labeled in the splice tray. Pigtail ends shall also be labeled to identify the destination of the fiber.

FIBER OPTIC SPLICE CLOSURE

The fiber optic field splices shall be enclosed in splice closures which shall be complete with splice organizer trays, brackets, clips, cable ties, and sealant, as needed. The splice closure shall be suitable for a direct burial or pull box application. Manufacturer's installations shall be supplied to the Engineer prior to the installation of any splice closures. Location of the splice closures shall be where a splice is required as shown on the plans, designated by the Engineer, or described in these special provisions.

The splice closure shall conform to the following specifications:

A. Non-filled thermoplastic case
B. Rodent proof, water proof, re-enterable and moisture proof
C. Expandable from 2 cables per end to 8 cables per end by using adapter plates
D. Cable entry ports shall accommodate 10 mm to 25 mm diameter cables
E. Multiple grounding straps
F. Accommodate up to 8 splice trays
G. Suitable for "butt" or "through" cable entry configurations
H. Place no stress on finished splices within the splice trays.

The fiber optic splice closure shall be suitable for a temperature range of 0ºC to 40ºC.

Each splice shall be individually mounted and mechanically protected in the splice tray.

The Contractor shall install the fiber splice closure in the fiber optic vaults where splicing is required. The fiber optic splice closures shall be securely fastened to the fiber optic vault or wall using standard hardware as recommended by the closure manufacturer.

The Contractor shall provide all mounting hardware required to securely mount the closures to the splice vault.

SPLICE TRAY

Each splice tray shall conform to the following:

A. Accommodate the quantity of fusion splices as shown on the plans but not less than 12 fusion splices per tray.
B. Place no stress on completed splices within the tray.
C. Accommodate "butt" or “feed through" splicing applications.
D. Be stackable with a transparent snap-on hinge cover.
E. Accommodate buffer tubes securable with channel straps.
F. Contain fiber retention strips.

PASSIVE CABLE ASSEMBLIES AND COMPONENTS

The F/O cable assemblies and components shall be compatible components, designed for the purpose intended, and manufactured by a company regularly engaged in the production of material for the fiber optic industry. All components or assemblies shall be best quality, non-corroding, with a design life of at least 20 years. All components or assemblies of the same type shall be from the same manufacturer.

10-3.20 FIBER OPTIC TESTING

GENERAL

Testing shall include the tests on elements of the passive fiber optic components: (1) at the factory, (2) after delivery to the project site but prior to installation and, (3) after installation. The Contractor shall provide all personnel, equipment, instrumentation and materials necessary to perform all testing. The Engineer shall be notified two working days prior to all field tests. The notification shall include the exact location or portion of the system to be tested.

A minimum of 15 working days prior to arrival of the cable at the site, the Contractor shall provide detailed test procedures for all field testing for the Engineer's review and approval. The procedures shall identify the tests to be performed and how the tests are to be conducted. Included in the test procedures shall be the model, manufacturer, configuration, calibration and alignment procedures for all proposed test equipment.

Documentation of all test results shall be provided to the Engineer within 2 working days after the test is completed.

FACTORY TESTING

Documentation of compliance with the fiber specifications as listed in the fiber characteristics table shall be supplied by the original fiber manufacturer. Before shipment, but while on the shipping reel, 100 percent of all fibers shall be tested for attenuation. Copies of the results shall be attached to the cable reel in a waterproof pouch and submitted to the Contractor and to the Engineer.

ARRIVAL ON SITE

The cable and reel shall be physically inspected on delivery and the attenuation shall be measured for 100 percent of the fibers. The failure of any single fiber in the cable to comply with these special provisions, is cause for rejection of the entire reel. Test results shall be recorded, dated, compared and filed with the copy accompanying the shipping reel in a weather proof envelope. Attenuation deviations from the shipping records of greater than 5 percent shall be brought to the attention of the Engineer. The cable shall not be installed until completion of this test sequence and the Engineer provides written approval. Copies of traces and test results shall be submitted to the Engineer. If the test results are unsatisfactory, the reel of fiber optic cable shall be considered unacceptable and all records corresponding to that reel of cable shall be marked accordingly. The unsatisfactory reels of cable shall be replaced with new reels of cable at the Contractor's expense. The new reels of cable shall then be tested to demonstrate acceptability. Copies of the test results shall be submitted to the Engineer.

AFTER CABLE INSTALLATION

After the fiber optic cable has been pulled but before breakout and termination, 100 percent of all the fibers shall be tested with an OTDR for attenuation. Test results shall be recorded, dated, compared and filed with the previous copies of these tests. Copies of traces and test results shall be submitted to the Engineer. If the OTDR test results are unsatisfactory, the F/O cable segment will be unacceptable. The unsatisfactory segment of cable shall be replaced with a new segment, without additional splices, at the Contractor's expense. The new segment of cable shall then be tested to demonstrate acceptability. Copies of the test results shall be submitted to the Engineer.

Singlemode fibers shall be tested at 1310 nm and 1550 nm after arrival on site and after cable installation. Attenuation readings in one direction after arrival on site and for each direction after installation shall be recorded on the cable data sheet. The Engineer will review and notify the Contractor of the results in writing in five working days of "arrival on site test" and in ten working days of "after cable installation test".

OUTDOOR SPLICES

At the conclusion of all outdoor splices at one location, and before they are enclosed and sealed, all splices shall be tested with the OTDR, in both directions. Splices in segments shall be tested at 1310 nm and at 1550 nm. Individual fusion splice losses shall not exceed 0.07 dB. Measurement results shall be recorded, dated, validated by the OTDR trace printout and filed with the records of the respective cable runs. Copies of traces and test results shall be submitted to the Engineer. If the OTDR test results are unsatisfactory, the splice shall be unacceptable. The unsatisfactory splice shall be replaced at the Contractor's expense. The new splice shall then be tested to demonstrate acceptability. Copies of the test results shall be submitted to the Engineer.

DISTRIBUTION INTERCONNECT PACKAGE TESTING AND DOCUMENTATION

All the components of the passive interconnect package (FDUs, pigtails, jumpers, couplers and splice trays as shown on the plans and in these special provisions) shall comprise a unit from a manufacturer who is regularly engaged in the production of the fiber optic components.

In developing the distribution interconnect package, each SC termination (pigtail or jumper) shall be tested for insertion attenuation loss with the use of an optical power meter and light source. In addition, all singlemode terminations shall be tested for return reflection loss. These values shall meet the loss requirements specified earlier and shall be recorded on a tag attached to the pigtail or jumper.

Once assembly is complete, the manufacturer shall visually verify that all tagging, including loss values, is complete. Then as a final quality control measure, the manufacturer shall do an "end to end" optical power meter/light source test from pigtail end to jumper lead end to assure continuity and overall attenuation loss values.

The final test results shall be recorded, along with previous individual component values, on a special form assigned to each FDU. The completed form shall be dated and signed by the Manufacturer's Quality Control supervisor. One copy of this form will be attached in a plastic envelope to the assembled FDU unit. Copies will be provided separately to the Contractor and to the Engineer, and shall be also be maintained on file by the manufacturer or supplier.

SYSTEM VERIFICATION AT COMPLETION

OTDR Testing.--Once the passive cabling system has been installed and is ready for activation, 100 percent of the fiber links shall be tested with the OTDR for attenuation. Print out shall include at least link number, fiber color, buffer color and cable number. Test results shall be recorded, dated, compared and filed with previous copies. A hard copy printout and a electronic copy of the traces and test results along with a licensed copy of the associated software on a DOS based 89 mm

disk shall be submitted to the Engineer. If the OTDR test results are unsatisfactory the link shall be replaced at the Contractor's expense. The new link shall then be tested to demonstrate acceptability. Copies of the test results shall be submitted to the Engineer.

Power Meter and Light Source.--At the conclusion of the final OTDR testing, 100 percent of all fiber links shall be tested end to end with a power meter and light source, in accordance with EIA Optical Test Procedure 171 and in the same wavelengths specified for the OTDR tests. These tests shall be conducted in both directions. Test results shall be recorded, compared and proven to be within the design link loss budgets, and filed with the other recordings of the same links. Test results shall be submitted to the Engineer.

Link Loss Worksheet.--The Link Loss Worksheet shown in Appendix A shall be completed for 100 percent of all links in the fiber optic system, using the data gathered during cable verification. The completed worksheets shall be included as part of the system documentation.

Test Failures.--If the link loss measured from the power meter and light source exceeds the calculated link loss, or the actual location of the fiber ends does not agree with the expected location of the fiber ends (as would occur with a broken fiber), the fiber optic link will not be accepted. The unsatisfactory segments of cable, or splices shall be replaced with a new segment of cable or splice at the Contractor's expense. The OTDR testing, power meter and light source testing and Link Loss Worksheet shall be completed for the repaired link to determine acceptability. Copies of the test results shall be submitted to the Engineer. The removal and replacement of a segment of cable shall be interpreted as the removal and replacement of a single contiguous length of cable connecting two splices, two connectors or one splice and one connector. The removal of only the small section containing the failure and therefore introducing new unplanned splices, will not be allowed.

APPENDIX A

Link Loss Budget Worksheet

Contract No. _____

Contractor: _____

Approved by Caltrans: _____

Date: _____ Operator:_____

Link Number: _____ Fiber Color: _____

Buffer Color: _____ Cable No.: _____

Test Wavelength (Circle one): 1310 1550

Expected Location of fiber ends:
End 1: _____ End 2: _____

OTDR Test Results:		
Forward Loss:	_____ dB	1A
Reverse Loss:	_____ dB	1B
Average Loss:	_____ dB	1C
Power Meter and Light Source Test Results:		
Forward Loss:	_____ dB	2A
Reverse Loss:	_____ dB	2B
Average Loss [(2A + 2B)/2]:	_____ dB	2C
Calculated Fiber Loss:		
Length of the link (from OTDR):	_____ km	3A
Allowed loss per km of fiber:	0.4 dB/km	3B
Total Allowed Loss due to the fiber (3A * 3B):	_____ dB	3C
Calculated Splice Loss:		
Number of Splices in the Link:	_____	4A
Allowed Link Loss per Splice:	0.07 dB	4B
Total Allowed Loss due to Splices (4A * 4B):	_____ dB	4C
Calculated Link Loss:		
Connector Loss:	0.9 dB	5A
Total Link Loss (5A + 3C + 4C):	_____ dB	5B
Cable Verification:		
Compare Power Meter Average Loss to Calculated Link Loss (2C - 5B):	_____ dB	6A

If the value of 6A is greater than zero, the link has failed the Test. See Test Failures in these special provisions.

To Be Completed by Caltrans:
Resident Engineer's Signature: _____
Cable Link Accepted: _____

10-3.21 FIBER DISTRIBUTION UNIT

The Contractor shall furnish and install all related equipment to interface the fiber distribution unit (FDU) to the incoming fiber optic communication cables.

The units shall accommodate the fiber optic cable described in these special provisions.

Type A FDU shall accommodate termination of not less than 84 individual fibers.

Type C FDU shall accommodate termination of 12 individual fibers.

The FDU shall provide interconnect capability and shall include the following:

A. A patch panel to terminate singlemode fiber with SC type connector feed through adapters.
B. Storage for splice trays.

The patch panel shall be hinged to provide easy access and maintenance. Brackets shall be provided to spool the incoming fiber a minimum of three turns, each turn of not less than 250 mm in length, before separating out individual fibers to the splice tray. Strain relief shall be provided for the incoming fiber optic cable. All fibers shall be terminated and identified in the FDU.

The FDU (Type A) shall be 475 mm rack mountable and not to exceed 435 mm (W) x 500 mm (H) x 375 mm (D).

The FDU (Type C) shall be 475 mm rack mountable and not to exceed 435 mm (W) x 50 mm (H) x 305 mm (D).

10-3.22 BONDING AND GROUNDING

Bonding and grounding shall conform to the provisions in Section 86-2.10, "Bonding and Grounding," of the Standard Specifications and these special provisions.

Bonding jumpers in standards with handholes and traffic pull box lid covers shall be attached by a UL listed lug using 4.5-mm diameter or larger brass or bronze bolts and shall run to the conduit or bonding wire in the adjacent pull box. The grounding jumper shall be visible after the standard has been installed and the mortar pad and cap have been placed on the foundation.

Standards without handholes shall have bonding accomplished by jumpers attached to UL listed ground clamps on each anchor bolt.

For slip base standards or slip base inserts, bonding shall be accomplished by jumpers attached to UL listed ground clamps on each anchor bolt, or a UL listed lug attached to the bottom slip base plate with a 4.5-mm diameter or larger brass or bronze bolt.

Equipment bonding and grounding conductors are required in conduits, except when the conduits contain only combinations of loop lead-in cable, fiber optic cable, or signal interconnect cable. A No. 8 minimum, bare copper wire shall run continuously in circuits, except for series lighting circuits, where No. 6 bare copper wire shall run continuously. The bonding wire size shall be increased to match the circuit breaker size in conformance with the Code, or shall be as shown on the plans. Conduits to be installed for future conductors, may omit the copper wire.

Bonding of metallic conduits in metal pull boxes shall be by means of bonding bushings and bonding jumpers connected to the bonding wire running in the conduit system.

10-3.23 SERVICE

Continuous welding of exterior seams in service equipment enclosures is not required.

Type III service equipment enclosures shall be the aluminum type.

Service equipment enclosures shall not be painted.

Circuit breakers shall be the cable-in/cable-out type, mounted on non-energized clips. All circuit breakers shall be mounted vertically with the up position of the handle being the "ON" position.

A barrier terminal block rated for 60 A, minimum shall be provided in each service equipment enclosure.

Circuit breakers used as service disconnect equipment shall have a minimum interrupting capacity of 42 000 A, rms, for 120/240 V(ac) services.

10-3.24 NUMBERING ELECTRICAL EQUIPMENT

Self-adhesive numbers (with reflective sheet background) will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

The numbers shall be placed on the equipment where designated by the Engineer.

Where new numbers are to be placed on existing or relocated equipment, the existing numbers shall be removed.

Numbers shall be applied to a clean surface.

Where shown on the plans, equipment numbers shall be placed for all electroliers, soffit lighting, sign lighting, and service equipment enclosures. On service equipment enclosures, the numbers shall be placed on the front door. On

electroliers the numbers shall be placed as shown on the plans, except that the numbers shall be placed on the side nearest the roadway facing approaching traffic at a height up to 2.5 m above the base plate.

Numbers for illuminated signs mounted on overcrossings or for soffit luminaires shall be placed on the nearest adjacent bent or abutment at approximately the same station as the sign or soffit luminaire. Where no bent or abutment exists near the sign or soffit luminaire, the number shall be placed on the underside of the structure adjacent to the sign or soffit luminaire. Arrangement of numbers shall be the same as those used for electroliers.

Numbers for overhead sign bridges shall be placed on both posts.

10-3.25 CLOSED CIRCUIT TELEVISION (CCTV) CABINETS

The Model 334 (CCTV) cabinets shall conform to the provisions in Section 86-3.03, "Model 170 and Model 2070 Controller Assemblies," of the Standard Specifications and these special provisions.

Police panels will not be required.

Prior to shipping to the project site, each CCTV cabinet shall be submitted to the Transportation Laboratory for acceptance testing. The costs of transportation to and from the Laboratory shall be at the Contractor's expense.

Foundations for Type 1 housing shall conform to the details in the plans for Model 332 and 334 cabinets.

The Engineer shall be notified when each CCTV cabinet is ready for the functional test. The functional test will be conducted by State forces.

Terminal blocks shall conform to the requirements in Chapter 6, Section 5, Subsection 6.5.3, "Terminal Blocks," Paragraph 5.3.1 of the TSCES, except that the screw size shall be 8-32.

Over voltage protection shall be provided for the power distribution assembly and shall contain as a minimum, a surge arrestor, which shall reduce the effect of power line voltage transients and be rated as follows:

Recurrent Peak Voltage	184 V
Energy Rating (Minimum)	20 J
Power Dissipation, Average	0.85 W
Peak Current for pulses less than 7 microseconds	1250 A
Stand-by Current for 60 Hz Sinusoidal	1 mA or less

The thermostatically controlled fan shall provide 4.25 cubic meter per minute of ventilation. The fan shall be activated when the temperature inside the cabinet exceeds 24 degrees Centigrade and shut off when the temperature is less than 18 degrees Centigrade.

Door locks for the CCTV cabinets shall be a removable-core mortise cam cylinder door lock that receives the State's lock core. The State's lock core is a "Best" construction core. Keys shall be removable from the locks in the locked position only. Door locks shall be installed in conformance with the manufacturer's written instructions and recommendations. Two keys for each door lock shall be delivered to the Engineer.

10-3.26 STATE-FURNISHED CONTROLLER ASSEMBLIES

The Model 170 controller assemblies, including controller unit, completely wired controller cabinet, battery backup system (without batteries), and inductive loop detector sensor units, but without anchor bolts, will be State-furnished as provided under "Materials" of these special provisions.

The Contractor shall construct each controller cabinet foundation as shown on the plans for Model 332 and 334 cabinets (including furnishing and installing anchor bolts), shall install the controller cabinet on the foundation, and shall make field wiring connections to the terminal blocks in the controller cabinet.

A listing of field conductor terminations, in each State-furnished controller cabinet, will be furnished free of charge to the Contractor at the site of the work.

State forces will maintain controller assemblies. The Contractor's responsibility for controller assemblies shall be limited to conforming to the provisions in Section 6-1.02, "State-Furnished Materials," of the Standard Specifications.

10-3.27 TELEPHONE DEMARCATION CABINET (TYPE A)

Duplex convenience receptacles shall have ground-fault circuit interruption as defined by the Code. Circuit interruption shall occur on 6 mA of ground-fault current and shall not occur on less than 4 mA.

A listing of field conductor terminations, in each telephone demarcation cabinet (Type A), will be furnished free of charge to the Contractor at the site of the work.

10-3.28 VEHICLE SIGNAL FACES AND SIGNAL HEADS

Type SV-2-TD mountings shall be bolted to the standard through the upper pipe fitting in the same manner shown for bolting the terminal compartment.

Pipe fittings shall not be the aluminum type.

10-3.29 LIGHT EMITTING DIODE SIGNAL MODULE

The Contractor shall use light emitting diode (LED) signal modules as the light source for traffic signal faces with 300-mm and 200-mm circular sections, arrow sections, and 300-mm programmable visibility (PV) sections in conformance with these special provisions.

GENERAL

The Contractor shall install LED signal modules in the doorframes of standard traffic signal housings. Lamp sockets, reflectors, reflector holders, and lenses used with incandescent lamps shall not be used when LED signal modules are installed.

The 300-mm PV LED signal modules shall plug into programmable visibility housings without modifications to the housing. The PV module shall be in conformance with the provisions in Section 86-4.05, "Programmed Visibility Vehicle Signal Faces," of the Standard Specifications.

LED signal modules, including green, yellow, and red circular balls; arrow indications; and PV types shall be from the same manufacturer, and each size shall be the same model.

LED signal modules shall be sealed units with a printed circuit board, a power supply, a lens and a gasket. Signal modules shall be weatherproof after installation and connection. Circuit boards and power supplies shall be contained inside LED signal modules. Circuit boards shall conform to the requirements in Chapter 1, Section 6 of the "Transportation Electrical Equipment Specifications," published by the Department. LED module, except the PV type, shall have conductor leads for power connection and the PV module shall have a three-prong plug-in type connector.

Lenses of LED signal modules shall be integral to the units, shall be convex with a smooth outer surface, and shall be made of ultraviolet stabilized plastic or glass. The lenses shall be capable of withstanding ultraviolet exposure from direct sunlight for a minimum period of 60 months without exhibiting evidence of deterioration.

The Contractor shall seal LED signal modules in doorframes, except the PV type, with one-piece ethylene propylene rubber (EPDM) gaskets.

Lenses used with PV signal modules shall be sealed in doorframes with one-piece EPDM gaskets.

LEDs used in signal modules shall be of aluminum indium gallium phosphide (AlInGaP) technology for red and yellow indications and of gallium nitride (GaN) technology for green indications. LEDs shall be the ultra-bright type rated for 100,000 hours of continuous operation from -40°C to +74°C.

The Contractor shall wire signal and PV module LED clusters so that a total failure of one LED will result in the loss of not more than 5 percent of the signal module light output. Failure of an individual LED in a string shall not result in the loss of the entire string or any other indication.

Maximum power consumption requirements for LED signal modules shall be as follows:

LED Signal Module	Power Consumption in Watts					
	Red		Yellow		Green	
	25°C	74°C	25°C	74°C	25°C	74°C
300 mm circular	11	17	22	25	15	15
200 mm circular	8	13	13	16	12	12
300 mm arrow	9	12	10	12	11	11
300 mm arrow	9	12	10	12	11	11
300 mm PV	11	17	22	25	15	15

The minimum power consumption for LED modules shall be 6 Watt or greater.

PHYSICAL AND MECHANICAL REQUIREMENTS

The maximum weight of an LED module shall be 1.8 kg, and 0.4-kg for the PV module.

Installation of LED signal modules shall only require the removal of the optical unit components. LED signal modules shall be weather tight, fit securely to the housing (except PV types), and connect directly to electrical wiring.

Arrow modules shall conform to the requirements for arrow indications in Section 9.01 of the ITE publication "Equipment and Materials Standards, Vehicle Traffic Control Signal Heads." LEDs shall be spread evenly across the illuminated portion of the arrow area.

LED Signal Module Lens

The LED signal module shall be capable of replacing the optical unit. The lens may be tinted, or may use transparent film or materials with similar characteristics to enhance "ON/OFF" contrasts. The use of tinting or other materials to enhance "ON/OFF" contrast shall not affect chromaticity and shall be uniform across the face of the lens.

If a polymeric lens is used, a surface coating or chemical surface treatment shall be used to provide front surface abrasion resistance.

Environmental Requirements

LED signal modules shall be rated for use in the operating temperature range of -40°C to +74°C.

The Contractor shall provide LED signal modules that are protected against dust and moisture intrusion in conformance with the requirements in NEMA Standard 250 for Type 4 enclosures.

Construction

LED signal modules shall be single, self-contained devices, not requiring on-site assembly for installation into existing traffic signal housings. The power supply for LED signal modules shall be integral to the module.

Assembly and manufacturing processes for LED signal modules shall be designed to assure internal components will be adequately supported to withstand mechanical shock and vibration from high winds and other sources.

Materials

Materials used for lenses and LED signal modules shall conform to the requirements in ASTM Specification: D-3935 for the materials.

Enclosures containing the power supply or electronic components of LED signal modules shall be made of UL94VO flame-retardant materials. The lenses of LED signal modules are excluded from this requirement.

Module Identification

LED signal modules shall have the following permanently marked on the back of the module:

A. manufacturer's name,
B. trademark,
C. model number,
D. serial number,
E. lot number,
F. month and year of manufacture, and
G. required operating characteristics including:

    1. rated voltage,
    2. power consumption, and
    3. volt-ampere.

Each module shall have a 25-mm diameter symbol identifying the module type (i.e. circle, arrow, etc.) in the color of the module. The color shall be written out in 12-mm text next to the symbol.

LED signal modules shall have prominent and permanent vertical markings for correct indexing and orientation within the signal housings. Markings shall consist of an up arrow or the word "UP" or "TOP."

PHOTOMETRIC REQUIREMENTS

Initial luminous intensity values for LED signal modules, operating at 25°C, shall meet or exceed the following minimum values:

Circular Indications (cd)						
	200 mm			300 mm		
Angle (v, h)	Red	Yellow	Green	Red	Yellow	Green
2.5, ±2.5	157	314	314	399	798	798
2.5, ±7.5	114	228	228	295	589	589
2.5, ±12.5	67	133	133	166	333	333
2.5, ±17.5	29	57	57	90	181	181
7.5, ±2.5	119	238	238	266	532	532
7.5, ±7.5	105	209	209	238	475	475
7.5, ±12.5	76	152	152	171	342	342
7.5, ±17.5	48	95	95	105	209	209
7.5, ±22.5	21	43	43	45	90	90
7.5, ±27.5	12	24	24	19	38	38
12.5, ±2.5	43	86	86	59	119	119
12.5, ±7.5	38	76	76	57	114	114
12.5, ±12.5	33	67	67	52	105	105
12.5, ±17.5	24	48	48	40	81	81
12.5, ±22.5	14	29	29	26	52	52
12.5, ±27.5	10	19	19	19	38	38
17.5, ±2.5	19	38	38	26	52	52
17.5, ±7.5	17	33	33	26	52	52
17.5, ±12.5	12	24	24	26	52	52
17.5, ±17.5	10	19	19	26	52	52
17.5, ±22.5	7	14	14	24	48	48
17.5, ±27.5	5	10	10	19	38	38

Arrow Indications Minimum Source Intensity (cd/m^2)			
	Red	Yellow	Green
Arrow Indication	5500	11 000	11 000

Minimum PV Luminous Intensity at 25˚C (cd)			
	Red	Yellow	Green
2.5 degrees left	314	314	314
2.5 degrees right	314	314	314

Red and green LED signal modules shall meet or exceed the following illumination values for a minimum period of 48 months, based on normal use in traffic signal operation over an operating temperature range of -40°C to +74°C. Yellow LED signal modules shall meet or exceed the following illumination values for a minimum period of 48 months, based on normal use in traffic signal operation at 25°C:

Circular Indications (cd)						
	200 mm			300 mm		
Angle (v, h)	Red	Yellow	Green	Red	Yellow	Green
2.5, ±2.5	133	267	267	339	678	678
2.5, ±7.5	97	194	194	251	501	501
2.5, ±12.5	57	113	113	141	283	283
2.5, ±17.5	25	48	48	77	154	154
7.5, ±2.5	101	202	202	226	452	452
7.5, ±7.5	89	178	178	202	404	404
7.5, ±12.5	65	129	129	145	291	291
7.5, ±17.5	41	81	81	89	178	178
7.5, ±22.5	18	37	37	38	77	77
7.5, ±27.5	10	20	20	16	32	32
12.5, ±2.5	37	73	73	50	101	101
12.5, ±7.5	32	65	65	48	97	97
12.5, ±12.5	28	57	57	44	89	89
12.5, ±17.5	20	41	41	34	69	69
12.5, ±22.5	12	25	25	22	44	44
12.5, ±27.5	9	16	16	16	32	32
17.5, ±2.5	16	32	32	22	44	44
17.5, ±7.5	14	28	28	22	44	44
17.5, ±12.5	10	20	20	22	44	44
17.5, ±17.5	9	16	16	22	44	44
17.5, ±22.5	6	12	12	20	41	41
17.5, ±27.5	4	9	9	16	32	32

Arrow Indications Minimum Source Intensity (cd/m^2)			
	Red	Yellow	Green
Arrow Indication	5 500	11 000	11 000

Measured chromaticity coordinates of LED signal modules shall conform to the chromaticity requirements of the following table, for a minimum period of 48 months, over an operating temperature range of -40°C to +74°C.

Chromaticity Standards	
Red	Y: not greater than 0.308, nor less than 0.998 – x
Yellow	Y: not less than 0.411, nor less than 0.995 - x, nor greater than 0.452
Green	Y: not less than 0.506 - 0.519x, nor less than 0.150 + 1.068x, nor greater than 0.730 – x

Circular LED modules will be tested in conformance with California Test 604. Optical testing will be performed with LED signal modules mounted in standard traffic signal sections without visors or hoods attached to the signal sections.

LEDs for arrow indications shall be spread evenly across the illuminated portion of the arrow area. Arrow LED signal modules will be tested in conformance with California Test 3001. Optical testing will be performed with LED signal modules mounted in standard traffic signal sections without visors or hoods attached to the signal sections. LED arrow signal section indication shall provide minimum initial luminous intensity as listed herein. Measurements will be performed at the rated operating voltage of 120 V (ac).

ELECTRICAL

Maximum power consumption requirements for LED signal modules shall not exceed those listed in "General," in these special provisions. LED signal modules shall operate at a frequency of 60 Hz ± 3 Hz over a voltage range from 95 V (ac) to

135 V (ac) without perceptible flicker to the unaided eye over the voltage specified. Fluctuations of line voltage shall have no visible effect on luminous intensity of the indications. Rated voltage for measurements shall be 120 V (ac).

Wiring and terminal blocks shall conform to the provisions of Section 86-4.01C, “Electrical Components,” of the Standard Specifications and to the requirements of Section 13.02 of the ITE publication "Equipment and Material Standards," Chapter 2 (Vehicle Traffic Control Signal Heads). LED modules shall have 2 secured, color coded, one-meter long conductors, 600 V, 20 AWG minimum, jacketed wires with quick disconnect terminals attached, conforming to the National Electronic Code, rated for service at 105°C, shall be provided for electrical connection for each LED signal module.

LED signal module on-board circuitry shall include voltage surge protection to withstand high repetition noise transients in conformance with the requirements in Section 2.1.6 of NEMA Standard TS-2.

LED signal modules shall be operationally compatible with currently used controller assemblies including solid state load switches, flashers and conflict monitors. When a current of 20 mA (ac) or less is applied to the unit, the voltage read across the 2 leads shall be 15 V (ac) or less.

LED signal modules and associated on-board circuitry shall meet Class A emission limits in Federal Communications Commission (FCC) Title 47, SubPart B, Section 15.

LED signal modules shall provide a power factor of 0.90 or greater.

Total harmonic distortion from current and voltage induced into an alternating current power line by LED signal modules shall not exceed 20 percent at an operating temperature of 25°C.

QUALITY ASSURANCE PROGRAM

The Contractor shall supply modules of an approved model number and from pre-qualified manufacturers appearing on the current California Department of Transportation Pre-Qualified LED Traffic Signal Module List at:

http://www.dot.ca.gov/hq/esc/approved_products_list

LED signal modules shall be manufactured in conformance with a vendor quality assurance (QA) program. The QA program shall include design and production. Production quality assurance shall include statistically controlled routine tests to ensure minimum performance levels of LED signal modules built to meet these specifications.

The manufacturer shall have a documented problem resolutions process. Documentation of the QA process test results and problem resolution records shall be kept on file for a minimum period of five years.

LED signal module components and subassemblies that may affect reliability or performance shall be traceable to the original manufacturers.

Production Quality Assurance Testing

Production quality assurance testing shall be performed on each LED signal module prior to shipment. Failure to conform to the requirements of a production quality test shall be cause for rejection. The manufacturer shall retain test results for five years for warranty purposes.

Specified parameters shall be measured and used for quality comparison of production modules (rated power, etc.).

LED signal modules shall be tested for specified initial intensity after burn-in. The burn-in period shall consist of signal modules being energized at rated voltage for a 30 minute stabilization period before the measurements are made. A single point measurement with a correlation to the minimum initial luminous intensity requirements in "Photometric Requirements" of these special provisions for circular modules may be used. The ambient temperature for this measurement shall be 25°C.

LED signal modules shall be tested for luminous intensity requirements in "Photometric Requirements" of these special provisions.

LED signal modules shall be tested for required power factor after burn-in.

LED signal modules shall be tested by measuring current flow in amperes after burn-in. The measured current values shall be compared against current values resulting from design qualification measurements. The current flow shall not exceed the specified value. The measured ampere values with rated voltage shall be recorded as volt-ampere on the product labels.

LED signal modules shall be visually inspected for exterior physical damage or assembly anomalies. The surface of the lens shall be free of scratches, abrasions, cracks, chips, discoloration, or other defects. Defects shall be cause for rejection.

CERTIFICATE OF COMPLIANCE

The Contractor shall provide the Engineer a Certificate of Compliance from the manufacturer, in conformance with the provisions of Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall certify that the LED signal modules comply with the requirements of these specifications. The certificate shall also include a copy of applicable test reports on the LED signal modules.

QUALITY ASSURANCE TESTING

The Department will test LED shipments. Testing will be completed within 30 days after delivery to the Transportation Laboratory. Circular LED signal modules will be tested in conformance with California Test 604 and these special provisions. Arrow signal modules will be tested in conformance with California Test 3001 and these special provisions. Optical testing will be performed with the module mounted in a standard traffic signal section, but without a visor or hood attached to the section or housing. All parameters of the specification may be tested on the modules.

The Contractor shall ship the LED modules and a list of LED module serial numbers intended for this job, at the Contractor's expense, to the Transportation Laboratory for testing. Delays resulting from submittal of non-compliant materials shall not relieve the Contractor from executing the contract within the allotted time. In the event of LED module failures and when re-testing is required, the Contractor shall be responsible for providing new LED modules and allowing a minimum of 30 days to test them. The Contractor shall pay shipping and handling costs related to re-testing. Delay generated due to re-submittal and re-testing shall be the responsibility of the Contractor and no extra time will be granted to the Contractor.

WARRANTY

In addition to meeting the performance requirements for the minimum period of 48 months, the Contractor shall provide the Engineer with a written warranty from the manufacturer against defects in materials and workmanship for LED signal modules for a period of 60 months after installation of LED signal modules. Replacement LED signal modules shall be provided within 5 days after receipt of failed LED signal modules at no cost to the Department. Warranty documentation shall be given to the Engineer prior to installation. Replacement LED signal modules shall be delivered to the Caltrans District 11 Signal Laboratory, 7181 Opportunity Road, San Diego, CA 92111.

10-3.30 BATTERY BACKUP SYSTEM

DESCRIPTION

The battery back up system (BBS) shall consist of an external cabinet, an inverter/charger, a power transfer relay, a manual bypass switch, a temperature probe, hardware, a battery harness, and interconnect wiring. The BBS will be State-furnished as provided under "Materials" of these special provisions. The Contractor shall furnish the batteries.

A completely assembled, wired BBS and external cabinet will be State-furnished as provided under "Materials" of these special provisions. The Contractor shall construct the BBS extended foundation. The Contractor shall install the batteries, and connect the battery wiring harness.

MATERIAL

The Contractor shall furnish batteries compatible with the State-furnished BBS and suitable for outdoor applications.

Batteries shall:

A. have voltage rating 12 V,
B. be group size 24,
C. be 75 to 80 ampere-hour at 20 hour rate,
D. be commercially available and stocked locally,
E. have a carrying handle,
F. be marked with date code and maximum recharge data and recharge cycles,
G. have 2 top mounted terminal posts with recessed thread lugs for 6.35 mm diameter, 20 thread count per 25.4 mm bolts,
H. be fully charged when furnished, and
I. be free from damage or deformities.

The Contractor shall provide 4 batteries per BBS installation.

The batteries shall be deep cycle, sealed prismatic lead-calcium based absorbed glass mat/valve regulated lead acid (AGM/VRLA).

The batteries shall be certified by the manufacturer to operate over a temperature range of -25°C to 74°C.

The Contractor shall submit the battery data sheet to the Engineer when the batteries are delivered to the jobsite. The data sheet shall include the following features:

A. model number,
B. serial number,
C. dimensions,
D. charts,

E. table of discharge rating,
F. product information,
G. battery specifications, and
H. conductivity reading per battery (in Siemens).

The batteries shall have a written warranty against defects in materials and workmanship from the manufacturer prorated for a period of 60 months after installation. The Contractor shall provide the Engineer with all warranty documentation prior to installation. Replacement batteries shall be provided within 5 days after receipt of failed batteries at no cost to the State except the cost of shipping the failed batteries. Replacement batteries shall be delivered to Caltrans Maintenance Electrical Shop at the Caltrans District 11 Signal Laboratory, 7181 Opportunity Road, San Diego, CA 92111.

MOUNTING AND CONFIGURATION

Functional Testing

The BBS functional test shall include at least 30 minutes of continuous, satisfactory operation with utility power turned off. Testing will be performed in the presence of the Engineer.

10-3.31 LIGHT EMITTING DIODE PEDESTRIAN SIGNAL FACE MODULES

The Contractor will provide and install light emitting diode (LED) "UPRAISED HAND" and "WALKING PERSON" pedestrian signal face (PSF) modules in standard Type A pedestrian signal housings as the light source and as shown on the plans and in conformance with these special provisions.

Incandescent Lamp-s in existing Type A pedestrian signals housing shall be replaced with LED pedestrian signal face (PSF) modules, as shown on the plans and in conformance to these special provisions.

GENERAL

PSF modules shall be designed to mount in standard Type A housings. PSF modules shall be designed to mount behind or replace face plates of standard Type A housings in conformance with the requirements of the Institute of Transportation Engineers (ITE) Standards: "Pedestrian Traffic Control Signal Indications," the Manual on Uniform Traffic Control Devices (MUTCD), and MUTCD California Supplement. Where existing Type A pedestrian signal faces contain both incandescent and LED light sources, both light sources shall be removed and replaced by a new LED combination pedestrian signal face module in conformance with these special provisions.

PSF modules used on this project shall be from a single manufacturer.

Circuit boards and power supplies shall be contained inside the PSF LED modules. Circuit boards shall conform to the requirements in Chapter 1, Section 6 of the "Transportation Electrical Equipment Specifications," (TEES) published by the Department.

The PSF LEDs shall utilize the appropriate technology to achieve the required color and shall be the ultra bright type rated for 100,000 hour continuous operation over a temperature range from –40°C to +74°C.

Individual PSF LEDs shall be wired so that a catastrophic loss or the failure of one or more LEDs will result in the loss of not more than 5 percent of the PSF module light output. Failure of an individual LED in a string shall not result in the loss of the entire string or any other indication.

Photometric Requirements

Each module shall emit an average luminous intensity of at least 3,750 candela/m^2 for "Hand" and 5,300 candela/m^2 for "Walking Person" symbol at the time of initial testing at 25°C and throughout 48 months of operation over a temperature range of –40°C to + 73° C.

The color output of the module shall conform to the requirements of Section 5.3 in the ITE Publication: Equipment and Material Standards, Chapter 3 (Pedestrian Traffic Control Signal Indications). "Hand" shall be Portland Orange. "Walking Person" shall be lunar white. Height and width of each symbol shall not be less than 250 mm and 165 mm respectively.

Uniformity ratio of illuminated symbols shall not exceed 4 to 1 between the highest luminance area and the lowest luminance area. The measured chromaticity coordinates of PSF LED modules shall conform to the requirements for chromaticity in Section 5.3.2.1 and Figure C of the VTCSH standards.

PSF LED modules shall be rated for a minimum useful life of 48 months. All modules shall meet all parameters of this specification during this period.

Physical and Mechanical Requirements

PSF LED modules shall be designed as retrofit replacement for existing optical units of signal lamps, or existing pedestrian signal faces with both LED and incandescent light sources, and shall not require special tools for installation. PSF

modules shall fit into pedestrian signal section housings built in conformance with the ITE Publication: Equipment and Materials Standards, Chapter 2 "Vehicle Traffic Control Signal Heads" (VTCSH) without modification to the housing.

If a specific mounting orientation is required, each module shall have prominent and permanent marking for correct indexing and orientation within a signal housing. The marking shall consist of an up arrow or the word "UP" or "TOP."

Environmental Requirements

PSF LED modules shall be rated for use over the operating temperature range of -40°C to +74°C.

Construction

PSF LED modules shall be single, self-contained devices, not requiring on-site assembly for installation into standard Type A housings. Combination "UPRAISED HAND"/"WALKING PERSON" section housings, without the reflectors, shall be used.

Power supplies for PSF LED modules shall be integral to the modules.

Assembly and manufacturing processes for PSF LED modules shall be designed to assure all internal components will be adequately supported to withstand mechanical shock and vibration from high winds and other sources.

Materials

Material used for PSF LED modules shall conform to the requirements in ASTM specifications D-3935.

Enclosures containing either the power supply or electronic components of the PSF LED module , excluding the lens, shall be made of UL94VO flame-retardant materials.

Module Identification

PSF LED modules shall have the manufacturer's name, trademark, model number, serial number, lot number, month and year of manufacture, and required operating characteristics permanently marked on the back of the module. Required operating characteristics shall include rated voltage, power consumption and volt-ampere (VA).

ELECTRICAL

PSF LED module power consumption shall not exceed the following maximum watts:

PSF module	Power Consumption @ 25ºC	Power Consumption @ 74ºC
UPRAISED HAND	10.0 W	12.0 W
WALKING PERSON	9.0 W	12.0 W

PSF LED modules shall operate at a frequency of 60 Hz ± 3 Hz over a voltage range from 95 V (ac) to 135 V (ac) without perceptible flicker to the unaided eye. Fluctuations of line voltage shall have no visible effect on the luminous intensity of the indications. Rated voltage for all measurements shall be 120 V (ac).

PSF LED module on-board circuitry shall include voltage surge protection to withstand high-repetition noise transients in conformance with the requirements in Section 2.1.6 of NEMA Standard TS2.

Wiring and terminal blocks shall conform to the requirements of Section 13.02 of the ITE Publication: Equipment and Material Standards, Chapter 2, "Vehicle Traffic Control Signal Heads."

PSF LED modules shall be operationally compatible with currently used controller assemblies including solid state load switches, flashers and conflict monitors. When a current of 20 mA (ac) or less is applied to the unit, the voltage read across the PSF module shall be 15 V (ac) or less.

PSF LED modules and associated on-board circuitry shall meet Class A electronic noise emission limits of Federal Communications Commission (FCC) regulation: Title 47, SubPart B, Section 15.

PSF LED modules shall provide a power factor of 0.90 or greater.

Total harmonic distortion from current and voltage induced into an alternating current power line by PSF LED modules shall not exceed 20 percent at an operating temperature of 25°C.

QUALITY ASSURANCE PROGRAM

The Contractor shall supply modules of an approved model number and from pre-qualified manufacturers appearing on the current California Department of Transportation Pre-Qualified LED Traffic Signal Module List at:

http://www.dot.ca.gov/hq/esc/approved_products_list

PSF LED modules shall be manufactured in conformance with a vendor quality assurance (QA) program. The QA program shall include design and production. Production quality assurance shall include statistically controlled routine tests to ensure minimum performance levels of PSF LED signal modules built to meet these specifications.

The manufacturer shall have a documented problem resolutions process. Documentation of the QA process test results and problem resolution records shall be kept on file for a minimum period of five years.

PSF LED module components and subassemblies, that may affect reliability or performance, shall be traceable to the original manufacturers.

Production Quality Assurance Testing

Production quality assurance testing shall be performed on each PSF LED module prior to shipment. Failure to conform to the requirements of a production quality test shall be cause for rejection. The manufacturer shall retain test results for five years for warranty purposes.

Specified parameters shall be measured and used for quality comparison of production modules (rated power, etc.).

PSF LED modules shall be tested for specified initial intensity after burn-in. The burn-in period shall consist of signal modules being energized at rated voltage for a 30 minute stabilization period before the measurements are made. A single point measurement with a correlation to the minimum initial luminous intensity requirements in "Photometric Requirements" of these special provisions for circular modules may be used. The ambient temperature for this measurement shall be +25°C.

PSF LED modules shall be tested for luminous intensity requirements in "Photometric Requirements" of these special provisions.

PSF LED modules shall be tested for required power factor after burn-in.

PSF LED modules shall be tested by measuring current flow in amperes after burn-in. The measured current values shall be compared against current values resulting from design qualification measurements. The current flow shall not exceed the specified value. The measured ampere values with rated voltage shall be recorded as volt-ampere on the product labels.

PSF LED modules shall be visually inspected for exterior physical damage or assembly anomalies. The surface of the lens shall be free of scratches, abrasions, cracks, chips, discoloration, or other defects. Defects shall be cause for rejection.

CERTIFICATE OF COMPLIANCE

The Contractor shall provide the Engineer a Certificate of Compliance from the manufacturer, in conformance with the provisions of Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall certify that the PSF LED modules comply with the requirements of these specifications. The certificate shall also include a copy of applicable test reports on the PSF modules.

QUALITY ASSURANCE TESTING

The State will test all PSF LED module shipments. Testing will be completed within 30 days after delivery to the Transportation Laboratory. PSF LED modules shall be tested in conformance with California Test 610 and these special provisions. Optical testing will be performed with the module mounted in Type A housing. All parameters of the specification may be tested.

The Contractor shall ship the PSF LED modules and a list of all PSF LED module serial numbers intended for this job, at the Contractor's expense, to the Transportation Laboratory for testing. Delays resulting from submittal of non-compliant materials shall not relieve the Contractor from executing the contract within the allotted time. In the event of PSF LED module failures and when re-testing is required, the contractor shall be responsible for providing new PSF LED modules and allowing a minimum of 30 days to retest them. The Contractor shall pay all shipping and handling costs related to re-testing. Delay generated due to re-submittal and re-testing shall be the responsibility of the contractor and no extra time will be granted to the contractor.

WARRANTY

The manufacturer shall provide a written warranty against defects in materials and workmanship for the PSF LED modules for a period of 60 months after installation of the PSF LED modules. Replacement PSF LED modules shall be provided within 5 days after receipt of failed PSF modules at no cost to the State. All warranty documentation shall be given to the Engineer prior to installation. Replacement PSF LED modules shall be delivered to the Caltrans District 11 Signal Laboratory, 7181 Opportunity Road, San Diego, CA 92111.

10-3.32 SERIAL TO ETHERNET CONVERSION UNIT

Serial to ethernet conversion unit (SECU) shall conform to the details shown on the plans and shall be in conformance with these special provisions.

Serial to ethernet conversion unit (SECU) shall have the following features:

SERIAL TO ETHERNET CONVERSION UNIT (SECU)	
FEATURE	PARAMETER/REMARKS
Support Protocols	ARP, UDP, TCP, Telnet, ICMP
Serial Device Support	Asynchronous, 7 or 8 bit with or without parity
Network Interface	Ethernet, 10BaseT
Network Connector	RJ45
Serial Interface	RS232, RS422, RS485, DCE Configuration
Serial Interface Connector	DB25 Female
Data Rates	300 bps to 115 Kbps, Must transmit and receive 3600 bytes of serial data without interruption
Control Lines	RTS, CTS, DSR, DCD, DTR
DCD Control Line	Must frame data on receive line
Software Flow Control	XON, XOFF
Hardware Flow Control	CTS/RTS
Management	SNMP, Local console port log in or Telnet log in, Menu driven user selection
Indicators	Good Link, Network transmit/receive data, RS232, Transmit/Receive Data
Indicator Type	LED
Operating Mode	Client or Server Unit
Client Mode	Communications up to 7 Server units on IP list
Client Mode Addressing	IP Addressable
Server Mode	Communicates with Client Unit
Dimensions (nominal) (HxWxD)	Maximum 23 mm x 64 mm x 90 mm
Operating Temperature	5 to 50˚C
Power	110 V(ac), 10 W

10-3.33 ETHERNET SWITCH

Ethernet switch unit shall conform to the details shown on the plans and shall be in conformance with these special provisions.

Ethernet switch shall have the following features:

ETHERNET SWITCH	
FEATURE	**PARAMETER/REMARKS**
Unit Designation	Ethernet Switch
Number of Network Ports	12
Network Port type	10/100BaseT
Number of Uplink Ports	2
Type of Uplink Port	10/100/1000BaseT
Network Port Connector	RJ45
Network Interface	Auto sensing 10/100BaseT, Full Duplex/Half Duplex
	IEE 802.3 10BaseT Compliant
	IEE 802.3u 100BaseT Compliant
	IEE 802.3ab 1000BaseT Compliant
MAC Address	Configurable to at least 1000 MAC Addresses
Protocol Support	TCP/IP, UDP/IP, TELNET, SNMP v1/v2, VLAN, Spanning Tree
Standards Support	IEEE 802.1d Spanning Tree, IEEE 802.1p Class of Service Prioritization, IEEE 802.1Q VLAN Tagging, IEEE 802.1s Multiple Spanning Tree, IEEE 802.1w Rapid Spanning Tree, IEEE 802.1x Port Based Network Access Control, IEEE 802.3, IEEE 802.3u Fast Ethernet, IEEE 802.x Full Duplex and Flow Control, IEEE 802.ab Gigabit Ethernet, 802.3ad Link aggregation, RFC 854 Telnet, CDP
Indicators	Power, “Good Ethernet Link”, Ethernet Traffic
Indicator Type	LED
Dimensions (nominal) (HxWxD)	(available cabinet space as shown on plans)
Operating Temperature	0 to 60° C
Operation Voltage	110v
Operating Current	Less than 1.3A at 110v
Weight	0.3 kg
Relative Humidity	5 to 95% relative humidity
Regulatory Compliance	EN 60950, EN 55024, FCC part 15, CSA 22.2 No. 60950
Warranty	Three Years

10-3.34 ETHERNET EXTENDER PROVIDER

Ethernet extender provider (EEP) shall conform to the details shown on plans and shall be in conformance with these special provisions.

Ethernet extender provider (EEP) unit shall operate as a pair with ethernet extender subscriber (EES) unit to extend 10/100BaseT ethernet network signaling over a single twisted pair of conductors as shown on plans and shall have the following features:

ETHERNET EXTENDER PROVIDER	
FEATURE	**PARAMETER/REMARKS**
Unit Designation	Ethernet Extender Provider
Unit Operability	Must work with Ethernet Extender Subscriber
Line Coding Standard	G.SHDSL
Minimum Line Rate	2300 kbit/s at 1.7Km, AWG24 cat 5 cable
Data Rate Selection	DIP switch
G.SHDSL ports	1 minimum
G.SHDSL connector	RJ11, RJ12 or RJ45
G.SHDSL protocol	ITU G.991.2
Network Ports	10/100 Base-TX
Network Connector	RJ45 for 10/100 Base-TX Ethernet
Network Interface	Full Duplex/Half Duplex
	IEE 802.3 10BaseT Compliant
	IEE 802.3u 10BaseT Compliant
Protocol Support	TCP/IP, UDP/IP
Indicators	Power, “Good Ethernet Link”, Ethernet Traffic, “Good SHDSL Link”, “SHDSL connection initiation”
Indicator Type	LED
Dimensions (nominal) (HxWxD)	35mm x 121mm x 119mm
Operating Temperature	0 to 50° C
Operation Voltage	110V
Operating Current	Less than 1.0A at 110V
Weight	0.3 kg
Relative Humidity	5 to 95% relative humidity
Regulatory Compliance	EN 60950, EN 55024, FCC part 15, CSA 22.2 No. 60950
Warranty	Three years

10-3.35 ETHERNET EXTENDER SUBSCRIBER

Ethernet extender subscriber (EES) shall conform to the details shown on plans and shall be in conformance with these special provisions.

Ethernet extender subscriber (EES) unit shall operate as a pair with ethernet extender provider (EEP) unit to extend 10/100Base T ethernet network signaling over a single twisted pair of conductors as shown on plans and shall have the following features:

ETHERNET EXTENDER SUBSCRIBER	
FEATURE	**PARAMETER/REMARKS**
Unit Designation	Ethernet Extender Provider
Unit Operability	Must work with Ethernet Extender Provider
Line Coding Standard	G.SHDSL
Minimum Line Rate	2300 kbit/s at 1.7Km, AWG24 cat 5 cable
Data Rate Selection	DIP switch
G.SHDSL ports	1 minimum
G.SHDSL connector	RJ11, RJ12 or RJ45
G.SHDSL protocol	ITU G.991.2
Network Ports	10/100 Base-TX
Network Connector	RJ45 for 10/100 Base-TX Ethernet
Network Interface	Full Duplex/Half Duplex
	IEE 802.3 10BaseT Compliant
	IEE 802.3u 10BaseT Compliant
Protocol Support	TCP/IP, UDP/IP
Indicators	Power, “Good Ethernet Link”, Ethernet Traffic, “Good SHDSL Link”, “SHDSL connection initiation”
Indicator Type	LED
Dimensions (nominal) (HxWxD)	35mm x 121mm x 119mm
Operating Temperature	0 to 50° C
Operation Voltage	110V
Operating Current	Less than 1.0A at 110V
Weight	0.3 kg
Relative Humidity	5 to 95% relative humidity
Regulatory Compliance	EN 60950, EN 55024, FCC part 15, CSA 22.2 No. 60950
Warranty	Three years

10-3.36 ETHERNET HUB

Ethernet Hub shall conform to the details shown on plans and shall be in conformance with these special provisions. Ethernet Hub shall have the following features:

ETHERNET HUB	
FEATURE	**PARAMETER/REMARKS**
Unit Designation	Ethernet Hub
Number of Network Ports	4
Network Port type	10/100BaseT
Number of Uplink Ports	2
Type of Uplink Port	10/100BaseT
Network Port Connector	RJ45
Network Interface	Auto sensing 10/100BaseT, Full Duplex/Half Duplex
	IEE 802.3 10BaseT Compliant
	IEE 802.3u 100BaseT Compliant
	IEE 802.3ab 1000BaseT Compliant
MAC Address	Configurable to at least 1000 MAC Addresses
Protocol Support	TCP/IP, UDP/IP, TELNET, SNMP v1/v2
Indicators	Power, "Good Ethernet Link", Ethernet Traffic
Indicator Type	LED
Dimensions (nominal) (HxWxD)	(available cabinet space as shown on plans)
Operating Temperature	0 to 60° C
Operation Voltage	110v
Operating Current	Less than 1.3A at 110v
Weight	0.3 kg
Relative Humidity	5 to 95% relative humidity
Regulatory Compliance	EN 60950, EN 55024, FCC part 15, CSA 22.2 No. 60950
Warranty	Three Years

10-3.37 MEDIA CONVERTER

Media converter shall conform to the details shown on the plans and shall be in conformance with these special provisions.

Media converter optical link range shall be suitable for the operational distances shown on the plan sheets.

Media converter shall have the following features:

MEDIA CONVERTER	
FEATURE	PARAMETER/REMARKS
Ports	RJ-45 (10/100Base-TX)
	100 Mbps duplex fiber port with SC-Type connector (singlemode required)
10/100Base-TX port	Automatically senses 10 Mbps or 100 Mbps connection speed, Auto-negotiates half- or full-duplex mode, Auto-selects MDI/MDI-X media type
Fiber port	Half /full-duplex mode selector
Network media	100Base-TX and 100Base-FX: Singlemode fiber optic cable 8/125 µm or 9/125 µm, full-duplex to 20 km
Serial Console Port	RS232
Protocol	SNMP manageable through SNMP-enabled networking management system via console or add-on module
Data Transfer Rate	100Mbps (Half-Duplex), 200Mbps (Full-Duplex)
Status LED indicators	power, copper link/activity, fiber optic link/activity, half/full duplex mode
Mounting	Standalone or Slot/Chassis Configuration as required
Power Supply	Supply voltage range 100 V to 135 V at 60 Hz. Standalone units: Internal power supply (maximum power consumption 6 W) or external power supply (maximum power consumption 14 W) Chassis units: only one power supply permitted
Power Adapter	Temperature: Operating: 0 to 35˚C
	Humidity: Operating: up to 85 % (non-condensing)
Standards Compliance	IEEE 802.3; FCC: Class A or Class B, 10/100Base-TX, 100Base-FX
Warranty	not less than 5 years for media and chassis (excludes power supplies, fans and lasers)

10-3.38 MEDIA CONVERTER (MULTIPOINT MEDIA CONVERTER)

Media converter shall conform to the details shown on the plans and shall be in conformance with these special provisions.

Media converter optical link range shall be suitable for the operational distances shown on the plan sheets.

Media converter shall have the following features:

MEDIA CONVERTER (Multipoint Media Converter)	
FEATURE	**PARAMETER/REMARKS**
Ports	RJ-45 (10/100Base-TX)
	100 Mbps duplex fiber port with SC-Type connector (singlemode required)
10/100Base-TX port	Automatically senses 10 Mbps or 100 Mbps connection speed, Auto-negotiates half- or full-duplex mode, Auto-selects MDI/MDI-X media type
Fiber port	Half /full-duplex mode selector
Number of Fiber to Ethernet Conversion Ports	14 fiber to 14 ethernet
Network media	100Base-TX and 100Base-FX: Singlemode fiber optic cable 8/125 µm or 9/125 µm, full-duplex to 20 km
Serial Console Port	RS232
Protocol	SNMP manageable through SNMP-enabled networking management system via console or add-on module
Data Transfer Rate	100Mbps (Half-Duplex), 200Mbps (Full-Duplex)
Status LED indicators	power, copper link/activity, fiber optic link/activity, half/full duplex mode
Mounting	Rack mounted or Slot/Chassis Configuration as required
Power Supply	Supply voltage range 100 V to 135 V at 60 Hz. Standalone units: Internal power supply (maximum power consumption 6 W) or external power supply (maximum power consumption 14 W) Chassis units: only one power supply permitted
Power Adapter	Temperature: Operating: 0 to 35˚C
	Humidity: Operating: up to 85 % (non-condensing)
Standards Compliance	IEEE 802.3; FCC: Class A or Class B, 10/100Base-TX, 100Base-FX
Warranty	not less than 5 years for media and chassis (excludes power supplies, fans and lasers)

10-3.39 DS3 ROUTER

DS3 Router shall conform to the details shown on plans and shall be in conformance with these special provisions. DS3 Router shall have the following features:

DS3 ROUTER PERFORMANCE	
FEATURE	**PARAMETER/REMARKS**
DS3	2B1Q Modulation
	Data Rates (symmetrical): up to 45Mbs
Bridging	Transparent bridging including Spanning Tree protocol (IEEE802.ID)
Routing	TCP/IP, RIP, ETGRP
Configuration Management	SNMP
DS3 Connector	RJ45
LAN Connector	RJ45 10BaseT Ethernet
PPP	(( ))
Security	User Authentication
	Password control via Manager
Unit Designation	DSL Router
Unit Operability	(( ))
Serial Console Port	RS232 connectivity
Identification	IP Addressable
Memory	Internal Flush, 1 MB minimum
Indicators	Power, "Good Link", Transmit/Receive Data
Indicator Type	LED
Software Updates	Via Serial Port or Network Port
Configuration	Via Serial Port or Network Port
Dimensions (nominal, maximum)	(60H x 250W x 200D) (mm)
Operating Temperature	5 to 40ºC
Operating Voltage	110V (ac)

10-3.40 DETECTORS

Loop detector sensor will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

Loop wire shall be Type 2.

Loop detector lead-in cable shall be Type B.

Slots shall be filled with elastomeric sealant or hot-melt rubberized asphalt sealant.

For Type E detector loops, sides of the slot shall be vertical and the minimum radius of the slot entering and leaving the circular part of the loop shall be 40 mm. Slot width shall be a maximum of 20 mm. Loop wire for circular loops shall be Type 2. Slots of circular loops shall be filled with elastomeric sealant or hot melt rubberized asphalt sealant.

The depth of loop sealant above the top of the uppermost loop wire in the sawed slots shall be 50 mm, minimum.

PREFORMED INDUCTIVE LOOPS

Preformed inductive loops shall be the type shown on the plans.

The loop shall be 1.8 m square unless otherwise shown. The loop shall consist of 4 turns of No. 16, or larger, wire with Type THWN or TFFN insulation.

The loop wires shall be encased in Size 10, minimum, Schedule 40 or Schedule 80 PVC or polypropylene conduit. The conduit shall be sealed to prevent the entrance of water and the movement of wires within the conduit.

The loop wires from the preformed loop to the adjacent pull box shall be twisted together into a pair (at least 7 turns per meter) and encased in Schedule 40 or Schedule 80 PVC or polypropylene conduit between the preformed loop and the adjacent pull box or detector handhole. The lead-in conduit shall be sealed to prevent the entrance of water at the pull box or handhole end.

In new reinforced concrete structure decks, the preformed loops shall be secured to the top of the uppermost layer of reinforcing steel using nylon wire ties. The loop shall be held parallel to the structure deck by using PVC or polypropylene spacers where necessary. Conduit for lead-in conductors shall be placed between the uppermost 2 layers of reinforcing steel.

10-3.41 VIDEO IMAGE VEHICLE DETECTION SYSTEM

A Video Image Vehicle Detection System (VIVDS) shall be installed to operate traffic signals on all approaches shown on the plans and include an initial site analysis, set-up and system configuration, calibration of the system, performance accuracy verification and training.

MATERIALS LIST AND DRAWINGS

The Contractor shall submit a proposed list of materials before commencing work and drawings and other data before the completion of the contract:

A. Certificate of Compliance – Provide a Certificate of Compliance reviewed and approved by the manufacturer.

B. Site Analysis Report –Evaluate and provide a written analysis for each detection site recommending the optimum video sensor placement approved by the manufacturer.

C. Lane Configuration - Provide a shop drawing showing detection zone setback, detection zone size, camera elevation, selected lens viewing angle and illustration of how the detection zones will map into reporting contact outputs as well as how output connector pins or wire terminals correspond to the lane assignments.

D. Configuration Record - Provide a Windows PC compatible Compact Disk (CD) that contains the final zone designs as well as calibration settings formatted to allow the same configuration to be re-installed and used in the event of disputed performance.

E. Mounting and Wiring Information – Provide one set of the approved diagrams detailing wiring and service connections, covered on each side with clear self-adhesive plastic and placed in a heavy-duty plastic envelope. Secure the envelope to the inside of the cabinet door or at a location designated by the Engineer.

F. Communication Protocol - Provide a document that completely defines the unit's communication protocol (message structure organization, data packet length as well as information necessary to make use of such messages) as well as all information needed for operating the system from a remote Windows based Personal Computer (PC).

G. Programming Software - Provide a PC compatible Compact Disk (CD) that contains set-up and calibration software which observes the vehicular traffic, allows placement of detection zones and adjustment of the detection sensitivity.

H. Detector Performance DVD Recordings & Analysis– Furnish the Engineer a performance analysis for each approach based on DVD recordings of 24 hours of contiguous operation. Provide video clips of two contiguous hour of sunny conditions with visible shadows projected a minimum of 6 feet into the adjacent lanes and 2 different one hour night periods with vehicle headlights present.

I. Acceptance Testing Schedule–Submit an acceptance testing schedule to the Engineer for approval fifteen days prior to acceptance testing of the VIVDS. Acceptance testing shall be separate from the detector performance & analysis testing noted in the previous paragraph.

J. Acceptance Testing Documentation- Provide documentation necessary to utilize the support equipment that is organized so that the Engineer will be able to perform acceptance testing using the documentation without assistance from the Contractor.

K. Training – Provide a copy of the training material to the Engineer for approval 30 days prior to the training.

FUNCTIONAL REQUIREMENTS

The VIVDS shall consist of enclosed and environmentally protected Video Image Sensor assemblies (VIS) and mounting hardware assemblies installed on poles or mast-arms as shown on the plans. Necessary Video Detection Units (VDU), image processors, extension modules as well as power supplies, surge suppression, cables, connectors and wiring to a State Furnished Type 332 traffic control cabinet shall be included.

The VIS image sensor and lens shall be housed in an environmentally sealed enclosure, watertight and dust tight to NEMA 4 standards. The enclosure shall include a thermostat controlled heater to prevent condensation and assures proper lens operation at low temperatures with an adjustable sun shield that diverts water from the sensor field of view. The assembly shall have waterproof connections for power, control and video signal cables and wiring.

The VIVDS shall include necessary hardware and software for designing the necessary detection pattern or zones at the intersection or approach. The detection zones shall be created with a graphic user interface designed to allow a trained VIVDS system operator to configure and calibrate a lane in less than 15 minutes. The system shall support normal operation of existing detection zones while a zone is being added or modified. The zone shall flash or change color on a viewing monitor whenever a vehicle is detected.

Software and firmware shall be included that detects vehicle presence, provides vehicle counts, provides the means to set-up detection zones, tests the VIVDS performance as well as allows viewing the video scenes and the operation the system from a remote location.

The system shall allow the user to define detection zones or elements and to set detection outputs for presence or pulse operation. The number of optically isolated detection outputs shall equal the detection zones shown on the plans plus one spare output for every approach.

The VIVDS shall support a minimum of two separate detection pattern or zone arrangements that can be enacted by a remote operator over a network connection. The system shall detect low-visibility conditions including fog and inclement weather and respond by selecting a predefined detection pattern and, when necessary, placing all defined detection zones into

a constant call mode. VIVDS outputs shall assume a fail-safe "on" or "call" for presence detection in the event of loss of video signal or power failure and recover from a power failure by restoring normal operation within three minutes without manual intervention. The system shall maintain the configuration and calibration information in memory while powered off for at least 90 days.

Vehicle detection must call service to a phase only when there is demand and extend green service to a phase until there is no longer demand or until the flow rates have reduced to levels for phase termination. The VIVDS shall detect the presence of vehicles at the detection zone positions shown on the plans and provide the call contact outputs to the Model 170E or Model 2070 with the following performance:

Detector Performance Requirements	Performance During AMBER & RED Interval	Performance During GREEN Interval
Average response time after vehicle penetrates 3' of detection zone or after departing 3' past detection zone	< 1 Sec	< 100 ms
Maximum number of MISSED CALLS* in 24 hours	0	10
*Where MISSED CALLS are response times greater than the following (on penetrating 3' of detection zone or after departing 3' past detection zone)	< 5 Sec	< 1 Sec
Maximum number of FALSE CALLS in 24 hours (calls greater than 500ms without a vehicle present)	20	20

The VIVDS shall be able to locally store, for remote retrieval, per lane vehicle count data in 10, 20,30, and 60 minute intervals for a minimum period of one week (168 hours). The VIVDS shall count vehicles with a better than 95 percent accuracy over a 24 hour period for each approach.

The VDU front panel shall have indications for power, communication, presence of video input for each video sensor as well as the real time detector output operation. A test switch shall have positions that allow the user to place either a constant or momentary call for each approach. The indications shall be visible in daylight from 1.5°m away.

A flat panel video display (with a minimum 8 inch screen and as recommended by the VIVDS manufacturer as suitable for the application intended) shall be furnished and installed in the 332 cabinet for viewing video detector images and for diagnostic testing. Each VIVDS system shall have video connections that support the NTSC video output format and include means for the user to switch to any video signal at an intersection. The system is to allow independent viewing of any scene while video recording any other scene without interfering with the operation of the system outputs.

The VIVDS shall have a serial communication port that supports sensor unit setup, diagnostics, and operation from a local Windows PC compatible laptop. The VIVDS shall have an ethernet communication card and include necessary software to support remote real-time viewing and operation over a Wide Area Network (WAN) connection.

TECHNICAL REQUIREMENTS

System elements shall be designed to operate continuously in an outdoor traffic monitoring and control environment, 24 hours a day. Manufacturing quality and electronic components shall support a minimum mean time between failure (MTBF) of ten (10) years.

The video image sensor assembly (VIS) shall include the video sensor, a zoom lens and weathertight enclosure. The video sensor shall use a Charged Coupled Device (CCD) element and support NTSC and RS170 video output formats with resolution of not less than 360 horizontal lines. The video sensor shall include an Auto-Gain Control circuit (AGC), have a minimum sensitivity to scene luminance from 0.1 lux to 10,000 lux and produce a usable video image of vehicles, under all roadway lighting conditions and regardless of the time of day. The sensor shall have a motorized lens with variable focus and zoom control with an aperture of f/1.4 or better. The focal length shall allow +/- 50% adjustment of the viewed detection scene.

The enclosed video image sensor assembly (VIS) shall operate from –34°C to +74°C and 0 percent to 95 percent relative humidity, weigh less than 3 kg and present less than 930 sq cm of effective wind surface to any direction.

Sensor unit mounting hardware shall be stainless steel or be treated to withstand 250 hours of salt fog exposure under ASTM Designation: B117 conditions without any visible corrosive damage.

The VDU including image processors, extension modules and video output assemblies shall insert into the controller input file slots using the edge connector to obtain limited 24VDC power and to provide contact closure outputs. Cabling to a "D" connector on the front of the VDU is acceptable. No rewiring to the standards 332 cabinet shall be allowed. The controller cabinet resident modules shall conform to the requirements detailed in Chapter 1 as well as Sections 5.2.8, 5.2.8.1, 5.2.8.2, 5.4.1, 5.4.5, 5.4.5, and 5.4.6, 5.5.1, 5.5.5, and 5.5.6 of the Transportation Electrical Equipment Specifications (TEES).

The VIVDS shall operate from 95 to 135 VAC service per NEMA TS-1. The VIS sensor assembly, excluding the heater circuit, shall draw less than 10 watts of power**.** The power supply or transformer for the VIVDS shall meet the following minimum requirements:

Item	Power Supply	Transformer
Power Cord	Standard 120VAC, 3 prong cord, at least 1 meter in length (may be added by Contractor)	Standard 120VAC, 3 prong cord, at least 1 meter in length (may be added by Contractor)
Type	Switching mode type	Class 2
Rated Power	Two time (2x) full system load	Two time (2x) full system load
Operating Temperature	-35°C to 74°C	-35°C to 74°C
Operating Humidity Range	From 5 percent to 95 percent	From 5 percent to 95 percent
Input Voltage	From 90°V (ac) to 135°V(ac)	From 90°V (ac) to 135°V(ac)
Input Frequency	60°Hz +/- 3°Hz	60°Hz +/- 3°Hz
Inrush Current	Cold start, 25 A max. at 115 V	N/A
Output Voltage	As required by the VIVDS	As required by the VIVDS
Overload Protection	From 105 percent to 150 percent in output pulsing mode	Power limited at >150%
Over Voltage Protection	From 115 percent to 135 percent of rated output voltage	N/A
Setup, Rise, Hold Up	800°ms, 50°ms,15°ms at 115°V(ac)	N/A
Withstand Voltage	I/P-0/P:3°kV, I/P-FG:1.5°kV, for 60 sec.	I/P-0/P:3°kV, I/P-FG:1.5°kV, for 60 sec
Working Temperature	Not to exceed 70°C@30% load	Not to exceed 70°C@30% load
Safety Standards	UL 1012, TUV EN60950	UL 1585
EMC Standards	EN55022 Class B, EN61000-4-2, 3, 4, 5	N/A

All field terminated circuits shall include transient protection that complies with IEEE Standard 587-1980 Category C. Video connections shall be isolated from ground.

The VIVDS as well as support equipment required by the Engineer for acceptance testing shall be new and conform with the manufacturer's recommendations. The date of manufacture, as shown by date codes or serial numbers of electronic circuit assemblies, shall not be older than six months from the scheduled start date of this installation. No substitutions of materials shall be allowed that deviate from the list of materials approved by the Engineer.

CONSTRUCTION

The Contractor may be required to perform a field demonstration of the VIVDS at a site selected to approximate the conditions under which the system will need to operate for the project. During the demonstration the unit must prove it can meet the requirements of this SSP. The Engineer has the right to reject the material if the demonstration fails to show the device compliant.

The Contractor is to provide personnel skilled in the installation of video detection including the selection of correct camera locations, the right cabling as well as zone design, VIVDS set-up and calibration. The Contractor or manufacturer's representative shall conduct a site analysis of each installation and provide a written recommendation for optimum camera placement prior to installation.

The number of video image sensors (VIS) shall be provided to cover vehicle detection for every approach shown on the plans. Video Detection Units (VDU) shall be installed in a State Furnished Model 170E or Model 2070 controller assembly. VIS power supply or transformer shall be installed on a standard DIN rail using standard mounting hardware and power conductors wired to DIN rail mounted terminal blocks in the controller cabinet as directed by the Engineer.

Each VIS sensor assembly shall be wired to the controller cabinet with a connectorized wiring harness that includes all power and control wiring as well as coaxial video cable. The harness shall be attached with standard Mil Type and rated plugs. The cable type and wire characteristics (rated for 600 V and 75°C, minimum) shall meet the manufacturer's recommendations for the respective VIS to cabinet distances of the project. Wiring and cables shall be continuous (without splices) between the VIS sensor and controller cabinet. A minimum of two meter slack shall be coiled in the bottom of the controller cabinet or as directed by the Engineer. The serial data communication output conductors shall be terminated at TB-0, and continue for a minimum of three meters to a DB9F connector for setup and diagnostic access. The ends of unused

and spare conductors shall be taped to prevent accidental contact to other circuits. Conductors inside the cabinet shall be labeled for the functions as depicted in the approved detailed diagrams.

The lens shall be adjusted to view 110% of the largest detection area dimension. Detection zones or elements shall be created to meet the performance requirements of this SSP. Zones or elements shall be logically combined into reporting contact outputs that are equivalent to the detection loops shown on the plans with the detection accuracy required by this specification.

TESTING

The performance of each unit shall be individually verified and the recorded medium and other materials submitted to the Engineer at the conclusion of the performance test. The accuracy of each unit shall be determined and documented so that each unit may be approved or rejected separately by the Engineer. Failure to submit the materials at the conclusion of testing invalidates the test. The recorded media serves as acceptance evidence and shall not be used for calibration. The calibration shall have been completed prior to testing and verification.

Detection accuracy shall be verified by observing the VIVDS performance and recorded video images for a contiguous 24 hour period for each approach. The recorded video images shall show the viewed detection scene, the detector call operation, the signal phase status for each approach, the vehicle count and time-stamp to 1/100 of a second all overlaid on the recorded video. The 24 hour analysis periods shall be transferred to a DVD for viewing on a PC. All software needed for the analysis shall be provided by the Contractor.

The VIVDS shall meet the following detection acceptance criterion for the Intervals shown.

	Performance During AMBER & RED Interval	Performance During GREEN Interval
Maximum number of MISSED CALLS per approach in 24 hours	0	10
Maximum number of FALSE CALLS per approach in 24 hours	20	20

The VIVDS vehicle count accuracy shall be determined by the formula 100(1-DC/TC) where DC = the Detector Vehicle Count and TC = the Traffic Count observed from the media recording for the period. Vehicle 24 hour count accuracy shall be better than 95 percent for each approach.

The Engineer will review the data findings and accept or reject the results within 7 days. Determination of any vehicle anomalies or unusual occurrences will be decided by the Engineer. Data or counts that are not agreed upon by the Engineer shall be considered errors and count against the unit's calibration. If the Engineer determines that the VIVDS does not meet the performance requirements, the Contractor will have seven days to re-calibrate and re-test the unit and re-submit new test data. Following three failed attempts, the Contractor shall replace the VIVDS system with a new unit.

The Contractor shall notify the Engineer 15 working days before the unit is ready for acceptance testing. Acceptance testing shall be scheduled to be accomplished before the end of the normal work shift. The Contractor shall demonstrate the operation of all VIS cameras and VDU units satisfy the functional requirements of these special provisions.

The Contractor shall provide all equipment, documentation, materials and special tools required for acceptance testing, maintenance and operation of the system. The Contractor shall provide software required to program and support the VIVDS system, installed in the appropriate equipment at the time of acceptance testing, and used for the acceptance test.

TRAINING

The Contractor shall arrange for a training course of not less than two eight-hour (excluding lunch break) days in duration provided by a factory authorized representative for up to 10 students selected by the Engineer. The content of the training shall include instruction on how to align, program, adjust, calibrate and maintain the unit. All materials and equipment for the training shall be provided by the Contractor. The Contractor shall give the Engineer 15 working days notice prior to the training. The training time shall be agreed upon by the Engineer and the Contractor. If no agreement can be reached, the Engineer shall determine the time. A training area will be provided by the State at the Kearny Mesa Construction Office, located at 7177 Opportunity Road, San Diego, CA, 92111.

10-3.42 EMERGENCY VEHICLE DETECTOR SYSTEM

Each traffic signal shall have an emergency vehicle detector system which shall conform to the details shown on the plans and these special provisions.

GENERAL

Each emergency vehicle detector system shall consist of an optical emitter assembly or assemblies located on the appropriate vehicle and an optical detector/discriminator assembly or assemblies located at the traffic signal.

Emitter assemblies are not required for this project except units for testing purposes to demonstrate that the systems perform as specified. Tests shall be conducted in the presence of the Engineer as described below under "System Operation" during the signal test period. The Engineer shall be given a minimum of 2 working days notice prior to performing the tests.

Each system shall permit detection of 2 classes of authorized vehicles. Class I (mass transit) vehicles shall be detected at ranges of up to 300 m from the optical detector. Class II (emergency) vehicles shall be detected at ranges up to 550 m from the optical detector.

Class I signals (those emitted by Class I vehicles) shall be distinguished from Class II signals (those emitted by Class II vehicles) on the basis of the modulation frequency of the light from the respective emitter. The modulation frequency for Class I signal emitters shall be 9.639 Hz ± 0.110 Hz. The modulation frequency for Class II signal emitters shall be 14.035 Hz ± 0.250 Hz.

A system shall establish a priority of Class II vehicle signals over Class I vehicle signals and shall conform to the requirements in Section 25352 of the California Vehicle Code.

EMITTER ASSEMBLY

Each emitter assembly, provided for testing purposes, shall consist of an emitter unit, an emitter control unit, and connecting cables.

General

Each emitter assembly, including lamp, shall operate over an ambient temperature range of -34°C to 60°C at both modulation frequencies and operate continuously at the higher frequency for a minimum of 3000 hours at 25°C ambient before failure of the lamp or other components.

Each emitter unit shall be controlled by a single, maintained-contact switch on the respective emitter control unit. The switch shall be located to be readily accessible to the vehicle driver. The control unit shall contain a pilot light to indicate that the emitter power circuit is energized and shall generate only one modulating code, either that for Class I vehicles or that for Class II vehicles.

Functional

Each emitter unit shall transmit optical energy in one direction only.

The signal from each Class I signal emitter unit shall be detectable at a distance of 300 m when used with a standard optical detection/discriminator assembly and filter to eliminate visible light. Visible light shall be considered eliminated when the output of the emitter unit with the filter is less than an average of 0.0003-candela per energy pulse in the wavelength range of 380 nm to 750 nm when measured at a distance of 3 m. A Certificate of Compliance, conforming to the requirements in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be submitted to the Engineer with each Class I emitter unit.

The signal from each Class II signal emitter unit shall be detectable at a distance of 550 m when used with a standard optical detection/discriminator assembly.

The standard optical detection/discriminator assembly to be used in making the range tests shall be available from the manufacturer of the system. A certified performance report shall be furnished with each assembly.

Electrical

Each emitter assembly shall provide full light output with input voltages of between 12.5 V (dc) and 17.5 V (dc). An emitter assembly shall not be damaged by input voltages up to 7.5 V (dc) above supply voltage. The emitter assembly shall not generate voltage transients, on the input supply, which exceed the supply voltage by more than 4 volts.

Each emitter assembly shall consume not more than 100 W at 17.5 V (dc) and shall have a power input circuit breaker rated at 10 A to 12 A, 12 V (dc).

The design and circuitry of each emitter shall permit its use on vehicles with either negative or positive ground without disassembling or rewiring of the unit.

Mechanical

Each emitter unit shall be housed in a weatherproof corrosion-resistant housing. The housing shall be provided with facilities to permit mounting on various types of vehicles and shall have provision for aligning the emitter unit properly and for locking the emitter unit into this alignment.

Each emitter control unit shall be provided with hardware to permit the unit to be mounted in or on an emergency vehicle or mass transit vehicle. Where required for certain emergency vehicles, the emitter control unit and exposed controls shall be weatherproof.

OPTICAL DETECTION/DISCRIMINATOR ASSEMBLY

General

Each optical detection/discriminator assembly shall consist of one or more optical detectors, connecting cable and a discriminator module.

Each assembly, when used with standard emitters, shall have a range of at least 300 m for Class I signals and 550 m for Class II signals. Standard emitters for both classes of signals shall be available from the manufacturer of the system. Range measurements shall be taken with all range adjustments on the discriminator module set to "maximum".

Optical Detector

Each optical detector shall be a waterproof unit capable of receiving optical energy from two separately aimable directions. The horizontal angle between the 2 directions shall be variable from 180 degrees to 5 degrees.

The reception angle for each photocell assembly shall be a maximum of 8 degrees in all directions about the aiming axis of the assembly. Measurements of reception angle will be taken at a range of 300 m for a Type I emitter and at a range of 550 m for a Type II emitter.

Internal circuitry shall be solid state and electrical power shall be provided by the associated discriminator module.

Each optical detector shall be contained in a housing, which shall include 2 rotatable photocell assemblies, an electronic assembly and a base. The base shall have an opening to permit mounting on a mast arm or a vertical pipe nipple, or suspension from a span wire. The mounting opening shall have female threads for Size 21 conduit. A cable entrance shall be provided which shall have male threads and gasketing to permit a waterproof cable connection. Each detector shall have mass of less than 1.1 kg and shall present a maximum wind load area of 230 cm^2. The housing shall be provided with weep holes to permit drainage of condensed moisture.

Each optical detector shall be installed, wired and aimed as specified by the manufacturer.

Cable

Optical detector cable (EVC) shall meet the requirements of IPCEA-S-61-402/NEMA WC 5, Section 7.4, 600-V (ac) control cable, 75°C, Type B, and the following:

A. The cable shall contain 3 conductors, each of which shall be No. 20 (7 x 28) stranded, tinned copper with low-density polyethylene insulation. Minimum average insulation thickness shall be 0.63-mm. Insulation of individual conductors shall be color coded: 1-yellow, 1-blue, 1-orange.
B. The shield shall be either tinned copper braid or aluminized polyester film with a nominal 20 percent overlap. Where film is used, a No. 20 (7 x 28) stranded, tinned, bare drain wire shall be placed between the insulated conductors and the shield and in contact with the conductive surface of the shield.
C. The jacket shall be black polyvinyl chloride with minimum ratings of 600 V (ac) and 80°C and a minimum average thickness of 1.1 mm. The jacket shall be marked as required by IPCEA/NEMA.
D. The finished outside diameter of the cable shall not exceed 8.9 mm.
E. The capacitance, as measured between any conductor and the other conductors and the shield, shall not exceed 157 pf per meter at 1000 Hz.
F. The cable run between each detector and the controller cabinet shall be continuous without splices or shall be spliced only as directed by the detector manufacturer.

Discriminator Module

Each discriminator module shall be designed to be compatible and usable with a Model 170 controller unit and to be mounted in the input file of a Model 332 or Model 336 controller cabinet, and shall conform to the requirements of Chapter I of the State of California, Department of Transportation, "Traffic Signal Control Equipment Specifications."

Each discriminator module shall be capable of operating two channels, each of which shall provide an independent output for each separate input.

Each discriminator module, when used with its associated detectors, shall perform the following:

A. Receive Class I signals at a range of up to 300 m and Class II signals at a range of up to 550 m.
B. Decode the signals, on the basis of frequency, at 9.639 Hz ± 0.119 Hz for Class I signals and 14.035 Hz ± 0.255 Hz for Class II signals.

C. Establish the validity of received signals on the basis of frequency and length of time received. A signal shall be considered valid only when received for more than 0.50–second. No combination of Class I signals shall be recognized as a Class II signal regardless of the number of signals being received, up to a maximum of 10 signals. Once a valid signal has been recognized, the effect shall be held by the module in the event of temporary loss of the signal for a period adjustable from 4.5 seconds to 11 seconds in at least 2 steps at 5 seconds ± 0.5 second and 10 seconds ± 0.5 second.
D. Provide an output for each channel that will result in a "low" or grounded condition of the appropriate input of a Model 170 controller unit. For Class I signals the output shall be a 6.25 Hz ± 0.1 percent, rectangular waveform with a 50 percent duty cycle. For Class II signals the output shall be steady.

Each discriminator module shall receive electric power from the controller cabinet at either 24 V (dc) or 120 V (ac).

Each channel together with the channel's associated detectors shall draw not more than 100 mA at 24 V (dc) or more than 100 mA at 120 V (ac). Electric power, one detector input for each channel and one output for each channel shall terminate at the printed circuit board edge connector pins listed below:

BOARD EDGE CONNECTOR PIN ASSIGNMENT

A	DC ground		
B	+24 V (dc)	P	(NC)
C	(NC)		
D	Detector input, Channel A	R	(NC)
E	+24V (dc) to detectors	S	(NC)
F	Channel A output (C)	T	(NC)
		U	(NC)
H	Channel A output (E)	V	(NC)
J	Detector input, Channel B	W	Channel B Output (C)
K	DC Ground to detectors	X	Channel B Output (E)
L	Chassis ground	Y	(NC)
M	AC-	Z	(NC)
N	AC+		

(C) Collector, Slotted for Keying
(E) Emitter, Slotted for Keying
(NC) Not connected, cannot be used by manufacturer for any purpose.

Two auxiliary inputs for each channel shall enter each module through the front panel connector. Pin assignment for the connector shall be as follows:

A. Auxiliary detector 1 input, Channel A
B. Auxiliary detector 2 input, Channel A
C Auxiliary detector 1 input, Channel B
D. Auxiliary detector 2 input, Channel B

Each channel output shall be an optically isolated NPN open collector transistor capable of sinking 50 mA at 30 V (ac) and shall be compatible with the Model 170 controller unit inputs.

Each discriminator module shall be provided with means of preventing transients received by the detector from affecting the Model 170 controller assembly.

Each discriminator module shall have a single connector board and shall occupy one slot width of the input file. The front panel of each module shall have a handle to facilitate withdrawal and the following controls and indicators for each channel:

A. Three separate range adjustments each for both Class I and Class II signals.
B. A 3-position, center-off, momentary contact switch, one position (down) labeled for test operation of Class I signals, and one position (up) labeled for test operation of Class II signals.
C. A "signal" indication and a "call" indication each for Class I and for Class II signals. The "signal" indication denotes that a signal above the threshold level has been received. A "call" indication denotes that a steady, validly coded signal has been received. These 2 indications may be accomplished with a single indication lamp; "signal" being denoted by a flashing indication and "call" with a steady indication.

In addition, the front panel shall be provided with a single circular, bayonet-captured, multi-pin connector for 2 auxiliary detector inputs for each channel. Connector shall be a mechanical configuration conforming to the requirements in Military Specification MIL-C-26482 with 10-4 insert arrangement, such as Burndy Trim Trio Bantamate Series, consisting of the following:

A. Wall mounting receptacle, G0B10-4PNE with SM20M-1S6 gold plated pins.
B. Plug, G6L10-4SNE with SC20M-1S6 gold plated sockets, cable clamp and strain relief that shall provide for a right angle turn within 65 mm maximum from the front panel surface of the discriminator module.

Cabinet Wiring

The Model 332 cabinet has provisions for connections between the optical detectors, the discriminator module and the Model 170 controller unit.

Wiring for a Model 332 cabinet shall conform to the following:

A. Slots 12 and 13 of input file "J" have each been wired to accept a 2-channel module.
B. Field wiring for the primary detectors, except 24-V (dc) power, shall terminate on either terminal board TB-9 in the controller cabinet or on the rear of input file "J," depending on cabinet configuration. Where TB-9 is used, position assignments shall be as follows:

Position	Assignment
4	Channel A detector input, 1st module (Slot J-12)
5	Channel B detector input, 1st module (Slot J-12)
7	Channel A detector input, 2nd module (Slot J-13)
8	Channel B detector input, 2nd module (Slot J-13)

The 24-V (dc) cabinet power will be available at Position 1 of terminal board TB-1 in the controller cabinet.

Field wiring for the auxiliary detectors shall terminate on terminal board TB-O in the controller cabinet. Position assignments are as follows:

FOR MODULE 1 (J-12)		FOR MODULE 2 (J-13)	
Position	Assignment	Position	Assignment
1	+24V (dc) from (J-12E)	7	+24V (dc) from (J-13E)
2	Detector ground From (J-12K)	8	Detector ground from (J-13K)
3	Channel A auxiliary detector input 1	9	Channel A auxiliary detector input 1
4	Channel A auxiliary detector input 2	10	Channel A auxiliary detector input 2
5	Channel B auxiliary detector input 1	11	Channel B auxiliary detector input 1
6	Channel B auxiliary detector input 2	12	Channel B auxiliary detector input 2

SYSTEM OPERATION

The Contractor shall demonstrate that the components of each system are compatible and will perform satisfactorily as a system. Satisfactory performance shall be determined using the following test procedure during the functional test period:

A. Each system to be used for testing shall consist of an optical emitter assembly, an optical detector, an optical detector cable and a discriminator module.
B. The discriminator modules shall be installed in the proper input file slot of the Model 170 controller assembly.
C. Two tests shall be conducted; one using a Class I signal emitter and a distance of 300 m between the emitter and the detector, the other using a Class II signal emitter and a distance of 550 m between the emitter and the detector. Range adjustments on the module shall be set to "Maximum" for each test.
D. Each test shall be conducted for a period of one hour, during which the emitter shall be operated for 30 cycles, each consisting of a one minute "on" interval and a one minute "off" interval. During the total test period the emitter signal shall cause the proper response from the Model 170 controller unit during each "on" interval and there shall be no improper operation of either the Model 170 controller unit or the monitor during each "off" interval.

10-3.43 CLOSED CIRCUIT TELEVISION CAMERA ASSEMBLY

Closed circuit television (CCTV) camera assembly shall conform to the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and these special provisions.

GENERAL

Prototype equipment will not be allowed. All equipment shall be current standard production units.
The CCTV camera assembly shall consist of the following components:

A. Camera
B. Motorized zoom lens
C. Environmental enclosure with sun shield or shroud
D. Pan/tilt drive unit
E. Iris control circuit devices
F. AC step-down transformer

The CCTV camera assembly shall have all necessary wiring, cables, and connectors. All CCTV camera assemblies shall be plug compatible, interchangeable and suitable for use with the CCTV camera cable assembly described in these special provisions.

CAMERA

All cameras supplied shall meet the following specifications.

Performance

PARAMETER	SPECIFICATION
Optical Device	CCD, Color, interline transfer
Optical Ccd Format Size	6.3 mm format
Horizontal Resolution	460 television lines (minimum)
Sensitivity	1 lux @ 1/60 s shutter speed (measured with fl.6 lens)
Scanning System	525 lines 2:1 interlace

Closed circuit television camera assembly components shall be rated for NEMA 4X, IP 66 or IP 67.
The camera shall be equipped with an electronic shutter with adjustable speeds ranging from 1/60 second to 1/30,000 second.

Electrical

PARAMETER	SPECIFICATION
Operating Voltage	120 V(ac) ± 10% (external adapter allowed)
Power Consumption	50 W (Maximum)
Video Output Signal	Standard NTSC color TV
Video Output Connector	Standard BNC bulkhead on rear of camera
Signal To Noise Ratio	>48 dB
Synchronization	Internal sync or phase adjustable line lock
Video Output Level	1.0 V p-p (75 Ω composite)
Gain Control	Automatic
Automatic Back Focus (Automatic White Balance)	Required

Programming shall be stored non-volatile memory and the CCTV assembly firmware shall be updateable via serial communication.

Environmental

PARAMETER	SPECIFICATION
Operating Temperature	-10˚C to 50˚C
Storage Temperature	-40˚C to 60˚C
Operating Humidity	20 to 80% non-condensing
Storage Humidity	20 to 90% non-condensing

CLOSED CIRCUIT TELEVISION CAMERA LENS

The CCTV camera lens shall meet the following specifications.

PARAMETER	SPECIFICATION
Format	6.3 mm format
Iris	Motorized , with automatic and manual adjust modes
Operating temperature	-10°C to +50°C
Focal Length	Maximum not less than 80 mm (Optical power not less than 21X)
Lens Aperture	F1.6 - F3.6
Horizontal angle of view at Maximum Focal Length	Not less than 2.2° for 6.3 mm format camera

The lens shall have motors for zoom, focus and iris.

The lens shall have capability for focus and zoom preset positions. A telescopic converter or extender shall not be used to achieve required focal length range.

Electrical

When the power is removed from the lens, the lens iris shall automatically close.

The motorized-iris cable shall be strain relieved or sufficiently rugged such that the cable will not fail at the point where it leaves the lens assembly.

Optical

When the camera is pointed at a very bright object and or when the camera and lens is first turned on, the image produced by the lens and camera combination shall not optically "oscillate" (i.e., produce an image that alternates from too light to too dark) or otherwise be unstable.

Each lens shall have an automatic, motor-driven iris with manual override.

The lens shall include mechanical or electrical means to protect the motors from over running in the extreme position.

The iris shall be controlled directly through the camera in automatic mode and from any keyboard connected into the camera system in the manual mode. The automatic iris shall provide continuous aperture adjustments of the lens as determined by the amount of light reaching the camera imager. The power supply and electronics for iris motor shall be contained within the environmental housing.

Environmental

PARAMETER	SPECIFICATION
Operating Temperature	-25.6˚C to 50˚C (minimum range).
Storage Temperature	-40˚C to -10˚C
Operating Humidity	20 to 80% non-condensing
Storage Humidity	20 to 90% non-condensing

Installation

The Contractor shall make all the necessary adjustments on different components of the CCTV camera assembly. This includes the back-focus and tracking adjustments on the lens and color balancing of the camera.

The Contractor shall ensure the back-focus adjustment on the camera is such that the lens focus is properly set and maintained when adjusting the focal length from zoom to wide angle. The Contractor shall make this adjustment with the lens iris at full open position. This adjustment shall be made such that when the zoom is adjusted from long range (telephoto) to wide angle, no refocusing is necessary.

ENVIRONMENTAL ENCLOSURE

The environmental enclosure shall be the sealed, pressurized type, designed to withstand exposure to sand, dust, fungus, and salt atmosphere, and house the assembled camera, motorized zoom lens and all internal wiring. It shall operate on a voltage range of 120 V(ac) ±10 percent power source. The enclosure shall include an internal thermostatically controlled heater assembly to minimize external faceplate condensation. The Contractor has the option of providing a sealed, pressurized Integrated Optics Cartridge (IOC) housed in a NEMA 4X rated enclosure.

The enclosure shall include a sun shield or shroud to provide protection from direct solar radiation.

The enclosure or IOC shall be pressurized with 34 kPa dry nitrogen. The enclosure shall have a valve for pressurizing. In addition, a pressure relief valve with a 137 kPa rating shall be provided to protect the enclosure from overcharging.

The notation "CAUTION - PRESSURIZED" shall be printed on the enclosure. The letter height shall be at least 6.3 mm.

Performance

The housing unit shall have lens preset capabilities.

The housing shall not interfere with the widest viewing angle of the motorized zoom lens.

Physical

PARAMETER	SPECIFICATION
Construction	All aluminum
Finish	White, light beige or gray baked enamel or polyester powder coat
Weight	Less than 21 kg excluding heater
Camera Mounting	Platform mount with adjustment fore and aft

The camera lens shall be positioned in the center of the housing window.

Any enclosure supplied shall include a sun shield or shroud to protect the housing from the direct rays of the sun. The sun shroud shall be made specifically for the model of enclosure that is selected.

Shock And Vibration

The camera enclosure shall not incur any physical damage after a shock, return to normal operation immediately and operate within the specified vibration (see Note 1 below table).

PARAMETER	SPECIFICATION
Shock	Up to 5 G while in non-operation mode
Vibration	5-60 Hz with 2.1 mm total excursion, and 5 G rms vibration from 60 to 1000 Hz.

Note 1: Where the manufacturer's cut sheet or specification data does not contain shock and vibration data a listing of at least 2 project sites with identical equipment, with similar installation conditions and similar traffic patterns showing continuous functional performance of at least 2 years may be substituted.

Installation

The Contractor shall apply an approved weather-resistant spray to the inside of the connectors before engaging the connectors.

PAN AND TILT UNIT

The pan and tilt unit will consist of the pan and tilt unit itself along with any electrical or communication interfaces required to perform the functions specified. The pan and tilt unit shall be designed to operate under a full range of environmental conditions.

Performance

PARAMETER	SPECIFICATION
Braking: Pan And Tilt	Mechanical or Electrical to limit coast
Overload Protection	Motors: Impedance protected
Angular Travel	Pan: 0 to 355° Horizontal, Continuous Tilt: +30° Up to -80° Down
Pan Speed	0.1°/s to 40°/s variable-speed
Tilt Speed	0.1°/s to 20°/s variable-speed
Pan And Tilt Position Preset	Positions camera to a predetermined azimuth, elevation and lens position (Minimum of 64 Presets)

Physical Specifications

PARAMETER	SPECIFICATION
Pan & Tilt Worms	Ground and polished Stainless Steel
Pan & Tilt Worm Gears	Non-metallic material
Mounting (Base)	178 mm ± 0.32 mm diameter bolt circle Check Plans
Camera Mount	Compatible with camera housing
Bearings on Rotating Surfaces	Heavy duty roller type
Overload Protection	Provided - internal
OPERATING TEMPERATURE	-23.3°C to 60° C
CONSTRUCTION	Corrosion resistant steel or aluminum
FINISH	Weather resistant paint or polyurethane
SEALS	"O" ring or gaskets for all weather protection of pan and tilt unit and cables.

The pan and tilt unit with camera assembly mounted shall withstand a wind load of 129 km/h.

The cable connector shall be fully weather protected.

Access into pan/tilt for routine maintenance or adjustments shall not require removal of the pan and tilt from the installation site, nor removal of the camera enclosure from the pan/tilt unit. Access cover shall be readily removable regardless of the tilt position.

External body components shall be manufactured from aluminum that have been anodized, painted or coated to prevent oxidation and corrosion.

Pan And Tilt Stops

The pan and tilt unit shall have pan and tilt stops. The settings of these pan and tilt stops shall be determined by the Engineer.

Installation

The Engineer will notify the Contractor of the pan and tilt presets and stops for the pan and tilt unit for the Contractor to set prior to camera assembly installation check. Installation check shall be done by the Contractor in the presence of the Engineer. The test of the operation (zoom, iris, etc.) of the pan and tilt unit may be performed at the CCTV Cabinet adjacent to the camera or by remote keyboard location at the Contractor's option. The Contractor shall furnish a color video monitor, for testing only, to view the actual camera image. Upon completion of the installation, the Engineer will verify operation of the pan and tilt unit. Any additional adjustments necessary to restore the presets and stops to acceptable parameters shall be at the Contractor's expense.

The Contractor shall provide five copies of the operation and maintenance manuals for the pan and tilt unit.

OVERALL REQUIREMENTS

The complete unit, including the pan/tilt unit shall not exceed 199 mm wide x 442 mm high x 381 mm deep. Any external cables shall not interfere with or limit the continuous pan and tilt operation. The camera control protocol used by the

camera assembly shall be either an open public domain protocol, Pelco D, or other protocol convertible to Pelco D via translator. All functions described shall be available using the described protocol. If a protocol other than Pelco D is proposed, the Contractor shall provide a version of Baxall's camera control software "PC Control" or latest equivalent version that includes the new protocol as a choice for the new camera locations. The version of camera control software shall not interfere with the operation of any other camera locations that use Pelco D. All camera control functions shall be through the RS-422 communications interface.

OPERATOR FUNCTIONS
Pan Right
Pan Left
Tilt Up
Tilt Down
Zoom In
Zoom Out
Focus Near
Focus Far
Iris Open
Iris Close
Iris Manual
Iris Auto
Pan Stop
Tilt Stop
Zoom Stop
Focus Stop
Iris Stop
ADMINISTRATIVE FUNCTIONS
Status Query
Set Char. Display
Activate Char. Display
Blank Char. Display
Set Preset Position
Go to Preset Position
Set Relay
Reset Relay
Turn on Camera
Turn off Camera
Wiper on
Wiper off
Heater Control

Camera Control and Configuration

The existing system keyboard is a BAXALL Keyboard Part Number ZKX3-J. A copy of the keyboard manual is available for review upon request.

Pan and Tilt Position Presets shall be programmable via the system keyboard.

The following operator basic functions shall be controlled via the system keyboard:

Pan Left, Pan Right and Pan Stop controlled by Joystick.
Tilt Up, Tilt Down and Tilt Stop controlled by Joystick.
Zoom In, Zoom Out and Zoom Stop controlled by Zoom In and Zoom Out button.
Focus Near, Focus Far and Focus Stop controlled by Near Focus and Far Focus button.
Iris Open, Iris Close and Iris Stop controlled by Open Iris and Close Iris button.
Camera selections made by numeric keypad on system keyboard.
Monitor selections made by numeric keypad on system keyboard.

The Stop actions for all Pan, Tilt, Zoom, Focus and Iris features will be issued once the Joystick, Zoom, Focus and Iris buttons are released.

The camera administrative functions shall be accessible via system keyboard or by software installed on a personal computer. If the software method is used, the camera manufacturers menu system may be used.

SYSTEM TESTING AND DOCUMENTATION

The Contractor shall be responsible for all testing and documentation required for approval and acceptance of the production, installation, and operation of these materials and equipment. The following identifies the specific quality control requirements for testing and documentation.

The Contractor shall test all cables after installation with connectors attached for continuity and shorts or grounds.

The Contractor shall adjust and set limit stops to the pan/tilt unit at each camera site to prevent the view of the areas outside of the roadway system. The final settings shall be approved by the Engineer.

The Contractor shall perform a local functional test at each of the CCTV locations. At the Contractor's option the test may be performed directly at the CCTV cabinet or remotely via keyboard or keyboard and personal computer. The Contractor shall demonstrate to the Engineer all the CCTV features. The Contractor shall provide all the test equipment.

The Contractor shall arrange to have a technician, qualified to work on the closed circuit television assembly and employed by the closed circuit television assembly manufacturer or the manufacturer's representative, present at the time the equipment is turned on.

The Contractor shall provide four sets of documentation containing complete specifications and operation details of each of the components of the CCTV camera assembly. The documentation shall also include wiring diagrams showing wire colors, functions, and pin assignments for connecting these components to each other and to the encoder.

PRE-ACCEPTANCE TESTING

Each closed circuit television system shall be subjected to tests as outlined herein. All testing will be performed by Department personnel, arranged by the Engineer, and in the presence of the Contractor. The Contractor shall notify the Engineer in writing fifteen days prior to the scheduled testing. The Contractor shall provide all necessary equipment required to access the CCTV equipment for testing.

CERTIFICATE OF COMPLIANCE

The Contractor shall provide the Engineer a Certificate of Compliance from the manufacturer, in conformance with the provisions of Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall certify that the closed circuit television camera assembly complies with the requirements of these specifications. The certificate shall also include a copy of all applicable test reports on the closed circuit television camera assembly.

10-3.44 SIGN LIGHTING FIXTURES-INDUCTION

Induction sign lighting fixtures shall conform to the provisions for mercury sign lighting fixtures in Section 86-6.05, "Sign Lighting Fixtures-Mercury," of the Standard Specifications and these special provisions.

Each fixture shall consist of a housing with door, a reflector, refractor or a lens, a lamp, a power coupler, a high frequency generator and a fuse block.

Fixtures shall have a minimum average rating of 60 000 hours. Fixtures shall be for a wattage of 87 W, 120/240 V (ac). The power factor of the fixtures shall be greater than 90 percent and the total harmonic distortion shall be less than 10 percent. Fixtures shall be Underwriter’s Laboratories (UL) approved for wet locations and be Federal Communications Commission (FCC) Class A listed.

The mass of the fixture shall not exceed 20 kg. The manufacturer's brand name, trademark, model number, serial number and date of manufacture shall be located on the packaged assembly and permanently marked on the outside and inside of the housing.

MATERIALS

Mounting Assembly

The mounting assembly may be either cast aluminum, hot-dip galvanized steel plate or steel plate that has been galvanized and finished with a polymeric coating system or the same finish that is used for the housing.

Housing

Housings shall have a door designed to hold a refractor or lens. Housing doors shall be designed to be opened without the use of special tools. Housings and doors shall have a powder coat or polyester paint finish of a gray color resembling unfinished fabricated aluminum.

The maximum height of the fixture shall not be greater than 325 mm above the top of the mounting channels.

Reflector

Reflectors may be designed to be removed as a unit that includes the lamp and power coupler.

Refractor

Refractors or lenses shall have smooth exteriors. Lenses shall be flat or convex. Convex lenses shall be made from heat resistant, high-impact resistant, tempered glass.

Convex lenses shall be designed or shielded so that no fixture luminance is visible when the fixture is approached directly from the rear and the viewing level is the bottom of the fixture. When a shield is used it shall be an integral part of the door casting.

Lamp

Each fixture shall be furnished with a 85-W induction lamp. Interior lamp walls shall be fluorescent phosphor coated. Lamp light output shall be at least 70 percent at 60 000 hours. Lamps shall have a minimum color-rendering index of 80. Lamps shall be rated at a color temperature of 4 000K. Lamps shall be removable without the use of tools.

Power Coupler

Power couplers shall consist of a construction base with antenna, heat sink and electrical connection cable.

The power coupler shall be designed so that it can be removed with common hand tools.

High Frequency Generator

High frequency generators shall start and operate lamps at an ambient temperature of -25°C or greater for the rated life of the lamp.

Generator output frequency shall be 2.65 MHz +/- 10 percent. The generator radio frequency interference shall meet the requirements of the Federal Communications Commission Title 47, Part 18, regulations concerning harmful interference.

High frequency generators shall operate continuously at ambient air temperatures from -25°C to 25°C without reduction in generator life. High frequency generators shall have a design life of at least 100 000 hours at 55°C.

High frequency generators shall be capable of being replaced with common hand tools. Conductor terminals shall be identified as to the component terminal to which they connect.

High frequency generators shall be mounted to use the fixture upon which they are mounted as a heat sink.

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications, and a copy of the high frequency generator test methods and results shall be submitted by the manufacturer with each lot of fixtures. The certificate shall state that the high frequency generators meet the requirements of this section and the generator specifications of the lamp manufacturer.

10-3.45 PHOTOELECTRIC CONTROLS

Contactors shall be the mechanical armature type.

10-3.46 PAYMENT

The contract lump sum price or prices paid for signal and lighting shall include highway lighting at intersections in connection with signals only.

Other roadway lighting on the project shall be considered as included in the contract lump sum price paid for lighting and sign illumination.

The contract lump sum price or prices paid for ramp metering shall include highway lighting at ramps in connection with ramp metering only.

If any of the fabrication sites for the materials listed are located more than 480 air line kilometers from both Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. Whereas it is and will be impractical and difficult to determine the actual increase in these expenses, it is agreed that payment to the Contractor for furnishing these listed materials from each fabrication site located more than 480 air line kilometers from both Sacramento and Los Angeles will be reduced $1500:

1. Service equipment enclosures
2. Telephone demarcation cabinets
3. Closed circuit television cabinets furnished by the Contractor

Full compensation for furnishing all labor, materials (excluding the State-furnished BBS), tools, equipment, and incidentals and for doing all the work involved in installing the battery backup 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 shall be

considered as included in the lump sum price paid for the item of work involved and no separate compensation will be made therefor.

The contract lump sum price paid for fiber optic communication system shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing the fiber optic communication 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 video image vehicle detection system, including training, shall be considered as included in the contract lump sum price paid for the signal and lighting item involved and no separate payment will be made therefor.

SECTION 10-4. RELOCATION OF UTILITY FACILITIES

10-4.01 GENERAL DESCRIPTION

Relocating the utility facilities shall consist of modifying the existing utility facilities and constructing or installing new facilities in accordance with the provisions of the following publications: "Greenbook" Standard Specifications for Public Works Construction, 2006 edition, herein known as the "Utility Standard Specifications", 2006 Regional Supplement to "Greenbook" Standard Specifications for Public Works Construction, 2006 edition, the Standard Specifications; Sections 1 through 9, Section 15, "Existing Highway Facilities", and Section 70, "Miscellaneous Facilities"; as shown on the plans, these Special Provisions and as directed by the Engineer.

Except for Sections 15 and 70, Sections 10 through 95 of the Standard Specifications shall not apply to the work in this Section 10-4 except when specific reference is made thereto.

If parking is to be restricted during construction, the Contractor shall post "Tow-Away/No Parking" signs 24 hours in advance after receiving approval from the Engineer. The sign shall contain "days/hours" information and be posted so as to be reasonably seen by the public.

The Contractor shall notify the Engineer 3 working days in advance of any lane, street or alley closures or implementing any construction detour.

The Contractor shall keep the streets in and adjacent to the construction area clean at all times. Streets shall be swept before washing.

EXCAVATION

Excavation shall conform to the provisions in Section 19.3, "Structure Excavation and Backfill," of the State Standard Specifications and to the lines and grades shown on the plans and as directed by the Engineer.

TRENCH EXCAVATION

Whenever work involves trench excavation, the Contractor shall provide all necessary shoring, bracing, sloping, or other provisions to be made for worker protection from hazard of caving ground during the excavation. If such plan varies from the shoring system standards established by the Construction Safety Orders of the Division of Industrial Safety, a Civil Engineer or Structural Engineer registered in the State of California shall prepare the plans.

The Contractor shall comply with the Safety Orders of California, Code of Regulations: Title 8, Section 1539 (Excavation, Trenches, Earthwork).

Trench excavation shall conform to the provisions in Sections 5-1.02A, "Trench Excavation Safety Plans," and Section 19-1.02 "Preservation of Property," of the State Standard Specifications, the contract plans, and these Special Provisions.

The narrowest practicable trench width at top of pipe which will allow proper densification of pipe zone bedding and backfill materials shall be maintained regardless of the type of soil or the method of densification. The width of trench at bottom of pipe shall be determined by the space required for proper and effective use of tamping equipment, but not less than pipe OD plus 600 millimeters.

TRENCH EXCAVATION AND PLACEMENT OF BEDDING

Excavate the trench to the lines and grades shown on the plans with allowance for 150 mm of pipe bedding material. The trench section shall be as shown on the plans.

The maximum length of open trench shall be 152 m except by permission of the Engineer. The distance is the collective length at any location, including open excavation and pipe laying, which has not been backfilled to the elevation of the surrounding grade.

Trench walls shall be sloped or shored per the requirements of CAL-OSHA.

The trench bottom shall be graded to provide a smooth, firm, and stable foundation that is free from rocks and other obstructions.

Place the specified thickness of bedding material over the full width of the trench. Grade the top of the pipe base ahead of the pipe laying to provide a firm, uniform support along the full length of pipe.

Excavate bell holes at each joint to permit proper assembly and inspection of the entire joint.

Trenches for main pipelines and all appurtenances shall be backfilled with the materials and methods as specified for the Pipe Zone, Trench Zone and Pavement Zone.

Trench widths shall be in accordance with the plans.

Trench depth shall be as required to install pipelines in accordance with the plans and these Specifications. Unless shown otherwise in the plans, the minimum cover for pipelines shall be as follows:

Pipeline Application	Minimum Cover Required
Potable Water	0.91 m
Recycled Water	1.22 m
Sewer	1.52 m

Safe and suitable ladders, which project 600 millimeters above the top of the trench, shall be provided for all trenches over 1.2 meter in depth. One ladder shall be provided for each 15 meters of open trench or fraction thereof, and be so located that workers in the trench need not move more than 7.6 meters to a ladder.

The Contractor's design and installation of shoring shall be consistent with the rules, orders, and regulations of CAL-OSHA.

Excavations shall be shored, sheeted, and supported such that the walls of the excavation will not slide or settle and all existing improvements of any kind, either on public or private property, will be fully protected from damage.

The sheeting and shoring shall be arranged so as not to place any stress on portions of the completed work until the general construction has proceeded far enough to provide ample strength.

Care shall be exercised in the moving or removal of trench shields, sheeting, and shoring to prevent the caving or collapse of the excavation faces being supported.

Protection of workers within trenches shall be as required by the California Labor Code and in accordance with these Special Provisions.

All excavations shall be performed in a safe manner and shall be protected and supported in accordance with CAL-OSHA regulations.

Barriers and traffic delineators shall be placed in accordance with the requirements of the agency having jurisdiction.

Shoring is considered to be adequate sheeting, shoring, bracing, or equivalent method for:

A. Protection of life and limb, which shall conform to applicable safety orders.
B. Protection of existing underground and aboveground private and public improvements;
C. The remedy of any and all conditions encountered, regardless of depth, (including, but not limited to trench sloughing, pavement separation, etc,) during the construction of the project.

Should a bracing system utilize steel H-beams or piles or other similar vertical supports, driving of said vertical supports will not be permitted except for the last 1.2 meter above the bottom of pile, except where this procedure is impracticable. The vertical support may then be driven to the required depth, not to exceed 1.2 meter. During the drilling and driving operations the Contractor shall take care to avoid damage to utilities.

At locations where the drilling of such holes is impracticable because of the existence of rocks, running sand, or other similar conditions, and provided said impracticability is demonstrated to the satisfaction of the Engineer by actual drilling operations by the Contractor, the Engineer may, upon request of the Contractor, approve the use of means other than drilling for the purpose of placing the vertical support. Such other means, however, must be of a nature, which will accomplish, as nearly as possible, the purpose of the drilling, namely, the prevention of damage to existing surface or subsurface improvements, both public and private.

FOUNDATION STABILIZATION

When unsuitable soil materials are encountered, the unsuitable material shall be removed to the depth determined necessary in the field by the Engineer, and as acceptable to the Engineer. The sub-grade shall be restored with compacted Imported Granular Material or crushed rock as recommended by the Engineer. Place the appropriate bedding or base material on this restored foundation.

When rock encroachment is encountered, the rock shall be removed to a point below the intended trench or excavation sub-grade as determined necessary in the field by the Engineer, and as acceptable to the Engineer. The sub-grade shall be restored with compacted Imported Granular Material as recommended by the Engineer. Place the appropriate bedding or base material on this restored foundation.

When excessively wet, soft, spongy, or similarly unstable material is encountered at the surface upon which the bedding or base material is to be placed, the unsuitable material shall be removed to the depth determined necessary in the field by the Engineer, and as acceptable to the Engineer. Restore the trench with crushed rock enclosed in filter fabric as directed by the

Engineer. Larger size rocks, up to 75 mm, with appropriate gradation, may be used if recommended by the Engineer. Place the appropriate bedding or base material on this restored foundation.

DEWATERING

The Caltrans inspector shall be present for all dewatering.

The Contractor shall abide by all applicable local, state and federal regulations, and by the conditions of the Regional Water Quality Control Board. The Contractor shall provide effective measures where necessary to prevent operations from producing dust in an amount damaging to property or causing a nuisance as determined by the Engineer. The Contractor shall be responsible for any damage due to dust originating from its operations.

The Contractor shall anticipate and correct any erosion problem arising from its operations. The Contractor shall abide by the conditions of the Regional Water Quality Control Board, General Construction Activity Storm Water Permit and the project Storm Water Pollution Prevention Plan (SWPPP).

WATER IN TRENCH

The Contractor shall provide and maintain at all times during construction ample means and devices to promptly remove and dispose of all water from any source entering excavations or other parts of the work. Dewatering shall be performed by methods that will ensure a dry excavation and preservation of the final lines and grades of the bottoms of excavations. Dewatering methods may include well points, sump points, suitable rock or gravel placed as pipe bedding for drainage and pumping, temporary pipelines, or other means, all subject to the approval of the Engineer. The cost of all dewatering activities shall be borne by the Contractor.

In no case shall the sewers be used as drains for water without the approval of the Engineer. Sewer systems shall not be used as drains for dewatering trenches or excavations, nor for disposal of collected or accumulated groundwater, without the approval of the agency of jurisdiction.

Concrete shall not be poured in water, nor shall water be allowed to rise around concrete or mortar until it has set at least four hours.

The Contractor is responsible for meeting all Federal, State, and local laws, rules and regulations regarding the treatment and disposal of water from dewatering operations at the construction site.

The Contractor shall keep the excavation free from water during construction. Where groundwater is encountered, the static water level shall be drawn down a minimum of 300 millimeters below the bottom of the excavation to maintain the undisturbed state of the native soils to prevent softening of the bottom of the excavation, and to allow the placement of any fill to the specified density. Disposal of the water shall not damage property or create a public nuisance. The Contractor shall have on hand pumping equipment and machinery in good working condition for emergencies. Dewatering systems shall operate continuously until the backfill has been completed to 300 millimeters above the normal static groundwater level. Water may be discharged into an existing storm drain, channel, or street gutter only with the approval of the Engineer.

Dewatering systems shall not remove natural soils.

Release of the ground water to its static level shall be controlled to prevent the disturbance of the natural foundation soils or compacted fill and to prevent flotation or movement of structures or pipes.

Crushed rock shall be used for drainage when required by the Engineer. When crushed rock is used, filter fabric shall be installed between the rock and backfill material. Crushed rock shall be the 25 millimeters crushed rock gradation as specified in Section 200-1.2, "Crushed Rock and Rock Dust," of the Utility Standard Specifications.

When crushed rock for drainage is so ordered by the Engineer, crushed rock will be paid for as extra work as provided in Section 4-1.03D of the State Standard Specifications.

Full compensation for dewatering, shall be considered as included in the contract prices paid for the various items of work, and no additional compensation shall be allowed therefore.

EXCESS TRENCH EXCAVATION

Wherever the Contractor over-excavates the bottom of a trench, the bottom of the trench for water mains shall be backfilled with "Bedding For Water Pipes" listed elsewhere in these Special Provisions.

Overexcavations shall be corrected by backfilling with approved imported granular material or crushed rock, compacted to 90 percent relative compaction, as directed by the Engineer.

The Contractor shall remove and legally dispose of all excess excavated material and demolition debris.

It is the intent of these specifications that all surplus material shall be legally disposed of by the Contractor. Before acceptance of the work by the Engineer, the Contractor shall provide the Engineer with written releases signed by all property owners with whom the Contractor has entered into agreements for disposing of excess excavated material, absolving the Engineer from any liability connected therewith.

Over excavation and associated bedding not ordered by the Engineer shall be at the Contractor's expense.

ADDITIONAL BEDDING

When so ordered by the Engineer, additional bedding required below sub grade to replace soft or unstable material will be paid for as extra work as provided in Section 4-1.03D of the State Standard Specifications.

Material for additional bedding shall be the 25 millimeters crushed rock gradation as specified in Section 200-1.2, "Crushed Rock and Rock Dust," of the Utility Standard Specifications.

IMPORTED BACKFILL

The densification method for imported backfill material shall be the same as the method for non-imported backfill.

A minimum relative compaction of 90 percent shall be achieved.

Separate payment for imported backfill will be made only when the excavation is done in heavy clay, highly expansive or other deleterious material, and imported backfill is ordered by the Engineer. The Engineer will be responsible for decisions whether or not the excavated material is suitable for backfill and when separate payment is made for imported backfill.

TRENCH RESURFACING

Trench resurfacing where required shall consist of asphalt concrete or Portland cement concrete as per Section 39, "Asphalt Concrete" or Section 90, "Portland Cement Concrete," of the State Standard Specifications and these Special Provisions, as shown on the plans, and as directed by the Engineer.

Whenever excavation is made through pavement, sidewalk, driveway or drainage ditch, temporary bituminous resurfacing 50 millimeter thick shall be placed and maintained according to Section 306-1.5.1, "Temporary Resurfacing," of the Utility Standard Specifications unless permanent pavement is placed within 24 hours after backfill of trench.

COORDINATION

The Contractor shall notify the Engineer at least 10 working days in advance of his intent to begin work on the steel water pipe.

The Contractor shall provide for a safe 1.2 m wide pedestrian walkway to all places of business, and for all residences during construction.

The Contractor shall not allow sewage to be discharged onto the ground or into any stream, creek or storm drain.

The Contractor shall distribute printed notices of proposed utility work to all occupants along streets where construction work is to be performed at least one week before starting such work.

The Contractor shall notify the owner or occupant (if not owner occupied) of the closure of the driveways to be closed more than one 8-hour day at least 3 working days prior to the closure. The Contractor shall minimize the inconvenience and minimize the time period that the driveways will be closed. The Contractor shall fully explain to the owner/occupant how long the work will take and when closure is to start.

The Contractor shall perform his work in such a manner that existing private and/or public utilities will not be disturbed for a period of time in excess of 4 hours. Utility service shall not be interrupted prior to 8:00 a.m. or after 4:00 p.m. unless otherwise approved in writing by the Engineer.

The Contractor shall cooperate with the utility owner's personnel in order to facilitate their inspection work and shall allow them access to the site of the work.

Approvals and instructions from the utility owner's personnel will be transmitted to the Contractor through the Engineer.

STORAGE OF MATERIALS

All materials for use in the work shall be stored by the Contractor in such manner as to prevent damage from exposure to the elements, admixture of foreign materials, or from any other cause. The Contractor shall be entirely responsible for damage or loss by weather or other causes. The Material Safety Data Sheets (MSDS) for all products to be used in the work shall be kept on-site by the Contractor, and the material manufacturer's recommendations for proper storage of its products shall be strictly followed.

Materials shall not be stored without the written permission of the Engineer. The Contractor shall be responsible to provide its own storage area or property. Materials for use on the work shall be stored on private property only as allowed by law and with the written permission of the property owner, and a copy of such permission shall be provided to the Engineer. In addition, a release letter signed by said property owner and stating that materials are no longer stored on the property and that Contractor has restored the area to original condition is required prior to the filing of the Notice of Completion.

EXISTING UTILITIES

The Contractor's attention is directed to the possible existence of pipe and other underground improvements that may or may not be shown on the plans. Once discovered, the Contractor shall preserve and protect all such improvements whether shown on the plans or not. The Contractor shall provide and install suitable safeguards, and shall be responsible for the care

and protection of all existing sewer and water pipe, telephone conduit, gas mains, culverts, or other above-ground or below-ground facilities or structures which may be encountered in or near the area of work. It shall be the responsibility of the Contractor to notify each agency of jurisdiction and utility company and to make arrangements for location of facilities prior to beginning construction. In the event of damage to existing facilities during the progress of the work, such facilities shall be replaced or restored to original condition, as determined by the Engineer, at the Contractor's expense.

Where a possible at-grade conflict with existing underground utilities appears on the plans, unless prior pothole information is shown, the Contractor shall determine its location a minimum of 150 meters ahead of the work prior to trenching. Grade and alignment changes shall be made only if approved by the Engineer.

The horizontal and vertical locations shown for the existing underground utilities are approximate. It will be the responsibility of the Contractor to locate all utility lines in the construction area prior to excavation. Any damage to existing utility, structure, or service, whether or not indicated on the plans shall be repaired at the Contractor's expense in a manner approved by the Engineer.

Attention is directed to "Obstructions" elsewhere in these Special Provisions.

All existing services must remain in service during construction. The Contractor to provide and install all high -lines as needed to provide constant service.

The Contractor shall be responsible for determining in advance the location, elevation, alignment and pipe type and size of all existing pipelines to which connections are to be made. Potholing to determine location will be allowed only after providing the Engineer with three (3) day's advance notice. The Contractor is required to contact Underground Service Alert (USA) at 1-800-227-2600 or 1-800-422-4133 for mark-out of all utilities in the area of the work.

Any pot holing required will be paid for as extra work as provided in Section 4-1.03D of the State Standard Specifications.

Where a water distribution main is shown on the plans, it shall be assumed that every property adjacent to such water distribution main is served by that water main.

Where existing underground utilities are undercut, particular care shall be exercised in selecting, placing, and compacting the backfill material under and around such utility to assure firm support. For at least 300 millimeters all around the undercut utility, the backfill material shall have a sand equivalent of 50 and a relative compaction of 95 percent.

Where, in the opinion of the Engineer, the native soil is unsuitable for supporting the undercut utility; the material shall be removed. The resulting depression shall be backfilled with suitable backfill material. Such excavation and backfill below the planned elevation of the bottom of the trench will be paid for as extra work as provided in Section 4-1.03D of the State Standard Specifications.

Where a 25 mm or smaller water service is damaged during trenching operation, a minimum of 1.2 meter section of such service shall be removed and replaced with two 45 degrees elbows and new copper tubing bent to a 300 millimeters minimum radius.

The Contractor's attention is directed to Section 7-1.11, "Preservation of Property," of the State Standard Specifications. The Contractor shall be careful to avoid damage to water services, sewer laterals, water and sewer mains during trenching operations. In the event damage is done requiring new service connections and water main repairs, the Contractor shall pay for work required to be done by the utility owner if requested by the Contractor and approved by the Engineer, the Contractor may perform said repairs. The Contractor shall make every effort to provide continuous service to the utility customers.

The Contractor shall alter, relocate or reconstruct portions of existing utility service connections, such as water, which may or may not have been shown on the plans, or not accurately shown on the plans, but which are found to interfere with the work. Such work will be paid for at the unit prices for the various contract items of work involved, except for the following:

A. The service connection is not shown on the plans or marked in the field.
B. The service connection will conflict with the plan elevation of the new main.

Upon discovery of service connections not shown on the plans or marked in the field that conflict with the plan elevation of the new main, the Contractor shall immediately notify the Engineer. When so ordered by the Engineer, protection or relocation of the items listed above will be paid for as extra work as provided in Section 4-1.03D of the State Standard Specifications.

If the Contractor, either before commencing work or during the course of the work, finds any discrepancy between the specifications or plans and the physical conditions at the site of the work, Contractor shall promptly notify the Engineer in writing of such discrepancy.

WATER FOR CONSTRUCTION PURPOSES

The Contractor shall furnish all water required for construction, including water for flushing. The water and meter shall be paid for by the Contractor in accordance with the water district's, city's, or county's rates and rules.

Only the 62 mm port shall be used for water available from fire hydrants along the job site. The 100 mm port shall be free for use in the event of a fire.

No compensation shall be paid the Contractor for water for the initial filling or refilling, for testing or re-testing, and for re-flushing the pipeline.

The size and location of temporary meters shall be determined by the Contractor and approved by the Engineer.

BURIED WATER LINE WARNING AND IDENTIFICATION TAPE

Warning/identification tape shall be used to identify location of underground utilities and to act as a warning against accidental dig-ins of buried utilities. Warning/identification tape shall be used on all underground water and recycled water mains, potable and recycled water irrigation systems, sewer mains, and all related appurtenances. Warning/identification tape shall also be used on cathodic protection wiring systems and tracer wire brought into and out of access ports.

Warning/identification tape shall be as indicated below and in accordance with the Approved Materials List.

Tape shall be an inert plastic film (non-metallic) formulated for prolonged underground use that will not degrade when exposed to alkalies, acids and other destructive substances commonly found in soil.

Tape shall be puncture-resistant and shall have an elongation of two times its original length before parting.

Tape shall be colored to identify the type of utility intended for identification. Printed message and tape color shall be as follows:

Printed Message	Tape Color
Caution: Waterline Buried Below	Blue
Caution: Recycled Waterline Buried Below	Purple
Caution: Sewerline Buried Below	Green
Caution: Cathodic Protection Cable Buried Below	Red
Caution: Electric Line Buried Below	Red

Ink used to print messages shall be permanently fixed to tape and shall be black in color with message printed continuously throughout.

Tape shall be minimum 0.102 mm thick x 150 mm wide with a printed message on one side. Tape used with the installation of onsite potable and recycled water irrigation systems shall be a minimum of 75 mm wide.

Warning/Identification Tape shall be installed as described below in accordance with these Special Provisions.

Tape shall be placed at the top of the pipe zone 300 mm above and centered over the utility intended for identification. Tape used with onsite potable and recycled water irrigation systems shall be installed at 150 mm above the pipe.

Tape shall be installed with the printed side up and run continuously along the entire length of the utility intended for identification. Tape shall be installed on the main piping and all appurtenant laterals, including blowoffs, air valve assemblies, fire hydrants, and services. Tape splices shall overlap a minimum of 600 mm for continuous coverage.

Tape shall be installed prior to placement of the Trench Zone Backfill.

BURIED WATER LINE IDENTIFICATION TRACER WIRE

Tracer wire shall be used on all buried water and recycled water mains for the purpose of providing a continuous signal path used to determine pipe alignment after installation. Tracer wire is not required in installation of sewer mains.

Tracer wire shall be as indicated below and shall be selected from the Approved Materials List.

Tracer wire shall be Number 14 AWG solid copper UF type wire with cross-linked polyethylene insulation. The insulation shall be white or yellow in color.

Wire splices (at pipe tees, crosses and laterals) shall be accomplished using a direct bury silicone-filled capsule tube with standard wire nut or silicone-filled wire nut connectors of the appropriate size selected from the Approved Materials List.

Tracer wire shall be installed as described below in accordance with these Special Provisions.

Tracer wire shall be installed with all water and recycled water mains.

Wire shall be placed on the top centerline of the pipeline and shall run continuously along the entire length of pipe prior to placement of trench backfill. Wire shall be mechanically and electrically continuous throughout the pipeline, including within pipe casings.

Tracer wire shall be secured to the pipe at 1.8 m intervals with plastic adhesive tape, duct tape or plastic tie straps. The wire may alternately be secured to the pipe by looping the tracer wire around itself such that tracer wire remains continuous atop the pipe during backfill operations.

Tracer wire access ports shall be installed in accordance with the plans within the concrete splash pad of all fire hydrants installed as a part of the work. Tracer may terminate within meter boxes, blow off boxes, CP test boxes or air valve enclosures only as directed by the Engineer at intervals of not more than 305 m. Locations of all tracer wire access ports installed shall be noted on the As-Built drawings.

Wire shall extend into the access port and terminate with a coiled 600 mm length of wire. All tracer wire not located atop pipe shall be installed within a conduit at a minimum depth of 600 mm in accordance with the plans.

Splices shall be installed only when necessary and shall be made using a wire connector selected from the Approved Materials List.

The Contractor shall test tracer wire for electrical continuity in the presence of the Engineer prior to the installation of any paving over atop pipelines or appurtenances. Testing shall be accomplished using a Progressive Electronics 77M tone generator, or similar device, and a testing telephone handset.

POLYETHYLENE ENCASEMENT

Polyethylene encasement shall be used for all ferrous metal materials not otherwise protectively coated.

Polyethylene wrap shall be used for the protection of buried ductile-iron fittings and valves.

Polyethylene sleeves shall be used for the protection of buried ductile iron pipe.

Polyethylene encasement shall be as indicated below and shall be selected from the Approved Materials List. Polyethylene materials shall be kept out of direct sunlight exposure.

Polyethylene sleeves shall be a minimum 0.305 mm thick polyethylene plastic in accordance with AWWA C105.

Polyethylene wrap shall be a minimum 0.203 mm thick polyethylene plastic in accordance with AWWA C105.

Polyethylene wrap and sleeves shall be clear for use with potable water and purple for use with recycled water.

Polyethylene or vinyl adhesive tape a minimum of 50 mm wide or plastic tie straps shall be used to secure polyethylene encasement.

Polyethylene encasement shall completely encase and cover all metal surfaces.

Pipe: All ductile-iron pipe shall be encased with polyethylene sleeves in accordance with Method A described in AWWA C105, or with polyethylene wrap in accordance with Method C described in AWWA C105.

Fittings: Fittings such as tees, bends and reducers shall be encased with polyethylene wrap in accordance with AWWA C105.

Valves: Valves shall have only the stem and operating nut exposed and the wrap shall be attached so that valve operation will not disturb the wrapping or break the seal.

Polyethylene sleeves shall be secured with polyethylene or vinyl adhesive tape or plastic tie straps at the ends and quarter points along the sleeve in a manner that will hold the sleeve securely in place during backfill. Polyethylene wrap shall be secured with polyethylene or vinyl adhesive tape in a manner that will hold the wrap securely in place during backfill. The polyethylene wrap shall extend at least 300 mm into adjacent polyethylene wrap before taping. Any damage that occurs during installation shall be repaired with polyethylene or vinyl adhesive tape prior to backfilling.

CURB IDENTIFICATION

The Contractor shall mark the location of all potable water, recycled water and sewer laterals at the curb crossing by stamping the face of the curb in 50 mm high letters as described below:

A. Potable water laterals shall be stamped with a letter "W".
B. Recycled water laterals shall be stamped with a letter "RW".
C. Sewer laterals shall be stamped with a letter "S".

CONCRETE FOR ANCHOR, VALVE, AND THRUST BLOCKS

Concrete thrust and anchor blocks shall be used, at all unrestrained fittings or as required for hydrostatic testing, and shall conform to Section 90-10, "Minor Concrete," of the State Standard Specifications.

Concrete thrust and anchor blocks shall be poured against wetted, undisturbed soil in accordance with the plans and as directed by the Engineer. The concrete shall be placed so that fittings and valves will be accessible for repairs or replacement. Prior to filling the pipeline with water, the concrete for thrust and anchor blocks shall cure for the following number of days:

A. Thrust Blocks 3 days minimum (unless approved by Engineer)
B. Anchor Blocks 7 days minimum

Pipe Thrust

The following table lists the resulting thrust, in pounds, from the noted fitting for each pipe size. The thrust amount shown is for each 70,307 Kg/m2 of test pressure. (For instance, if the test pressure is required to be 90,000 Kg/m2, multiply the value in the table by (90,000/70,307).

Pipe Size	Tees and Dead Ends	90 Degree Bend	45 Degree Bend	22-1/2 Degree Bend	11-1/4 Degree Bend
100 mm	839 Kg	1,184 Kg	644 Kg	327 Kg	177 Kg
150 mm	1,724 Kg	2,436 Kg	1,320 Kg	667 Kg	363 Kg
200 mm	2,985 Kg	4,218 Kg	2,286 Kg	1,157 Kg	626 Kg
250 mm	4,876 Kg	6,895 Kg	3,738 Kg	1,891 Kg	1,025 Kg
300 mm	6,945 Kg	9,816 Kg	5,316 Kg	2,694 Kg	1,461 Kg
400 mm	12,193 Kg	17,241 Kg	9,340 Kg	4,731 Kg	2,563 Kg

Safe Soil Bearing Load

Soil	SAFE BEARING LOAD
Muck, peat, etc.***	0 Kg/m
Soft Clay	2,441 Kg/m 2
Fine Sand	4,882 Kg/m 2
Decomposed Granite (D.G.)	7,324 Kg/m 2
Sandy Gravel	9,765 Kg/m 2
Cemented Sandy Gravel	9.765 Kg/m 2
Hard Shale	12,206 Kg/m 2
Granite	48,824 Kg/m 2

***In muck or peat soils, competent resistance shall be achieved by removal and replacement with a ballast of sufficient stability to resist the intended thrusts. Consult the Engineer.

Thrust Block Placement and Sizing

Thrust blocks shall be located at all unrestrained pipe fittings and bear against firm, undisturbed soil. The thrust blocks shall be centered on the fitting so that the bearing area is exactly opposite the resultant direction of the thrust, refer to the plans. Care shall be taken to prevent the placed thrust block concrete from eliminating maintenance access to the valve operators. The shape and location of all thrust block excavations shall be approved by the Engineer prior to pouring concrete. The size, in sq. ft., of the thrust block can be calculated by dividing the thrust by the safe bearing load. For instance, use a 300 mm pipe, 45 Degree bend, at 140,614 Kg/m2 test pressure, with a D.G. trench the value of 5,316 Kg of thrust can be obtained from the upper chart and 7,324 Kg/m2. safe bearing load from the lower chart as follows:

5,316 Kg x (140,614 / 70,307) / 7,324 Kg/m2 = 1.45 m2

Therefore, for this example, the trench wall adjacent to the fitting shall be excavated to the dimensions of 1.22 m x 1.22 m or 1.07 m x 1.52m or some closely approximate multipliers to achieve the minimum required 1.45 m2. bearing area.

Anchor Block Placement and Sizing

A. For all vertical bends in pipelines (downward bends) that do not have restrained joints, the fittings shall be retained in place by means of an anchor block. The block shall be sized to withstand the thrust exerted for the particular deflection angle at the required test pressure plus 10 percent (Do not rely on the restraining benefit from the soil). The Engineer shall verify the size chosen and the reinforcing steel required.
B. The size, m3. of the anchor block can be calculated by dividing the thrust by the unit weight of concrete (i.e. one m3 of concrete weighs approximately 2322 Kg). For instance, use the same mm pipe, 45 Degree bend, at 140,614 Kg/m2 test pressure - the value of 5,316 Kg of thrust can be obtained from the upper chart:

5,316 Kg x 2 / 2322 Kg = 4.58 m3 (plus 10 percent) = 5.04 m3

Therefore, for this example, the anchor block shall be 1.68 m x 1.68 m x 1.83 m or 1.83 m x 1.83 m x 1.52 m, or some closely approximate multipliers to achieve a minimum of 5.04 m3 of concrete.

Valve support blocks shall be installed as described below and in accordance with the plans:

A. Support blocks below valves shall be cut into the side of the trench a minimum of 300 mm.
B. Support blocks shall extend up to the height of adjoining pipe and shall have a minimum depth below the valve of 300 mm.
C. Support blocks shall be installed so that the valves will be accessible for repairs.

Unless otherwise directed, blocking shall be placed so that joints of pipe and fitting will be accessible for repair. Refer to the project plans for the sizes of the various anchor and thrust blocks. Additional concrete required for thrust blocks, due to soil conditions, will be paid for as extra work as provided in Section 4-1.03D of the State Standard Specifications.

HYDROSTATIC TESTING OF MAINS

The Contractor shall notify the Engineer at least 3 working days in advance of performing any pressure test. No pressure test shall be made on Saturdays, Sundays or designated legal holidays as per Section "Maintaining Traffic" elsewhere in these Special Provisions unless approved in writing by the Engineer.

The pipeline shall be hydrostatically tested by the Contractor in the presence of the Engineer, after all pipe and appurtenances have been installed as shown on the staging plans. All permanent thrust blocks and anchors shall be in place and shall have set the required period of time prior to testing. Testing shall not begin until the pipe trench has been backfilled and compacted a minimum of 750 millimeters above the top of pipe and the anchor, thrust, and supporting concrete has attained a compressive strength of 1 400 kPa.

Steel pipelines shall not be tested before the mortar lining and coating on all of the pipe lengths in the line have attained an age of 14 days. Cement mortar lined pipe shall not be filled with water until a minimum of 8 hours has elapsed after the last joint has been mortared.

Potable water shall be used for hydrostatic testing when such testing is performed separately from disinfecting operations. Make up water for testing shall also be potable water.

Temporary blocking during the tests will be permitted only at temporary plugs, caps or where directed by the Engineer.

All valves and appurtenances shall be operated during the test period. The test shall be conducted with the valves in the open position.

All valves, air vacuum assemblies, blow-offs, and services shall be monitored during the test for possible leakage and repairs made if necessary before the test proceeds.

For pipe lines with a porous lining such as cement mortar the pipe shall be filled with water and placed under a 35 kPa pressure for a minimum of 48 hours prior to the actual hydrostatic test.

Before applying the specified test pressure, care shall be taken to release all air within the pipe and appurtenances to be tested. Air shall be released through services, fire hydrants, air release valves, or other approved methods.

The Contractor shall furnish all materials including water, equipment, bracing, connections, labor and expense required for testing of pipeline. The Contractor shall be responsible for the result of any failure under test, which is attributable to defective material and/or workmanship furnished by him or to his negligence or improper conduct of the test.

Hydrostatic testing of pipelines shall be performed prior to or concurrently with the disinfection operations. In the event repairs are necessary, as indicated by the hydrostatic test, the Engineer may require additional disinfection in accordance.

Hydrostatic testing shall be performed prior to connections to existing mains. Authorization for connection to the existing system shall be given only on the basis of acceptable hydrostatic, disinfection and bacteriological test results.

Potable water shall be used for hydrostatic testing of potable and recycled water mains when such testing is performed separately from disinfection operations.

Potable water shall be supplied by a source as approved by the Engineer. Make-up water for testing shall also be potable water.

A chlorinated water solution shall be used to charge the line and for make-up water when hydrostatic testing and disinfection operations are combined.

Well water shall not be used for hydrostatic testing or any other purposes in new or existing pipelines.

Testing water shall be supplied through a metered connection equipped with a backflow prevention device at the point of connection to the potable water source used.

The Contractor shall provide any temporary piping needed to deliver potable water to the piping that is to be tested.

At the onset of testing, all valves, air vacuum assemblies, blowoffs, and services shall be monitored for possible leakage and repairs made, if necessary, before the test proceeds. The appurtenances shall be monitored through the duration of the testing.

Before applying the specified test pressure, care shall be taken to release all air within the pipe and appurtenances to be tested. Air shall be released through services, fire hydrants, air release valves, or other approved locations.

A five (5) hour hydrostatic pressure test shall be performed after the pipe and all appurtenances have been installed and after any trench backfill compaction with heavy-duty compaction equipment has been completed. The hydrostatic test pressure shall be 345 kPa above the class rating of the pipe at the lowest point in the section being tested, or as directed by the Engineer, and shall be at least equal to the design class of the pipe at the highest point in the line.

The test pressure shall be applied and continuously maintained by pumping for a period of four (4) hours. During the pumping phase of the test, the test pressure shall be maintained at not less than 95 percent of the specified test pressure at all times.

At the end of the fourth (4th) hour, the pressure shall meet the requirements stated above. Pumping shall then be discontinued for one hour and the drop in pressure shall be recorded. Pumping shall then be resumed to restore the initial test pressure, and the quantity of water pumped into the line shall be accurately measured. This measured quantity shall not exceed that which would result from leakage at the following rates:

A. The allowable leakage for steel (flanged or welded) and ductile iron (flanged) pipe shall be zero.
B. The leakage for polyvinyl chloride (PVC) pipe, and for steel or ductile- iron pipes with rubber joints shall be considered as the total amount of water pumped into the pipe system after the fifth (5th) hour of testing. Allowable leakage during the fifth (5th) hour shall be in accordance with the plans, calculated using the following formula:

0.4625 liters x nominal diameter of pipe (mm) x length of pipe (m) /
[24 (hrs) x 1000 (m)]

If the leakage exceeds the allowable loss, the leak points shall be located and repaired as required by the Engineer. All defective pipe, fittings, valves and other appurtenances discovered shall be removed and replaced with sound material. Additional disinfection shall be performed as necessary. The hydrostatic test shall be repeated until the leakage does not exceed the rate specified above. All visible leaks shall be similarly repaired.

DISINFECTION OF PIPING

All water mains and appurtenances taken out of service for inspection, repairs, or other activity that might lead to contamination shall be disinfected before they are returned to service.

All new water mains and temporary high lines shall be disinfected prior to connection to the existing system.

All components incorporated into a connection to the existing system shall be disinfected prior to installation.

A written disinfection and dechlorination plan signed by a certified chlorinator shall be submitted to the Engineer for review and approval prior to starting disinfection operations.

Chlorination and dechlorination shall be performed by competent individuals knowledgeable and experienced in the operation of the necessary application and safety equipment in accordance with applicable Federal, State and Local laws and regulations. The transport, storage and handling of these materials shall be performed in accordance with Code of Federal Regulations (CFR) 1910.120 Hazardous Waste Operations and Emergency Response, CFR 49.172 Hazardous Materials Regulations, and the General Industry Safety Orders of the California Code of Regulations, Title 8, Section 5194.

The specified disinfection of the pipelines may be performed concurrently with the hydrostatic testing. In the event repairs are necessary, as indicated by the hydrostatic test, additional disinfection may be required by the Engineer in accordance with this specification.

Prior to connection to existing mains, disinfection and bacteriological testing shall be performed in accordance with this specification, and hydrostatic testing shall be performed. Authorization for connection to the existing system shall be given only on the basis of acceptable hydrostatic, disinfection and bacteriological test results.

Liquid chlorine contains 100 percent available chlorine and is packaged in steel containers in net weights of 68.1 kg or 907.2 kg.

Liquid chlorine shall be used with appropriate gas flow chlorinators, heaters, and injectors to provide a controlled, high-concentration solution feed to the water. The chlorinators and injectors shall be the vacuum-operated type.

Sodium hypochlorite is available in liquid form in glass or plastic containers, ranging in size from 0.95 L to 18.93 L. The solution contains approximately 10 percent to 15 percent available chlorine.

Tablet or granular hypochlorite shall not be used at any time.

Disinfections of pipelines shall not proceed until all appurtenances and any necessary sample ports have been installed and the Engineer provides authorization.

Every effort shall be made to keep the water main and its appurtenances clean and dry during the installation process.

All piping, valves, fittings, and appurtenances which become contaminated during installation shall be cleaned, rinsed with potable water, and then sprayed or swabbed with a 5 percent sodium hypochlorite disinfecting solution prior to installation.

Water mains under construction that become flooded by storm water, runoff, or ground water shall be cleaned by draining and flushing with metered potable water until clear water is evident. Upon completion, the entire main shall be disinfected using a method approved by the Engineer.

Liquid Chorine (Gas)

A. Only vacuum-operated equipment shall be used. Direct-feed chlorinators, which operate solely from gas pressure in the chlorine cylinder, shall not be permitted. The equipment shall incorporate a backflow prevention device at the point of connection to the potable water source used to fill the line being tested.
B. The chlorinating agent shall be applied at the beginning of the system to be chlorinated and shall be injected through a corporation stop, a hydrant, or other approved connection to ensure treatment of the entire system being disinfected.
C. Only a certified, licensed chlorination and testing contractor shall perform gas chlorination work. The chlorination contractor must also possess a Grade II Treatment Plant Operator Certification from the State of California if required by the Engineer.

Sodium Hypochlorite Solution (Liquid)

A. Sodium hypochlorite solution shall be used for cleaning and swabbing piping and appurtenances immediately prior to installation and for disinfecting all components of connections to the existing system.
B. Sodium hypochlorite solution may be used for the initial disinfection of newly installed water mains. The solution shall be applied at a terminus of the system to be chlorinated using an injector, which can adjust the amount of solution being injected into the piping system. The solution shall be injected in the appropriate concentration to achieve the specified concentration range of chlorine throughout the entire piping system. Where pumping equipment is used in conjunction with an injector, an integral backflow prevention device shall be installed and connected to the potable water supply.
C. Water trucks, pumping equipment, piping, appurtenances and all other equipment in contact with potable water shall be disinfected prior to use.
D. Sodium hypochlorite solution may also be used to increase the total chlorine residual if the concentration from the initial chlorination of the system is found to be low. The solution shall be added to the system in sufficient amounts at appropriate locations to insure that the disinfecting solution is present at a concentration within the specified range throughout the piping system.

The pipeline shall be filled at a rate not to exceed 1,135 liters per minute, or a velocity of 0.3 m per second, whichever is less.

Disinfections shall result in an initial total chlorine concentration of 25-mg/l. This concentration shall be evenly distributed throughout the system to be disinfected.

All valves shall be operated with the disinfection solution present in the pipeline. All appurtenances such as air-vacuum relief valves, blowoffs, hydrants, backflow prevention devices, and water service laterals shall be flushed with the treated water a sufficient length of time to insure a chlorine concentration within the specified range in all components of each appurtenance. (Note the limitations for discharge of chlorinated water outlined below.)

The Engineer will verify the presence of the disinfection solution throughout the system by sampling and testing for acceptable chlorine concentrations at the various appurtenances and/or at the test ports provided by the Contractor. Areas of the system found to be below the specified chlorine concentration level shall receive additional flushing as noted above and/or additional disinfection solution as necessary. (Note the limitations for discharge of chlorinated water outlined below.) Addition of disinfection solution after the initial charging of the line shall be made by either the liquid chlorine (gas) method, or the sodium hypochlorite method as directed by the Engineer.

The chlorinated water shall be retained in the system for a minimum of 24 hours. The Engineer will test the total chlorine residual. The system shall contain a total chlorine residual of not less than 80 percent of the initial total chlorine residual before the 24-hour soaking period began. If the total chlorine residual has decreased more than 20percent, the system shall be soaked for an additional 24-hour period. If the total chlorine residual has not decreased after this additional 24-hour period, the system shall be flushed in accordance with the procedure detailed herein. If the total chlorine residual has decreased, the system shall be flushed in accordance with the procedure detailed herein, and shall be re-disinfected.

Following a successful retention period as determined by the Engineer, the chlorinated water shall be flushed from the system at its extremities and at each appurtenance, using potable water from a source designated by the Engineer. The minimum water velocity during flushing shall be 0.9 meters per second or as directed by the Engineer. Flushing shall continue until the replacement water in the new system is equal in chlorine residual to the potable source of supply as verified by the Engineer. (Note the limitations for discharge of chlorinated water outlined below.)

The Engineer will perform bacteriological sampling and testing as specified herein.

Indiscriminate onsite disposal or discharge to sewer systems, storm drains, drainage courses or surface waters of chlorinated water is prohibited.

The environment, which the chlorinated water is to be discharged, shall be examined by the Engineer. Where necessary, federal, state and local regulatory agencies should be contacted to determine Special Provisions for the disposal of chlorinated water. Any indication that the discharge of chlorinated water may cause damage to the environment shall require the neutralizing of the chlorine residual by means of a reducing agent in accordance with AWWA C651 and the requirements of this specification.

In locations where chlorine neutralization is required, the reducing agent shall be applied to the water as it exits the piping system. The Contractor shall monitor the chlorine residual during the discharge operations. Total residual chlorine limits in these locations, and for the discharge of chlorinated water from the testing of pipelines to surface waters of the San Diego Region are as follows:

Total Residual Chlorine Effluent Limitations	
30-Day Average	0.002 mg/l
Average Daily Maximum	0.008 mg/l
Instantaneous Maximum	0.02 mg/l

The various methods of dechlorination available can remove residual chlorine to concentrations below standard analytical methods of detection, 0.02 mg/l, which will assure compliance with the effluent limit. The Contractor will perform all necessary tests to ensure that the total residual chlorine effluent limitations listed above are met.

In locations where no hazard to the environment is evident based on the joint examination described above, the chlorinated water may be broadcast for dust control on the surface of the immediate site. Care shall be exercised in broadcasting the water to prevent runoff.

The Engineer will perform bacteriological sampling and testing of all new system installations. The testing methodology employed by the Engineer shall be as set forth in "Standard Methods for the Examination of Water and Waste Water" (current edition). Testing requirements are as set forth in the California Domestic Water Quality and Monitoring Regulations and commensurate with current requirements for surface water testing. The Engineer will analyze the samples for the presence of coliform bacteria and heterotrophic-type bacteria (heterotrophic plate count). The evaluation criteria employed by the Engineer for a passing test sample is as follows:

A. Coliform bacteria: no positive sample, and
B. Heterotrophic plate count (HPC): 500 colony forming units/ml or less.

If the initial disinfection fails to produce satisfactory bacteriological test results, the pipeline system shall be re-flushed and re-sampled. If the second set of samples does not produce satisfactory results, the pipeline system shall be re-chlorinated, flushed, and re-sampled. The chlorination, flushing, and sampling procedure shall continue until satisfactory results are obtained. Re-disinfection and retesting shall be at the Contractor's expense.

Pipes, fittings, valves and all other components incorporated into connections with the existing system shall be spray disinfected or swabbed with a liquid chlorine solution in accordance with AWWA C651 and as specified herein. Upon connection to the main, the line shall be flushed as directed by the Engineer. Disinfection by this method is generally limited to assemblies of 6 m or less in length. Alternate methods such as "predisinfection" prior to installation in accordance with AWWA C651 may be required at the discretion of the Engineer.

VALVE TESTING PROCEDURES

Manufacturer Factory Testing Requirements

The manufacturer shall test each butterfly valve in accordance with AWWA C504 and each resilient wedge gate valve in accordance with AWWA C509 or AWWA C515, and these Special Provisions, prior to shipping the valve.

Each butterfly valve and resilient wedge gate valve shall be hydrotested by the manufacturer after the interior and exterior coatings have been applied and cured.

Each butterfly valve shall be hydrotested by the manufacturer after the actuator has been mounted and adjusted.

Each butterfly valve and resilient wedge gate valve shall be dry film thickness tested and holiday detection tested by the manufacturer prior to the valve being shipped.

Each butterfly valve and resilient wedge gate valve shall be operated from the fully closed to fully open to fully closed positions prior to the completed valve being shipped.

Prior to shipment, the manufacturer shall provide notarized certification that each butterfly valve and resilient wedge gate valve supplied has successfully completed the tests required by AWWA, ANSI, ASTM and these Special Provisions.

Each valve shall be shipped with end seals and wrapped in shipping plastic.

Testing Requirements Prior to Installation

Valve testing, shall be provided by either the supplier or the Contractor at no cost to the Engineer. Valves failing to pass the testing regimen specified shall be either replaced or repaired at no cost to the Engineer. Replaced or repaired valves shall be tested as specified in these Special Provisions.

Testing of valves shall not be scheduled until a submittal has been processed and approved by the Engineer.

Valves shall be tested within a 80-km radius of the Engineer's office.

Valves shall be tested in the presence of the Engineer. It is the responsibility of the either the supplier or the Contractor to schedule the witnessing of the testing with the Engineer assigned to the project. Requests for valve testing shall be made to the Engineer 5 working days in advance of the desired testing date.

All butterfly valves shall be mil thickness tested, holiday detection tested and hydrotested by either the supplier or the Contractor prior to installation in the field. Generally, the valves will be tested at the supplier's facility prior to shipment to the field.

A representative sample of resilient wedge gate valves on a project may be selected for testing by the Engineer. The Engineer shall indicate on the approved submittal when resilient wedge gate valves have been selected for testing.

The procedures and requirements for the testing of valves shall be as described in these Special Provisions. Butterfly valves shall be required to pass all tests prior to being incorporated into the project. When selected for testing, resilient wedge gate valves shall be required to pass the Hydrotesting phase in accordance with these Special Provisions.

Valves not passing the tests required shall be replaced or repaired at the discretion of the Engineer. Replaced valves shall be in accordance with these Special Provisions. Repaired valves shall repeat the phase of the required testing, which was failed in addition to the phases not yet completed. Repaired valves, may be rejected and required to be replaced if it repeatedly fails any phase of the testing.

Testing Media

The testing media for hydrostatic testing shall be an approved source of potable water. Testing with a gaseous media shall be prohibited.

Testing Equipment Furnished by the Supplier or Contractor

The supplier or the Contractor shall furnish all necessary manpower and hydrotesting equipment, including test pump, hoses, gages, blind flanges and a safe means of turning the valves over. Insufficient manpower, substandard or unsafe equipment shall be ground for the Engineer to cancel the testing until adequate manpower and acceptable equipment have been provided.

Testing of valves shall be in the following order:

A. Pre-Test Inspection
B. Hydrostatic Test
C. Dry Film Thickness Test
D. Holiday Detection Test

Pre-Testing Inspection

On the date and time agreed the Engineer shall travel to the testing site. The testing site must be within a 80-km radius of the Engineer's office.

The Engineer responsible for the project will receive one copy of the valve submittal. The Engineer shall take the submittal to the testing site to verify the valves to be tested correspond to those on the approved submittal.

Upon arrival at the testing site, the Engineer shall assess the readiness of the tester's personnel to perform the testing. If there is not sufficient manpower and equipment present to perform the tests in a timely manner, the Engineer is to cancel the testing scheduled for that day. The Engineer is to inform the tester of the reason(s) for canceling the test and instruct the tester to reschedule the testing.

Visually inspect each valve (class and configuration), operation of valve, and it's actuator for compliance with the submittal. Valves not in compliance with the approved submittal shall be rejected.

Visually inspect each valve for obvious damage or substandard construction. Valves found to be damaged or of substandard construction shall be rejected. Record the model and serial number of each valve and its actuator on the Valve Inspection Record Sheet.

Hydrostatic Testing Procedures

Each valve shall be tested on both sides at its rated pressure. During the hydrostatic test, there shall be no leakage through the valve body, end joints, or shaft seals, nor shall any part of the valve be permanently deformed.

The testing medium shall be water. Under no circumstances is a gas to be used as the test medium.

The test duration on each side of the valve is 15 minutes. The test equipment will be disconnected during this time.

Valves require careful handling when turning them over. The Engineer shall stop the testing activity if the manner used by the tester to handle the valves is unsafe or will result in damage to the valve. The flange faces are especially susceptible to damage if the valve is not properly handled.

Valves exhibiting no visible leakage, no decrease in the initial test pressure or no deformation shall be considered passed.

Valves exhibiting visible leakage a decrease in the initial test pressure or deformation shall be considered rejected. Valves, which fail the hydrotest test, shall be either repaired or replaced at the Engineer's discretion.

Personnel authorized by the valve manufacturer shall only repair valves permitted by the Engineer to be repaired. Unless the valve manufacturer has authorized them, supplier or contractor personnel shall not be permitted to perform repairs.

Indicate on the Valve Testing Sheet the results of the hydro test.

Dry Film Thickness Testing Procedure

The dry film thickness gage shall be calibrated prior to beginning the taking of the mil readings and periodically during the testing. Use plastic shims or standardized plates and follow the instructions provided with the instrument.

A minimum of four readings should be taken on each side of the disc and a minimum of three reading on each side of the interior of the valve body. Some readings should be taken near edges and around intricate assemblies are where the coating is likely to be thin.

Mark the spot and mil reading at each location where the reading were taken with a felt tip pen. More readings many be taken at the discretion of the Engineer.

The minimum dry film thickness of any reading shall be a minimum 0.2 mm. Mark with felt pen any location where the coating thickness is less than minimum dry film thickness required.

Valves with adequate coating thickness shall be considered passed and the results indicated on the valve testing form. Proceed to the Holiday Detection phase of the testing.

Valves with inadequate coating thickness in any location shall be rejected. Qualified personnel approved by the valve manufacturer shall repair valves with unacceptable coating in accordance with the valve manufacturer's recommendations in a facility.

Holiday Detection Testing Procedure

The interior surface of each valve shall be tested in accordance with NACE Standard RPO490-90, (Holiday Detection of Fusion-Bonded Coatings) and NACE Standard RPO274-98, (High Voltage Electrical Inspection of Pipeline Coatings) using a high voltage as described above.

Assure the instruments to be used are properly calibrated, batteries charged, and in proper working order prior to use.

High-Voltage Holiday Detector set-up:

A. Select output voltage (on the detector) to the desired setting. Use 100 volts per mil thickness. The 8-mil thickness specified requires a setting of 800 volts.
B. Connect the ground wire to the valve to be tested. Assure a sound metallic contact is achieved. Plug the ground wire into the detector.
C. Select the appropriate powerpack, wand length, and electrode (stainless brush or rubber paddle) to be used. Assemble the powerpack, wand electrode and plug the assembly into the high voltage port on the detector.
D. Turn the detector switch on. An audible tone will be heard if the instrument is ready to use. Verify the working of the instrument by running wand across the ground bare metallic surface of the valve. A buzz tone will be heard.

The surface to detected should be dry. A wet surface will "carry over" a holiday in an area.

Cover all surface area with the electrode in a slow thorough motion, testing all interior coated surfaces. Most holidays are found on or around casting numbers, nuts, bolts, and sharp edges. When a holiday is detected, circle area with a black permanent felt pen.

Valves with no holidays in the coating shall be considered passed and the results indicated on the Valve Testing Sheet. Proceed to the Hydrotesting phase of the testing.

Valves with holiday(s) in the coating in any location shall be rejected. Qualified personnel approved by the valve manufacturer shall repair valves with unacceptable coating in accordance with the valve manufacturer's recommendations in a facility. Indicate on the Valve Testing Form that the valve failed this portion of the test.

Reporting and Marking

The Engineer shall record the results of each phase of the testing of each valve on the Valve Testing Sheet.

The Engineer shall mark the flange of each side of the valve to indicate the results of the test. The required marking convention is shown on the Valve Testing Sheet.

Marking shall be made using a white metal marker.

The markings should be made on the portion of the valve flange that will be readily visible in the field. For valves to be used in buried service, the markings should be oriented toward the top of the trench.

The Engineer shall visually check each valve in the field for proper markings prior to installation. Any valve not displaying the proper markings shall be immediately rejected and the contractor instructed to remove it from the site.

CLOSED CIRCUIT TELEVISION (CCTV) INSPECTIONS

CCTV inspections on newly constructed water and sewer mains shall be conducted after all utilities have been installed and backfill compaction has been certified, but prior to final pavement.

The Contractor shall notify the Engineer two (2) working days in advance of the anticipated date of televising so that the Engineer may observe CCTV inspection operations. Schedule shall also include time for pre-cleaning operations, when necessary.

CCTV inspections shall be performed by the Contractor as follows:

Inspection of steel water mains 900 mm and smaller for the purpose of documenting the physical condition and cleanliness of the pipe and inspection of mortared joints.

The Contractor shall furnish all equipment and materials required for inspection. Equipment shall be in accordance with SSPWC Section 500, SSPWC Regional Supplement Amendments Section 306 and as noted below:

The video equipment utilized shall be specifically designed and constructed to be operative in one hundred percent humidity conditions. Lighting for the camera shall minimize reflective glare. Lighting and camera quality shall be suitable to provide a clear, continuously in-focus picture of the entire inside periphery of the pipe for all conditions encountered during the inspection. A reflector in front of the camera may be required to enhance lighting in large diameter pipe.

Video equipment utilized for inspection of water mains shall be certified for domestic water main inspection only, shall also be certified to never have been utilized in non-potable systems.

Videotape shall be high-quality color VHS format. The capacity of the videotape shall be adequate to record inspection of at least one (1) complete pipe segment. Recording of a single segment shall not extend to more than one (1) videotape.

Recording shall be performed using a four (4) head VHS format VCR recorded in SP or LP modes only.

CCTV inspections may be recorded onto digital media such as DVD with the prior permission of the Engineer.

Procedures for CCTV inspections shall be in accordance with SSPWC Section 500, SSPWC Regional Supplement Amendments Section 306 and as noted below:

The camera operator shall slow or stop the camera at potential or actual imperfections in the new main to obtain a high quality video image. Each location where a potential obstruction or structural deficiency exists shall be identified with accurate distance measurements above ground from the manhole or access hole.

For CCTV inspections on water mains the Contractor shall examine the main to insure the passage of the camera through all valves and fittings prior to any televising. Mains with fittings that would obstruct the camera, such as butterfly valves, shall be televised either prior to the installation of those fittings or from access holes immediately adjacent to the obstructing fitting, if available.

Documentation of CCTV inspections shall be in accordance with Section 500 of the Utility Standard Specifications, Section 306 of the 2003 Regional Supplement Amendments to the "Greenbook" Standard Specifications for Public Works Construction, 2003 edition, and as noted below:

Audio and written documentation shall accompany all videotape(s) submitted to the Engineer.

If voice recording is used on the videotape the recording shall have brief informative comments on unusual conditions, type and size of connection and fitting, collapsed sections, the presence of scale and corrosion, location and description of each defect, and other significant data.

The Contractor shall prepare an inspection report, which shall be a complete written log of pipe conditions, indexed to the footage counter. The Contractor shall turn over the original videotape and written reports to the Engineer at completion of the inspection.

10-4.02 WATER SYSTEM RELOCATION

GENERAL

Constructing a new 510 mm CML&C welded steel potable water pipeline in Britannia Boulevard from Airway Road to Otay Mesa Road. This pipe will replace the existing 300 mm ACP water main in Britannia Boulevard owned by the Otay Water District. The 510 mm pipe will split into two smaller 305 mm pipes in the Britannia Boulevard Bridge that will span

SR 905. The 305 mm pipes will be constructed inside the reinforced concrete box beam cells as shown on the plans. An additional third 305 mm future reclaimed water pipeline will be constructed inside the bridge and capped on the north and south side of the bridge as show on the plans. The 305 mm pipes within the bridge will be cement mortar line and epoxy coated. Each pipe will be supported on cast-in-place concrete supports and secured with stainless steel strap anchors as shown on the plans. Each pipe will be equipped with a 50 mm combination air and vacuum release valve. The air vacuum release valves will be installed near the high point in the pipeline and plumbed to the access manholes as shown on the plans and details.

Constructing news 305 mm, 450 mm and 510 mm CML&C welded steel potable water pipeline in Harvest Road, Airway Road and Caltrans Utility Corridor. These pipes will replace the existing 250 mm ACP at Harvest Road, 305 mm and 450 mm ACP at Airway Road and 450 mm ACP water main along Rte 905 owned by the Otay Water District. The 510 mm pipe within the Caltrans Utility Corridor will be steel casing at the Caltrans Right of Way crossing.

DRAWINGS AND DATA REQUIRED

Attention is directed to Section 5-1.02, "Plans and Working Drawings", of the State Standard Specifications.

Where pipe and supports are fabricated for this project, the Contractor shall submit complete erection and fabrication drawings to the Engineer for approval as follows:

An affidavit of compliance with AWWA C200, C203, C205, or C214 as applicable.

A tabulated schedule including:

A. Order of installation and closures.
B. Pipe station and bottom of pipe elevation at each change of grade and alignment.
C. Elements of curves and bends, both in horizontal and vertical alignment.
D. Pipe internal diameter, wall thickness, and internal design pressure.
E. Locations of bulkheads for field hydrostatic testing. (Testing against valves will not be permitted).
F. Locations of closures, including cut-to-fit allowances, for length adjustments and for construction convenience.
G. Locations of valves, flanges, and other mechanical equipment
H. Fabrication details for pipe supports.
I. Typical details of all specials and fittings, joints, and linings and coating, and butt straps.
J. Calculations supporting the sizing of reinforcing collars, wrapper plates or crotch plates.
K. Calculations supporting selected wall thickness of the pipe and specials.
L. Calculations supporting welded joint design.
M. Current shop welder and field welder certification.
N. Mill test reports on each heat from which steel is rolled.
O. Certification of dye-penetration shop weld testing.
P. Details and description of exterior pipe coatings including repair and testing procedures.
Q. Cathodic protection design and installation details.

Materials

A. Manufacturer's catalog data including model or figure number and dimensions for each type of coupling and for each type of pipe material and which the couplings are used. Include bolting and gasket data.
B. Manufacturer's recommended installation or instructions.
C. Materials of construction by ASTM reference grade.
D. Shop coating data including surface preparation, coating material, number of coats, and dry film thickness applied shall be described.

A layout schedule shall include the station, elevation and piece identification of each pipe special, fitting and appurtenance, and the station and elevation of each pipe joint.

Before preparing the schedule and fabrication drawings, the Contractor shall determine the precise locations and alignment of the new pipe relative to the alignment of the new pipe as shown on the plans. The Contractor shall furnish the Engineer with tracings or transparencies of the approved schedule and drawings, from which the Engineer can obtain the required prints.

CONNECTIONS TO EXISTING WATER MAINS

Unless otherwise indicated on the plans or specifically directed by the Engineer, all connections to existing facilities, including wet taps on active pipelines and cut-in installations, shall be performed by Utility Owner personnel. When the plans indicate wet taps or cut-in installations are to be performed by Contractor, or when Contractor has the specific written permission of the Engineer to perform wet taps or cut-in installations, such work shall be performed in strict accordance with

the following procedures. The Engineer must approve all work performed by Contractor prior to allowing access to the work site by Utility Owner personnel.

The Contractor shall furnish the tapping sleeve or tee, valves and all other materials as called for on the plans or as required for completion of the work and in accordance with the Approved Materials List. The Contractor shall provide all equipment and labor required for the excavation and installation of the connection including but not limited to thrust blocks, backfill and pavement replacement. In certain circumstances the Contractor may be required to provide a water truck, high line, and fittings as part of the equipment for making the connections. In addition, the Contractor shall assist the Utility Owner in alleviating any hardship incurred during a shutdown for connections. Emergency standby equipment or materials may be required of the Contractor by the Engineer.

The tapping machine shall have the ability to positively flush all shavings and other residue created when installing tapped outlets of 100 mm or larger.

The shell cutter bell on the tapping machine shall be tapped with a 50 mm minimum outlet.

A ball valve shall be installed on the outlet to regulate flow.

A hose and filter shall be connected to the ball valve to retrieve shavings and residue generated during the tapping process.

A multi-toothed shell cutter is required to minimize the size of shavings generated when tapping PVC pipe. The shell cutter pilot tool shall be designed to capture the coupon generated by performing the wet tap.

The tapping machine shall be filled with water prior to commencing the tapping procedure.

Wet taps or cut-in tee and valve installations shall be performed as follows:

Prior to construction, Contractor shall pothole the existing pipe at the location of the proposed connection. The Engineer shall inspect the pothole prior to Contractor's repair of trench. The Contractor shall record the following information on As-Built drawings:

A. Pipe size, outside diameter.
B. Pipe type such as ACP, PVC, Ductile-Iron or Steel.
C. Pipe class and/or pressure rating.
D. Elevation, grade, and alignment.
E. Location of collars, pipe bells, fittings or couplings, if found.
F. Potential conflicts with existing utilities.

To facilitate the proposed connection and allow for slight adjustments in alignment, the Contractor shall leave a minimum 3.0 m gap between the new pipe installation and the proposed connection point at the existing water main. The Contractor shall leave a gap longer than 3.0 m if conditions warrant, or if directed by the Engineer.

The new pipeline shall have successfully passed pressure testing, disinfection, and bacteriological testing in accordance with these Special Provisions prior to proceeding with the connection to the existing pipeline.

After the Engineer has given approval to proceed with the connection, the Contractor shall schedule with the Engineer for the wet tap or cut-in installation.

A. Shutdowns will be scheduled at the convenience of the Utility Owner. Shutdowns may be scheduled for nights or weekends if required.
B. The Contractor shall give the Engineer a minimum of five (5) working days notice prior to any proposed excavation or shutdown of existing mains or services. Scheduling shall be subject to approval by the Engineer.
C. The Engineer may postpone or reschedule any shutdown operation if, for any reason, the Engineer believes that the Contractor is improperly prepared with competent personnel, equipment, or materials to proceed with the connection.
D. If progress in completing the connection within the time specified is inadequate, the Engineer may order necessary corrective measures. Corrective measures may consist of directing Utility Owner personnel or another contractor to complete the work. All costs for corrective measures shall be borne by the Contractor.

The Contractor may proceed with excavation only when pothole has been completed, materials have been approved and delivered, wet tap or cut-in installation has been scheduled and a copy of the approved traffic control plan has been supplied to the Engineer.

A. The Contractor shall saw-cut pavement, excavate and provide and install shoring and steel plating, when necessary, one day prior to the wet tap or cut-in installation.
B. The Contractor shall provide lights, barricades and traffic control in accordance with the agency of jurisdiction and as deemed necessary for the excavation by the Engineer.
C. The Contractor shall de-water existing mains where cut-in installations are required in the presence of the Engineer. The Contractor shall be prepared to deal with leaking valves and water from those valves to complete the shutdown.

Only Utility Owner personnel are authorized to operate existing valves. The Contractor shall be responsible for any and all damage resulting from unauthorized operation of existing facilities.

D. In areas where cut-ins are to be performed the Contractor shall line the bottom of the trench with 300 to 450 mm of 19 mm rock and install a 300 to 400 mm deep sump for dewatering the trench bottom.

E. The Utility Owner shall perform the following work for wet taps and cut-in installations:

1. Wet taps: Disinfect and install the tapping saddle and tapping valve and perform tapping operations in accordance with these Special Provisions.
2. Cut-ins: Cut and remove portions of existing mains, and disinfect and install tees, valves, couplings, and appurtenances required to complete the closure. The Contractor shall discard pipe and appurtenances removed from service in accordance with the Special Provisions.

F. After the Utility Owner has performed tapping or cut-in operations, and the Engineer has given approval to proceed, the Contractor shall complete the installation as shown on the plans in accordance with the Special Provisions including, but not limited to:

1. Disinfecting and installing the pipe section(s) necessary to make the closure to the new system.
2. Installing and setting the valve gate well(s) in accordance with the plans.
3. Installing thrust and anchor blocks.
4. Completing all backfill and compaction of the trench.
5. Repairing or replacing pavement as necessary in accordance with agency of jurisdiction requirements.

BEDDING FOR WATER PIPE

Bedding to the spring line shall be placed at approximately the same elevation on each side of the pipe to prevent unequal loading and displacement of the pipe. Bedding shall be a minimum of 150 millimeters below the bottom of the water pipe.

Bedding material shall be the same as "Sand Bedding" listed elsewhere in these Special Provisions.

BACKFILL

The trench backfill shall be placed and mechanically compacted. Compaction shall conform to the Section 19-5, "Compaction," of the State Standard Specifications, as shown on the plans and these Special Provisions.

Compaction shall be accomplished by mechanical means. Consolidation by water settling methods such as jetting or flooding is prohibited.

If the backfill fails to meet the specified relative compaction requirements; the backfill shall be reworked until the requirements are met. All necessary excavations for density tests shall be made as directed by the Engineer, and as acceptable to the Engineer. The requirements of the Agency having jurisdiction shall prevail on all public roads.

Compaction tests shall be performed at random depths, and at random intervals not to exceed 45 m, as directed by the Engineer.

Relative compaction shall be determined by the impact or field compaction test made in accordance with ASTM D 1557 Procedure C.

Unless otherwise shown on the plans or otherwise described in the specifications for the particular type of pipe installed, relative compaction in pipe trenches shall be as follows:

A. Pipe zone – 90 percent relative compaction.
B. Trench zone – 90 percent relative compaction.
C. Structural section in paved areas - per agency requirements, 95 percent minimum.
D. Imported Granular Material for over excavation or foundation stabilization – 90 percent relative density.

All excavations are subject to compaction tests.

Imported Granular Material, Sand Bedding:

Imported granular material shall be used within the Pipe Zone for installations of PVC Pressure Pipe, Ductile-Iron Pipe, Cement-Mortar Coated Steel Pipe, Tape-Wrapped Steel Pipe, and Paint-Coated Pipe.

Crushed Rock shall be used in the Pipe Zone on PVC Gravity Sewer Pipe. Crushed rock shall be clean, crushed stone free of organic matter. Crushed rock shall be certified to contain less than 1 percent asbestos by weight or volume and shall conform to the following gradation and requirements:

Sieve Size	Percent Passing
25 mm	100
19 mm	90-100
12.5 mm	30-60
9.5 mm	0-20
4.75 mm	0-5
2.36 mm	0

Tests	California Test	Requirements
Loss in Los Angeles Rattler (after 500 revolutions	211	
100 Revolutions		15 % Max
500 revolutions		52 % Max

Native materials may not be used in lieu of Imported Granular Material within the trench zone unless such materials meet all of the requirements specified for Imported Granular Material within the pipe zone.

Sand-cement slurry shall consist of two sacks, 85.3 kg of Portland cement per 0.76 cubic meter of sand and sufficient moisture for workability. Approval from the Engineer is required for use of slurry as a backfill material.

Filter fabric shall be manufactured from polyester, nylon, or polypropylene. Material shall be of non-woven construction and shall meet the following requirements:

Grab tensile strength (ASTM D 4632)	45.4 kg minimum for a 25 mm raveled strip
Weight (ASTM D 3776)	152.6 kg/m^2
Apparent opening size (ASTM D 4751)	0.150 mm

Imported granular material shall be free of organic material. The coefficient of uniformity shall be 3 or greater. The material shall be quarry waste or sand. Material shall have a sand equivalent of not less than 30 per ASTM D 2419 and shall conform to the following gradation:

Sieve Size	Percent Passing by Weight
13 mm	100
1 mm	90-100
No. 4	50-100
No. 8	10-60
No. 30	25-60
No. 100	5-20
No. 200	0-12

Sand bedding material shall be placed along the length of the pipe to 150 millimeters above the top of pipe. The Contractor shall use mechanical vibration of the bedding to obtain 90 percent relative density.

Backfill

The trench backfill shall not contain more than 15 percent by volume of clay or adobe. A maximum of 15 percent shall pass a No. 200 sieve. The material shall be at optimum moisture content and shall be compacted in maximum 150 millimeters deep uniform layers on each side of the pipe. Backfill shall be complete prior to hydrostatic tests on the water mains and casings unless otherwise specified or permitted by the Engineer.

Trench backfill shall be compacted to obtain 90 percent relative compaction. For areas within roadways, the top 300 mm shall be compacted to 95 percent relative compaction.

Water consolidation shall not be used.

The use of a backhoe mounted compaction wheel is prohibited within the sand bedding.

Should evidence of pipe settlement be observed during any stage of backfilling by mechanical means, such operations shall be immediately discontinued and the remainder of backfilling in the affected portions of the trench shall be backfilled by methods as approved by the Engineer.

WATER MAIN REMOVAL AND DISPOSAL OF ABANDONED WATERLINE

Existing water mains to be removed shall be removed and disposed of. Attention is directed to "Disposal of Friable Asbestos" and "Disposal of Non-Friable Asbestos" elsewhere in these Special Provisions. All resulting openings shall be plugged with minor concrete.

Before excavating for new mains that are to replace existing pipes or services, the Contractor shall make provisions for the continuation and maintenance of service to customers as directed by the Engineer.

Abandonment or removal from service of existing mains, appurtenances or water services shown on the plans or as called for by the Engineer shall be as indicated below and in accordance with the Special Provisions. All materials removed during construction operations shall be salvaged or disposed of.

Existing pipe 100 mm and smaller that are to be abandoned in place shall have a short section of pipe removed and pipe ends encased in concrete.

Existing pipe 150 mm through 250 mm that are to be abandoned in place shall be cut and plugged with concrete or shall be pressure-grouted at intervals of 60 m.

Existing pipe 300 mm and larger that are to be abandoned in place shall be entirely filled by pressure-grouting or by blown sand.

Existing pipe ends shall be filled with concrete in accordance with the plans.

All valves shall be turned to the closed position.

Gate wells shall be cut 600 mm below grade and filled with concrete or removed and replaced with compacted backfill.

Water service corporation stops shall be closed. Meter boxes and curb stops shall be removed.

Water services to be abandoned that are connected to pipelines that will remain in service shall be abandoned in-place in accordance with the plans.

Pipelines shall not be abandoned until their use is no longer required. The Contractor shall notify the Engineer in advance of any intended pipeline abandonment.

If the Contractor elects to remove and dispose of a pipeline which is specified to be abandon, as provided herein, backfill specified for the pipe will be measured and paid for in the same manner as if the pipeline has been abandon in place.

The contract price paid per cubic meter for sand backfill shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all the work involved in backfilling pipelines with sand, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Controlled low strength material and slurry cement backfill, if used at the Contractor's option, will be measured and paid for by the cubic meter as sand backfill.

Full compensation for concrete plugs, pipe removal, structure excavation, shall be considered as included in the contract price paid per each for abandon pipeline and no additional compensation will be allowed.

Sewer laterals shall be cut and plugged with concrete at the main as directed by the Engineer for the specific circumstance and material type identified.

Sewer manholes shall have the cover and frame, concrete ring, grade rings and cone section removed. Inlet and outlet piping shall be plugged with concrete, manhole void shall be filled with sand, and a 300 mm thick reinforced concrete slab shall be poured over the top of remaining manhole. The Contractor shall backfill hole to ground surface with compacted select fill.

Existing pipe and appurtenances to be removed by excavation shall be removed from the ground as indicated on the plans or as directed by the Engineer. All materials removed during construction operations shall be salvaged or disposed of.

The Contractor shall provide measures that allow for the removal of existing sewer mains and appurtenances with no leakage of raw sewage. Transportation of sewer mains and appurtenances removed from service shall be in waterproof trucks to prevent raw sewage from leaking on public streets.

Removal of asbestos-cement pipe (ACP) and sewer mains and appurtenances shall be in accordance with all applicable State and Federal requirements.

Backfill, compaction, and surface repair of all excavations for removal of pipe and appurtenances shall be made in accordance with the plans and the Special Provisions.

When the Contractor is required to remove existing pipe and appurtenances, or portions thereof from the ground, such materials may at the discretion of the Engineer, be considered salvage. All valves shall be salvaged and returned to the Utility Owner. All materials identified as salvage are considered property of the Utility Owner.

The Contractor shall remove and temporarily stockpile all materials identified as salvage in a safe location that will not disrupt traffic or shall deliver salvage to the Utility Owner's Field Operations Yard as directed by the Engineer.

The Contractor shall legally dispose of all other materials in an appropriate manner. Disposal is the responsibility of the Contractor. Obtain concurrence from the agency having disposal jurisdiction with respect to disposal sites and transportation methods.

Removal of water mains shall include valves with valve box and cover. Valves to be removed shall be removed entirely with the valve box and cover.

All material from the removed water mains and its appurtenances, except valves, shall become the property of the Contractor at the time of its removal from the trench, unless otherwise specified or shown on the plans. Such material shall not be allowed to accumulate along the line of work, but shall be removed from the area at the earliest practical time.

PIPE LAYING-GENERAL

Pipe laying shall conform to the State Standard Specifications and these Special Provisions. The pipe shall be laid in accordance with the manufacturer's recommendations, and shall be laid to the lines and grades shown on the plans except as amended and supplemented by the manufacturer's tabulated layout schedule and approved by the Engineer. Internal bracing installed at fabrication shall be maintained until pipe zone compaction is complete.

Necessary facilities, including slings, shall be provided by the Contractor for lowering and properly placing the pipe sections and fittings in the trench without damage.

Trenches shall be in a reasonable dry condition when pipe is laid. The Contractor shall take all necessary precautions to prevent the pipe from floating due to water entering the trench from any source, and he shall assume full responsibility for any damage due to this cause.

When the exterior joint weld is less than a complete circumferential weld extreme caution shall be exercised to assure that there is no damage to the rubber gasket in the pipe joint. The Engineer reserves the right to limit the size of welding rod and the thickness of pass as well as control of amperage used for making the welds. Where joints on the existing pipe are to be field welded, the mortar on the entire joint shall be removed, cleaned and refilled with mortar after welding is completed.

Bedding shall provide uniform and adequate longitudinal support under the full length of pipe. Bell holes at each joint shall be provided to permit the joint to be assembled properly while maintaining uniform pipe support.

All connecting parts of the pipe, rings, couplings, and fittings shall be cleaned before assembly, shall be tightly fitted together and care taken to secure true alignment and grade.

The rubber gasket joint shall be made by properly lubricating the rubber gasket with a suitable vegetable compound soap before it is placed in the groove at the spigot end. The gasket shall be stretched over the spigot end of the pipe and carefully seated in the groove, with care taken to equalize the stress in the gasket around the circumference of the joint. The gasket shall not be twisted, rolled, cut, crimped, or otherwise injured or forced out of position during the closure of the joint. A "feeler" gage shall be used to check the position of the rubber gasket after the joint has been telescoped.

The Contractor shall keep the pipe and appurtenances clean during the progress of the work. Dirt, rocks, or other foreign materials shall be removed from the interior of the pipe before and during installation. All openings in the pipeline shall be closed at the end of each day's operations or whenever the workmen are to be absent from the work area. This may require the use of a plywood or steel bulkhead. All surface or groundwater shall be prevented from entering the pipe and shall be removed from the trench.

Each section of pipe shall be carefully lowered into the trench using slings in such a way that the coating and lining are not damaged by flexure or abrasion. The spigot shall be entered into the bell or collar and forced home. The joint shall be made carefully to avoid undue stressing of, or impact damage to, the pipe and gasket, and stabbing as a method of installation will not be permitted. Unless otherwise detailed on the plans, pipe shall not be set on blocks of any kind (including wood) in the trench bottom. If blocking becomes necessary, bags filled with sand may be placed under the pipe. These bags shall be broken after the haunches are packed.

The pipe shall not be dragged along the bottom of the trench, but shall be securely supported by the slings until the joint is assembled. Each spigot shall be inserted into the bell or collar the distance shown on the approved fabrication drawings so as to avoid cumulative gain or loss of laying length.

Suitable excavations shall be provided in the bedding material for removal of the slings, without damaging the coating, after assembly of the joint. These sling removal holes shall be filled, the pipe length securely blocked in its proper alignment, and the pipe barrel partially backfilled.

Unless the sheeting or shoring is to be cut off and left in place, densification of bedding for pipe shall be accomplished after the sheeting or shoring has been removed from the bedding zone. Alternate methods of pipe bedding, which are recommended by the pipe manufacturer, may be used if approved by the Engineer.

All joints shall be cleaned with a wire brush and welded before coating repair. All jetting locations shall be sufficient to thoroughly saturate the bedding material around the pipe.

DISPOSAL OF ASBESTOS

Disposal of Non-Friable Asbestos

Disposal of non-friable asbestos-containing materials shall be in accordance with the County of San Diego Guidelines. Guidelines may be obtained at the Solid Waste Division, County of San Diego, Public Works Division, Building 2, 5555 Overland Avenue, San Diego, CA 92123.

Full compensation for the disposal of non-friable asbestos containing materials shall be considered as included in the contract unit price paid for "Remove Pipeline" and no separate payment will be made therefore.

Disposal of Friable Asbestos

All friable asbestos containing materials (materials that can be crumbled, pulverized, or reduced to powder in hand) are regulated as a hazardous waste and shall be transported by a licensed hazardous waste hauler and disposed of in an appropriate landfill.

Full compensation for the disposal of friable asbestos-containing materials shall be considered as included in the contract unit price paid for "Remove Pipeline" and no separate payment will be made therefore.

DELIVERY, STORAGE, AND HANDLING OF CEMENT MORTAR LINED AND COATED STEEL PIPE AND SPECIALS

Delivery, storage, and handling of the pipe and specials shall be as follows:

Pipe and fittings shall be carefully handled and shall be protected against damage to linings and coatings due to impact shocks. Pipe shall not be placed directly on rough ground but shall be supported in a manner, which will protect the pipe against injury whenever stored at the site or elsewhere. Pipe shall be handled and stored per these requirements and in accordance with the Manufacturer’s recommendations.

Temporary internal bracing shall be installed in all pipe 400 mm and larger prior to shipment to the job site. Temporary internal bracing shall be 100 mm x 100 mm wooden stulls installed in both the horizontal and vertical directions. Each set of stulls shall be nailed together as a unit. Wooden wedges may be used to maintain the proper tight fit of the internal bracing. The bracing shall be located 300 mm in from each end of the pipe section for all pipe, and additionally at the mid-point for piping 600 mm and larger. Maintain internal bracing as specified under Pipe Installation.

Transport pipe to the job site on padded bunks with nylon tie-down straps or padded bonding to protect the pipe.

Pipes and specials shall only be handled with appropriate spreader bars and wide nylon slings. Chains or wire rope slings shall not be used. Under no circumstances shall pipe or specials be pushed or dragged along the ground. All pipe sections over 6 m in length shall be lifted at the quarter points from each end.

Store pipe on earth berms or timber cradles adjacent to the trench in the numerical order of installation. Place the supports at about the one-quarter point from the pipe ends.

Maintain plastic end caps on all pipe and specials in good condition until the pipe is ready to be installed in the trench. Periodically open the plastic end caps and spray potable water inside the pipe for moisture control.

DELIVERY, STORAGE, AND HANDLING OF POLYVINYL CHLORIDE (PVC) WATER PIPE

Polyvinyl chloride pressure pipe shall be stored in the field by supporting the pipe uniformly as specified in AWWA Manual M23. Do not stack pipe higher than11.2 m or stack the pipe with weight on the bell ends. Cover stored PVC pipe to protect it from the sun's ultraviolet radiation.

Overly faded pipe, which is determined by the Engineer to be of suspect quality shall not be used and shall be removed from the project site immediately. PVC pipe, which has been gouged, shall not be used. PVC pipe, which has received minor scratches during handling, may be used solely at the discretion of the Engineer. Pipe which has been contaminated with any petroleum products (inside or outside) shall not be installed.

PVC pipe shall be installed in the trench using bell holes at each joint to prevent the pipe from being supported by the bell end or coupling. The identification strip marking shall be continuously aligned on the top of the installed pipe.

A 2 m section of PVC pipe shall be used into and out of all fittings and valves.

Where pipe sections less than the standard pipe lengths are required, the pipe sections shall be installed in accordance with the manufacturer's installation guide.

Installation of pipe shall not vary more than 30 mm vertically or 35 mm horizontally from the alignment shown on the approved plans.

Cutting and milling shall be accomplished with tools intended for such use to create a machined end equal in workmanship to the milled ends of the pipe as furnished by the manufacturer. Milling shall not result in undercutting the wall thickness and must be approved by the Engineer prior to installation.

A cleaning tool approved by the Engineer shall be pulled through the pipe during installation to remove dirt, rocks, or foreign materials. The tool shall be designed to fit closely without damaging the pipe during the cleaning operation. The tool shall be examined as it is pulled up to the end of each joint of pipe and any foreign material shall be removed. All openings in the pipeline shall be sealed to protect the pipe from the intrusion of groundwater or any other foreign material at all times.

All connecting parts of pipe, rings, coupling and castings shall be clean before assembly. Assembly of the couplings and rings shall be in accordance with the manufacturer's recommendations. Lubricant and rubber rings shall be supplied by the pipe manufacturer. The use of excessive lubricant will not be permitted.

After the spigot end has been inserted into the bell or coupling to the proper insertion mark the elastomeric ring shall be checked for grooving or improper assembly by passing a feeler gauge around the completed joint.

Bronze saddles shall be used on all 25 mm and 50 mm services or appurtenance connections. Saddles shall be located a minimum of 0.6 m from any pipe joint, and from other saddles or fittings. Multiple saddles installed on the same side of a single pipe length shall be staggered 30 degrees so as not to form a weak line in the pipe. Tapping tools and shell cutters of the kind and type recommended by the manufacturer shall be used. Saddles shall be installed to manufacturers' specified torque.

Tapping saddles shall be installed a minimum of 0.6 m from the edge of the saddle to any other saddle, pipe joint or other fitting. Multiple taps of 150 mm or larger shall not be made in the same joint of pipe without the approval of the Engineer.

The entire exterior surface area of valves and fittings shall be coated with 20 mils of lap cement and wrapped in 8 mils thick polyethylene sheet plastic.

DELIVERY, STORAGE AND HANDLING OF VALVES

Valves shall be delivered and stored in accordance with AWWA C550. The port openings shall be covered with plastic, cardboard, or wood while in transit and during storage in the field. These shall remain in place until the valve is ready to be installed. Valves shall not be stored in contact with the ground. Valves shall not be stacked.

INSTALLATION OF VALVES

Valves shall be installed with the bolt holes straddling the centerline of the pipe and the operating nut in the vertical position. Joints shall be cleaned as listed elsewhere in these Special Provisions. Valves shall be installed in accordance with the manufacturer's recommendations and in accordance with applicable specifications for the pipe material and joint type being used for the valve and water mains.

HI-LINE

All hi-line, fittings and service connections shall be furnished, installed and connections made by the Contractor.

The Contractor shall be responsible for disinfecting all hi-line, connections, flushing and assisting in taking water samples for bacteriological tests. Refer to disinfection and bacteriological test procedures listed elsewhere in these special provisions.

Following disinfection and acceptance of the hi-line as a potable water system, the Contractor shall maintain continuous service through the hi-line piping to all consumers normally served, both directly and indirectly, by the pipeline. Upon completion of the work, the hi-line piping shall be removed or abandoned by the Contractor.

The hi-line shall be installed in such a manner that it will not present a hazard to traffic and will not interfere with access to homes and driveways along its route.

All pipe, valves, fittings, hose and connections furnished by the Contractor shall be of good quality, suitable for conveying potable water. Only hot dipped galvanized pipe and fittings or Schedule 80 polyvinyl chloride (PVC) pipe shall be used for hi-line piping. All polyvinyl chloride piping must be labeled "N.S.F." tested for a potable water system.

FLEXIBLE EXPANSION JOINTS

Flexible expansion joints shall be installed in the locations indicated on the plans and shall be manufactured of 65-45-12 ductile iron conforming to the material requirements of ASTM A536 and ANSI/AWWA C153/A21.53. Foundry certification of material shall be readily available upon request.

Each flexible expansion joint shall be pressure tested prior to shipment against its own restraint to a minimum of 24.61 Kg/cm2 (17.58 Kg/cm2 for flexible expansion joints 750 mm diameter and larger.). A minimum 2:1 safety factor, determined from the published pressure rating, shall apply. Factory Mutual Approval for the 300 mm and smaller sizes is required.

Each flexible expansion joint shall consist of an expansion joint designed and cast as an integral part of a ball and socket type flexible joint, having a minimum per ball deflection of: 20 degree and 100 mm minimum expansion. Additional

expansion sleeves shall be available and easily added or removed at the factory or in the field. Both standardized mechanical joint and flange end connections shall be available.

All internal surfaces (wetted parts) shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213 and shall be holiday tested with a 1500 volt spark test conforming to said specification. Sealing gaskets shall be constructed of EPDM. The coating and gaskets shall meet ANSI/NSF-61.

All external surfaces shall be coated with a catalyzed coal tar epoxy conforming to the material requirements of AWWA C210. Appropriately sized polyethylene sleeves, meeting ANSI/AWWA C105/A21.5, shall be included for direct buried applications.

FLANGED CONNECTIONS

Flanged connections shall be installed where indicated on the plans.

Bolt holes shall straddle the horizontal and vertical centerlines.

The bolts, nuts and flange faces shall be thoroughly cleaned by wire brush prior to assembly.

Bolts and nuts shall be lubricated with an approved anti-seize compound.

Nuts shall be tightened in an alternating "star" pattern to the manufacturer's recommended torque.

Slip-on type flanges intended for field fit-up and welding shall be welded inside and outside in accordance with AWWA C207.

BUTT STRAP JOINTS

Butt strap closure joints shall be installed where shown on the plans in accordance with AWWA C206.

Butt straps shall be field welded to the outside plain end of the pipe along both edges with a full circumferential weld. A minimum of two weld passes shall be used.

The interior of the joints shall be filled with a rapid-set mortar and finished off smoothly to match the pipe interior diameter.

Clean the butt strap with a wire brush and apply a cement and water wash coat prior to applying cement mortar.

Galvanized wire mesh, 50 mm x 100 mm x No. 13 gauge shall be installed to the exterior of the joint prior to applying the mortar coating.

Coat the exterior of the closure assemblies with mortar to cover all steel with a minimum of 32 mm.

Seal weld the steel plug to the hand hole after the interior of the joint has been inspected and approved by the Engineer.

Following grouting, the joint shall then be wrapped with two layers of polyethylene encasement.

TEMPORARY BLOW-OFFS

The Contractor shall install temporary caps, plugs, thrust blocks, and temporary blow-offs for testing water mains**.** Caps and plugs installed by the Contractor to temporarily close the ends of new mains adjacent to points of connections shall contain 50 mm outlets with corporation stops. Corporation stops shall protrude free from thrust blocks and be available for use in relieving pressure in the mains prior to connecting. Caps and outlets will be the property of the Contractor and may be claimed after connections are made.

After testing, the Contractor shall supply and install the connections and equipment necessary to convey the discharge water to a storm drain adequate for the discharge volume.

If the new water main is to be installed and tested in sections, caps and plugs installed by the Contractor to temporarily close the ends of each section of new water main shall contain 50 millimeters outlets with gate valves. Valves shall protrude free from thrust blocks and be used for testing and relieving pressure. Valves, outlets and thrust blocks used for the temporary blow-off shall remain the property of the Contractor and be entirely removed before connecting the pipeline to an adjacent section.

GASKETS

Rubber-ring gaskets shall comply with AWWA C200 according to the applicable joint type and pressure rating of the piping system and shall be suitable for potable water service.

Flange gaskets shall comply with AWWA C207. Flange gaskets shall be 3.18 mm thick acrylic or aramid fibers bound with nitrile for all sizes of pipe. Gaskets shall be full-face type with pre-punched holes or ring-type extending to the inner edge of the bolt circumference of the flange.

In the event of encountering organic solvents or petroleum products during the course of the work, alternate gasket materials or joint treatment will be required as directed by the Engineer.

All rubber gaskets shall be bonded along the entire buried length of metallic pipe.

BOLTS AND NUTS

Bolts and nuts shall be as indicated below and shall be selected from the Approved Materials List.

Cadmium-plated, zinc-plated or fluoropolymer coated bolts and nuts shall be used for the installation of pipelines up to 500 mm diameter and shall be carbon steel conforming to ASTM A307, Grade A, unless otherwise indicated on the plans. Bolts shall be standard ANSI B1.1, Class A coarse threads. Nuts shall be standard ANSI B1.1, Class 2H coarse threads.

Stainless steel bolts and nuts shall be used for the installation of pipelines 600 mm diameter and larger and for submerged flanges. Bolts and nuts shall be Type 316 stainless steel conforming to ASTM A193, Grade B8M for bolts, and Grade 8M for nuts.

All bolt heads and nuts shall be hexagonal, except where special shapes are required. Bolts shall be of such length that not less than 6.4 mm or more than 12.7 mm shall project past the nut in tightened position.

All bolts and nuts shall be new and unused. Bolts and nuts shall be cleaned, if needed, by wire brushing and lubricated prior to assembly.

Tighten nuts uniformly and progressively.

Buried bolts and nuts shall receive a heavy coat of protective grease coating selected from the Approved Materials List prior to being wrapped with polyethylene.

All stainless steel bolts shall be coated with an anti-seize compound selected from the Approved Materials List.

Bolts and nuts shall not be reused once tightened. Used bolts and nuts shall be discarded and removed from the job.

INTERIOR JOINT FINISH FOR PIPES LESS THAN 600 MILLIMETERS IN DIAMETER

Complete interior mortar joints for pipe sizes less than 600 mm by drawing through a tight-fitting swab or squeegee. Coat the face of the cement mortar lining at the bell with a sufficient amount of stiff cement mortar to fill the gap. Immediately after joining the pipes, draw the swab through the pipe to remove all excess mortar and expel it from the open pipe end. Do not move the pipe after the swab has been pulled past the joint. See requirements under "Field Welded Joints" for these joints requiring welding.

INTERIOR JOINT FINISH FOR PIPES 600 MILLIMETERS DIAMETER AND LARGER

Complete interior mortar joints for pipe sizes 600 mm and larger by the trowel method. Prior to applying interior mortar at the joints all backfill in the area shall be completed. After cleaning the interior joint, pack cement mortar into each joint. Finish the surface with a steel trowel to a smooth finish and equal thickness to match the adjoining pipe mortar.

Where more than a 100 mm joint strip of mortar is required, place galvanized welded wire mesh reinforcement in 50 mm x 100 mm pattern of No. 13 gauge over the exposed steel. Install the mesh so that the wires on the 50 mm spacing direction run circumferentially around the pipe. Crimp the wires on the 100 mm spacing to support the mesh 9.5 mm from the metal surface. Steel-trowel finish the interior mortar to match adjoining mortar-lined pipe sections.

EXTERIOR JOINT FINISH

The outside annular space between pipe sections shall be completely filled with grout formed by the use of polyethylene foam-lined fabric bands. The grout space shall be flushed with water prior to filling so that the surfaces of the joint to be in contact with the grout will be thoroughly moistened when the grout is poured. The joint shall be filled with grout by pouring from one side only. Grout shall be rodded with a wire or other flexible rod or vibrated so that the grout completely fills the joint recess by moving down one side of the pipe, around the bottom of the pipe and up the opposite side. Pouring and rodding the grout shall be continued to allow completion of the filling of the entire joint recess in one operation. Care shall be taken to leave no unfilled space. Grouting of the outside joint spaces shall be kept as close behind the laying of the pipe as possible except that in no case shall grouting be closer than three joints of the pipe being laid.

The grout bands or heavy-duty diapers shall be polyethylene foam-lined fabric with steel strapping of sufficient strength to hold the fresh mortar, resist nodding of the mortar, and allow excess water to escape. The foam plastic shall be 100 percent closed cell, chemically inert, insoluble in water and resistant to acids, alkalis and solvents. Foam Plastic shall be Dow Chemical Company, Ethafoam 222, or equal. The fabric backing shall be cut and sewn into 224 mm wide strips with slots for the steel strapping on the outer edges. The polyethylene foam shall be cut into strips 150 mm wide and slit to a thickness of 6.35 mm that will expose a hollow or open-cell surface on one side. The foam liner shall be attached to the fabric backing with the open or hollow cells facing towards the pipe. The foam strip shall cover the full interior circumference of the grout band with sufficient length to permit a 200 mm overlap of the foam at or near the top of the pipe joint. Splices to provide continuity of the material will be permitted. The polyethylene foam material shall be protected from direct sunlight. The polyethylene foam-lined grout band shall be centered over the joint space with approximately equal widths extending over each pipe end and securely attached to the pipe with the steel straps. After filling the exterior joint space with grout, the flaps shall be closed and overlapped in a manner that fully encloses the grout with polyethylene foam. The grout band shall remain in position on the pipe joint.

Following grouting, the joint shall be wrapped with two layers of polyethylene encasement.

FIELD PAINTING AND COATING

The Contractor shall provide notice 3 working days in advance of field operations involving surface preparation and coating application.

The Engineer will determine compliance of the preparation of the shop and field prepared surface.

Notify the Engineer 48 hours in advance of field operations involving surface preparation and coating application.

The Engineer will inspect shop-and field-prepared surfaces. The Contractor shall not proceed with paint application until the surface preparation has been approved by the Engineer.

The Engineer will inspect application of all prime, intermediate, finish, and touch-up coatings to verify the integrity of the coating and compliance with the specifications. Each coating application will be checked and deficiencies marked. Items exhibiting an improper finish or color, or insufficient surface preparation or dry film thickness shall be prepared as necessary and corrected, utilizing the specified paint materials to obtain compliance.

In addition to touch up painting and coating, all metallic appurtenances of the elements not protected from corrosion by another system shall be painted with a two part coating. The Engineer will inspect application of all touch up, primer, intermediate and finish coatings to determine the integrity of the coating and compliance with the required dry film thickness. Each coating application will be checked and deficiencies marked. Items exhibiting an improper finish or color, or insufficient surface preparation or dry film thickness, shall be prepared as necessary and corrected, utilizing the specified paint materials to obtain compliance.

Under no circumstances shall the specified paint materials be used where they may come in contact with the public water supply or for buried installations. Those products are intended for exposed exterior use only.

The publication listed below forms a part of this specification to the extent referenced and are referred to in the text by the basic designation only.

A. AWWA C 210 - Liquid Epoxy Coating Systems For Interior And Exterior Of Steel Water Pipes.
B. AWWA C 218 - Coating the Exterior of above ground steel Water Pipelines and Fittings SSPC Steel Structures Painting Council.

All colors and shades of colors of all coats of paints and protective coating material shall be as selected by the Engineer. Each coat shall be of a slightly different shade, as directed by the Engineer, to facilitate inspection of surface coverage of each coat.

Color Schedule

The following tables designate the color coding and type of paint which shall be used to identify potable and recycled facilities. A description of specific paint types to be used can be found in the Approved Materials List.

ITEM	COLOR	PAINT TYPE
Fire Hydrant	Safety Yellow	Silicone Alkyd
Blow Off Box Lids	Safety Yellow	Silicone Alkyd
Gate Well Lids- Potable Valves Acrylic Latex	Safety Yellow	Waterbase
Gate Well Lids- Fire Hydrant Valves Acrylic Latex	White	Waterbase
Air/Vac Assemblies	Safety Yellow	Silicone Alkyd
Air/Vac Enclosures	Chocolate Brown	Fusion
Water Test Station Enclosures Bonded Polyester	Chocolate Brown	Fusion
Protector Posts	Safety Yellow	Silicone Alkyd
Vault Piping Machine	Gray	Silicone Alkyd
Above Ground Piping Machine	Gray	Silicone Alkyd
Normally Closed Valve	Safety Red	Silicone Alkyd

The following items or materials are not to be field painted unless specifically required elsewhere in the Special Provisions:

A. Buried mortar-coated pipe and fittings
B. Stainless steel
C. Interior surfaces of valves, fittings and pipe
D. Nameplates
E. Grease fittings
F. Brass, copper or bronze, except as required for reclaimed water system identification.

G. Buried pipe and appurtenances, except as required in the piping specifications.

Painting:

Paint, coating products and color selections shall be selected from the table above and the Approved Materials List.

All materials of a specified painting system, including primer, intermediate and finish coats, shall be produced by the same manufacturer.

Additives shall be used only as recommended by the paint manufacturer and as permitted by the Engineer.

Deliver all paint products to the job site in the original, unopened containers.

Coating systems shall be as follows:

Silicone-Alkyd Enamel Paint System:

All materials of a specified system including prime, intermediate, finish, and touch-up coats shall be provided by the same manufacturer in accordance with the Approved Materials List. Thinners, cleaners, driers, and other additives shall be as recommended by the coating manufacturer for the specified system.

Primer: Field-applied, single-component, VOC-compliant, solvent-curing primer. The primer shall be as recommended by the manufacturer for the substrate to be painted with the silicone alkyd enamel finish paint. Intermediate primer coats may be required by the manufacturer of the painting system.

Intermediate and Finish Coats: The silicone alkyd finish paint shall be an industrial-type single-component, high-solids, high-gloss, VOC-compliant, lead-free alkyd enamel. The silicone alkyd paint shall contain 30 percent silicone and a minimum 47 percent solids by volume. The silicone alkyd paint system to be used shall be easily applied by brush, roller or spray. The silicone alkyd enamel system shall be used as a protective coating and for applying color code identification to the exterior of potable and recycled water facilities.

Waterborne Acrylic Latex Painting System:

All materials of a specified system including prime, intermediate, finish, and touch-up coats shall be provided by the same manufacturer selected from the Approved Materials List. No solvent-based thinners, cleaners, driers and other additives are required for this painting system.

The water facility items requiring color code identification with this paint system can be found under Color Schedule shown above.

100 percent waterborne acrylic latex paint shall be a rapid-drying paint, resistant to weather and abrasion, containing a minimum of 100 percent solids by volume. The waterborne acrylic latex painting system shall be used to apply color code identification to fire hydrant valve gate well lids.

If any of the following minimum conditions are present, the application of coatings shall be delayed or postponed until conditions are favorable.

A. During rain, fog, or mist, or when the relative humidity exceeds 80 percent.
B. When the surface to be coated is wet, moist, or contaminated with any foreign matter.
C. When the surrounding air temperature or the temperature of the surface to be coated is below 4 ˚C.
D. When the temperature of the surface to be coated is more than 13˚ C below the air temperature or when the surface temperature is 50˚ C or above.
E. When the surface temperature is less than 13˚ C above the dew point or is expected to be within 4 hours after application of coating.
F. If a change in weather conditions results in damage to a newly-applied coating, the affected coatings shall be restored to their specified condition as directed by the Engineer.

Surfaces not to be painted shall be protected as follows:

A. Remove, mask, or otherwise protect hardware, switch plates, aluminum surfaces, machined surfaces, couplings, shafts, nameplates and other surfaces not intended to be painted. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces. Protect working parts of mechanical and electrical equipment from damage during surface preparation and the painting process.

Prior to field touch up of shop applied prime coat, prepare the surface per manufacturer's recommendations and as directed by the Engineer. Reapply primer as required to cover all scratched, abraded, or deficient areas.

Do not prepare more surface area than can be coated in the same work day. Surface preparation shall conform to the Steel Structures Painting Council specifications as follows:

Item	Specification
Solvent Cleaning	SP 1
Hand Tool Cleaning	SP 2
Power Tool Cleaning	SP 3
White Metal Blast Cleaning	SP 5
Commercial Blast Cleaning	SP 6
Brush-off Blast Cleaning	SP 7
Picking	SP 8
Near-White Blast Cleaning	SP 10

Wherever the words "solvent cleaning", "hand tool cleaning", "wire brushing", or "blast cleaning" or similar words are used in these Special Provisions or in paint manufacturer's specifications, they shall be understood to refer to the applicable Surface Preparation Specifications of Steel Structures Painting Council listed above.

Surface preparation shall be as recommended by the product manufacturer or as directed by the Engineer in the field. In general, surface preparation shall be either SP1, SP2, or SP3. Water blasting or sandblasting may be utilized as required by field conditions or as directed by the Engineer.

Unless otherwise directed by the Engineer, do not sandblast items that have previously been factory primed or painted.

Application shall be as follows:

A. Work shall conform to the requirements of Steel Structures Painting Council PA-1, "Shop, Field, and Maintenance Painting" unless the recommendations of the coating manufacturer are more restrictive, including the selection of spray equipment, brushes, rollers, mixing, drying time, temperature and humidity limitations during application, and safety precautions. Procedures for the application of coatings will be reviewed by the Engineer.
B. Stir, strain, and keep coating materials at a uniform consistency during application. Where thinning is permitted by the Engineer, do not reduce the coating material more than is necessary to obtain the proper application characteristics and to obtain the specified dry film thickness. Do not exceed the maximum rate allowed by the manufacturer. Do not flood the coating material surface with thinner prior to mixing. Stir coating materials at all times when adding thinner.
C. Apply each coating evenly, free of brush marks, sags, runs, bridges, shiners, laps or other imperfections and evidence of poor workmanship. Visible areas of chipped, peeled, or abraded paint shall be hand or power sanded, feathering the edges. The areas shall then be primed and finish coated in accordance with the specifications. Finished surfaces shall be free from defects and blemishes prior to final acceptance.

The following items shall be field painted using a silicone-alkyd system and shall be color coded in accord with the specifications utilizing appropriate pigments added to the coating by the manufacturer:

The following items shall be field painted using the silicone alkyd enamel paint system.

A. All recycled water ferrous metal piping and appurtenances, including meters, blowoff-piping, backflow preventers, where located above ground, exposed, or in vaults.
B. All potable water ferrous metal piping and appurtenances where located above ground, exposed, or in vaults.
C. All potable water fire hydrant bodies, blowoff box lids, the exterior of air/vacuum assemblies and protector posts around potable water facilities.
D. All recycled water gate well lids and frames, the exterior of air/vacuum assemblies and protector posts around recycled water facilities.
E. Normally closed valves.

The silicone alkyd enamel painting system shall consist of a prime coat, an intermediate coat (if required) and sufficient finish coats to provide a total dry film thickness of 0.152 mm to 0.203 mm. Apply the coatings in accordance with the manufacturer's recommended film thickness, adding finish coats as necessary to meet the minimum total dry film thickness specified above.

Observe minimum and maximum re-coat times as specified by the manufacturer. If these times are exceeded, the surface shall be prepared as recommended by the manufacturer and as directed by the Engineer prior to receiving additional coats.

The following items shall be field painted using the waterborne acrylic latex system:

A. Potable water fire hydrant valve gate well lids and frames.

The waterborne acrylic latex paint system shall consist of two coats of paint to provide a total dry film thickness of 0.203 mm to 0.305 mm. Apply the paint system in accordance with the manufacturer's recommendations. Add finish coats as necessary to achieve the mil thickness specified above.

FIELD WELDED JOINTS

Field welders shall be certified under Section IX, Part A of the ASME Boiler and Pressure Vessel Code or in accordance with AWWA C206, Section 3. Welders shall present a copy of their certification to the Engineer prior to performing any field welding.

Welded joints shall be completed in the trench per AWWA C206.

Both the bell and spigot ends shall be cleaned of foreign matter prior to welding.

For pipe diameters less than 600 mm the exterior of the joint shall be welded. For pipe diameter 600 mm and larger, the joint shall be welded in accordance with the approved submittal. All welded joints shall remain exposed until inspection has been performed.

Welding electrodes shall be as recommended by the pipe manufacturer. Typically, electrodes shall be E6010 for root passes and E7018 for additional passes. Do not deposit more than 3.2 mm of throat thickness per pass.

Weld material shall be deposited in successive layers. Complete and clean each pass around the entire circumference of the pipe before commencing the next pass.

The minimum number of passes in the completed weld shall be as follows:

Steel Cylinder Thickness mm	Fillet Weld Minimum Number of Passes
6.35 or less	2
Greater than 6.35	3

To minimize longitudinal stresses due to temperature variations, it is necessary to leave unwelded one joint per each 120 m of pipeline. This joint shall be left unwelded until all the joints on both sides of it are welded, and it shall be welded at the coolest time of the working day. The Engineer shall decide if and when this procedure is warranted.

Tack-welding the joint may be permitted to hold the pipe in place. If the joint is to be circumferentially welded, sufficient time shall elapse to allow for an initial set of interior joint lining prior to proceeding with joint welding. Rapid-setting mortar may be used in accordance with these Special Provisions. In some cases, the Engineer may require hand holes.

Field welders shall be certified in accordance with ASME Section 9 (pipe welders) or AWS D1.1 (plate welders). Welders shall present a copy of their certification to the Engineer prior to performing any field welding.

Prior to butt-strap welding, the pipe and pipe joint shall be properly positioned in the trench using line-up damps so that, in the finished joint, the abutting pipe sections shall not be misaligned by more than 1.59 mm.

The pipe ends shall be cut straight on joints where butt straps are used for realignment, adjustment, or deflection, and fillet welds shall be made as indicated.

Inspection of Field Welded Joints:

A. The Engineer shall arrange for the welds to be inspected. Inspection of welds shall take place as soon as possible following the completion of the welds.
B. The Contractor shall coordinate and supply ventilation, lighting, and other equipment deemed necessary for inspection. The Contractor shall be responsible for providing safe entry into and out of the trench, safety of inspection personal, traffic control and other safety precautions deemed necessary for the inspections.

CATHODIC PROTECTION SYSTEM

The publications listed below form part of this specification to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said standards unless otherwise called for.

AWWA C217 - Cold-Applied Petrolatum Tape and Petroleum Wax Tape Coatings for the exterior of special sections, connections, and fittings for buried steel water pipelines

ASTM D 1248 - Standard Specification for Polyethylene Plastics Molding and Extrusion Materials for Wire and Cable

NACE RP0286 - The Electrical Isolation of Cathodically Protected Pipelines

NACE RP0375 - Application and Handling of Wax-Type Protective Coatings and Wrapper Systems for Underground Pipelines

The Contractor shall submit manufacturer's catalog data on wire and cable, copper sulfate reference electrodes, test stations, conduit, exothermic weld molds and charges, pipe flange insulation kits, pipe flange internal coating, wax tape system, plastic warning tape and any other required materials.

All materials furnished under this specification shall be standard products from manufacturers regularly engaged in the manufacture of such products and shall be the manufacturer's latest design that complies with the specification requirements.

Prepackaged Magnesium Anodes

Prepackaged magnesium anodes shall be used in low current demand applications. The amount and size of magnesium anodes shall be as shown on the plans. Prepackaged magnesium anodes shall have galvanized steel rod cores encased in magnesium ingots. The ingot portion of anodes shall be of the weight as required on the plans. Provide magnesium anodes with minimum No. 8 AWG HMW/PE insulated wire. Each lead wire shall be long enough to extend to the corrosion monitoring test box plus 450 mm of slack without splices. Magnesium anodes shall be prepackaged in a permeable cloth bag with low resistivity backfill mixture selected from the Approved Materials List. Prepackaged magnesium anodes shall be placed a minimum of 1.5 m below the pipe in the trench or an augured hole. Soaking of the anode is not required. Backfill material around the prepackaged anodes shall be as specified for the pipeline trench. Installation shall be in accordance with the plans.

Anodes shall be installed at the locations indicated, with 6 anodes being installed at each of the designated locations. Plastic or paper wrap shall be removed from the anode prior to lowering the anode into the hole. Anodes shall not be suspended by the lead wires. When compacted soil is required and has been placed to the top of the anode and prior to the filling of the hole with soil, a minimum of 37.9 liters of water shall be poured into the hole to saturate the anode backfill and surrounding soil.

The Contractor shall notify the Engineer and the Utility Owner at least 5 working days in advance of his intent to begin work on the installation of anodes.

Backfilling with native soil shall proceed in 150 mm lifts, compacting the soil around the anode during each lift until the backfill has reached grade. Damage to the canvas bag, anode to wire connection, copper wire, or wire insulation will require replacement of entire assembly.

Prepackaged Copper Sulfate Reference Electrodes

Copper sulfate reference electrodes shall be constructed with an ion trap to prevent contamination. The reference electrode shall have a design life of 15 years and a stability of +/- 5 millivolts under a 3.0 microampere load. Provide reference electrodes with minimum No. 10 AWG HMW/PE insulated wire. Each lead wire shall be long enough to extend to the corrosion monitoring test box plus 450 mm of slack without splices. Reference electrodes shall be prepackaged in a permeable cotton cloth bag with low resistivity backfill mixture to protect against the "drying out" type of failure. The backfill mixture shall be composed of 50 percent Gypsum and 50 percent Powdered Bentonite. Reference electrodes shall be placed 300 mm away from the pipe at spring line. Electrodes shall be placed opposite side of the pipe from anodes. Saturate packaged electrode in 18.9 liters of water prior to installation. Backfill material around the electrode shall be as specified for the pipeline trench. Installation shall be in accordance with the plans.

Pipe Joint Bonding Cables

Electrical continuity bonding cables shall be installed across all buried or submerged metallic inline valves, flexible couplings, grooved couplings, pipe joints that are not circumferentially welded, and all other pipe joints except flange joints equipped with insulation gaskets. Where shown on the plans, bonding cables shall be installed in vaults.

Galvanic Isolation

All threaded outlets shall incorporate the use of an insulated ball valve for galvanic isolation of stray current. Threaded outlets may incorporate the use of a nylon isolation bushing for galvanic isolation only with the approval of the Engineer. Where the use of nylon bushings is required, the threaded outlet shall be increased in size to accept the bushing.

Warning/Identification Tape

All cathodic protection test wires, cables and conduit shall include Warning/Identification Tape. Warning/Identification tape materials shall be as referenced elsewhere in these Special Provisions and in accordance with the Approved Materials List.

Test Cable And Bonding Cable

All test cable and bonding cable shall be stranded copper wire with insulation rated at 600 volts. Cable with cut or damaged insulation is not acceptable. All cable shall be of sufficient length to extend from the point of connection to the appropriate corrosion monitoring test box without splices. The cable shall have a 2.8 mm thick, high molecular weight polyethylene (HMW/PE) insulation specifically designed for cathodic protection service and suitable for direct burial in corrosive soil or water, conforming to ASTM D 1248, Type I, Class C, Category 5 (HMW/PE Type CP) Grade E-5 or J-1. Test cable shall have at least 450 mm of slack in the test box. Cable size shall be in accordance with the plans.

Pipe Flange Insulating Kits

All pipe flange-insulating materials shall be of the type designated by the manufacturer as suitable for service at the operating temperatures and pressures of the pipeline.

A. Insulating gaskets shall be full-face dielectric neoprene-faced phenolic.
B. Insulating sleeves shall be full-length phenolic.
C. Insulating washers shall be phenolic.

Pipe flange insulating kits shall be installed at the locations shown on the plans and in accordance with the manufacturer's recommendations. Insulation shall also conform to the National Association of Corrosion Engineer's Recommended Practice RP0286 "Electrical Isolation of Cathodically Protected Pipelines". Particular attention shall be paid to properly align the pipe flanges prior to inserting the bolts with insulating sleeves to prevent cutting of the sleeves and creating an electrical path when the bolts are tightened. Care shall be taken to prevent any moisture, soil, or other foreign matter from contacting any portion of the two mating pipe flanges or gaskets prior to or during installation. If any foreign matter contacts any portion of the insulated pipe flange, the entire pipe joint shall be disassembled, cleaned with a suitable solvent and dried prior to reassembly. Strictly follow the manufacturer's recommendations regarding the torque pattern of the bolts and the amount of torque to be used when installing the pipe flange insulating kit. Conductive grease shall not be used on the flange bolts or any other flange components under any circumstances. Refer to Field Testing below for testing of the flange insulation kits.

Additional Smooth Epoxy Lining At Insulated Pipe Flanges

In addition to the cement mortar lining, at all insulated pipe flanges the interior of the pipe shall be coated with an additional two-part smooth white liquid epoxy lining consisting of 100 percent solids. The interior of the pipe and flanges shall be coated with the two-part smooth epoxy for a distance of two pipe diameters in each direction away from the insulated pipe flange.

A. Surface Preparation: The surface preparation shall consist of wire brushing to remove all rust and scale and to provide a suitable surface for adhesion of the coating in accordance with the manufacturer’s recommendations.
B. Mixing the Coating: The two-part epoxy paint shall be mixed per the manufacturer's recommendations. The two-part epoxy shall be mixed thoroughly for at least two minutes by hand or with a mechanical mixer before being applied by brush.
C. Applying the Coating: The application of the undiluted coating shall be made by brushing until a minimum dry film thickness (DFT) of 0.51 mm is achieved. Each subsequent coat shall be applied before the preceding coat cures, which is normally within 3-6 hours. The application of the coating shall be per the guidelines and at the rate recommended by the coating manufacturer.

Tape Wrap For Aboveground Insulated Pipe Flanges

All aboveground-insulated pipe flanges shall be wrapped with minimum 0.36 mm thick general utility pipeline tape in accordance with the Approved Materials List.

Wax Tape Coating For Buried Insulated Pipe Flanges

All buried insulated pipe flanges shall be coated with a three-part, cold-applied wax tape coating system as described by NACE RP0375 and AWWA C217 in accordance with the Materials List. Wax tape is also required where indicated on the plans.

A. Primer: Primer shall be a blend of petrolatums, plasticizers and corrosion inhibitors having a paste-like consistency. The primer shall have the following properties:

Color Brown	
Pour Point	37.8º C - 43.3º C
Flash Point	176.7º C
Coverage	0.41 liter/m2

B. Wax Tape: Wax tape shall consist of a plastic-fiber felt, saturated with a blend of petrolatums, plasticizers, and corrosion inhibitors, forming a tape coating that is easily form-able over irregular surfaces. The tape shall have the following properties:

Color Brown	
Saturant Pour Point	46.1º C - 48.9º C
Thickness	1.27 - 1.78 mm
Tape Width	150 mm
Dielectric Strength	170 volts/mil

C. Tape Outerwrap: Wrapper shall be a polyvinylidene chloride plastic with three 50-gauge plies wound together as a single sheet. The wrapper shall have the following properties:

Color Clear	
Thickness	0.0381 mm
Dielectric Strength	2000 volts/mil
Tape Width	150 mm
Water Absorption	Negligible

After continuity testing, all flange and pipe surfaces shall be clean and free of all dirt, grease, water or other foreign material prior to the application of the primer, wax tape, and tape outerwrap.

A. Apply primer by hand or brush to all surfaces of the flanges. Work the primer into all crevices, around bolts and nuts, and completely cover all exposed metal surfaces. Extend the primer a minimum of 75 mm onto adjacent surfaces of the pipe or valve.
B. Apply the wax tape immediately after the primer application. Cut short lengths of tape and place completely around each bolt head and nut. Work the tape into the crevices around the bolts and nuts. Wrap the wax tape spirally around the pipe and across the flanges to the other pipe or valve. Cover the entire primed area with wax tape using a minimum overlap of 55 percent of the tape width. Work the tape into the crevices and contours of the irregular shaped surfaces and smooth out so that there is a continuous protective layer with no voids or spaces under the tape.
C. Apply the tape outerwrap to the completed wax tape installation. Wrap spirally around the pipe and across the flanges. Extend the plastic wrap 75 mm past the wax tape using a minimum overlap of 55 percent of the plastic material width to apply two layers of overwrap.

Exothermic Weld Molds And Weld Charges

Wire-to-pipe connections shall be made using exothermic welds. Weld charges and mold sizes for various surface configurations and materials shall be in accordance with the manufacturer's recommendations.

A. Preparation of Cable: Cut cable with a wire cutter to prevent deforming the cable ends. Remove only enough insulation from the cable to allow the weld connection to be made.
B. Preparation of Pipe: The surface of the steel or ductile-iron pipe shall be ground or filed to a bright, shiny, clean and dry surface before welding the cable connection. For cement mortar coated pipe, a nominal 75 mm x 75 mm area of cement mortar shall be chipped off.
C. Attachment of Cable to Structure: The attachment of the cable to the structure shall be made using an exothermic weld. The cable shall be held at a 300 degree to 450 degree angle to the surface when welding. Only one cable shall be attached with each weld. All cable-to-pipe welds shall be a minimum of 75 mm apart. All weld slag shall be removed from the weldment with a wire brush.
D. Weldment Test: After the exothermic weld has cooled, the weld shall be tested by the Contractor for strength, in the presence of the Engineer, by striking the weldment a sharp blow with a 0.91 kg hammer while pulling firmly on the cable. All unsound welds shall be rewelded and retested.
E. Repair Grout: The area to be repaired shall be thoroughly clean and dry. Cement-mortar coating shall be repaired or replaced to original condition by hand-placing cement-mortar repair grout as directed by the Engineer.

Brass Identification Tags

All wires terminating in CP Test Boxes shall be identified with brass tags securely attached to the wires with nylon fasteners. The tags shall be 38 mm in diameter, 1.6 mm thick, and shall be die-stamped with identifying letters and numbers 6.4 mm high.

Care shall be taken to accurately maintain the wire identities. The tags for all test cables shall be stamped with the District or Agency name, the pipeline size, the contents of the pipeline, and the direction of the connection point along the pipe, in accordance with the plans. Copper sulfate reference electrode tags at cathodic test boxes shall be stamped "CuSO4". The tags shall be securely attached to each wire with nylon fasteners prior to pipe backfilling operations.

Corrosion Monitoring Test Stations

Cathodic test station boxes shall be circular precast concrete boxes with ductile-iron covers selected from the Approved Materials List.

All test stations shall be installed behind existing or proposed curbs or otherwise and out of traffic lanes to allow safe access for personnel during testing. Test boxes shall be set and centered in a 600 mm x 600 mm x 150 mm thick concrete slab. A utility marker post shall be installed when indicated in accordance with the plans.

Test Cable

All buried test cable requiring trenching to the test station box location shall be installed, without splices, in a conduit in the trench at a minimum depth of 600 mm. Trenches shall be compacted as specified elsewhere in these Special Provisions. Care shall be taken when installing wire and backfilling trench to prevent damage to the installation. Damaged wire shall be replaced in entirety.

Field Testing

The Contractor shall test the cathodic protection installations in the presence of the Engineer. Contractor shall notify Engineer of proposed test dates and times a minimum of 48 hours in advance. As a practical approach, the Contractor may choose to verify pipe continuity and flange isolation (described in Items A and B below) prior to backfilling as an unofficial test. Official testing shall occur after the backfilling and installation of the test boxes.

A. Pipeline Electrical Continuity Testing: Test the electrical continuity of all sections of pipe to be monitored between each pair of adjacent corrosion monitoring test stations or between the ends of pipe sections less than 152.4 m apart. Each pipe section shall be considered electrically continuous when the measured longitudinal resistance of each pipe section is no greater than 20 percent higher than the theoretical resistance of that section of pipe. If testing indicates inadequate electrical continuity, the Contractor shall excavate to investigate and locate improperly bonded pipe joints and make repairs until electrical continuity is accomplished to the satisfaction of the Engineer.
B. Insulated Pipe Flange Testing: Each insulated pipe flange will be tested for effective electrical isolation of the two mating pipe flanges. The insulated pipe flange shall be judged for effectiveness in accordance with NACE RP0286, Section 7, "Field Testing and Maintenance." The Contractor shall replace or repair any insulated pipe flange assembly until electrical discontinuity is accomplished.
C. Initial Reference CP Potential Measurements: The entire metallic piping system shall be tested to establish the base CP Potential measurement readings. The base data will be used for comparative purposes with future monitoring data. The baseline data shall include voltage measurements (+/- 1mV) between any permanent copper sulfate reference electrodes (+ voltmeter correction) and a reliable portable copper sulfate reference electrode (- voltmeter correction) placed directly in the CP test box.

Cathodic Testing Report

At the completion of the testing, a report of the results will be prepared and presented to the Engineer. The report shall be typed and shall include, at a minimum, test locations, date of tests, name of technician, testing methods, voltage measurements, and theoretical and calculated resistance.

10-4.03 MATERIALS FOR WATER SYSTEM WORK

GENERAL

Waterlines shall consist of PVC pressure pipe, Cement Mortar Lined and Coated (CML&C) steel pipe, steel pipe casings, fittings, closure pieces, supports, bolts, nuts, gaskets, jointing materials, fire hydrants, valves, and appurtenances as required for a complete and operable system.

Pressure rating of pipe and fittings used in connections shall meet of exceed the pressure rating of the mainline pipe.

All piping and above grade appurtenances for the recycled water system installed shall be colored purple, Pantone Color No.522.]

Unless otherwise required in these special provisions or shown on the plans, materials for this project shall be those included on the latest City of San Diego and Otay Water District Approved Materials List.

WATER MAIN

All water pipe and fittings installed as water main shall be Polyvinyl Chloride Pipe (PVC), or Welded Steel Pipe (WS) as shown on the plans.

CEMENT MOTAR LINED AND COATED STEEL PIPE AND SPECIALS

All steel used for pipe or specials shall have a 248 MPa minimum yield point unless otherwise directed by the Engineer. See material information concerning steel designation below.

Design stress in steel cylinders shall not exceed 50 percent of the specified minimum yield strength of the steel used. The internal operating pressure used for design shall be a minimum of 1.38 MPa or as called for on the plans, whichever is greater. If no specific surge analysis has been performed, the internal operating pressure used in circumferential stress calculations shall include at least a 10 percent increase for surge conditions. No allowance shall be made for the tensile strength of the cement mortar lining and coating.

Specials shall be designed per AWWA M11 and as a minimum shall conform to the pressure rating, grade of steel and cylinder thickness of the adjoining standard pipe sections. Fitting dimensions shall conform to AWWA C208. Reinforcing collars, wrappers, crotch plates, and anchor rings shall be designed and fabricated per AWWA M11.

A. Outlets may be built into the wall of the pipe or may be fabricated as steel plate specials. Outlets to be installed on straight pipe lengths shall be welded to the steel cylinder of the pipe prior to application of mortar coating to the cylinder. Outlets of size 50 mm and smaller in piping 100 mm and larger shall be of the threadolet type or shall be extra-heavy half couplings to fit the pipe in accordance with AWWA M11. Outlets shall be 1360 kg WOG forged steel per ASTM A105. Threads shall comply with ANSI B1.20.1. Outlets larger than 50 mm shall use a tee or nozzle with a flanged outlet. All outlets larger than 50 mm in diameter shall be provided with steel reinforcing collars, wrapper plates, or crotch plates per AWWA M11. At the option of the manufacturer, wrappers may be used in place of collars, and crotch plates may be used in place of collars or wrappers.
B. On 50 mm and smaller outlets where nylon insulation bushings are to be used, the outlet shall be increased in size to accept the bushing.
C. Tees, wyes, and crosses shall be dimensioned in accordance with AWWA C208, Table 1, or as modified on the plans.
D. Bends shall have a minimum radius of not less than 2½ times the pipe diameter unless otherwise approved by the Engineer. The maximum deflection at mitered girth seams shall be 22½ degree. At the option of the Contractor, a bend may be welded to the adjacent pipe section.
E. All specials shall be marked at both ends of the fitting with "Field Top" indicators.

Minimum cylinder thickness for pipe and specials shall be 6.35 mm or as directed by the Engineer.

The wall thickness tolerances for steel pipe 300 mm diameter and larger shall be governed by the requirements of the ASTM specifications to which the plates or sheets are ordered, but in no case shall the thickness be less than 6.35 mm or as directed by the Engineer.

Standard pipe sections shall not be less than 6 m nor more than 12 m in length, except where shorter lengths are required to fit horizontal and vertical alignment or are otherwise shown on the plans.

Pipe ends shall be as follows:

A. Bell and Spigot with Rubber Gasket: In accordance with AWWA C200 and AWWA M11. Bell ends that are pressed or rolled shall be limited to maximum pipe diameter of 525 mm nominal.
B. Lap Welded Joints: Use expanded bell with matching spigot end.
C. Flanges: Flanges for use in construction of Steel Pipe shall be as described below.

    1. AWWA C207, Class D flanges (matching ANSI/ASME B16.1, Class 125 flanges for bolt hole size and drilling) shall be used for pressures up to 1.03 Pa.
    2. AWWA C207, Class E flanges (matching ANSI/ASME B16.1, Class 125 flanges for bolt hole size and drilling) shall be used for pressures between 1.03 MPa and 1.72 Map.
    3. AWWA C207, Class F flanges (matching ANSI/ASME B16.1, Class 250 flanges for bolt hole size and drilling) shall be used for pressures between 1.72 MPa and 2.07 MPa or when Class 250 butterfly valves or other appurtenances using flanges corresponding to AWWA C207 Class F are required.
    4. Flanges shall be flat-faced type only. Segmented flanges shall not be used.

D. Butt Straps: Use two-piece rolled steel straps with a minimum thickness of 6.35 mm, and a minimum width of 250 mm. Straps shall be fabricated to snugly fit over the plain pipe ends, and shall be centered over the ends of the pipe sections to be joined. Weld one or more standard 125 mm, 1361 kg threaded half-couplings to the butt strap section as shown on the plans. Provide a threaded steel plug for each half-coupling.
E. Grooved-End or Shouldered Couplings: Use square-cut shouldered or grooved ends per AWWA C606. Grooved-end couplings shall be malleable iron per ASTM A 47, or ductile-iron per ASTM A 536. Gaskets shall be per ASTM D 2000. Nuts and bolts in exposed service shall conform to ASTM A 183, 758.43 MPa tensile strength.

F. Flexible Pipe Couplings: Use plain-end pipe with flexible pipe couplings per AWWA C200. Provide joint harnesses per AWWA M11 where indicated on the plans.

Hand holes shall be provided at each joint to apply mortar to line the inside joint. The liner shall be applied to the joints only after full penetration welds are complete and cooled to ambient temperature.

The Contractor shall tap the outlets for standard pipe thread, weld to the pipe, and weld close after use with solid forged steel plugs.

The plugs shall not project beyond the inner surface of the pipe shell. Retap the pipe thread in the outlet to correct any distortion caused by welding. Apply a seal weld made by at least two passes around the inside or outside of the plug after it has been inserted in final position in the field.

The Contractor shall place 50 mm x 100 mm 18 gage wire mesh reinforcement all around pipe.

The Contractor shall coat outlets, plugs, and closures inside and outside to match the adjacent coated surfaces in the same manner as specified for outlets and as required at field joints in the pipe.

Angles or Curves in Alignment:

Minor changes of direction in the grade or alignment may be made by a deflection in the joint up to a maximum of 19 mm on one side of the joint. For greater angular deflections, pipe with ends beveled up to a maximum of 5 degrees measured from a plane perpendicular to the pipe's axis may be used. The short point on the bevel shall be so marked on the pipe. Pipe length shorter than 6 m may be used on curves. Where curves that have a shorter radius than can be accommodated by beveled pipe are required, or where indicated on the plans, special short-radius bends shall be provided.

Mortar Coating and Lining:

Use coatings and linings conforming to AWWA C205, except as noted below or indicated on the plans. All exterior metal surfaces intended for direct buried service shall be coated. Epoxy exterior coating shall comply with the requirements of subsection 207-10.4.2 of the Utility Standard Specifications and these special provisions.

A. Minimum Coating Thickness shall be as follows:

Coating Thickness	Tolerance
31.8 mm	-1.59 mm, + 3.18 mm

B. Minimum Lining Thickness shall be as follows:

Lining Thickness	Tolerance
19.05 mm	-1.59 mm, + 3.18 mm

All buried cement-mortar coated steel pipes, fittings, and appurtenances associated with the waterlines shall be provided with a shop applied coal tar epoxy overcoat per AWWA C-203 and C-205. The 100 percent solids epoxy shall be applied over the cement-mortar coating to a minimum thickness of 16 mils per AWWA standards.

The exterior surfaces of areas of pipes and fittings that are not mortar coated, such as flanges, grooved ends, or plain ends for butt-straps or flexible couplings, uncoated pipelines installed within the Britannia Blvd. bridge shall be sandblasted in accordance with Steel Structures Painting Council SP10, "Near White Blast Cleaning," and coated in accordance with these Special Provisions.

The term "diameter of pipe" as used in these specifications or as shown on the plans shall mean the net inside diameter of the mortar lining.

Cement-mortar lined and coated steel pipe shall be inspected at the supplier's manufacturing plant by the Engineer. The Contractor shall be responsible for Engineer's expenses, including travel, time, meals and overnight accommodations. Overnight accommodations and air travel may be required, at the discretion of the Engineer, if the manufacturing plant is more than 160 km from the Engineer's office.

In addition to the shop hydrostatic testing performed on pipe cylinders required per AWWA C200, all welds of specials and attachments (i.e. joint rings and nozzles) shall be tested by a dye-penetrate process. Certification of such testing shall be submitted to the Engineer.

Plainly mark each length of straight pipe and each special at the bell end to identify the proper location of the pipe item by reference to the layout schedule.

The top of all pipe and specials shall be clearly identified by marking the top with "T.O.P." for easy identification in the field.

Steel pipe and specials shall conform to the requirements of the AWWA C200 and C205, and AWWA M11, except as modified herein.

Steel for fabricated cylinders shall conform to ASTM A 36/A 36M, ASTM A 283/ A 283M, Grade D, or ASTM A 570/A 570M, Grade 36. Other steel grades may be used only upon approval of the Engineer.

Cement used in mortar lining and coating shall be Portland Cement per ASTM C 150, Type V for coating and Type II or Type V for lining.

Cement-mortar coating shall be reinforced in accordance with AWWA C205.

Cement mortar grout for field joints shall consist of a mixture of 1½ to 2 parts sand to 1 part Type II or Type V Portland Cement with enough clean, potable water to permit packing and troweling without crumbling. The sand shall be washed, well-graded sand such that all will pass a No. 8 sieve. The quantity of water to be used in the preparation of grout shall be the minimum required to produce a mixture sufficiently workable for the purpose intended. Grout shall attain a minimum compressive strength of 12.4 MPa in 28 days.

In certain circumstances, rapid-setting mortar may be required. Acceleration admixtures may be used in the mix as permitted by the Engineer. Calcium chloride shall not be used in the mix.

When the work requires and the size of the pipe allows entry of personnel into the pipe, the Contractor shall comply with all Federal and State regulations for confined space entry. Work inside pipelines shall not be undertaken until all the tests and safety provisions of the Code of Federal Regulations 1910.146, and the General Industry Safety Orders of the California Code of Regulations, Title 8, Section 5159 for confined space entry have been performed and the area is verified as safe to enter. Generally, the aforementioned safety provisions apply to pipe 600 mm and larger. Note that for pipe less than 600 mm diameter, more stringent safety procedures apply.

The Contractor shall furnish and install all pipe, specials, fittings, closure pieces, valves, supports, bolts, nuts, gaskets, jointing materials, and all other appurtenances as shown on the plans and as required to provide a complete and workable installation. Pipe installation shall be as shown on the plans and in accordance with the following:

No pipe shall be installed where the linings or coatings show cracks that may be harmful as determined by the Engineer. Such damaged linings and coatings shall be repaired or new, undamaged pipe sections shall be provided.

Pipe damaged prior to Substantial Completion shall be repaired or replaced by the Contractor.

The Contractor shall inspect each pipe and fitting to insure that there are no damaged portions of the pipe. The Contractor shall remove or smooth out any burrs, gouges, weld splatter, or other small defects prior to laying the pipe.

Before placement of pipe in the trench, each pipe or fitting shall be thoroughly cleaned of any foreign substance which may have collected thereon and shall be kept clean at all times thereafter. For this purpose, the openings of all pipes and fittings in the trench shall be closed during any interruption to the work as noted above.

Pipe shall be laid directly on the bedding material. No blocking will be permitted, and the bedding shall be such that it forms a continuous, solid bearing for the full length of the pipe. Excavations shall be made as needed to facilitate removal of handling devices after the pipe is laid. Bell holes shall be formed at the ends of the pipe to prevent point loading at the bells or couplings and to permit visual inspection of the joint. Excavation shall be made as needed outside the normal trench section at field joints to permit adequate access to the joints for field connection operations and for application of coatings on field joints.

Installation Tolerances: Each section of pipe shall be laid in the order and position shown on the approved layout schedule to the proper lines and grades in accordance with the following:

A. Each section of pipe having a nominal diameter less than 1200 mm shall be laid not to vary more than 50 mm horizontally or 25 mm vertically from the alignment and elevations shown on the plans.
B. Each section of pipe having nominal diameter 1200 mm and larger shall be laid not to vary more than five percent of the pipe diameter horizontally or two and one half percent of the pipe diameter vertically.
C. In addition to the horizontal and vertical tolerances above, lay the pipe so that no high or low points occur along the pipeline other than those shown on the approved layout schedule.

Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the Engineer may change the alignment and/or the grades. Such change shall be made by the deflection of joints, by the use of bevel adapters, or by the use of additional fittings. However, in no case shall the deflection in the joint exceed seventy five percent of the maximum deflection recommended by the pipe manufacturer. No joint shall be deflected any amount that will be detrimental to the strength and water tightness of the finished joint. In all cases the joint opening, before finishing with the protective mortar inside the pipe, shall be the controlling factor.

Pipes shall be laid uphill on grades exceeding 10 percent. Pipe that is laid on a downhill grade shall be blocked and held in place until the following pipe section has been installed to provide sufficient support to prevent movement.

Temporary internal pipe bracing shall be left in place in pipe sizes larger than 600 mm until pipe zone compaction has have been completed. Bracing in pipe smaller than 600 mm may be removed immediately after the pipe has been laid into the trench. The Contractor shall employ a laboratory to monitor pipe deflection by measuring pipe inside diameter before bracing is removed and 24 hours after struts are removed. Pipe deflection shall not exceed 3 percent in 24 hours after the bracing has been removed.

After the backfill has been placed, the struts shall be removed.

Cold Weather Protection: No pipe shall be installed upon a foundation onto which frost has penetrated or at any time that there is a danger of the formation of ice or penetration of frost at the bottom of the excavation. No pipe shall be laid unless it can be established that the trench will be backfilled prior to formation of ice and frost.

Pipe and Specials Protection: The openings of all pipe and specials where the pipe and specials have been mortar-lined in the shop shall be protected with suitable bulkheads to maintain a moist atmosphere and to prevent unauthorized access by persons, animals, water, or any undesirable substance. The bulkheads shall be designed to prevent drying out of the interior of the pipe. The Contractor shall introduce water into the pipe to keep the mortar moist where moisture has been lost due to damaged bulkheads.

TAPE COATING AND ROCK SHIELD

Tape coated steel pipe shall have a 19 mm cement mortar rock shield conforming to AWA C-209. The coating system for straight line pipe shall be in accordance with AWWA Standard C-214. The tape system shall consist of at least three layers consisting of the following:

A. Primer Layer.
B. Inner Layer Tape - Corrosion Protective Tape (0.5 mm) with (black) exterior.
C. Outer Layer Tape - Mechanical Protective Tape (0.75 mm) with (gray) exterior.
D. Outer Layer Tape - Mechanical Protective Tape (0.75 mm) with (white) exterior.

The total thickness of the tape coating shall be at least 80 mils. The coated pipe shall be tested and inspected in accordance with AWWA C214, certified reports of the testing and inspection shall be submitted to the ENGINEER. The CONTRACTOR and/or manufacturer shall submit a list of the tape coating materials to be used which indicates manufacturer, product numbers, and manufacturer recommended thickness of material. For each material, technical data sheets shall be submitted which indicate technical and performance information per AWWA C214.

POLYVINYL CHLORIDE (PVC) PRESSURE PIPE

Polyvinyl chloride pressure pipe shall conform to the Utility Standard Specifications and these special provisions.

PVC pipe shall conform to AWWA C900 and C905 pipe with rubber ring bell end or plain end with rubber ring coupling. Couplings for plain pipe shall be furnished with two elastomeric gaskets. Solvent welded joints are not permitted. Provide pipe with cast iron equivalent outside diameter and class SDR 18 and SDR 14 pressure rating as shown on the plans. For 100 mm thru 300 mm PVC, deflections at the joints shall not be permitted. Curves and deflections shall be made only with the use of high deflections C900 PVC couplings or the approved ductile iron fittings. The maximum deflection per coupling shall be per the manufacturer's recommendation. The working/shop plans shall clearly indicate the location of the couplings and the pipe lengths. Minimum allowable radius for PVC pipe, using deflector couplings shall be per the manufacturer's recommendation. Less than 3 m pipe length shall not be permitted within the radius.

Pipe Length	Minimum Allowable Radius
7 m	75 m
3 m	35 m

The minimum SDR rating shall be 35.

Mechanical joint fittings shall be used and shall conform to AWWA: C 153 and AWWA: C 111 of the latest edition. Bolt holes in the flanges of the mechanical joint fitting shall straddle the vertical centerline of the fitting. The fitting shall be cement-mortar lined in accordance with AWWA C 104. The outside shall be polyethylene-encased in accordance with the requirements of AWWA C 105. Gland shall be made of ductile iron and shall be factory-stamped. Ductile iron from which the glands are cast shall have a minimum elongation of 5 percent. Bolts shall be tee heads made of high-strength low-alloy steel or ductile iron per AWWA C 111.

Installation of mechanical joints shall conform to Appendix A of AWWA: C 111. Bolts and nuts shall be coated with rust-preventative grease.

Solvent cement joints or push or push-on fittings shall not be used.

FIRE HYDRANTS

Fire hydrants shall conform to the provisions of AWWA C503, "Wet Barrel Fire Hydrants," and to these special provisions.

Valve seats and stem guides may be threaded or cast into the hydrant body or may be secured to the body by means of a lock nut.

Unless otherwise specified, fire hydrants for residential areas shall have one 100 mm port and one 64 mm port. Fire hydrants for commercial and industrial areas shall have one 100 mm port and two 64 mm ports.

Hydrant valves shall be opened counter-clockwise.

Threads for pumper and hose nozzles shall conform to the American National Standard adopted by the American Insurance Association (formerly the National Board of Fire Underwriters) and the National Fire Protection Association published in pamphlet No, 194, Fire Hose Couplings, by N.F.P.A. in 1968.

Outer end of all hose coupling threads shall be terminated by the blunt start of "Higbee Cut" on full thread (to avoid crossing thread).

Hydrant body base flange shall be drilled in a 243 mm bolt circle with six bolt holes, 22 mm in diameter oriented to the center of the pumper connection.

Hydrant bodies may be solid bronze.

Valves stems shall have a pentagon end and shall have a short radius of 13 mm to center of flat sides.

Hydrant components made from brass or bronze shall be of a grade containing not more than 16 percent zinc and not more than 2 percent aluminum as specified in Section 2.6.4 of the AWWA C503 for waters with specific conductance exceeding 350 micro Mho per centimeter.

Exterior surfaces shall be painted with a zinc chromate primer of the same color as the finished coat. The finished coat shall be of a chrome yellow enamel meeting the requirements of Federal Specification TT-C595, Color No. 13538.

A.B.S. plastic fire hydrant caps are acceptable replacements for bronze or cast iron caps, when approved by the Engineer.

SALVAGE FIRE HYDRANT

All material removed for the existing fire hydrant lines, except gate valves and fire hydrant heads shall become property of the Contractor at the time of its removal from the trench, unless otherwise specified or shown on the plans. Such material shall no be allowed to accumulate along the line of work, but shall be removed from the area at the earliest practical time. All valves and fire hydrant heads shall be salvage and returned to the Engineer.

RELOCATE HYDRANTS

Existing fire hydrants to be relocated shall be reposition as shown on the plans, these special provisions and the Utility Standard Specifications.

All material removed from existing fire hydrant lines, except gate valves, shall become the property of the Contractor at the time of its removal from the trench unless otherwise specified or shown on the plans. Such material shall not be allowed to accumulate along the line of work but shall be removed from the area at the earliest practical time. All valves shall be salvaged and returned to the Engineer.

MODIFY FIRE HYDRANTS

Existing fire hydrants to be modified shall be adjusted as shown on the plans, these special provisions and the Utility Standard Specifications.

All material removed from existing fire hydrant lines, except gate valves, shall become the property of the Contractor at the time of its removal from the trench unless otherwise specified or shown on the plans. Such material shall not be allowed to accumulate along the line of work but shall be removed from the area at the earliest practical time. All valves shall be salvaged and returned to the Engineer.

RECONNECT EXISTING FIRE HYDRANTS

Existing fire hydrants to be reconnected shall be reconnected as shown on the plans, these special provisions and the Utility Standard Specifications.

All material removed for the existing fire hydrant lines, except gate valves, shall become the property of the Contractor at the time of its removal from the trench, unless otherwise specified or shown on the plans. Such material shall not be allowed to accumulate along the line of work, but shall be removed from the area at the earliest practical time. All valves shall be salvaged and returned to the Engineer.

STEEL PIPE CASING

Steel pipe casing shall be butt-welded sheets conforming to ASTM A36/A 36M, ASTM A 283/A 283M, Grade D or ASTM A 570/A570M, Grade 33. Pipe casing shall not be spiral welded.

The thickness of the pipe casing shall be as specified on the contract plans.

Pipe casing shall be lined and coated with hot applied coal tar enamel per AWWA C203, Type II. Coating and lining thickness shall be 2.3 mm minimum in the interior. Casing shall be 18.8 mm cement mortar coated on the exterior.

Casing end seals shall be a standard one piece pull-on S-shaped seal for easy installation to provide a barrier for backfill material and seepage. The end seals shall be of a synthetic rubber material with band locating ribs on the exterior and sealing

ribs on the inside under the bands to prevent leakage. Stainless steel band clamps shall be used to attach the end seals to the casing and carrier pipe.

FLANGED COUPLING ADAPTORS

Flanged coupling adapters shall be installed in accordance with the manufacturer's recommendations. Bolts shall be tightened with a torque wrench in the presence of the Engineer to the torque recommended by the manufacturer.

FLEXIBLE PIPE COUPLINGS

Flexible pipe couplings shall be in accordance with the Approved Materials List and as described below:

A. Steel Couplings shall have middle rings made of steel conforming to ASTM A 36/A 36M, A 53 (Type E or S), or A 512 having a minimum yield strength of 207 MPa. Follower rings shall be ductile-iron per ASTM A 536, or steel per ASTM A 108, Grade 1018 or ASTM A 510, Grade 1018. Minimum middle ring length shall be 175 mm for pipe sized 150 mm through 600 mm.
B. Sleeve bolts shall be made of stainless steel per ASTM A193 and shall have a minimum yield strength of 276 MPa, an ultimate yield strength of 414, and shall conform to AWWA C111.
C. Flexible pipe couplings shall be installed in accordance with the manufacturers recommendations and as described below:

    1. Use plain-end pipe with flexible couplings per AWWA C200. Provide joint harnesses per AWWA M11 for aboveground applications or where indicated on the plans.
    2. Flexible couplings may be used only where indicated on the plans.
    3. Clean oil, scale, rust, and dirt from the pipe ends and touch-up the epoxy coating and allow time for curing before installing the coupling. Clean the gaskets before installing.
    4. Follow the manufacturer's recommendations for installation and bolt torque using a properly calibrated torque wrench.
    5. Lubricate the bolt threads with graphite prior to installation.
    6. All flexible couplings shall be bonded along the entire buried length of metallic pipe.

GROOVED END OR SHOULDERED COUPLINGS FOR DUCTILE IRON OR STEEL PIPE

Grooved end or shouldered couplings shall be in accordance with the Approved Materials List and as described below:

Use square-cut shouldered or grooved ends per AWWA C606. Grooved-end couplings shall be malleable iron per ASTM A 47, or ductile iron per ASTM A 536. Gaskets shall be per ASTM D 2000.

Bolts in exposed service shall conform to ASTM A 183, 69 MPa tensile strength.

Grooved-end or shouldered couplings shall be installed in accordance with the manufacturer’s recommendations and as described below:

A. Grooved-end or shouldered joint couplings shall be installed per AWWA C606 and the manufacturer's recommendations.
B. Clean loose scale, rust, oil, grease, and dirt from the pipe or fitting groove and touch-up the epoxy coating as necessary, allowing time for curing before installing the coupling.
C. Clean the gasket before installation. Apply a lubricant selected from the Approved Materials List to the gasket exterior including lips, pipe ends, and housing interiors.
D. Fasten the coupling alternately and evenly until the coupling halves are seated. Follow the manufacturer’s recommendations for bolt torque using a properly calibrated torque wrench.

BLOWOFF ASSEMBLIES

Blowoff assemblies shall be installed on potable and recycled water mains.

Blowoff assemblies shall be sized and located as shown on the plans. In general, blowoff assemblies will be installed at the ends and at low points of pipelines as shown below:

A. 50 mm blowoff assemblies will be required on pipelines for temporary use or as otherwise directed by the Engineer.
B. 100 mm blowoff assemblies will be required on pipeline sizes 400 mm and smaller.
C. 150 mm blowoff assembly will be required on pipeline sizes 450 mm and larger.

All blowoff assemblies shall be installed in accordance with the plans at locations noted on the plans and at such additional locations as required by the Engineer for the removal of water or sediment from the pipeline.

All materials shall conform to the applicable requirements of "Approved Materials List" specified elsewhere is these Special Provisions.

Blow-off assemblies shall be installed within a section of the pipe no closer than 600 mm to a bell, coupling, joint, or lining. Blow-off assemblies shall be installed at the end of all pipe lines, regardless of the length, and at low points of the pipe line as shown in the contract plans.

Blow-off assemblies shall be disinfected, hydrostatically tested and coated in accordance with requirements listed elsewhere in these Special Provisions.

AIR RELEASE VALVE, AIR VACUUM VALVE

Combination air valves are generally installed on all potable and recycled water mains where shown on the plans.

Unless otherwise directed by the Engineer, combination air valves will be required as indicated below:

A. 50 mm combination air valve assemblies shall be installed on pipeline sizes 150 mm through 300 mm.
B. 100 mm combination air valve assemblies shall be installed on pipeline sizes 400 mm through 500 mm.
C. 150 mm combination air valve assemblies shall be installed on pipeline sizes 600 mm through 900 mm

Air release valves and air and vacuum valves shall be installed in accordance with the plans or as directed by the Engineer.

Combination air valves and appurtenant components and materials suitable for the system pressure shall be as manufactured by Apco or Val-Matic selected from the Approved Materials List.

Combination air valves shall comply with AWWA C512 except as modified herein.

50 mm combination air valves shall be the single-body type incorporating stainless steel internal components and National Pipe Threaded (NPT) inlet and outlet configurations.

100 mm and 150 mm Combination Air Valves shall be the single-body type. Valves shall incorporate stainless steel internal components, protective hood and flanged inlet.

Internal protective epoxy coatings shall be provided in accordance with AWWA C550.

Air release valves and air and vacuum valves shall be provided only as specifically shown on the plans. Air release valves, and air and vacuum valves and appurtenant components and materials suitable for the system pressure, shall be selected from the Approved Materials List.

Air release valves and air and vacuum valves shall comply with AWWA C512 except as modified herein.

50 mm air release valves and air and vacuum valves shall be the single-body type incorporating stainless steel internal components and National Pipe Threaded (NPT) inlet and outlet configurations.

100 mm and 150 mm air release valves and air and vacuum valves shall be the single-body style. Valves shall incorporate stainless steel internal components, protective hood and flanged inlet.

Epoxy linings and coatings for valves shall be provided in accordance with AWWA C550.

A. Liquid epoxy lining and coating materials shall be listed in the NSF Listing for Drinking Water Additives, Standard 61, certified for use in contact with potable water.
B. The minimum dry film thickness for epoxy linings shall be 0.203. Liquid epoxy lining shall be applied in two (2) coats in accordance with AWWA C210.

Combination air valves, air release valves and air and vacuum valves sized 100 mm and larger shall be installed with break-away bolts in accordance with the plans and selected from the Approved Materials List.

Air valve assemblies shall be provided as shown on the plans. Additional air valve assemblies may be required in areas of potential air entrapment, at the discretion of the Engineer.

Air valve assemblies shall be installed relative to street improvements in accordance with the plans.

Connections for the air valve assemblies shall be made within a section of the main line no closer than 600 mm to a bell, coupling, joint or fitting.

Air valve assemblies shall be disinfected in conjunction with disinfecting the main to which it is connected. The assembly valves shall be operated and the assembly flushed to completely disinfect all internal parts.

Air valve assemblies shall be hydrostatically tested in conjunction with the pipeline to which they are connected.

MANHOLE FRAMES AND COVERS

Manhole frames shall be 900 mm in diameter with two concentric covers made of cast-iron in accordance with ASTM A 48, Class 30, the Standard Plans and the Approved Materials List. Locking frames and covers, in accordance with the Standard Plans, may be required as determined by the District Engineer.

Frames and covers shall be designed for H-20 highway wheel loading.

Covers shall have the words "'OTAY WATER DISTRICT or CITY OF SAN DIEGO' and 'WATER' or 'RECYCLED WATER'" cast into the cover as appropriate by the application. No other lettering will be permitted on the top portion of the cover.

Castings shall be smooth, clean, and free from blisters, blowholes, and shrinkage. Mating surfaces of the frame and cover shall be machined to prevent movement of the lid. Frames and covers shall be match marked in sets before shipping to the site.

All castings shall be dipped twice in a preparation of asphalt of coal tar and oil applied at a temperature of not less than 143.3 degrees C nor more than 154.4 degrees C and in such a manner as to form a firm and tenacious coating.

VALVE BOX AND EXTENSION STEMS

Valve Stem Extensions shall be installed when the valve operating nut is more than 1.5 m below grade. Stem extensions shall be of sufficient length to bring the operating nut to a point between 300 mm and 450 mm below the gate well lid.

Stem extensions shall be complete with operating nut, location ring, and lower socket to fit valve-operating nut. The configuration of the extension stem nut shall match that of the valve it operates.

Stem extensions shall be square fiberglass tubing glued together to make a continuous one-piece unit used to a maximum length of 2.4 m.

Steel stem extensions shall be used where the maximum length of the extension exceeds 2.4 m or at the request of the Engineer. Steel stem extensions may be round or square hot-dipped galvanized steel tubing of solid design (no pinned couplings permitted) with guides.

GATE WELLS

Gate wells shall be installed as shown on the plans and as described below.

Gate wells shall be installed with lids flush with the final surface. No more than two 25 mm adjustment rings shall be used. Gate wells and adjustment rings shall be accurately cut perpendicular to the length of the piping used.

Gate wells shall be color coated to identify the type and use of the valve installed.

A. The inside portion of the gate well lid and interior portion of PVC gate well shall be identified with a minimum 50 mm diameter painted identification marking.
B. Paint color shall be as follows:

    1. Color Gate Well Lid and PVC Gate Well for:

Red	Normally Closed System Valves (NCV)
White	Resilient Wedge Gate Valves (RWGV)
Green	Butterfly Valves (BFV)

C. The top exterior portion of the gate well lid and ring shall be coated in accordance with these Special Provisions.

GATE VALVES – RESILIENT WEDGE

Resilient wedge gate valves (RWGV's) shall be installed on potable and recycled water mains and appurtenances in accordance with the plans.

Resilient wedge gate valves shall be used for open/closed operations, throttling service and frequent operation after long periods of inactivity.

In general, resilient wedge gate valves shall be used when valves are required on pipelines and appurtenances 100 mm through 300 mm

Valves for pipelines sized 400 mm and larger generally require the use of butterfly valves (BFV) in accordance with these Special Provisions.

The following items shall be submitted for review and approval by the Engineer prior to ordering or delivery of resilient wedge gate valves:

An affidavit from the valve manufacture stating that valves have successfully passed hydrostatic tests in accordance with AWWA C509 and manufacturer's own coatings tests.

The valve manufacturer's catalog data showing the size to be used, valve dimensions, pressure rating and materials of construction.

Manufacturer's catalog data and proof of NSF certification for the lining materials to be used.

Valves shall be the same size as the line in which they are installed unless otherwise noted on the plans.

Valve ends shall be compatible with the piping system in which they are being installed in accordance with the plans or directed by the Engineer.

Resilient wedge gate valves shall be hydrostatically tested and valve coatings shall be holiday detected prior to shipment to the field in accordance with the testing procedures described elsewhere in these Special Provisions. Valves delivered to the site prior to successful hydrostatic testing and holiday detection shall be subject to rejection.

Valves shall be delivered and stored in accordance with AWWA C550. The port openings shall be covered with plastic, cardboard or wood while in transit and during storage in the field. These covers shall remain in place until valves are ready to be installed. Valves shall not be stored in contact with bare ground. Valves shall not be stacked.

Polyethylene wrap shall be used for the buried installation of resilient wedge gate valves.

Resilient wedge gate valves and appurtenant components and materials shall be selected from the Approved Materials List.

RWGV's shall be ductile-iron in accordance with AWWA C509 and C515 except as modified herein.

Each valve shall have a smooth unobstructed waterway free from any sediment pockets.

All RWGV's shall be leak-tight at their rated pressure.

RWGV's shall have a non-rising low-zinc bronze or stainless steel stem, opened by turning left (counterclockwise).

Stem seals shall be the O-ring type incorporating a minimum of two rings as required by AWWA C509.

Low-friction torque-reduction thrust washers or bearings shall be provided on the stem collar.

Wedge (gate) shall be fully encapsulated with a bonded-in-place Nitrile elastomer covering. Minimum thickness of the rubber seating area shall be 6.35 mm.

Valves for buried applications shall be provided with a 50 mm square operating nut, and valves located above ground or in structures shall be equipped with a hand wheel in accordance with AWWA C509 unless otherwise indicated on the plans.

RWGV interior and exterior surfaces (except for the encapsulated disc) shall be coated as described below:

A. All bolts and nuts used in the construction of RWGV's shall be Type 316 stainless steel.
B. Epoxy linings and coatings for valves shall be provided in accordance with AWWA C210, C213 and C550, with the following modifications:

    1. Epoxy lining and coating of valve surfaces shall be performed by the manufacturer in a facility with qualified personnel, where the environment can be controlled. Epoxy lining and coating of valves in the field is prohibited.
    2. Repairs made to manufactures applied coatings shall be performed in a facility with qualified personnel, where the environment can be controlled. The facility shall be approved by the valve manufacturer.
    3. Surface preparation shall be in conformance with the requirements in Surface Preparation Specification No. 5, "White-Metal Blast Cleaning," of the Steel Structures Painting Council.
    4. Liquid epoxy lining and coating materials shall be listed in the NSF Listing for Drinking Water Additives, Standard 61, certified for use in contact with potable water.
    5. The minimum dry film thickness for epoxy linings shall be 0.203 mm Liquid epoxy lining shall be applied in two (2) coats in accordance AWWA C210.
    6. Powder epoxy coating materials shall contain one hundred percent solids, in accordance with AWWA C213.

Gate wells and extension stems for buried valves shall be selected from the Approved Materials List.

Polyethylene wrap shall be in accordance with and selected from the Approved Materials List.

Install valves with the bolt holes straddling the vertical centerline of pipe and the operating nut in the vertical position unless otherwise noted on the plans.

Valves shall be installed in accordance with the manufacturer's recommendations and the applicable section of these specifications for the piping material and joint type being used.

Installation of polyethylene wrap for buried valves shall be in accordance with the plans.

Concrete thrust, anchor, and support blocks shall be installed in accordance with the plans. The concrete shall be placed so that valves and valve operators will be accessible for repairs or replacement.

Gate wells and extension stems for buried valves shall be installed in accordance with the plans.

Disinfections and flushing of valves shall be completed as part of the process of disinfecting the main pipeline. The valves shall be operated during the disinfection period to completely disinfect all internal parts.

Valves shall be hydrostatically tested in conjunction with the pipeline in which they are installed.

The exterior of valves installed above ground or exposed in vaults or enclosures shall be field painted in accordance with these Special Provisions.

BUTTERFLY VALVES

Butterfly valves (BFV) shall be installed on potable and recycled water mains and appurtenances where shown on the plans.

Butterfly valves shall be used for open/closed operations and throttling service and frequent operation after long periods of inactivity.

In general butterfly valves shall be used when valves are required on pipelines 400 mm and larger and where the use of a motor-operated valve is required as shown on the plans. Butterfly valves smaller than 400 mm shall only be used as indicated on the plans or with the prior approval of the Engineer.

Valves for pipelines sized 300 mm and smaller generally require resilient wedge gate valves (RWGV's).

Valve ends shall be flanged ductile-iron unless otherwise called for on the plans or as directed by the Engineer. Ductile-iron flanges shall generally be in accordance with AWWA C115, rated at a working pressure of 1,724 kPa. When Class 250 butterfly valves are shown on the plans or are otherwise required, ductile-iron flanges shall be compatible with AWWA C207, Class "F".

Maximum working pressure of the flange shall as specified in AWWA or ASME/ANSI. Flanges shall be integrally cast per AWWA C110.

Butterfly valves shall be hydrostatically tested and coatings holiday detected prior to shipment to the field per testing procedures described elsewhere in these Special Provisions. Valves delivered to the site prior to successful hydrostatic testing and holiday detection will be subject to rejection.

Butterfly valves and appurtenant components and materials shall be selected from the Approved Materials List.

Butterfly valves shall be short body, leak-tight closing, and rubber-seated in accordance with AWWA C504 except as modified herein.

Except as modified below, BFV's shall be Class 150B in accordance with AWWA C504, rated for a flow velocity of 4.9 m/s.

Where the static pressure of the pipeline in which the BFV is to be installed exceeds 1.03 MPa, a Class 250B butterfly valve in general conformance with AWWA C504 shall be required. Class 250B butterfly valves shall be submitted to the Engineer for approval prior to ordering or delivery.

Butterfly valves shall open by turning left (counterclockwise). Valve disc shall rotate ninety degrees from the full open position to the tight shut position.

Butterfly valve interior and exterior surfaces shall be coated as described below:

Manual Valve Actuators:

A. All valve actuators shall be watertight, designed for buried or submerged uses. Actuators shall be fully gasketed, sealed, and factory packed with grease.
B. As directed by the Engineer, actuators for valves located above ground or in vaults and structures may have hand wheels or chain wheels. Minimum hand wheel diameter shall be 300 mm. The actuator shall be equipped with a dial indicator, which shows the position of the valve disc. The Engineer may require the use of a 50 mm square operating nuts in some cases.
C. Actuators for valves shall be provided with a 50 mm square-operating nut when buried or when indicated on the plans.
D. Actuators shall have travel stops, which can be adjusted in the field without having to remove the actuator from the valve.
E. Actuators shall be sized for opening and closing the valve at the valve's full rated working pressure and at a flow velocity of 4.9 m/s.
F. Actuators shall accept a minimum of 407 Nm of input torque at the full open and full closed positions without damage to the actuator or the valve.
G. Actuators equipped with 50 mm operator nuts shall require a maximum input torque of 203 Nm to operate the valve. A maximum input torque of 108 Nm shall be required to operate valves with hand wheels.
H. Actuators shall be of the same manufacturer as the valve where possible or as directed by the Engineer.
I. Actuators shall be installed, adjusted, tested and certified by the valve manufacture prior to shipping.
J. Actuators shall require a maximum of one hundred (100) input turns for the complete ninety-degree movement of the disc.
K. Actuators shall receive an epoxy coating on the exterior surface as described below.

Traveling nut actuators:

A. Actuators for butterfly valves sizes 400 mm through 600 mm may be the manual traveling nut type. Traveling nut actuators shall not be used on valves requiring motor driven actuators or where the Engineer has specified a worm gear type actuator.
B. Actuators shall be capable of producing the below listed output torque at the closed position:

Valve Size in mm	Output Torque Nm
400	2779
450	3729
500	3729
600	6372

Worm Gear Type Actuators:

A. Actuators for butterfly valves 750 mm or larger shall be the worm gear type. In addition, worm gear type actuators shall be used on butterfly valves requiring motor driven actuators or where the Engineer has specified a worm gear actuator.
B. Worm gear actuators shall be totally enclosed and self-locking.

Epoxy linings and coatings for valves and actuators shall be provided in accordance with AWWA C210, C213 and C550, with the following modifications:

Epoxy lining and coating of valve surfaces shall be performed by the manufacturer in a facility with qualified personnel, where the environment can be controlled. Epoxy lining and coating of valves in the field is prohibited.

Repairs made to shop-applied coatings shall be performed in a facility with qualified personnel, where the environment can be controlled. The facility shall be one that is approved by the valve manufacturer.

Surface preparation shall be as detailed in Steel Structures Painting Council SP5, "White Metal Blast Cleaning."

Liquid epoxy lining and coating materials shall be listed in the NSF Listing for Drinking Water Additives, Standard 61, certified for use in contact with potable water.

The minimum dry film thickness for epoxy linings shall be 0.203 mm. Liquid epoxy lining shall be applied in two (2) coats in accordance AWWA C210.

Powder epoxy coating materials shall contain one hundred percent solids, in accordance with AWWA 213.

METER BOXES

Meter boxes shall be used for 25 mm and 50 mm water meters and blowoff assemblies for water and recycled water systems.

Meter boxes shall be sized for the specific meter size or size of blowoff assembly as indicated on the plans.

Meter boxes shall be polymer-type boxes with lids selected from the Approved Materials List.

Meter box sizes shall be as follows:

Meter Box Size	Meter Box Uses
250 mm x 500 mm	25 mm water services
425 mm x 750 mm	50 mm water services and 50 mm through 150 mm blow-off assemblies

Meter box lids for use in potable water system applications shall be gray.

Meter box lids for use in recycled water system applications shall be purple.

Meter boxes shall be installed at the elevations and locations shown on the plans and in accordance with the plans. Near the completion of the project, a final meter box adjustment to finish grade may be required. Water meters shall not be installed until final adjustments are made to the meter box and approved by the Engineer.

50 MM COPPER PIPE FOR SERVICES LINES

50 mm copper pipe for future water meter as shown on the plans shall be furnished and installed in conformance with the provisions in Section 20-5, "Irrigation System," of the Standard Specifications and shall conform to the requirements of ASTM B 88 or ASTM B 88 M (Metric), Type A seamless water tube. Copper tubing shall be soft or rigid. Components shall be selected from the proper Approved Materials List in accordance with the plan details.

FIRE HYDRANTS

Fire hydrants shall be installed on potable water mains only. Fire hydrants shall not be installed on recycled water mains.

Wet-barrel hydrants shall generally be used for pressures up to 1.38 MPa.

System pressures up to and including 1.03 MPa require standard wet-barrel hydrants, and pressures up to 1.38 MPa require high-pressure wet-barrel hydrants in accordance with the Approved Materials List.

Dry-barrel hydrants shall generally be used for pressure ranges in excess of 1.38 MPa up to 1.72 MPa as specifically shown on the plans.

Hydrant outlet sizes and configuration shall be as shown on the plans or as directed by the fire department of jurisdiction. Hydrants shall generally have the following number and size of outlets as directed by the fire department of jurisdiction:

A. Residential: One 64 mm outlet and one 100 mm outlet
B. Commercial: Two 64 mm outlets and one 100 mm outlet.
C. Industrial: One 64 mm outlet and two 100 mm outlets.

Fire hydrants shall be delivered and stored in accordance with AWWA C210, AWWA C213, and AWWA C550. The port openings shall be covered with plastic, cardboard or wood while in transit and during storage in the field. These covers shall remain in place until the valve is ready to be installed. Fire hydrants shall not be stored in contact with bare ground. Fire hydrants shall not be stacked.

Fire hydrants and appurtenances shall be selected from the Approved Materials List.

Dry-barrel fire hydrants shall comply with AWWA C502 and these specifications unless otherwise indicated on the plans.

Wet-barrel fire hydrants shall comply with AWWA C503 and these Special Provisions unless otherwise indicated on the plans.

The interior of ductile-iron hydrants shall be fusion-epoxy lined per AWWA C550.

All outlets shall be provided with National Standard Fire-Hose Threads. Outlets shall be equipped with brass or ductile iron caps with chains.

Wet-barrel fire hydrant flanges and appurtenant bury ells and spools shall incorporate a six-hole bolt pattern.

Fire hydrant break-off check valves shall be in accordance with the Approved Materials List.

Hydrant flange bolts and nuts shall be selected from the Approved Materials List.

Wet barrel fire hydrants not equipped with break-off check valves shall be installed with break-away flange bolts selected from the Approved Materials List. The hollow shafts of break-away bolts shall be filled with silicone sealant. Bolts and nuts shall be zinc-plated A307 carbon steel.

Fire hydrant assemblies shall be installed at locations shown on the plans or as directed by the fire department of jurisdiction in accordance with the plans.

The location and port orientation of the Fire Hydrant shall be in accordance with the plans.

Fire hydrant flange bolts shall be set with nuts on top. Torque nuts uniformly and progressively in accordance with the manufacturer's recommendations. Fill the hollow bolt shafts of break-away bolts with silicone sealant.

Depending on location, fire hydrant assemblies may require protection posts or concrete retaining walls. When required by the Engineer, or when shown on the plans, protection posts or retaining walls shall be installed in accordance with the plans.

The fire hydrant assembly shall be disinfected as part of the process of disinfecting the main pipeline. The assembly valves shall be operated and the assembly flushed to completely disinfect all internal parts.

Fire hydrant assemblies shall be hydrostatically tested in conjunction with the pipeline to which it is connected.

The fire hydrant exterior shall be field painted in accordance with the Special Provisions.

10-4.04 WATER SYSTEM MEASUREMENT AND PAYMENT

MEASUREMENT

Water system work performed under these Special Provisions will be designated in the contract item by size, type, thickness, quality, or whatever information is necessary for identification.

The lengths of the various sizes and types of water pipe and welded steel pipe casing to be paid for will be determined by the meter from actual measurements along the centerline of the pipe in place in the completed work. Pipe placed in excess of the length designated by the Engineer will not be paid for. When pipes are cut to fit a structure, the quantity to be paid for will be the length of pipe placed before cutting, measured in one meter increments.

Fittings, including double ball joints and flexible couplings which increase the length of the water pipe and for which no separate contract item is provided, will be measured by the meter for the size of water pipe involved. Fittings will be measured along centerlines to the point of intersections.

Quantities of the various sizes and types of valve, valve assemblies, flexible expansion joints, cathotic and anode cathodic stations, couplings, blow off assemblies (including enclosure), and combination air vacuum assemblies, (including enclosure), fire hydrant assembly, to be paid for will be determined as units from actual count in the completed work.

PAYMENT

Items of work measured as provided in these Special Provisions will be paid for at the contract prices per meter for the various sizes and types of water pipe and casing, at the contract prices per unit for the various sizes and types of valve

assemblies, flexible expansion joints, cathotic and anode cathodic stations, blowoff assemblies (including enclosure), and combination air vacuum assemblies (including enclosure), fire hydrant assembly.

Full compensation for reconnect existing fire hydrant, modify fire hydrant, salvage fire hydrant, reconnect air valve, reconnect 50 mm water service, connect new mains to existing mains, cut off walls, temporary blow-off assemblies, flexible couplings and double ball joints, disinfect water mains and water pressure test, remove water mains for installation of new water pipe, casing end seal, and salvage materials involved in constructing the water main shall be considered as included in the contract prices paid for the various sizes and types of water and no separate payment will be made therefore.

Abandon water pipe, and abandon water services will be measured and paid for as abandon pipe lines.

Full compensation for the various sizes and types of anchor blocks, thrust blocks, and support blocks, adapters, services and disposal of friable and non-friable material involved in constructing the water mains shall be considered as included in the contract prices paid for the various items of water mains and no separate payment will be made therefore.

When imported backfill is ordered by the Engineer, it will be paid for as extra work as specified in Section 4-1.03D of the Standard Specifications.

Full compensation for furnishing all labor, materials (including metallic tape locator for non-metallic water pipe), tools, equipment, and incidentals, and for doing all the work involved in relocating the water system, complete and in place shall be considered as included in the prices paid for the various contract items of water systems relocation involved, and no additional compensation will be allowed therefore.

Full compensation for protective work operations required to accommodate or safeguard public traffic or existing facilities (including fencing) and for all trenching and shoring, control of water in and outside the excavations and trenches, shall be considered as included in the prices paid for the various contract items of water systems relocation involved, and no additional compensation will be allowed therefore.

10-4.05 INSTALLATION AND RELOCATION OF SEWER FACILITIES

GENERAL DESCRIPTION

Installing force main, gravity sewer, pipe casings, and appurtenances, shall consist of constructing and installing new facilities and relocation of existing facilities, owned by the City of San Diego, in accordance with the provisions of the following publications: "Greenbook" Standard Specifications for Public Works Construction, 2003 edition, herein known as the "Utility Standard Specifications"; Regional Supplement to "Greenbook" Standard Specifications for Public Works Construction, 2003 edition; Sections 1 through 9, Section 15, "Existing Highway Facilities", and Section 70, "Miscellaneous Facilities", of the State Standard Specifications; the details as shown on the plans; these Special Provisions; and as directed by the Engineer.

Except for Sections 15 and 70, Sections 10 through 95 of the State Standard Specifications shall not apply to the work in this Section 10-4 except when specific reference is made thereto.

If parking is to be restricted during construction, the Contractor shall post "Tow-Away/No Parking" signs 24 hours in advance after receiving approval from the Engineer. The sign shall contain "days/hours" information and be posted so as to be reasonably seen by the public.

The Contractor shall notify the Engineer 3 working days in advance of any lane, street or alley closures or implementing any construction detour.

The Contractor shall keep the streets in and adjacent to the construction area clean at all times. Streets shall be swept before washing.

The Contractor shall take the necessary precautionary measures to prevent dust or other nuisances which might be created by reason of his activities. The necessary precautionary measures shall be in accordance with Section 10 of the State Standard Specifications.

Areas to be excavated, filled, graded, and to be occupied by permanent construction or embankments shall be prepared by clearing and grubbing. Clearing and grubbing shall be in accordance with Section 16 of the State Standard Specifications.

COORDINATION

The Contractor shall notify the Engineer at least 10 working days in advance of his intent to begin work on the force main and gravity sewer.

The Contractor shall provide for a safe 1.2 m wide pedestrian walkway to all places of business, and for all residences during construction.

The Contractor shall not allow sewage to be discharged onto the ground or into any stream, creek or storm drain.

The Contractor shall distribute printed notices of proposed utility work to all occupants along streets where construction work is to be performed at least one week before starting such work. For all work on private property, the Contractor shall contact each owner individually a minimum of thirty (30) days prior to the work. In the event the work has been delayed, the Contractor shall notify residents of the new schedule of work.

The Contractor shall notify the owner or occupant (if not owner occupied) of the closure of driveways to be closed more than one 8-hour day at least 3 working days prior to the closure. The Contractor shall minimize the inconvenience and

minimize the time period that the driveways will be closed. The Contractor shall fully explain to the owner/occupant how long the work will take and when closure is to start.

The Contractor shall perform his work in such a manner that existing private and/or public utilities will not be disturbed for a period of time in excess of 4 hours. Utilities service shall not be interrupted prior to 8:00 a.m. nor after 4:00 p.m. unless otherwise approved in writing by the Engineer.

The Contractor shall cooperate with the utility owner's personnel in order to facilitate their inspection work and shall allow them access to the site of the work.

Approvals and instructions from the utility owner's personnel will be transmitted to the Contractor through the Engineer.

DELIVERY, HANDLING, AND STORAGE OF MATERIALS

Pipe and materials shall be delivered, handled, and stored per these requirements and in accordance with the manufacturer's recommendations. All pipe and materials shall be delivered to the job site from the factory and stored in a manner that will prevent unnecessary deflection or damage prior to installation. The Contractor shall be entirely responsible for damage or loss by weather or other causes. The Material Safety Data Sheets (MSDS) for all products to be used in the work shall be kept on-site by the Contractor, and the manufacturer's recommendations for proper storage of its products shall be strictly followed.

Transport pipe to the job site on padded bunks with nylon tie-down straps or padded bonding to protect the pipe. Care shall be taken during the transporting of the pipe to insure that the binding and the tie down methods do not damage, deflect, or crack the pipe in any manner. Pipe that is bent, deflected, cracked, or otherwise damaged during shipping shall be rejected and replaced by the Contractor.

Under no circumstances shall pipe be pushed or dragged along the ground. All pipe sections over 6 m in length shall be lifted at the quarter points from each end.

Pipe shall not be placed directly on rough ground but shall be supported in a manner which will protect the pipe against injury whenever stored at the site or elsewhere.

Polyvinyl chloride (PVC) pipe shall be stored out of direct sunlight. Any discoloration of the pipe shall be an indication of a possible reduction in impact strength. Discoloration may be sufficient reason for rejection of the pipe materials.

For steel pipe (casing), temporary internal bracing shall be installed in all pipe 400 mm and larger prior to shipment to the job site. Temporary internal bracing shall be 100 mm x 100 mm wooden stulls installed in both the horizontal and vertical directions. Each set of stulls shall be nailed together as a unit. Wooden wedges may be used to maintain the proper tight fit of the internal bracing. The bracing shall be located 300 mm in from each end of the pipe section for all pipe, and additionally at the mid-point for piping 600 mm and larger. Maintain internal bracing as specified in these Special Provisions. Maintain plastic end caps on all steel pipe in good condition until the pipe is ready to be installed in the trench.

Prior to installation, store pipe on earth berms or timber cradles adjacent to the trench in the numerical order of installation. Place the supports at about the one-quarter point from the pipe ends.

Any pipe section, including coatings and linings, that becomes damaged as a result of handling or stockpiling shall be replaced with a new unit or repaired at the discretion of the Engineer at no additional cost to the Owner.

HAZARDOUS WASTE AND UNKNOWN PHYSICAL CONDITIONS

If conditions listed below are found during construction, or if any other conditions are found during construction that may be detrimental to the existing facilities being constructed, or to the health and safety of the public, the Contractor shall promptly notify the Engineer.

A. Material that the Contractor or Engineer believes may be hazardous waste, as defined in Section 25117 of the Health and Safety Code, and is thus required to be removed to a Class I, Class II, or Class III disposal site in accordance with the provisions of existing law. If such material is discovered, the Contractor shall immediately cease work and shall not disturb the job site except as required to protect public safety.
B. Subsurface or latent physical conditions at the site differing from those indicated.
C. Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided in the Contract.

The Contractor shall promptly inform the Engineer of any such conditions found during construction. The Engineer shall investigate the conditions, and if it finds that the conditions do materially differ from those shown or expected, or do involve material that may be hazardous waste, the Contractor shall cease work in the impacted area. If material that may be hazardous waste is discovered, the Contractor shall insure that the appropriate government agencies are contacted prior to any further work being performed and that a solution is implemented.

WATER FOR CONSTRUCTION PURPOSES

The Contractor shall furnish all water required for construction, including water for flushing and testing. A meter shall be installed whenever water is required by the Contractor. The water and meter shall be paid for by the Contractor in accordance with the water district's, city's, or county's rates and rules.

Only the 62 mm port shall be used for water available from fire hydrants along the job site. The 100 mm port shall be free for use in the event of a fire.

No compensation shall be paid the Contractor for water for the initial filling or refilling, for testing or re-testing, and for re-flushing the pipeline. Water for the initial filling, refilling after dewatering for locating leaks or correcting workmanship, and final flushing shall be paid by the Contractor.

The size and location of temporary meters shall be determined by the Contractor and approved by the Engineer.

COST OF WATER WITHIN CITY OF SAN DIEGO

All water obtained from the City of San Diego shall be metered through a temporary meter. The temporary meter may be rented for a fee from the Meter Shop Supervisor at Chollas Operations, 2797 Caminito Chollas, San Diego, CA or the Contractor may, if desired, use the Contractor's own meter. The water and meter obtained from the City of San Diego shall be paid for by the Contractor in accordance with the City of San Diego rates and rules.

GENERAL SEWER SYSTEM REQUIREMENTS:

A. The existence and location of sewer facilities shown on these plans were obtained from available records. The Engineer shall not be held responsible for any error in the location and elevation of the existing sewer facilities.
B. All sewer mains will pass a deflection test and air pressure test prior to street paving, but after all other utilities have been completed and compaction testing approved.
C. Pipe shall be stored on a flat surface so the barrel is evenly supported. Pipe shall not be stacked higher than 1.2 m. Gaskets shall be stored in a cool, dark place out of contact with oil and grease.
D. New sewer mains will not be connected to the City's sewer system until accepted by the Engineer. Flows will be retained within the newly constructed system by means of plugging the new system, with a mixture of Plaster of Paris and Portland Cement (know as Dynamiting) in a place that will not impair the function of the City's sewer system. Prior to releasing sewer into the City's sewer system, the Contractor will perform the air pressure test and deflection test on lines as specified in these Special Provisions.
E. Existing sewer mains shall not be used for discharge of storm waters, drainage, or other similar uses.
F. All sewer lines shall be cleaned of foreign material, prior to connection to the City's sewer system.

SEQUENCE OF WORK

The Contractor shall comply with the following sequence of construction, unless directed otherwise by the Engineer:

A. Install all sewer facilities in Airway Road, and in the crossing of SR-905 to Station 2+71.00 as shown on the Contract Plans.
B. Install the remaining portion of the SR-905 crossing segment (Station 2+71.00 to Station 3+53.125) when traffic on Otay Mesa Road is transferred to the completed SR-905, and when Otay Mesa Road can be closed. This work shall be completed prior to construction of the "Park and Ride" facilities work of SR-905.
C. There is no dependency between the 400 mm sewer installation in Cactus Road and the other segments, two 1500 mm casings, one with a 600 mm force main shown as existing on the Contract Plans. Depending on the actual construction schedule, the Contractor shall be aware that those "existing" facilities may not be in place. If the 600 mm force main is not in place, the Contractor shall be responsible for bypass pumping when installing the 400 mm force main as part of this Contract.

10-4.06 METHODS OF CONSTRUCTION

GENERAL DESCRIPTION

The work consists of constructing various size sewer mains, lateral connections, concrete encasement, steel casing, concrete manholes and appurtenances, abandonment of existing sewer pipe, replacement of pavement, by-passing sewage, and all related work required to complete the sewer installation work belonging to the City of San Diego in accordance with the plans, State Standard Specifications, Utility Standard Specifications, and these Special Provisions.

Construction and installation of a 380 mm gravity sewer main in Airway Road/Harvest Road, 380 mm gravity sewer main crossing the proposed SR 905 near Britannia; and all appurtenances, all belonging to the City of San Diego.

DRAWINGS AND DATA REQUIRED

Attention is directed to Section 5-1.02, "Plans and Working Drawings," of the State Standard Specifications. The Engineer's maximum review period shall be fifteen working days and the Contractor shall make five copies of each submittal within five days after issuance of Notice to Proceed. Upon completion of the sewer facilities installation, the Contractor shall provide a complete set of record As-Built drawings, showing all work performed, to the Engineer.

A. Pipe and Appurtenances: The Contractor shall submit to the Engineer for review and approval, prior to the fabrication of any pipe, joints, and gaskets, the following items:

1. Line layout and marking diagrams which indicate the specific number of each pipe and fitting and the location of each pipe and the direction of each fitting in the completed line. In addition, the line layouts shall include: the pipe station and invert elevation at all changes in grade or horizontal alignment; the station and invert elevation to which the bell end of each pipe will be laid; all elements of curves and bends, both in horizontal and vertical alignment; and the limits of each reach of retrained and/or welded joints, or of concrete encasement.
2. Manufacturer's product literature and technical data, including pipe material data and pipe installation instructions. For HDPE pipe, include pipe joining instruction and manufacture recommendations.
3. Typical cross sections and joint, fitting, and appurtenance details.
4. Connection details for tie into existing sewer system.
5. Hydrostatic Test Reports (All Pipe)
6. Sustained Pressure Testing Reports (PVC Pressure Pipe)
7. Burst Strength Testing Reports (PVC Pressure Pipe)
8. Three-Edge Bearing Strength Test Reports (VCP)
9. List of large diameter high density polyethylene pipe installations using thermal butt-welded pipe, from the last five years, from the HDPE installer, including the linear meter, diameters, and owner telephone number and address for each installations.

A. Steel Casing: The Contractor shall submit to the Engineer for review and approval, prior to manufacture and installation of steel casings, the following items:

1. Casing installation schedules which include schedules of excavation, pipeline installation, backfill operations, and welding details.
2. Material list including diameter, thickness, and class of steel casing.
3. Shop drawings of casing insulators (spacers) and end seals including manufacturers' catalog information.
4. Certification of compliance for all steel casing pipe and other products or materials for the installation of steel casings. The certification of compliance shall include the physical and chemical properties of all steel supplied.
5. Description and manufacturers product data for the cathodic protection system to be installed.

B. Manholes and Appurtenances: The Contractor shall submit to the Engineer for review and approval, prior to the installation of any manhole and appurtenances, the following items:

1. Design calculations and detailed drawings of manhole component sections.
2. Shop drawings of cast iron frames and covers, and all appurtenances.
3. Manufacturer’s product literature and technical data for the plastic lining, including complete data indicating the physical properties and chemical resistance properties of the plastic lining in accordance with Section 210-2 of Utility Standard Specifications, and all details and dimensions in accordance with Section 210-2.4 of the Utility Standard Specifications.
4. Shop drawings indicating the installation procedures and dimensions and location of all joints or weld strips for PVC liners.
5. Results of all tests made on plastic liner material.

C. Sewer Bypass Plan: The Contractor shall submit to the Engineer for review and approval, the sewage bypass plan, prior to installation and operation of sewage bypass system.

D. Excavation: The Contractor shall submit to the Engineer for review and approval, prior to any excavation, the following items:

1. Excavation support system specified elsewhere in these Special Provisions.

2. Copy of the excavation permit issued by the California Department of Industrial Safety.
3. Samples of imported material. Samples shall be submitted in accordance with Section 306-1.3.5 of the Utility Standard Specifications.

E. Excavation Support Systems: The Contractor shall submit to the Engineer for review and approval, prior to the installation of any excavation support systems, the following items:

1. Drawings and supporting calculations for the proposed excavation support systems, stamped and signed by a Professional Engineer, licensed to practice in the State of California, and experienced in the design of excavation support systems.
2. The proposed method of installing sheet piling including sequence of installation, template, and equipment description.
3. Contingency plan for alternative procedures to be implemented if the excavation support system is found to perform unfavorably.
4. Arrangement and details for each excavation support system, supporting design calculations, and construction methods to be used for the installation of each system.
5. Soldier pile installation methods, connection details, bracing preloading, and jacking procedures.
6. Depths below the main excavation bottom elevation to which the support system will be installed.
7. Elevations of ground surface, struts, and shores, as applicable.
8. Permissible depth to which excavation may be carried before supports must be installed and preloaded.
9. Full excavation depth load to be carried by various support system members.
10. Bracing loads for various stages of excavation, bracing removal, and concrete placement.
11. Preloads as required.
12. Proposed sequence of strut and shore removal as applicable and as related to concrete placement and backfilling operations.

F. Grout for Structures: The Contractor shall submit to the Engineer for review and approval, prior to installation of any grout materials, the following items:

1. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement, and appropriate uses for each type of non-shrink and epoxy grouts proposed for use in the work.
2. Certified test results verifying the compressive strength, shrinkage, and expansion properties for proposed non-shrink and epoxy grouts.

G. Geotextiles: The Contractor shall submit to the Engineer for review and approval, prior to installation of any geotextile materials, the following items:

1. Manufacturer material specifications and product literature.
2. Installation drawings showing geotextile sheet layout, location of seams, direction of overlap, and sewn seams.
3. Description of proposed method of geotextile deployment, sewing equipment, sewing methods, and provisions for holding geotextile temporarily in place until permanently secured.

H. Fiberglass Reinforced Plastic (FRP) Assemblies: The Contractor shall submit to the Engineer for review and approval, prior to installation of any FRP assemblies, the following items:

1. Grating material data sheets, including dimensions and bearing loads.
2. Certificate of compliance stating that the FRP assemblies meet all the specifications and requirements of the work.

I. Sewer Facilities Testing: The Contractor shall submit to the Engineer for review and approval, prior to testing of any sewer facilities the following item:

1. Proposed plans for sewer facilities testing, including plans for water conveyance, control, and disposal; design and manufacture data for the mandrel (if proposed); and a minimum 48-hour advance written notice of proposed testing schedule.

PRODUCT TESTING

The Contractor's attention is directed to Section 6-3, "Testing," of the State Standard Specifications.

In accordance with Section 207-17.4.2 of the Utility Standard Specifications, pipe which has not been installed within 120 days of the latest test shall not be accepted for installation and shall not be used.

All pipe shall be subject to inspection at the factory. The Contractor shall notify the Engineer in writing of the manufacturing start date not less than 14 days prior to the start of manufacture. For all pipe, an affidavit of compliance, certified by the manufacturer, that the proposed pipe, joints, and gaskets comply with the requirements of these Specifications and the plans shall be submitted to the Engineer, before installation of the pipe.

PVC pipe shall be subject to testing in accordance with Section 207-17.4 of the Utility Standard Specifications. In addition, PVC pressure pipe shall be tested in accordance with the requirements of AWWA C-900 and C-905, as applicable.

VCP pipe shall be subject to testing in accordance with Section 207-8.5 of the Utility Standard Specifications.

SEWAGE DIVERSION PLAN

Contractor shall submit a sewage diversion plan to the Engineer thirty (30) days prior to the start of construction. The Sewage Diversion Plan shall allow construction in a dry trench and shall indicate the sequence of diversion operation the Contractor will establish to maintain sewer service during construction. The Diversion Plan shall also indicate procedures that would be implemented in case of an emergency failure of a pump or by-pass. By-passes shall be of sufficient capacity to handle peak flows without storage. Duplicate peak flow capacity pump units shall be provided by the Contractor to continuously handle sewer flow without interruption in the event of failure of either pump unit. Approval must be attained prior to placement of any bypass pumping equipment on the Project.

The Contractor shall submit to the Engineer per the requirements indicated in Drawings and Data Required, for approval, prior to the commencement of sewer bypass work, the following items:

A. Sewer Bypass Pumping Plan: The sewer bypass pumping system plan and calculations shall be prepared and stamped by a civil Engineer registered in the State of California. The sewer bypass pumping plan shall include, but not be limited to the following:

   1. Drawings showing location of bypass pumps, piping, power source, all appurtenances, required crossings of traveled roadways and methods for crossings, and trunk sewer main and lateral connections.
   2. Calculations showing bypass pumping and piping meet the design capacity requirements.
   3. Name and manufacturer designation of equipment used in sewer bypass pumping system.
   4. Name, address, phone and fax number, e-mail, and contact name of bypass pumping system manufacturer, or representative.
   5. Emergency sewer bypass pumping contingency plan.
   6. Name, address, and phone number of all personnel in-charge of and overseeing bypass pumping system, and all personnel maintaining bypass pumping system.
   7. Name, address, phone number, and pager number of two (2) contacts employed by the Contractor that can be called by the City of San Diego, Engineer, or other appointed representative for emergencies 24 hours a day.

B. Spill Prevention, Control, and Contingency Plan: A spill prevention, control and contingency (SPCC) plan shall be submitted to the Engineer for approval. The SPCC plan must include information in compliance with the Regional Water Quality Control Board requirements.

The Contractor, City of San Diego, and Engineer shall meet at a designated date and location set by the Engineer and City of San Diego, after submittal and review of the bypass pumping system plan by the Engineer and City of San Diego. This meeting will be conducted by the Engineer and City of San Diego. This meeting is designed to allow both the Contractor, City of San Diego, and Engineer to discuss issues and concerns on the bypass pumping system and plan. Final approval of the bypass pumping system plan will not take place until completion of the meeting and all changes to the plan required by the Engineer and City of San Diego are met by the Contractor.

SEWAGE BY-PASS

The Contractor shall maintain sewage flows in the existing sewers at all times except when flows shall be by-passed as mentioned herein.

By-passing of sewage shall be necessary at locations where the existing sewers are in conflict with the new construction work or to facilitate air testing of new sewer pipes as mentioned elsewhere in these Special Provisions.

The Contractor shall install the sewer bypass pumping system in accordance with the approved bypass pumping system plan. The bypass pumping system shall be installed and operational prior to commencement of the sewer connection work.

Wherever required, the Contractor shall provide all plugs, piping, pumps, power sources, valves, stand-by equipment, and appurtenances necessary to remove sewage from the existing system and shall legally dispose of the sewage into the closest downstream sewer system. Pumps and bypass lines shall be of adequate size and provide adequate capacity to handle all flows to be diverted. The bypass pumping system shall be designed to meet the force main maximum flow of two million gallons per day and the gravity sewer main maximum flows indicated on the Sewer Design Table in the plans.

Victaulic coupled steel pipe shall be used to pump sewage and shall be sized for peak flow velocity not to exceed 3 m per second. (Flows in the existing sewers vary depending on the season and the time of the day). When pumping is required to maintain sewage flows, the Contractor shall furnish at the job site stand-by-pumping equipment and piping of equal capacity to account for failure of mechanical equipment.

The bypass pumping system shall be operational during the entire time to install the new sewer main and complete all connections. This may include nighttime operation of the bypass system. The Contractor shall provide personnel on the site at all times, located at the bypass pumping station, in order to assure that the bypass pumping system is operational at all times. The Contractor shall also provide additional fuel or another power source on the site to maintain continuous operation of the bypass-pumping system.

It shall be the Contractor's responsibility to inform the affected homeowners and businesses regarding its by-pass operations and any potential of flooding. By-passing of sewage into surface water or drainage courses shall not be permitted. All sewers and lateral connections shall remain in continuous and full operation. It shall be Contractor's responsibility to notify property owners regarding any disruption/ non-availability of facilities during temporary disconnection of house connection sewers (laterals). Sewer service must be restored to each and every customer by the end of the work day.

On non-working days and during extended shut down periods, the Contractor shall suspend by-passing and restore flows to the existing sewers or new sewers (which have been air pressure tested) through use of adequate size flow through plug(s) and flexible pipe connection between the new and the existing pipe. The plug shall be secured to Engineer's satisfaction and the site shall be fenced in for security purposes. The by-pass line when in operation shall be guarded day and night against damage including vandalism. Any sewage spill resulting from the Contractors operations shall be the Contractors responsibility and no additional payment will be made.

All bypass systems shall meet all City of San Diego noise restrictions, particularly at night. At no time shall the bypass pumping system be allowed to fail during construction of the new sewer main and until the existing sewer is connected to the new piping and operating properly.

All costs related to spills or backups due to the failure of the bypass pumping system shall be borne by the Contractor.

In the event of a sewage spill, the Contractor shall immediately notify the County's emergency operation center at telephone number (619)-565-5255 and then follow directions of the Engineer and the County Health Department and proceed with clean up and mopping in accordance with Proposition 65 for sanitizing the area contaminated by spill. The Contractor shall paint the emergency contact phone number adjacent to the end of the trench during the construction period. If sewage backup occurs and enters buildings, houses, or surcharges above the surface of the existing ground, the Contractor shall be responsible for clean up, repair, property, damage costs, and claims.

SEWER MAIN REMOVAL AND DISPOSAL

Existing sewer pipes where shown on the plans to be abandoned shall be removed and disposed of in accordance with the provisions of Section 7-1.13 of the State Standard Specifications. All resulting sewer pipe openings into existing structures, that are to remain in place, shall be plugged with minor concrete.

ADJUST SEWER MANHOLE

Existing sewer manhole shown on the plans shall be adjusted in conformance with the details shown on the plans. Adjust Sewer manhole shall also include adjusting frame and cover as shown on the plans.

MODIFY MANHOLES

Existing sewer manholes shall be modified as shown on the plans.

Where a new sewer main differing in direction is to be added to an existing manhole, the bottom of the manhole shall be rechanneled, to minimize turbulence, as directed by the Engineer

REMOVE SEWER MANHOLES

Manholes shall be removed in accordance with Section 306-5, "Abandonment of Conduits and Structures," of the Utility Standard Specifications.

EXCAVATION

Excavation shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the State Standard Specifications, these Special Provisions, and to the lines and grades shown on the plans and as directed by the Engineer.

STRUCTURE EXCAVATION

Structure excavation shall consist of the removal of material for the construction of foundations for vaults, manholes, headwalls, culverts, or other structures, and shall be in accordance with Section 300-3 of the Utility Standard Specifications. The foundation material for vaults shall be firm native soils. If loose or soft materials are encountered, it shall be removed and replaced with 19 mm crushed rock materials wrapped in geotextile fabric specified elsewhere in these Special Provisions.

TRENCH EXCAVATION

Whenever work involves trench excavation, the Contractor shall provide all necessary shoring, bracing, sloping, or other provisions to be made for worker protection from hazard of caving ground during the excavation. If such plan varies from the shoring system standards established by the Construction Safety Orders of the Division of Industrial Safety, a Civil Engineer or Structural Engineer registered in the State of California shall prepare and stamp the Drawings and calculations. In accordance with "Excavation Support Systems" and "Drawings and Data Required" listed elsewhere in these Special Provisions, the Contractor shall submit to the Engineer for approval all excavation support systems proposed.

The Contractor shall comply with the Safety Orders of California, Code of Regulations: Title 8, Section 1539 (Excavation, Trenches, Earthwork).

Trench excavation shall conform to the provisions in Sections 5-1.02A, "Trench Excavation Safety Plans," and 19-1.02 "Preservation of Property," of the State Standard Specifications, the Contract Plans, and these Special Provisions.

Excavation for underground conduits shall be in accordance with Section 306-1.1 of the Utility Standard Specifications and the requirements contained herein. Unless otherwise shown or ordered, excavation for pipelines and utilities shall be open-cut trenches. Trench widths shall be kept as narrow as is practical for the method of pipe zone densification selected by the Contractor, but shall have a minimum width at the bottom of the trench equal to the outside diameter of the pipe plus 610 mm for mechanical compaction methods. The maximum width at the top of the pipe shall be as shown on the plans for sewer pipe 1050 mm diameter or greater. For sewer pipe less than 610 mm diameter, the maximum width at the top of pipe shall be equal to the outside diameter of the pipe plus 915 mm for pipe diameters 450 mm and larger and to the outside diameter of the pipe plus 610 mm for pipe diameters less than 450 mm. The maximum amount of open trench permitted in any one location shall be150 m, or the length necessary to accommodate the amount of pipe installed in a single day, whichever is greater. All trenches shall be fully backfilled at the end of each day or, in lieu thereof, shall be covered by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each day. The above requirements for backfilling or use of steel plate will be waived in cases where the trench is located further than 30 m from any traveled roadway or occupied structure. In such cases, however, barricades and warning lights conforming to requirements set forth in the California Department of Transportation Traffic Manual shall be provided and maintained.

Safe and suitable ladders which project 0.7 m above the top of the trench shall be provided for all trenches over 1.2 m in depth. One ladder shall be provided for each 15 m of open trench, or fraction thereof, and be so located that workers in the trench need not move more than 8 m to a ladder.

Shoring is considered to be adequate sheeting, shoring, bracing, or equivalent method for (1) protection of life and limb which shall conform to applicable safety orders; (2) protection of existing underground and above-ground private and public improvements; and (3) the remedy of any and all conditions encountered, regardless of depth, (including, but not limited to trench sloughing, pavement separation, etc.) during the construction of the project.

Should a bracing system utilize steel H-beams or piles or other similar vertical supports, driving of said vertical supports will not be permitted except for the last 1.2 m above the bottom of pile, except where this procedure is impracticable. The vertical support may then be driven to the required depth, not to exceed 1.2 m. During the drilling and driving operations the Contractor shall take care to avoid damage to utilities.

At locations where the drilling of such holes is impracticable because of the existence of rocks, running sand, or other similar conditions, and provided said impracticability is demonstrated to the satisfaction of the Engineer by actual drilling operations by the Contractor, the Engineer may, upon request of the Contractor, approve the use of means other than drilling for the purpose of placing the vertical support. Such other means, however, must be of a nature which will accomplish, as nearly as possible, the purpose of the drilling, namely, the prevention of damage to existing surface or subsurface improvements, both public and private.

EXCESS TRENCH EXCAVATION

Wherever the Contractor over-excavates the bottom of a trench, the bottom of the trench for sewer mains shall be backfilled in accordance with "Bedding" listed elsewhere in these Special Provisions.

Over-excavations shall be corrected by backfilling with approved imported granular material or crushed rock, compacted to 95 percent relative compaction, as directed by the Engineer.

The Contractor shall remove and legally dispose of all excess excavated material and demolition debris.

It is the intent of these Specifications that all surplus material shall be legally disposed of by the Contractor. Before acceptance of the work by the Engineer, the Contractor shall provide the Engineer with written releases signed by all property owners with whom the Contractor has entered into agreements for disposing of excess excavated material, absolving the Owner from any liability connected therewith.

Over excavation and associated bedding not ordered by the Engineer shall be at the Contractor's expense.

EXCAVATION SUPPORT SYSTEMS

Support of temporary open excavations shall be by means of sheet pilings, soldier piles and lagging, structural steel walls and struts, liner plates, and timber. The Contractor shall be responsible for the design and selection of methods in conformance with the design criteria as specified herein. Temporary excavation support systems shall be utilized for demolition, construction of underground cast-in-place concrete structures, and installation of buried pipelines.

Excavation support systems shall be designed, and shop drawings and calculations stamped and signed, by a Professional Engineer, licensed to practice in the State of California and experienced in the design of excavation support systems. All design drawings and calculations shall be submitted in accordance with "Drawings and Data Required" listed elsewhere in these Special Provisions.

Shop drawings with supporting calculations for the various excavation support systems shall be prepared in accordance with the following design criteria:

A. Design the excavation support system and all components to support the earth pressures, unrelieved hydrostatic pressures, utility loads, equipment, traffic, and construction loads including impact, and other surcharge loads in such manner as will allow the safe and expeditious construction of the permanent structures, to minimize ground movement or settlement, and to prevent damage to or movement of adjacent buildings, structures, roadways and utilities.
B. Design support members to resist the maximum loads expected to occur during the excavation and support removal stages.
C. Design for staged removal shall conform to construction concrete placement, and backfill sequence shown. Design shall consider provisions for future construction, and limits on bracing level elevations as shown on the plans.
D. Maximum vertical center-to-center spacing of supports shall be 4.9 m between top 2 support levels and 3.6 m below second support level unless otherwise approved. If decking beams are not required, install the uppermost bracing tier at a vertical distance of not more than 1.82 m below the top of excavation.
E. Where water flows from the face of excavation, the maximum height of unsupported excavation shall not exceed 35 cm.
F. In running sand and silt, provide positive means for securing timber lagging to the soldier piles to avoid shifting or falling off of the lagging, and positive means for containing such material behind lagging.
G. Review of the Contractor's shop drawings and methods of construction by the Engineer does not relieve the Contractor of responsibility for the adequacy of the excavation support systems.
H. No portion of the excavation support system's vertical face will be permitted to penetrate the design lines as indicated on the plans for the permanent concrete structure to be constructed within the excavation.
I. Vertical support capacity shall be provided for wall systems and internal bracing elements, for loads due to vertical force components of tieback anchors, the weight of the structural systems themselves, and live load on any portion of the system.

Design of Timber Support Systems and Members shall be prepared in accordance with the following additional design criteria:

A. Bases for determination of minimum allowable working stress: UBC Chapter 25.
B. The minimum thickness of timber lagging between soldier piles spaced 1.5 to 2.1 m center-to-center shall be 75 mm for excavations up to 7.6 m in depth, and 100 mm for excavations deeper than 7.6 m.
C. For other conditions and types of lagging, design calculations shall be submitted.

If existing utility facilities interfere with the proposed method of support, the method shall be modified in a manner that will protect the facility and accommodate the proposed work. Shop drawings shall be revised and resubmitted along with design calculations required to account for the modified support method and to show the actual location of the existing utilities.

Provisions shall be made for contingencies as follows:

A. Monitor performance of support system components, for both vertical and horizontal movement, at regular intervals not to exceed 3 days.
B. Provide contingency plan for alternative procedures to be implemented if unfavorable performance is evidenced.
C. Keep on hand materials and equipment necessary to implement contingency plan.

Elements of the support system shall not be spliced unless approved by the Engineer.
Materials for excavation support systems shall be as follows:

A. Steel sheet piling shall be continuous interlocking type ASTM A 328 of appropriate shape and provided with at least one 65 mm-diameter handling hole on the centerline of the web located at least 150 mm from each end of the sheet pile.
B. Fabricated connections and accessories, steel H-piles, WF shapes, and other structural steel shall conform to the requirements of ASTM A 36, unless otherwise approved.
C. Concrete shall be as specified in Utility Standard Specifications except as otherwise noted herein:

1. For encasement of steel soldier piles below the final level of excavation, 1.723 x 108 dynes/cm2 shall be used.
2. For encasement of soldier piles above the final level of excavation, lean concrete shall be used, the strength of which shall be adequate to protect the excavated faces of the augured hole.

D. Wood lagging shall be dimension lumber with minimum allowable stress of 7.584×10^7 dynes/cm^2.

1. The stress grade of the lagging shall be in conformance with the allowable stresses of the UBC, Chapter 25.
2. Lumber shall be grade marked by WWPA or WCLIB with species and grade conforming with those shown on approved shop drawings.

The support system shall extend the main excavation bottom elevation to a depth adequate to prevent lateral movement and to adequately support applied vertical loads. In areas where additional excavation is required below the main excavation subgrade provisions shall be made to prevent movement of main excavation supports. Damage to existing utilities during installation of excavation support system shall be avoided.
Installation of solider piles shall be as follows:

A. Soldier piles shall be installed by preboring or other approved pre-excavation methods to tip elevation shown on approved shop drawings. Prevent prebored or other pre-excavated holes from collapsing.
B. Prebored hole shall be filled with lean concrete from bottom of hole to subgrade dependent upon analysis of vertical support requirements.
C. Remaining pile length shall be filled with lean concrete, completely encasing the pile.
D. Concrete shall be placed from the bottom of the hole upwards by means of a flexible pipe connected to a hopper.

Installation of sheeting and lagging shall be as follows:

A. Sheeting and lagging shall be installed with no gap between the boards unless specifically approved. As installation progresses, the voids between the excavation face and the lagging or sheeting shall be backfilled with sand or soil rammed into place. Materials such as hay or burlap shall be used where necessary to allow drainage of groundwater without loss of soil or packing material. If gaps in the lagging are allowed, the gap width between lagging boards shall be limited to 12 mm maximum.
B. If unstable material is encountered, suitable measures shall be taken to retain it in place or to otherwise prevent soil displacement.
C. Extend lagging down to final subgrade.
D. A sufficient quantity of material shall be on hand for sheeting, shoring, bracing, and other operations for protection of work and for use in case of accident or emergency.

Installation of steel sheet piling shall be as follows:

A. Steel sheet piling may be used only where existing subsurface conditions are suitable for installation of sheet piling to the full depth of penetration required, and to proper alignment and plumbness, specified herein,

without damage to the sheet piling or rupture of its interlocks. The use of steel sheet piling will not be permitted where sheeting would be required to penetrate boulders, rock or other materials which may prevent the proper installation of sheet piling.

B. Steel sheet piling shall be installed in plumb position with each pile interlocked with adjoining piles for its entire length so as to form a continuous diaphragm throughout the length of each run of wall, bearing tightly against original ground. Install sheeting to depth required for design. Exercise care during installation so that interlocking members can be extracted, if required, without injury to adjacent ground. The installation equipment shall be suitable to the type and nature of the subsurface materials anticipated to be encountered. The equipment, and methods of installation, cutting, and splicing shall conform to the approved shop drawings.

C. Liner plate shall be installed to proper line and grade and dimensions which will enable final liner to be placed in accordance with tolerances specified by the excavation support system Design Engineer. Annular void, if present by method of ground support shall be filled with tunnel grout as specified by the excavation support system Design Engineer.

Installation of all internal bracing support systems shall be as follows:

A. All bracing support members shall be installed and maintained in tight contact with each other and with the surface being supported.

B. Bracing members shall be preloaded by jacking the struts and shores in accordance with loads, methods, procedures, and sequence as described on the approved shop drawings. Coordinate excavation work with bracing installation and preloading. Use steel shims and steel wedges welded or bolted in place to maintain the preloading force in the bracing after release of the jacking equipment pressure. Use procedures so as to produce uniform bracing member loading without appreciable eccentricities, overstressing, or support member distortion.

C. Struts shall be provided with intermediate bracing as needed to enable them to carry their maximum design load without distortion or buckling. Provide diagonal bracing as necessary to maintain the stability of the system. Web stiffeners, plates, or angles shall be provided as needed to prevent rotation, crippling, or buckling of connectors at points of bearing between structural steel members. Allow for eccentricities resulting from field fabrication and assembly.

D. Excavations shall be to a depth no more than 600 mm below the elevation of the support member about to be placed. The support member shall be installed and preloaded immediately after installation and prior to continuing excavation.

Removal of all excavation support systems shall be as follows:

A. Where removal is required wholly or in part, such removal shall be performed in a manner that will not disturb or damage adjacent new or existing construction or utilities. Fill all voids immediately with lean concrete, or other approved means.

B. All elements of support systems shall be removed to a minimum depth of 1.8 m below final ground surface. However, when a structure poured against the sheeting system extends above the 1.8 m limit, removal of the sheeting system shall be to the top of the structure.

C. All damage to property resulting from removal shall be promptly repaired at no cost to the Owner. The Engineer shall be the sole judge as to the extent and determination of the materials and methods for repair.

DEWATERING

The Contractor shall provide and maintain at all times during construction ample means and devices to promptly remove and dispose of all water from any source entering excavations or other parts of the work. Dewatering shall be performed by methods that will ensure a dry excavation and preservation of the final lines and grades of the bottoms of excavations. Dewatering methods may include well points, sump points, suitable rock or gravel placed as pipe bedding for drainage and pumping, temporary pipelines, or other means, all subject to the approval of the Engineer. The cost of all dewatering activities shall be borne by the Contractor.

Sewer systems shall not be used as drains for dewatering trenches or excavations, nor for disposal of collected or accumulated groundwater, without the approval of the Engineer and Agency of jurisdiction.

Concrete shall not be poured in water, nor shall water be allowed to rise around concrete or mortar until it has set at least four hours.

The Contractor is responsible for meeting all Federal, State, and local laws, rules and regulations, including all Regional Water Quality Control Board conditions, regarding the treatment and disposal of water from dewatering operations at the construction site.

The Engineer shall be present for all dewatering.

The Contractor shall keep all excavations free from water during construction. Where groundwater is encountered, the static water level shall be drawn down a minimum of 300 millimeters below the bottom of the excavation to maintain the undisturbed state of the native soils to prevent softening of the bottom of the excavation, and to allow the placement of any fill to the specified density. Disposal of the water shall not damage property or create a public nuisance. The Contractor shall have on hand pumping equipment and machinery in good working condition for emergencies. Dewatering systems shall operate continuously until the backfill has been completed to 300 millimeters above the normal static groundwater level. Water may be discharged into an existing storm drain, channel, or street gutter only with the approval of the Engineer.

Dewatering systems shall not remove natural soils.

Release of the ground water to its static level shall be controlled to prevent the disturbance of the natural foundation soils or compacted fill and to prevent flotation or movement of structures or pipes.

Crushed rock shall be used for drainage when required by the Engineer. When crushed rock is used, filter fabric shall be installed between the rock and backfill material. Crushed rock shall be the 25 millimeters crushed rock gradation in accordance with Section 200-1.2 of the Utility Standard Specifications.

When crushed rock for drainage is so ordered by the Engineer, crushed rock will be paid for as extra work as provided in Section 4-1.03D of the State Standard Specifications.

The Contractor shall anticipate and correct any erosion problem arising from its operations. The Contractor shall abide by the conditions of the Regional Water Quality Control Board, General Construction Activity Storm Water Permit and the project Storm Water Pollution Prevention Plan (SWPPP).

FOUNDATION STABILIZATION

When unsuitable soil materials are encountered, the unsuitable material shall be removed to the depth determined necessary in the field by the Soils Technician, and as acceptable to the Engineer. The sub-grade shall be restored with compacted imported granular material or crushed rock as recommended by the Soils Technician. Place the appropriate bedding or base material on this restored foundation.

When rock encroachment is encountered, the rock shall be removed to a point below the intended trench or excavation sub-grade as determined necessary in the field by the Soils Technician, and as acceptable to the Engineer. The sub-grade shall be restored with compacted imported granular material as recommended by the Soils Technician. Place the appropriate bedding or base material on this restored foundation.

When excessively wet, soft, spongy, or similarly unstable material is encountered at the surface upon which the bedding or base material is to be placed, the unsuitable material shall be removed to the depth determined necessary in the field by the Soils Technician, and as acceptable to the Engineer. Restore the trench with crushed rock enclosed in filter fabric as directed by the Engineer. Larger size rocks, up to 75 mm, with appropriate gradation, may be used if recommended by the Engineer. Place the appropriate bedding or base material on this restored foundation.

BEDDING FOR SEWER MAINS

All sanitary sewer pipes shall be bedded with 10 mm crushed rock. The crushed rock shall be in accordance with Section 200-1.2 of the Utility Standard Specifications.

All pipe shall be bedded in either sand, gravel, crushed aggregate, or native free-draining granular material having a sand equivalent of not less than fifty and a expansion when saturated of not more than half of one percent. The sand shall be in accordance with Section 200-1.5 of the Utility Standard Specifications.

All sewer pipe bedding shall have a pH within the range of 6.0 to 8.5, a resistivity of 2,000 ohm-cm, or greater, a soluble sulfate content of 500 ppm or less and a soluble chloride content of 200 ppm or less. The analytical methods described in California Test 643 shall be used to measure pH and resistivity. The analytical methods described in California Tests 417 and 422 shall be used to measure soluble sulfates and soluble chlorides, respectively.

ADDITIONAL BEDDING

When so ordered by the Engineer, additional bedding required below subgrade to replace soft or unstable material will be paid for as extra work as provided in Section 4-1.03D of the State Standard Specifications.

Material for additional bedding shall be the 25 millimeters crushed rock gradation in accordance with Section 200-1.2 of the Utility Standard Specifications.

PIPE LAYING-GENERAL

All pipe shall be carefully inspected for defects before being placed in the trench. Pipe shall be bedded true to line and grade, with uniform bearing for the entire barrel length. Pipe sections shall be so laid and fitted together that when complete, the sewer sections will have a smooth and uniform interior. Each section of pipe shall be laid in the order and position shown on the laying schedule. Unless indicated otherwise, the pipe shall be laid to the design line and grade, within approximately

15 mm plus or minus. No tolerance is permitted on pipes designed for zero slope. Bell holes shall be dug so that the pipe rests on the barrel. All material shall be removed from the interior of the pipe, and the inner surface of the bell and the outer surface of the spigot ends shall be thoroughly cleaned to insure good joints.

Except for short runs which may be permitted by the Engineer, sections of pipe shall be laid in a sequence moving in an upgrade direction on grades exceeding 10 percent. Pipe which is laid in a downgrade direction shall be blocked and held in place until sufficient support is furnished by the following pipes to prevent movement.

Installation of all pipe shall be in accordance with Section 306-1.2 of the Utility Standard Specifications. Pipe laying shall proceed upgrade with spigot ends pointing in direction of flow. After a section of pipe has been lowered into the prepared trench and immediately before joining the pipe, the ends of the pipe to be joined shall be cleaned, and the rubber gasket lubricated, all in accordance with the pipe manufacturer's written instructions. Assembly of the pipe length shall be in accordance with the recommendations of the manufacturer of the type of joint used. When cutting or machining of the pipe is necessary, only tools and methods recommended in writing by the pipe manufacturer shall be employed.

The minimum depth of cover over the top of all pipe shall be 1,525 mm unless otherwise shown.

If water enters the trench from any source, pipe laying operations shall be stopped and dewatering operations shall be adjusted to prevent the pipe from floating. The Contractor shall reinstall all affected pipe to its specified condition and grade.

VCP pipe installation shall be in accordance with Section 306-1.2.3 of the Utility Standard Specifications.

PVC pipe installation be in accordance with Sections 306-1.2.12 and 306-1.2.13 of the Utility Standard Specifications, and per ASTM D 2321. In addition, installation of PVC pressure pipe shall conform to all applicable requirements of AWWA M23.

HDPE pipe installation shall comply with ASTM D 2321, Section 7. Allow extra length of pipe to compensate for contraction in the cooler trench bottom. Sections of polyethylene pipe and fittings shall be joined into continuous lengths as much as possible. The joining method shall be the thermal butt fusion method, performed in strict accordance with the pipe manufacturer's recommendations and producing joint strength equal to or greater than the pipe strength. Butt fusion shall conform to ASTM D 2657 and pipe manufacturer's criteria for the type of joining. Fusion equipment used in the joining procedure shall be capable of meeting all requirements of the pipe manufacturer, including fusion temperature, alignment, and fusion pressure. Fusion equipment shall be operated only by technicians who have been certified by a gas public utility or by the fusion equipment supplier.

In accordance with Section 207-17.4.2 of the Utility Standard Specifications, pipe which is not installed within 120 days of the latest test shall not be accepted for installation and shall be removed from the project site by the Contractor.

Immediately after a connection has been made to an existing manhole, the sewer main entering the manhole shall be sealed and shall be kept sealed until all sewer lines tributary to the connection have been tested and accepted by the Engineer.

At night, and whenever the work ceases for any reason, the unfinished end of the sewer shall be securely closed with a tight fitting cap or plug to prevent the entrance of mud, sand or other obstructing material. The sewer shall be clean and unobstructed at the time of its completion and acceptance, and shall be true to the line and grade as shown on the plans and profiles.

All necessary precautions shall be taken to prevent uplift or floating of the pipe prior to the completion of the back filling operation. The Contractor shall assume full responsibility for any damage due to this cause and shall restore and replace the pipe to its specified condition and grade at no increased cost to the Owner.

Sheet piling used for shoring shall extend at least 610 mm below the bottom of the trench. After completion of the pipe, it may be removed by cutting at least 300 mm above the top of the pipe. No vibratory methods for pile removal will be accepted, and piling lower than 300 mm above the top of the pipe shall be left in place.

CASING INSTALLATION – GENERAL

Pipe casing shall be provided for the carrier piping where shown on the plans or as required by the Engineer.

The trench for pipe casing installations shall be adequately shored to safeguard existing substructures and surface improvements.

Proper care shall be used to prevent damage in handling, moving and placing the pipe casing. All pipe casing materials shall be lowered into the trench in a manner that prevents damage. The pipe casing shall not be dropped, dragged or handled in a manner that will cause dents, cracks, or other damage to the pipe casing.

Installation of pipe casings shall be as described herein and in accordance with the plans. The Contractor’s attention is called to the fact that extreme care is required in placing the casing so as to permit the installation of the carrier pipe to the lines and grades shown on the plans. Gravity flow pipelines are designed at grades that do not permit variance from the lines and grade as shown on the plans.

Steel casing sections shall be full-circumference butt-welded in the field.

All welding procedures used to fabricate steel casings shall be prequalified under the provisions of ANSI/AWS D1.1. Welding procedures shall be required for, but not necessarily limited to, longitudinal and girth or special welds for pipe cylinders, casing joint welds, reinforcing plates and grout coupling connections.

All welding shall be done by skilled welders, welding operators, and tackers who have had adequate experience in the type of materials to be used. Welders shall be qualified under the provisions of ANSI/AWS D1.1 by an independent local, approved testing agency not more than 6 months prior to commencing work on the casing or pipeline. Machines and electrodes similar to those used in the work shall be used in qualification tests. The Contractor shall furnish all material and bear the expense of qualifying welders.

CARRIER PIPE INSTALLATION – GENERAL

Carrier pipe shall be pushed into the casing incorporating the use of casing spacers as described below.

The end seals shall be pulled on (in case of pull-on type of seals) and the casing spacers shall be installed over the carrier pipe at the proper location, in accordance with the casing spacer's manufacturer's instructions. Care shall be taken not to damage the carrier pipe coating or the inner coating of casing pipe while installing the carrier pipe. The position of the runners in the casing shall be as per manufacturer's recommendations. The clearance between the carrier pipe and casing shall be as indicated and shall be uniform throughout the casing length.

PVC or VCP carrier pipe joints shall be restrained either by mechanical means or by use of splined gaskets.

Upstream and downstream elevations of the carrier pipe shall be verified prior to installing the end seals.

Testing of the carrier pipe shall be completed prior to strapping the end seals. The portion of carrier pipe installed within a casing shall have pressure, leakage, and infiltration testing completed prior to installation of the end seals.

The annular space between the carrier pipe and casing shall be filled.

After the carrier pipe has been tested, and the annular space filled, the end seals shall be strapped by stainless steel bands in accordance with manufacturer's instructions.

MINOR CONCRETE

Minor Concrete where shown on the plans to be placed for sewer lines shall conform to Section 90-10, "Minor Concrete" of the State Standard Specifications, except that the minor concrete shall contain not less than 325 kg of Portland cement per cubic meter, and as shown on the plans.

REINFORCED CONCRETE PIPE

Reinforced Concrete Pipe where shown on the plans to be placed for sewer lines shall conform to Section 65, "Reinforced Concrete Pipe" of the State Standard Specifications.

GEOTEXTILE INSTALLATION

Geotextiles for subgrade enhancement shall be placed in accordance with Section 300-10.1 of the Utility Standard Specifications. Geotextiles shall be placed free of tension, folds, wrinkles, or creases.

The Contractor shall repair or replace torn, punctured, flawed, deteriorated, or otherwise damaged geotextile. The Contractor shall repair damaged geotextile by placing a patch of undamaged geotextile over the damaged area plus at least 0.50m in all directions beyond the damaged area. The Contractor shall remove interfering material as necessary to expose the damaged geotextile for repair. The Contractor shall sew patches or secure them with pins and washers, or by other means approved by the Engineer.

The Contractor shall protect the geotextile from contamination that would interfere, in the Engineer's opinion, with its intended function. The Contractor shall remove and replace any contaminated geotextile with clean geotextile.

BACKFILL

Backfill material shall consist of material obtained from the excavation, imported material, granular bedding material, or unclassified material. The Contractor shall import at his expense materials in excess of the approved material obtained from excavation as required to complete the backfill and grading work as indicated.

Fill and backfill shall be placed in accordance with the applicable provisions of Section 300 shall be in accordance with Section 306-1.3.1 and Section 306-1.3.2 of the Utility Standard Specifications, and the requirements stated herein.

Backfill shall not be dropped directly upon any structure or pipe. Backfill shall not be placed around or upon any structure until the concrete has been properly cured in accordance with the requirements of the Utility Standard Specifications and has attained sufficient strength to withstand the loads imposed.

Except for drain rock materials being placed in over-excavated areas or trenches, backfill shall not be placed until all water is removed from the excavation.

Materials shall be placed and spread evenly in layers. When compaction is achieved using mechanical equipment the layers shall be evenly spread so that when compacted each layer shall not exceed 150 mm in thickness. Flooding and jetting methods shall not be used to densify backfill.

During spreading, each layer shall be thoroughly mixed as necessary to promote uniformity of material in each layer. Bedding materials shall be brought up evenly around the pipe so that when compacted the material will provide uniform bearing and side support.

Where the material moisture content is below the optimum moisture content water shall be added before or during spreading until the proper moisture content is achieved. During backfilling the soil moisture content should be maintained at or with two or three percent above the optimum moisture content of the backfill materials.

Where the material moisture content is too high to permit the specified degree of compaction the material shall be dried until the moisture content is satisfactory.

The relative compaction of fill, backfill, and base material shall be accordance with Section 300 of the Utility Standard Specifications, with the following exceptions:

Description	Percent
Subgrade where trench has been over excavated	95
One foot layer of crushed aggregate backfill in over excavated trench. Where trench is over excavated more than610 mm, minimum of 2 layers shall be compacted	95
Pipe zone for flexible and rigid pipe:	95
Backfill above the bedding (pipe) zone	90
Backfill for section with 0.61m directly below pavement material.	95
Fill beneath structures	95

The trench backfill shall be placed and mechanically compacted. Compaction shall be in accordance with Section 306-1.3.1 and Section 306-1.3.2 of the Utility Standard Specifications, as shown on the plans and these Special Provisions.

All soils testing shall be done in accordance with Section 211 of the Utility Standard Specifications, and by a testing laboratory of the Owner's choice at the Owner's expense.

Compaction Tests: Compaction tests shall be performed in accordance with Section 211-2 of the Utility Standard Specifications. Where soil material is required to be compacted to a percentage of maximum density, the maximum density shall be determined in accordance with Section 211-2 of the Utility Standard Specifications. In case the tests of the fill or backfill show non-compliance with the required density, the Contractor shall accomplish such remedy as may be required to insure compliance. Subsequent testing to show compliance shall be by a testing laboratory selected by the Owner and shall be at the Contractor's expense.

A. Backfill, General. Unclassified backfill material shall be in accordance with Section 300-4 of the Utility Standard Specifications, except as noted below:

   1. The largest dimension of any rock shall be less than 100 mm in any dimension.
   2. Material shall be free of biodegradable materials, hazardous substance contamination, oil alkali, broken Portland cement concrete products, and bituminous type pavement materials.
   3. At least 70 percent (by weight) of unclassified material shall pass U.S. Standard 19 mm sieve, and no more than 40 percent (by weight) of unclassified fill shall pass U.S. Standard No. 200 Sieve.

   Rock products, consisting of crushed rock, rock dust, gravel, sand, and stone shall be clean, hard, sound, durable, uniform in quality and free of disintegrated material, organic matter, oil alkali, or other deleterious substance, and shall be in accordance with Section 200-1 of the Utility Standard Specifications, unless otherwise specified.
   Untreated base materials shall be crushed aggregate base in accordance with Section 200-2 of the Utility Standard Specifications, unless otherwise specified.

A. Backfill, Pipe Zone. Backfill, pipe zone, material shall be defined as material supporting, surrounding and extending to 300 mm above the top of a pipe, and shall be in accordance with Section 306-1.2.1 of the Utility Standard Specifications, except as modified herein. Pipe zone material shall be 19 mm crushed rock or gravel meeting the requirements of Sections 200-1.2 and 200-1.3 of the Utility Standard Specifications, unless otherwise indicated on the plans.

B. Backfill, Structure. Backfill, structure, material shall be in accordance with Sections 300-3.5 and 300-4.5 of the Utility Standard Specifications, unless otherwise indicated on the plans. Backfill above the bedding shall be considered as starting at the subgrade for cast-in-place structures such as manholes, transition structures, junction structures, vaults, and valve boxes.

IMPORTED BACKFILL

The densification method for imported backfill material shall be the same as the method for non-imported backfill.

A minimum relative compaction of 90 percent shall be achieved.

Separate payment for imported backfill will be made only when the excavation is done in heavy clay, highly expansive or other deleterious material, and the imported backfill is ordered by the Engineer. The Engineer will be responsible for decisions whether or not the excavated material is suitable for backfill and when separate payment is made for imported backfill. When ordered by the Engineer, imported backfill will be paid for as extra work provided in Section 4-1.03D of the State Standard Specifications.

BURIED WARNING AND IDENTIFICATION TAPE

Warning/identification tape shall be used to identify locations of underground utilities and to act as a warning against accidental dig-ins of buried utilities. Warning/identification tape shall be used on all underground sewer mains, and all related appurtenances. Warning/identification tape shall also be used on cathodic protection wiring systems and tracer wire brought into and out of access ports.

Warning/identification tape shall be as indicated below.

A. Tape shall be an inert plastic film (non-metallic) formulated for prolonged underground use that will not degrade when exposed to alkalies, acids and other destructive substances commonly found in soil.
B. Tape shall be puncture-resistant and shall have an elongation of two times its original length before parting.
C. Tape shall be colored to identify the type of utility intended for identification. Printed message and tape color shall be as follows:

Printed Message	Tape Color
Caution: Sewerline Buried Below	Green
Caution: Cathodic Protection Cable Buried Below	Red

D. Ink used to print messages shall be permanently fixed to tape and shall be black in color with message printed continuously throughout.
E. Tape shall be minimum 0.102 mm thick x 150 mm wide with a printed message on one side. Tape shall be placed at the top of the pipe zone 300 mm and centered over the utility intended for identification.
F. Tape shall be installed with the printed side up and run continuously along the entire length of the utility intended for identification. Tape shall be installed on the main piping and all appurtenant laterals. Tape splices shall overlap a minimum of 600 mm for continuous coverage.
G. Tape shall be installed prior to placement of the Trench Zone Backfill.

TRENCH RESURFACING

Trench resurfacing where required shall consist of asphalt concrete or Portland cement concrete as per Section 39, "Asphalt Concrete" or Section 90, "Portland Cement Concrete", of the State Standard Specifications and these Special Provisions, as shown on the plans, and as directed by the Engineer.

Whenever excavation is made through pavement, sidewalk, driveway or drainage ditch, temporary bituminous resurfacing 50 millimeter thick shall be placed and maintained in accordance with Section 306-1.5.1 of the Utility Standard Specifications unless permanent pavement is placed within 24 hours after backfill of trench.

SEWER FACILITIES TESTING

Testing of sewer pipes for leakage shall be performed after backfill and compaction tests have been approved. Leak testing shall be in accordance with Section 306-1.4 of the Utility Standard Specifications and these Special Provisions.

Prior to air pressure testing, each pipe shall be "Wayne" balled and mandreled in the presence of the Engineer.

The Contractor shall notify the Engineer at least three working days in advance of performing any pressure test, except no pressure test shall be made on Saturdays, Sundays or designated legal holidays, unless otherwise approved in writing by the Engineer.

The pipeline shall be air tested by the Contractor in the presence of the Engineer after all pipe and appurtenances have been installed as shown on the plans and after completion of trench backfill and finished grading, but prior to the introduction of sewage into the pipe, or the placement of pavement or permanent trench resurfacing where these items occur. Where there is no connected sewer the pipe shall be tested between manhole sections.

Connected sewers shall be by-passed so as to isolate and cap the section to be tested.

The gage utilized for the test shall be of a scale and range equivalent to 60 mm diameter, 0-70 kPa range (2.5 kPa maximum increments). Gauges supplied by the Contractor shall have a recent certification of accuracy from an approved testing agency.

Pipes that fail the above test shall be repaired and retested at the Contractor's expense until all pipes pass the appropriate pressure tests.

The Contractor shall furnish all materials including water, equipment, bracing, connections, labor and expense required for testing of pipeline. The Contractor shall be responsible for the result of any failure under test which is attributable to defective material and/or workmanship furnished by the Contractor or to the Contractor's negligence or improper conduct of the test.

DEFLECTION TESTING PVC PIPE

Flexible and semi-rigid main line pipe shall be tested for deflection, joint displacement, and other obstructions by mandrel test in accordance with Section 306-1.4.8 of the City of San Diego Supplement Amendments to Utility Standard Specifications.

The test shall be performed not less than 30 days after completion of the trench backfill, but prior to permanent resurfacing. The mandrel shall be a full circle, solid cylinder, or a rigid, non-adjustable, odd-numbered leg (9 leg minimum) steel cylinder which has been approved by the Engineer as to design and manufacture and shall be in accordance with Section 306-1.4.8 of the Utility Standard Specifications.

Obstructions and deflections, greater than 5 percent, encountered by the mandrel shall be corrected by the Contractor.

AIR PRESSURE TEST FOR SEWER PIPE

The air test shall be in accordance with Section 306-1.4.4 of the Utility Standard Specifications, except as modified herein. After laying, backfilling and compacting sewer lines, they shall be air pressure tested by the Contractor. For sewer main replacement where live laterals are connected to the new main, air pressure testing shall not be required. Joints may be air tested individually with the use of specialized equipment provided the joint testing procedure is submitted for the Engineer's review prior to testing. Prior to each test, the pipe at the joint shall be wetted with water. The maximum test pressure shall be 2.06×10^5 dyne/cm^2. The maximum allowable pressure drop shall be 68.9×10^4 dyne/cm^2 over a 30-second test period.

MANHOLE TESTING

Each manhole shall be vacuum tested for leakage immediately after assembly and prior to backfilling in accordance with ASTM C 1244.

Prior to vacuum testing, manholes shall be visually inspected for leaks. Leaks or cracks shall be repaired by the Contractor prior to vacuum testing.

All lift holes shall be plugged with an approved non-shrink grout.

All pipes entering the manhole shall be temporarily plugged, taking care to securely brace the pipes and plugs to prevent them from being drawn into the manhole.

The test head shall be placed at the top of the manhole in accordance with the manufacturer's recommendations.

A vacuum of 250 mm of mercury shall be drawn on the manhole. The valve on the vacuum line of the test head shall then be closed and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to 230 mm of mercury.

The manhole shall pass if the time for the vacuum reading to drop from 250 mm of mercury to 230 mm of mercury meets or exceeds 1 minute for 0-3.0 m deep manholes, 1 minute 15 seconds for 3.0 to 4.6 m deep manholes, and 1 minute 30 seconds for 4.6 to 7.6 m deep manholes. If the pressure drop exceeds 25 mm of mercury in the specified time, the manhole shall be repaired and then retested. If the manhole fails to meet a 25 mm mercury drop in the specified time after repair, the manhole shall be tested by water exfiltration and repaired as necessary.

TELEVISING SEWER MAINS

Existing and new sewer mains shall be inspected by CCTV (Closed Circuit Television) and shall be recorded on to a color VHS (Video Home System) or DVD (Digital Video Disc) after completion of trench backfill, but prior to finished grading and placement of pavement or permanent trench resurfacing, to determine the existence and extent of any obstructions, structural deficiencies, or sags.

The Contractor shall furnish all equipment and materials required for inspection.

The Contractor, in cooperation with the Engineer, shall televise the existing and new sewer mains. It shall be the Contractor's responsibility to provide a record log of the TV inspection in accordance with Section 306-1.4.8.4 of the Regional Supplement Amendments to the Utility Standard Specifications.

The Contractor shall perform the initial televising inspection once the first six hundred-ten meter (610) of sewer is constructed to identify any early deficiencies and make necessary adjustments to construction methods.

The Engineer reserves the right to re-televise any existing and new sewer main after the placement of pavement or permanent trench resurfacing, but before final acceptance by the City, to determine the existence and extent of any foreign material or obstructions such as, but not necessarily limited to, cement grout, wood, rocks, sand, concrete, or pieces of pipe,

and any structural deficiencies, or sags precipitated by the permanent resurfacing operations or other contract work. The Contractor shall notify the Engineer thirty (30) working days in advance of the anticipated date that final acceptance will be requested. If the specified advance notice is not given, final acceptance and bond release may be delayed.

The Contractor shall review the videotapes or DVDs for any discrepancies and or deficiencies in the installation of the pipe and submit a written list of all deficiencies including proposed repairs to the Engineer prior to the City review of the videotapes or DVDs. The Contractor shall submit the videotapes or DVDs and report to the Engineer within two (2) days from when the sewer reach was videotaped. Fifteen (15) working days shall be allowed for the Engineer and City MWWD to review each individual videotape or DVD of each and every sewer main documented on that particular videotape or DVDs. In the event that any deficiencies or sags are discovered by the Engineer, five (5) working days shall be allowed for the Engineer to judge whether the deficiencies or sags are repairable in place. If the judgment is made that the deficiencies or sags are non-repairable in place, the affected portion(s) shall be reconstructed at the Contractor's expense.

The Contractor shall not be entitled to any additional working days due to delays resulting from the need to correct any deficiencies or sags, either repairable or non-repairable in place, as determined by televised inspections.

TELEVISING EQUIPMENT

Televising equipment shall include the television camera, television monitor, cables, power source, lights and other equipment necessary for the televising operation. The camera system shall include a pan-and-tilt, radial viewing, pipe inspection camera that pans plus or minus 275 degrees and rotates 360 degrees with zooming capability. The Contractor shall use a camera with an accurate footage counter that displays, on the operator's monitor and the videotape or DVD, the distance of the camera from the centerline of the starting manhole. The Contractor shall use a camera with height adjustment so that the camera lens is always centered at one-half the inside diameter, or higher, in the pipe being televised. The Contractor shall provide a lighting system that allows the features and condition of the pipe to be clearly seen. A reflector in front of the camera may be required to enhance lighting in large diameter pipe. The camera system shall be controlled from the operator's truck. CCTV inspections may be recorded onto digital media such as DVD with the prior permission of the Engineer

Recording shall be on a 4-head VHS format VCR recorded at standard play mode in color or on a DVD disk that can be replayed on standard US NTSC (National Television System(s) Committee) DVD player.

The video equipment utilized shall be specifically designed and constructed to be operative in one hundred percent humidity conditions. Lighting for the camera shall minimize reflective glare. Lighting and camera quality shall be suitable to provide a clear, continuously in-focus picture of the entire inside periphery of the pipe for all conditions encountered during the inspection. A reflector in front of the camera may be required to enhance lighting in large diameter pipe.

Video cassette or DVD capacity shall be adequate to record inspection of at least one complete pipe segment between manholes, but no more than 5 segments shall be recorded on a single cassette or DVD. Recording of a single segment shall not extend to more than one videocassette or one DVD diskette. The Contractor shall not leave gaps in the recording of a segment between manholes.

Only segments between manholes on the same sewer reach shall be included on one videotape or DVD.

Two permanent labels are required. One label shall be placed on the spine and the other on the face of the videotape or in case of DVD one label shall be placed on the DVD case and the other on the DVD disk.

CASSETTE SPINE LABEL INFORMATION

1. Contractor Name
2. Project Name
3. Tape Number
4. Date Televised
5 Date Submitted

DVD CASE LABEL INFORMATION

1. Contractor Name
2. Project Name
3. DVD Disk Number
4. Date Televised
5. Date Submitted

CASSETTE FACE LABEL INFORMATION

1. Name of street
2. From Manhole Number and VCR counter number
3. To Manhole Number and VCR counter number
4. Pipe Length and Size

5. Project Name
6. Tape Number

DVD DISK LABEL INFORMATION

1. Name of street
2. From Manhole Number and VCR counter number
3. To Manhole Number and VCR counter number
4. Pipe Length and Size
5. Project Name
6. Disk Number

For each cassette or DVD the Contractor shall prepare a TV Inspection Report which shall be a complete written log of pipe conditions and connections, indexed to the footage counter.

TELEVISING PROCEDURES

1. Contractor shall notify the Engineer 48 hours in advance of TV inspection so that the Engineer may observe inspection operations.
2. In addition, the Contractor shall clean all associated sewer manholes, and shall pan the camera to document the conditions of manholes. Camera operator shall slowly inspect each connection and sewer transitions from one pipe material to another.
3. The Contractor shall move the camera downstream at a uniform rate not greater than 9.14 m per minute. The Contractor shall stop and thoroughly inspect each of the following:

    a. Collapsed pipe, obstructions
    b. Structural cracking, with and without deflection
    c. Sag, excessively deflected joint
    d. Cracked and open joints
    e. Protruding joint sealing material
    f. Missing, damaged, bulging PVC sheet liner.

4. The camera operator shall log on a suitable form their observations in the inspection of the above items.
5. If the camera is unable to pass an obstruction even though flow is unobstructed, the Contractor shall also approach the obstruction from the other direction in order to obtain complete video or DVD on both sides of the obstruction. The Contractor shall notify the Engineer whenever such an obstruction is encountered. The Engineer will determine if the obstruction must be removed.
6. Audio and written documentation shall accompany all videotape(s)or DVDs submitted to the Engineer.
7. If voice recording is used on the videotape or DVD the recording shall have brief informative comments on unusual conditions, type and size of connection and fitting, collapsed sections, the presence of scale and corrosion, location and description of each defect, and other significant data.
8. The Contractor shall prepare an inspection report, which shall be a complete written log of pipe conditions, indexed to the footage counter. The Contractor shall turn over the original videotape and written reports to the Engineer at completion of the inspection.

MEASURMENT AND PAYMENT

Televising sewer main performed under these special provisions will be measured by the meter determined by actual measurement along the centerline of the pipe. Televising of pipe in excess of the length designated by the Engineer will not be paid for.

The contract price paid per meter for televising sewer mains shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in televising sewer mains, including the cleaning of sewer manholes, as specified in these special provisions, and as directed by the Engineer.

10-4.07 MATERIALS FOR SEWER SYSTEM WORK

GENERAL DESCRIPTION

Provide materials and appurtenances of the sizes and types indicated on the plans and that shall comply with the applicable Sections of these Special Provisions.

All pipe installed as gravity sewer pipe shall be polyvinyl chloride (PVC) as specified in these Special Provisions, and as shown on the Contract Plans.

All pipes for sewer force mains shall be polyvinyl chloride (PVC) pressure pipe for sewer application.

All pipes for pipe casings shall be welded steel pipe, RCP, as specified in these Special Provisions, and as shown on the Contract Plans

Flexible pipe joints at manholes for pipes other than PVC shall be in accordance with Section 208-6 of the Utility Standard Specifications.

Pipe and fittings for house connection sewer (laterals) shall be PVC in accordance with Section 207-17 of the Utility Standard Specifications.

SDR-35 POLYVINILYL CHLORIDE (PVC) SEWER

SDR-35 Polyvinyl Chloride (PVC) Sewer Pipe, fittings, couplings, and appurtenances shall conform to ASTM D3034, and shall be in accordance with Section 207-17 of the Utility Standard Specifications. The gasket shall be neoprene, polyurethane, or synthetic rubber with equal or greater resistance to solvency, chemical, or biological attack.

The rubber ring joints shall be per ASTM D3034.

In addition to the identification marks specified in Section 207-17.2.1 of the Utility Standard Specifications, the Contractor shall also require the manufacturer to mark the date of extrusion on the pipe. This dating shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch number, and other information deemed necessary by the manufacturer.

PIPE CASING – WELDED STEEL PIPE

The pipe casing shall be welded steel, of the diameter indicated, and shall be furnished complete with welded joint ends and pressure grout couplings as indicated. The Contractor may select a greater diameter or thickness for the method of work and loadings involved, site conditions, and possible interferences at no additional cost to the Owner.

Welded steel pipe casing designated on the plans shall be steel pipe in accordance with ASTM A283, Grade C, unless otherwise indicated. Casing section joints shall be butt welded, lap welded, or welded using butt straps in the field to form a continuous casing. Each end of the casing for butt welding shall be prepared by providing 6 mm by 45-degree chamfer on the outside edges. Minimum thickness of filet welds for butt-welded casing shall be the casing pipe thickness.

ANNULAR SPACE MATERIAL FOR CASING

Silica sand shall be used to fill the annular space between the carrier pipe and casing or as indicated on the plans. Silica sand shall meet the requirements of sand for asphalt concrete as shown in Table 200-1.5.5 (A) of the Utility Standard Specifications.

PIPE CASING SPACERS AND END SEALS

Casing spacers and end seals shall be used for all pipe installations within casings. If the carrier pipe is not installed within the casing, as a continuous operation, following completion of the casing installation, then bulkhead the portals and backfill the trench. Bulkheads will be removed at a later time to allow for the installation of the carrier pipe.

Casing spacers shall be used to prevent the carrier pipe bell from touching the casing and to maintain a uniform space between the carrier pipe and casing interior. Casing spacers shall be installed on the carrier pipe at intervals per the manufacturer's recommendations with a minimum of three spacers per pipe section equally spaced.

Pipe casing spacers shall be bolt-on type bands. The bands shall be 300 mm wide and shall be made of two or three sections of 12 gauge steel coated with fusion bonded epoxy or polyvinyl chloride. The thickness of fusion bonded coating shall be at least 10 mils. The bands shall be lined with a 2.3 mm thick PVC ribbed liner having a hardness of Durometer "A" 85-90. The runners shall be made of at least 50 mm wide fiberglass reinforced plastic. Bolts, studs, nuts and washers shall be cadmium plated.

Casing end seals shall be installed in accordance with the manufacturer's recommendations. Carrier pipe shall pass hydrostatic or leakage tests prior to the installation of casing end seals or backfilling operations.

End seals shall be made of synthetic rubber. Banding straps and clamps shall be made of Type 316 stainless steel.

CATHODIC PROTECTION SYSTEM

Contractor shall furnish all labor, materials, tools and incidentals to install the sacrificial anode cathodic protection system for the steel casings associated with the project. Cathodic protection installation, inspection, and testing are required for a complete and workable system.

The publications listed below form part of this Specification to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said standards unless otherwise called for:

ASTM B3 - Standard Specification for Soft or Annealed Copper Wire

ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors

ASTM C94 – Standard Specification for Ready-Mixed Concrete
ASTM D 1248 - Standard Specification for Polyethylene Plastics Molding and Extrusion Materials for Wire and Cable
ASTM D-2220 - Standard Specification for Poly(Vinyl Chloride) Insulation for Wire and Cable
MIL-C-18480B – Military Specification for Coating Compound, Bituminous, Solvent, Coal Tar Base
UL 83-80 - Thermoplastic-Insulated Wires
UL 486-76 - Wire Connectors and Soldering Lugs for Use with Copper Conductors
NACE RP0169-96 - Recommended Practice, Control of External Corrosion on Underground or Submerged Metallic Piping Systems
NACE RP0286 - Electrical Isolation of Cathodically Protected Pipelines

The Contractor shall submit per the requirements of "Drawings and Data Required" elsewhere in these Special Provisions, a minimum of five (5) copies of manufacturer's catalog data on the following:

A. High potential magnesium anode
B. At-grade, traffic-rated concrete test box with cast iron lid
C. Shunts
D. Wire and cable
E. Exothermic weld kits
F. Weld caps
G. Weld coating
H. Plastic warning tape
I. Wax tape coating system

One copy of each manufacturer's catalog data shall be copied to the Owner's corrosion section.

The Contractor shall maintain As-Built drawings showing exact locations of anodes, test stations, and wire trenching runs. Location changes from the design shall be clearly marked in red on a blue line copy of the design drawings

All materials and equipment shall be new and the standard product of manufacturers regularly engaged in the manufacturing of such products. All materials and equipment shall bear evidence of safe operation approval from a nationally recognized testing laboratory.

High Potential Magnesium Anodes:

A. Capacity: High potential magnesium anodes shall have a theoretical energy content of 1000 ampere-hours per pound and have a minimum useful output of 500 ampere-hours per pound.
B. Chemical Composition (High Potential Magnesium, ASTM B-843-93):

Description	Percent
aluminum	0.010
zinc	
manganese	0.5 to 1.30
silicon	0.050
copper	0.02
nickel	0.001
iron	0.03
calcium	
other metallic	0.05
others, total	0.30
magnesium	balance

C. Open Circuit Potential:

1. The open circuit potential of all anodes, buried in the soil, shall be between 1.65 and 1.75 volts dc versus a copper-copper sulfate reference electrode.

D. Anode Size And Weight:

1. Anodes shall be 21.8 Kg pre-packaged, high potential ingots with a trapezoidal cross section. Ingot length shall be 813 mm long. The total packaged weight shall be 47.6 Kg.

E. Anode Construction:

1. Anodes shall be cast magnesium with a galvanized steel core rod recessed on one end to provide access to the rod for connection of the lead wire. Silver braze the lead wire to the rod and make the connection mechanically secure. Insulate the connection to a 600 volt rating by filling the recess with epoxy and covering any exposed bare steel core or wire with heat shrinkable tubing. The insulating tubing shall extend over the lead wire insulation by not less than 12.7 mm.

Anode Pre-Packaged Backfill Material:

1. The anodes shall be completely encased and centered within a permeable cloth bag in a special low resistivity backfill mix with the following composition:

Description	Percent
Gypsum	75
Powdered bentonite	20
Anhydrous sodium sulfate	5

Backfill grains shall be such that 100 percent is capable of passing through a screen of 100 mesh. Backfill shall be firmly packed around the anode such that the ingot is approximately in the center of the backfill. The resistivity of the backfill shall be no greater than 50 ohm-cm when tested wet in a soil box. Total prepackaged weight shall be approximately 47.6 KG.

At-Grade Test Stations:

A. Test Box. At-grade test boxes shall be round, pre-cast concrete, traffic rated, with a 241.3 mm cast iron lid. The lid shall be cast with the legend referred in the appropriate Material List or as indicated on the plans.
B. Identification Tags. All test leads shall be identified with an avery label (model 5361), self adhesive covered with polyolefin clear heat shrink tubing (3mfp301). The label shall include: name of facility – size – pipe material; type of insulation; station number.
C. Concrete Pad: Test boxes mounted in unpaved areas shall be mounted in a reinforced 660 mm square by 102 mm thick concrete pad constructed of ASTM C94 ready-mix concrete. Rebar shall be No. 13 steel.
D. Wire and Cable: All wires shall be stranded copper with HMWPE or THWN insulation suitable for direct burial in corrosive soil and water, conforming to UL 83 and ASTM standards B3 or B8. HMWPE insulation shall conform to ASTM D1248 Type 1, class c, grade 5. THWN insulation shall conform to ASTM D-2220.
Test Leads: No. 8 AWG HMWPE.
Anode Lead Wire: Anode lead wires shall be No. 12 AWG THWN.
Wire Connectors: All wire and copper connectors shall conform to UL 486-76.
Wire Splicing: NO wire splicing is permitted.
Shunts: Holloway Type RS, 0.01 ohm, 6 Ampere Capacity
Test Lead To Anode Lead Connections: Shall be made by brass splitbolt connectors (supplied by the Contractor)
E. Exothermic Weld Kit: Wire-to-metal connections shall be made by the exothermic "cadweld" welding process. Weld alloy shall be for steel pipe. It is the Contractor's responsibility to determine the manufacturer's recommended weld charge size for metallic surfaces.
Weld Caps: Royston Roybond Primer 747 and Royston Handy Cap 2 or equal.
Weld Coating: Cold-applied fast-drying mastic consisting of bituminous resin and solvents per Mil. Spec. Mil-C-18480B such as Koppers bitumastic 50 or 505, Tnemec 40-h-413, tape-coat TC mastic or 3M Scotch Clad 244. The minimum coating thickness shall be 0.64 mm.
F. Plastic Warning Tape: Plastic warning tape for all cable trenches shall be a minimum of 0.1 mm thick and 152 mm wide, inert plastic film designed for prolonged use underground, and printed with "Caution: Cathodic Protection Cable Below".
G. External Coating For Buried Non-Shop Coated Surfaces: All buried, non-coated pipe sections and fitting surfaces shall be wrapped with a three-layer petrolatum wax tape coating system per AWWA C217.
Primer: All surfaces shall be prime coated with a blend of petrolatum, plasticizer, inert fillers, and corrosion inhibitors having a paste-like consistency.
Wax Tape: Covering material shall be a synthetic felt tape, saturated with a blend of petrolatum, plasticizers, and corrosion inhibitors that is formable over irregular surfaces.
Plastic Outer Wrap: The primed and wax taped surface shall be covered with a plastic outer wrap consisting of three layers of 50-guage polyvinylidene chloride or PVC, high cling membrane wound together.

Execution

A. Standard. Cathodic protection installation shall conform to NACE RP0169-96 "Recommended Practice, Control of External Corrosion on Underground or Submerged Metallic Piping Systems. Contractor shall retain a Corrosion Engineer who is trained and experience in cathodic protection installations and design and who is either a Registered Corrosion Engineer or a NACE Certified Cathodic Protection Specialist.
B. Contractor Qualifications: All work shall be performed by qualified, experienced personnel working under continuous, competent supervision. Qualified Contractors must demonstrate at least five years of experience with cathodic protection installations.
C. Test Results: The Contractor shall submit a Corrosion Engineer's report including all test data, conclusions, repairs, and cathodic protection system performance.
D. Notification For Testing: The Contractor shall notify the Engineer and the City's MWWD Corrosion Section (858-292-6382) at least five days in advance of the anodes and test station installations. The Engineer or the Owner's representative shall, at their discretion, witness the installation of anodes and cathodic protection facilities. Testing shall be as described in this section.

Magnesium Anodes:

A. Inspection: All lead wires shall be inspected to ensure that the lead wire is securely connected to the anode core and that no damage has occurred to the lead wire. Lead wire failures shall require replacement of the complete anode and lead wire.
B. Pre-Packaged Anode Inspection: Each anode shall be inspected to ensure that the backfill material completely surrounds the anode and that the cloth bag containing the anode and backfill material is intact. If the prepackaged anodes are supplied in a waterproof container or covering, that container or covering shall be removed before installation. The Contractor shall notify the Engineer at least five (5) days in advance of installing the anodes.
C. Location: Anodes are to be installed in augured holes at the locations shown in the plans. Anode positions can be adjusted slightly to avoid interference with existing structures. Alternate anode positions must be approved by the Engineer.
D. Handling: Care shall be taken to ensure that the anode is never lifted, supported, transported, or handled by the lead wire. All anodes shall be lowered into the hole using a sling or a rope.
E. Anode Hole Size And Depth: Anodes shall be placed vertically at the bottom of a 3.66 m deep augured hole, 305 mm in diameter (minimum).
F. Soaking Requirements, Pre-Packaged Anodes: Once the prepackaged anodes are in the hole, water shall be poured into the hole so that the anodes are completely covered with water. Allow the anodes to soak for a minimum of 30 minutes before any soil backfill is added.
G. Soil Backfill: After the pre-packaged anodes are soaked, the hole is backfilled with stone-free, native soil. No voids shall exist around the anode bags and the anode lead wire shall not be damaged. The backfill shall be tamped and compacted in 457 mm lifts taking care not to damage the anode lead wire.

At-Grade Test Stations

A. Location: At-grade corrosion monitoring test boxes shall be located as indicated in the plans. All test box locations shall be approved by the Engineer.
B. Test Box Bottom: Test boxes shall be set in native soil.
C. Test Lead Attachment: Test leads shall be attached to the pipe using the exothermic weld process. A 457 mm length of slack wire shall be coiled at each weld and inside each test box.
D. Concrete Pad: A 610 mm square by 102 mm thick reinforced concrete pad is required around each at-grade test station. Test boxes and concrete pad shall be flush with the top of the median curb.

Wire and Cable:

A. Test Lead Trench: Horizontal test or anode lead runs shall be placed in a 915 mm trench.
B. Wire Handling: Wire leads shall not be stretched or kinked. Care shall be taken when installing wire and backfilling. If wire insulation is damaged during installation, it shall be rejected and replaced completely at the Contractor's expense. All rejected wire shall be removed from the job site at the close of each workday.
C. Plastic Warning Tape: Plastic warning tape shall be installed in all wire trenches and 305 mm below finished grade.
D. Splicing: Wire splices are not permitted.
E. Wire-To-Pipe Connections: All connections of copper wires to the pipe shall be made by the exothermic weld method.
F. Weld Charge Size: It is the Contractor's responsibility to ensure that the manufacturer's recommended weld charge size is used.

G. Preparation Of Wire: Do not deform cable. Remove only enough insulation from the cable to allow for the exothermic weld.
H. Preparation Of Metal: Remove all coating, dirt, grime and grease from the metal structure by wire brushing. Clean the structure to a bright, shiny surface free of all serious pits and flaws by using a file. The surface area of the structure must be absolutely dry.
I. Wire Position: The wire is to be held at a 30-degree angle to the surface when welding. Only one wire shall be attached with each weld.
J. Testing Of Welds: After the weld has cooled, the weld shall be tested by striking the weld with a 907 g hammer while pulling firmly on the wire. All unsound welds shall be cleaned, re-welded, and re-tested. All weld slag shall be removed.
K. Coating Of Welds: The area to be coated shall be clean and completely dry. Apply a primer specifically intended for use with an elastomeric weld cap. Apply the weld cap and a bituminous mastic coating material to all exposed areas around the cap in accordance with the manufacturer's recommendations. The coating shall overlap the structure coating by a minimum of 76 mm.

External Coating:

All buried, non-coated pipe or casing sections shall be covered with a 3-layer wax tape coating system per AWWA C217:

A. Primer: Surfaces must be cleaned of all dirt, grime, and dust by using a wire brush and clean cloth. The surface shall be dry. Apply the primer by hand or brush. A thin coating of primer shall be applied to all surfaces and worked into all crevices. The primer shall be applied generously around bolts, nuts, and threads, and shall fully cover all exposed areas. The primer should overlap the pipe coating by a minimum of 75 mm.
B. Petrolatum Saturated Tape: The wax tape can be applied immediately after the primer. Short lengths of tape shall be cut and carefully molded around each individual bolt, nut, and stud end. For long bolts (such as in couplings), short lengths of tape shall be cut and circumferentially wrapped around each individual bolt. After the bolts are covered, the tape shall be circumferentially wrapped around the flange with sufficient tension to provide continuous adhesion without stretching the tape. The tape shall be formed, by hand, into all voids and spaces. There shall be no voids or gaps under the tape. The tape shall be applied with a 2.50 cm minimum overlap.
C. Outer Covering: A plastic outer cover shall be applied over the petrolatum-saturated tape. The plastic shall be a minimum of 50-guage and shall have two layers applied.

Testing And Inspection:

A. The Contractor's Corrosion Engineer shall submit his proposed test procedures to the Engineer at least five (5) days in advance of the time that the cathodic protection system testing is scheduled. The Engineer and the City's MWWD Corrosion Section shall witness all testing at their discretion. All test data shall be submitted to the Engineer within seven (7) days of the completion of the testing. All testing shall be done under the supervision of a qualified Corrosion Engineer who is retained by the Contractor. All deficiencies found to be due to faulty materials or workmanship shall be repaired or replaced by the Contractor and at his expense. The City of San Diego's MWWD Corrosion Section shall be notified (858.292.6382) at least three (3) days in advance to witness the performance testing.
B. Test Leads: It is the Contractor's responsibility to test all test leads.
C. Test Method: All completed wire connection welds shall be tested by striking the weld with a 907 g hammer while pulling firmly on the wire. Welds failing this test shall be re-welded and re-tested. Wire welds shall be spot tested by the Engineer. After backfilling the pipe, all test lead pairs shall be tested using a standard ohmmeter.
D. Acceptance: The resistance between each pair of test leads shall not exceed 150 percent of the total wire resistance as determined from published wire data.

Anode Lead Wire:

The Contractor is responsible for inspecting anode lead wires. Lead wires shall be spot inspected by the Engineer:

A. Test Method: A visual inspection and by running his hand along the full length of the lead while installing.
B. Acceptance: All lead shall be free of cuts nicks or abrasions in the wire insulation. Damaged leads shall be rejected.

Test Lead Trenching:

The Engineer, at his or her discretion, shall inspect wire trenches and backfill material and methods.

A. Test Method: The depth, trench bottom, padding, and backfill material shall be visually inspected prior to backfilling.
B. Acceptance: Conformance with Specifications.

Cathodic Protection Performance:

The cathodic protection system shall be activated and tested by the Contractor's Corrosion Engineer in the presence of the Engineer.

A. Test Method: The installed cathodic protection system testing shall include: native pipe-to-soil potentials, protected pipe-to-soil potentials, open-circuit anode potentials, and anode current output measurements.
B Acceptance: Shall be based on achieving the –850 mV criterion as outlined in NACE RPO169-96. All data shall be submitted, in a typed 21.6 X 27.9 cm report to the Engineer and the City's MWWD Corrosion Engineer for approval.

Compliance With Specifications: Deficiencies or omissions in materials or workmanship found by these tests shall be rectified at the Contractor's expense. Deficiencies shall include but are not limited to: broken leads, improper or unclean trenches, lack of 450 mm or slack wire in test boxes; improperly mounted test boxes; and other deficiencies associated with the workmanship, installation, and non-functioning equipment.

CONCRETE VAULTS AND MANHOLES

Sewer vaults and manholes shall be constructed of either pre-cast components or cast-in-place construction at the Contractor's option, per approval from the Engineer, per the requirements of the Special Provisions, and per the Contract Plans. For cast-in-place construction, Contractor shall submit to the Engineer for review and approval, manhole design, including calculations and drawings, showing cast-in-place manhole meets the requirements of these Special Provisions, the Contract Plans, and the State Standard Specifications.

Sewer vaults and manholes shall be constructed without steps. Upon request from the Engineer, the Contractor shall provide a workman with a ladder or other safe and adequate means for inspection access during the course of construction and acceptance of the sewer main.

Where a vault or manhole is to be constructed on unstable native material, a stable base shall first be constructed with additional bedding material, in accordance with Section 306-1.2.1 of the Utility Standard Specifications, and to the dimensions specified in writing by the Engineer.

All precast components (risers, base sections, tops, and cones) shall be manufactured in accordance with ASTM-C-478 except step spacing. Mortar for joining vault and manhole sections shall consist of 1 part cement to 2-1/2 parts of sand by volume. Manhole shelf sections shall be cast-in-place where specified on the plans. See the plans for shelf reinforcement and design.

All risers shall be lined with PVC sheet liners and the exterior surfaces of all vaults and manholes shall be coated with a waterproofing agent as specified in "Manhole Coating And Lining" in these Special Provisions.

Precast concrete vaults and manholes shall be installed in strict conformance with the manufacturer's written instructions, on a well-compacted foundation. The Contractor shall finish vaults and manholes to -1 m below finished grade. The Contractor shall be responsible for adjusting manhole covers to finished grade. Each new vault and manhole shall be vacuum tested prior to backfilling.

The entrance to every unventilated vault and manhole shall be fitted with a plastic warning sign, located 300 mm below the top of the manhole frame, with the inscription "CAUTION -VENTILATE BEFORE ENTERING" in clear letters no smaller than 12 mm in height. The sign shall be attached to the concrete with four Type 316 stainless steel screws and anchors.

MANHOLE FRAMES AND COVERS

Manhole frames and covers shall be non-rocking and shall conform to the requirements of ASTM A 48, Class 30. Unless otherwise indicated, manhole frames and covers shall be heavy duty cast iron type with 915 mm opening. Manhole cover insert shall be 610 mm diameter with lettering "CITY OF SAN DIEGO" and "SEWER" following the arrangement similar to what is indicated on the Contract Drawing.

Manholes located outside of the public right-of-way shall have covers locked to the frame as indicated on the Contract Drawing.

Imported cover, cover inserts, and frames shall have the country of origin marking in compliance with federal regulations.

MANHOLE COATING AND LINING

All manhole interiors are to be lined with a PVC liner and exteriors coated with a waterproofing system per this Section.

The waterproofing system for the exterior of manholes shall be three coats of Koppers Bitomastic Super Service Black or an approved equivalent, applied by brush, spray or roller to completely cover the exterior surface at the manufacturer's recommended usage rate. The three coats shall be applied at 14 – 17 mils DFT each, for a 42 – 51 mils total.

The PVC liner material shall be in accordance with Section 210-2 and shall be installed per Section 311-1 of the Utility Standard Specifications Tests shall be made on samples taken from plastic sheets, joints or weld strips in compliance with Subsection 210-2.3. However, before testing, the Engineer will visually and manually inspect the lining with a putty knife or a similar instrument. Any imperfections found as a result of all of the above tests shall be repaired per manufacturer's instruction and Engineer's approval, and surfaces restored before placing the lining in service. The manufacturer, applicator, and the Contractor shall, upon completion of the work, make a field inspection of the lining and installation and shall provide the Owner a written certificate of work compliance in their respective areas of responsibility.

Provide an epoxy coating system on all interior concrete surfaces not lined with PVC sheeting. The system shall be a 100-percent solids, solvent-free two component epoxy resin system thixotropic in nature and filled with select fillers to minimize permeability and provide sag resistance acceptable to these Specifications. The epoxy coating system shall be Raven Lining System's Raven 405 or approved equal meeting the following requirements:

Product type	Amine cured epoxy
Color	Light Blue
Solids Content (vol. percent)	100
Mix Ratio	3:1
Compressive Strength, dynes/cm^2	1.24×10^9
Tensile Strength, dyne/cm^2	5.24×10^8
Tensile Elongation, percent 1.50	
Flexural Modulus, dyne/cm^2	4.13×10^{10}
Hardness, Type D	88
Bond Strength – Concrete	>Tensile Strength of Concrete
Chemical Resistance:	
Severe Municipal Sewer:	All types of service
Successful Pass:	Utility Standard Specifications 210.2.3.3

A. Manufacturer approved heated plural component spray equipment shall be used in the application of the specified epoxy coating.
B. Epoxy coating must be applied by a Certified Applicator of the epoxy coating manufacturer and according to manufacturer Specifications.
C. Appropriate actions shall be taken to comply with local, state and federal regulatory and other applicable agencies with regard to environment, health and safety.
D. Installation of the epoxy coating shall not commence until the concrete substrate has properly cured.
E. Temperature of the surface to be coated should be maintained between 4 degree C and 49 degree C during application. Prior to and during application, care should be taken to avoid exposure of direct sunlight or other intense heat source to the structure being coated.
F. Surface Preparation:

1. Applicator shall inspect all specified surfaces prior to surface preparation. Applicator shall notify the Engineer of any noticeable disparity in the surfaces which may interfere with the proper preparation or application of the repair material and/or epoxy coating. The Contractor shall repair all disparities prior to application of epoxy coating.
2. Applicator shall perform all surface preparation and epoxy coating installation.
3. All contaminants including: oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed. All concrete or mortar that is not sound or has been damaged shall be removed by the Contractor to a sound concrete surface or replaced.

G. Application:

1. Application procedures shall conform to the recommendations of the epoxy coating manufacturer, including material handling, mixing, environmental controls during application, safety, and spray equipment.
2. The spray equipment shall be specifically designed to accurately ratio and apply the specified epoxy coating materials and shall be regularly maintained and in proper working order.

3. The epoxy coating material must be spray applied by a Certified Applicator of the epoxy coating manufacturer.
4. Specified surfaces shall be coated by spray application of a moisture tolerant, solvent-free, 100 percent solids, epoxy coating as further described herein. Spray application shall be to a minimum wet and dry film thickness as defined below:

   Concrete, New/Smooth: 80-100 mils

1. If necessary, subsequent top coating or additional coats of the epoxy coating should occur as soon as the basecoat becomes tack free, but no later than the recoat window for the specified products. Additional surface preparation procedures will be required if this recoat window is exceeded.
2. A final visual inspection shall be made by the Engineer and Applicator. Any deficiencies in the finished coating shall be marked and repaired by Applicator according to the procedures set forth herein.

GEOTEXTILES

Nonwoven geotextiles shall be in accordance with Section 213-2.1 of the Utility Standard Specifications. The unseamed sheet width shall be a minimum of 1.8 m. The nominal weight per 0.84 square meters shall be 140 to 225 g. Physical properties of woven geotextiles shall conform to the following requirements:

Fabric Property	Minimum Certified Values	Test Method
Grab Tensile Strength	136 kg	ASTM D 4632
Grab Tensile Elongation	35 percent (Maximum)	ASTM D 4632
Burst Strength	4.136×10^7 dynes/cm^2	ASTM D 3786
Trapezoid Tear Strength	1.66×10^6 dynes	ASTM D 4533
Puncture Strength	1.80×10^6 dynes	ASTM D 4833

Sewing thread shall be polypropylene, polyester, or Kevlar thread with durability equal to or greater than durability of geotextile sewn.

Securing pins shall be steel rods or bars, 5 mm diameter, Pointed at one end; head on other end sufficiently large to retain washer, and minimum length of 10 mm.

Steel washers for securing pins shall have an outside diameter of not less than 38 mm, inside diameter of 6 mm, and thickness of 3 mm.

Steel wire staples shall be U-shaped, 10-gauge and a minimum of 150 mm long.

Geotextiles shall be protected and identified in accordance with Section 213-2.3 of the Utility Standard Specifications. Storage and handling shall comply with Section 213-1.4 of the Utility Standard Specifications.

Sampling and test compliance shall be in accordance with Section 213-1.3 of the Utility Standard Specifications.

FIBERGLASS REINFORCED PLASTIC (FRP) ASSEMBLIES

Fiberglass items shall be constructed of new, filament-wound or fiberglass-fabric-reinforced polyester resin laminate material of the strength, thickness, and dimensions indicated, using the matched die-molded or contact molded method.

Finished surfaces of fiberglass items and fabrications shall be smooth, resin-rich, free of voids, without dry spots and unreinforced areas, corrosion resistant and without exposed glass fibers.

Fiberglass grating shall be minimum 25 mm high with 25 mm by 100 mm grid, or 38 mm high with 38 mm by 150 mm grid, and cut edges shall be resealed. The maximum deflection under design load shall not exceed at 610 mm span. Fiberglass grating shall have a permanently slip-resistant surface. Cut edges and openings shall be banded.

FRP assemblies shall be installed in accordance with the manufacturer's installation instructions.

10-4.08 SEWER LINE MEASUREMENT AND PAYMENT

MEASUREMENT

Sewer system facilities work performed under these Special Provisions will be designated in the contract item by size, type, thickness, quality, or whatever information is necessary for identification.

The quantity of various size and types of sewer pipe, and welded steel pipe casing to be paid for will be determined by the meter from actual measurements along the centerline of the pipe in place in the completed work. Pipe placed in excess of the length designated by the Engineer will not be paid for.

Fittings, which increase the length of the sewer main and for which no separate contract item is provided, will be measured by the meter for the size of sewer main involved. Fittings will be measured along centerlines to the point of intersections.

The abandoning of the various size sewer pipes will be measured by the unit.

Sand backfill and the various types of minor concrete will be measured by the cubic meter in accordance with the dimensions shown on the plans or such other dimensions as may be ordered in writing by the Engineer.

Quantities sewer manholes, modify manholes and sewer laterals to be paid for will be determined as units from actual count in the completed work.

Televising sewer will be paid for at contract lump sum price.

PAYMENT

Items of work measured as provided in these Special Provisions will be paid for at the contract prices per meter for the various sizes and types of sewer mains and welded steel pipe casing; at the contract prices per unit sewer manholes, modify manholes and sewer laterals; and at the contract price per cubic meter for sand backfill, the various types of minor concrete; and at the contract lump sum price for televising sewer.

Abandon sewer main will be measured and paid for as abandon pipe lines

Full compensation for all other concrete and miscellaneous iron and steel involved in constructing the sewer work shall be considered as included in the contract prices paid for the various items of sewer work and no separate payment will be made therefore.

When imported backfill is ordered by the Engineer, it will be paid for as extra work as specified in Section 4-1.03D of the State Standard Specifications.

Full compensation for furnishing all labor and materials including structure excavation, structure backfill, and bedding material, temporary cap, and polyethylene wrapping, dewatering pipe, testing, metallic tape locator for non-metallic pipe, pipe, pipe joints, linings, coatings, pipe fittings, tees, and bends, reducers, adapters, and end caps, spacers and supports within any casing and other appurtenances, tools, equipment and incidentals involved in constructing the sewer system, complete in place as specified in these Special Provisions and as directed by the Engineer shall be considered as included in the prices paid for the various contract items of sewer work and no additional compensation will be allowed therefore.

Full compensation for protective work operations required to accommodate or safeguard public traffic or existing facilities (including fencing) and for all trenching and shoring, control of water in and outside the excavations and trenches, and all sewage diversion systems shall be considered as included in the prices paid for the various contract items of sewer systems involved, and to additional compensation will be allowed therefore.

10-4.09 APPROVED MATERIALS LIST

CITY OF SAN DIEGO APPROVED MATERIALS LIST

SUBJECT	SPEC* REFERENCE	MANUFACTURER (Brand Name)	NOTES
BRONZE WATER SERVICES FOR IRON PIPE, PLASTIC, AND COPPER TUBING	*207-21.1	(Refer to section G, page 7 for model numbers).	Minimum 10.55 kg/cm2 working pressure.
CorporationStop,Curb Stop, Property Valve, Coupling. All Fittings. To be Pack-Joint, Insta-Tite, or Flared Copper Type Only.		Jones Ford Mueller McDonald	
Adaptors, Bends, and Misc. fittings. To be Pack-Joint, Insta-Tite, or Flared copper Type Only.			
Service Saddle (double-bronze straps and nuts for pipe other than PVC).		Jones (J-979) Ford (202B) Mueller (H-16000) Romac (202B)	

Service Saddle (full support for PVC C-900 pipe,100 mm through 300 mm unless otherwise noted). All SStl. Saddles		Smith-Blair (372) Romac (306)	
Bronze Saddle w/SStl. Strap		Jones (J-979) APAC (114) Smith-Blair (393) Ford (202BS) Romac (202BS)	
Water Services			
Polyvinyl Chloride Pipe (PVC) Schedules 40 & 80-50 mm diameter	*207-21.1	J-M Certainteed Carlon Flintkote	

SUBJECT	SPEC. REFERENCE.	MANUFACTURER (Brand Name)	NOTES
Water Services			
With Schedules 40 & 80 socket solvent weld type fittings		R.G. Sloane Lasco Dura Spears	
Copper Tube, Type "K" (soft) 25 mm & 50 mm diameters	*207-21.1	Mueller Brass Chase Cerro Phelps	
Water Service Lines			
Polyvinyl Chloride Pipe (PVC) - Schedules 40 & 80 -50 mm diameter	*207-21.1	1. J-M 2. Certainteed 3. Carlon 4. Flintkote	
WATER MAINS			
Valves			
Gate Valves75 mm through 1200 mm (a) All internal parts to be bronze (b) 300 mm diameter and larger to be mounted horizontally with by-passes and enclosed gear cases 75 mm thru 300 mm diameter-10.55 kg/cm2 working pressure	*207-21.3 AWWA C-500	1.Mueller A2380-9206 2.Kennedy 3.American Flow Control 4. Iowa-Eddy-Clow	
Resilient-Seat-Gate Valves 75 mm thru 300	AWWA C-509	Clow American Flow Control	

mm diameter (NRS)		American Flow Control (AFC 500) M & H American AVK (Series 25) Kennedy Stockham U.S. Pipe Metroseal (250)	
Rubber-Seated Butterfly Valves	*207-21.4	BIF	Class 150B
150 mm thru 300 mm diameter		M & H (Dresser) Mueller	

SUBJECT	SPEC. REFERENCE.	MANUFACTURER (Brand Name)	NOTES
Valves			
400 mm thru 1200 mm diameter		Kennedy American-Darling Keystone (fig. 504/507) Mueller	
150 mm thru 300 mm diameter		American-Darling BIF Pratt Keystone (fig. 47)	
Plug valves 100 mm		Dezurik	Series 100, Fig. 118RS17ANG
Plug valves 300 mm		Dezurik	100, Fig. 118 RS 17AGG12H12
Combination Air & Vacuum Valves (25 mm,50 mm,75 mm &100 mm diameters) All internal parts to be stainless steel or bronze		1. APCO 143C 145C 147C 149C 2. ValMatic 201C 202C 3. GA Industries, Inc. #945	
Automatic Control Valves		CLA VAL Co. GA industries	

***** The "Standard Specifications for Public Works Construction" section number. or other Reference

APPROVED MATERIALS LIST

SUBJECT	SPEC* REFERENCE	MANUFACTURER (Brand Name)	NOTES
Fire Hydrants			
Fire Hydrants	AWWA C-503	1.Clow - Rich	Ranger 850, 860, 950, 960
Wet Barrel Fire Hydrants for ordinary water works service		2.Long Beach Iron	Lido 702, 704 Anacapa 614, 615, 425, 430, B-125, B-133, B-135
(Hydrants with one-piece barrel only, no welded ports allowed)		3 James Jones	3700 series J-4040 J-4060C
		4 Mueller	A-481
Meter Boxes			
Concrete Water Meter Box	*207-21.1 SDW 112, 113	Brooks Products Associated Concrete Products San Diego Precast Eisel Enterprise (Nos. 6 and 37)	
Water Distribution Pressure Pipe			
Polyvinyl Chloride (PVC) Pipe, Class 150 or 200 100 mm through300 mm diameter	207-18 AWWA C-900 and C905	Any Manufacturer Meeting Specifications Pipe ends-Plain by gasket bell or plain by plain with gasket bell couplings.	Marking Pressure Class AWWA C-900 NSF Certification Pipe ends-plain/gasket bell or plain/plain with gasket bell couplings
Ductile Iron (Dl) pipe100 mm through 1380 mm diameter	207-9 AWWA C-111 AWWA C-151	Any Manufacturer Meeting Specifications	
Polyvinyl Chloride (PVC) pipe, 350 mm thru 900 mm diameter	*207-18.1 AWWA C-905 DR-18	Any Manufacturer Meeting Specification	Pressure Rating 16.52 kg/cm2
Water Distribution Miscellaneous			
Cast Iron & Ductile Iron Fittings and Joints For DI & PVC pipe, short body, cement lined	*207-9.2 AWWA C-110 AWWA C-111 AWWA C-153	Any Manufacturer Meeting Specifications	Only mechanical joint fittings shall be used on PVC pipe
SUBJECT	**SPEC* REFERENCE**	**MANUFACTURER (Brand Name)**	**NOTES**
Water Distribution Miscellaneous			

Tapping Sleeve 100 mm thru 500 mm diameter		International (228) APAC (502) Baker (428) ford (FTSC) Mueller (H619) Clow-Rich Improved Corey Smith-Blair (622) JCM (412) Romac (FTS420)	
Stainless Steel Bands (Repair Clamps)		JCM (101, 210, 211, 301) Ford (FS1, FS2) Romac (SS1, SS2) Cascade (CR1, CR2, CR3)	
D.I.P. Joints		Raychem Hotcladv	110 heat shrinkable
High Deflection fittings, and restrained expansion couplings		U.S. pipe	XTRA FLEWX
Paint and Protective Covering on Welded Steel Pipe			
Primer:		1) Ameron Amercoat 3127 2) Engard 3) Koppers	Amercoat 3127 511 P-1500 Inorganic Zinc
Intermediate Coat:		1) Ameron 2) Engard 3) Koppers	Amercoat 385 480 Hi-Gard Epoxy
Top Coat		1) Ameron 2) Engard 3) Koppers	Amershield 448 2501
Dry Standpipe			
Hose valve		Potter Roemer Inc.	Series 4300
Telescpoing Sleeve		TR-FLEX	
Cathodic Protection			
Test Station Housing		1) Christy Concrete Products Inc 2) Brooks Products	G5 Utility Box No. lRT Utility Box
SUBJECT	**SPEC* REFERENCE**	**MANUFACTURER (Brand Name)**	**NOTES**
Cathodic Protection			
Bitumastic Coating		1) Tapecoat Company 2) Kopcoat Inc.	TC Mastic Bitumastic 505

Weld Caps		1) Royston Laboratories, Inc. 2) Phillips Petroleum Co.	Royston Handy Cap Thermit Weld Cap

***** The "Standard Specifications for Public Works Construction" section number. or other Reference

APPROVED MATERIALS LIST

SUBJECT	SPEC* REFERENCE	MANUFACTURER (Brand Name)	NOTES
SEWER MAINS			
Sewer Pipe			
Vitrified Clay Extra Strength Pipe and Fittings	207-8	1.Pacific Clay Products 2.Gladdin & McBean 3.Mission Clay	Plain End and Bell & Spigot type pipe
PVC Sewer Pipe and Fittings - Gasket Joints, 100 mm through 375 mm diameter	207-17 ASTM D-3034 SDR 35	1.J-M. 2.Certainteed 3.Carlon 4.Pacific Western Plastics 5.Vinyltech 6. Diamond Plastics Corp.	Green Bell ----- ----- ----- ----- -----
PVC Sewer Pipe and Fittings - Gasket Joints, 450 mm through 750 mm diameter	*207-17 ATSM F-679 "T-1" only	J-M Diamond Plastics Corp. Vinyltech Pacific Western Plastics	
Sewer Laterals			
Vitrified Clay	*207-8	Pacific Clay Products Gladdin & McBean Mission Clay	Plain End & Bell and Spigot Type Pipe
PVC	*207-17 ASTM D-2751	J-M Certainteed Pacific Western Plastic Vinyltech	
ABS	*207-15 ATSM D-2751	Apache Grinnel Colby Standard Plastic	
PVC	207-17	1.J-M. 2. Certainteed 3. Pacific Western Plastics 4. Vinyltech	
Sewer Fittings			
Vitrified Clay	*207-8	Pacific Clay Products Gladdin & McBean Mission Clay	Plain end Type Pipe/Bell & Spigot Type Pipe

SUBJECT	SPEC* REFERENCE	MANUFACTURER (Brand Name)	NOTES
Sewer Fittings			
PVC	*207-17	Vassallo Multi-Fitting G.P.K. J-M	
ABS	*207-15	U-Brand	
Manhole			
Precast Manhole Bases	ASTM C-478	Mar-Con Products	
Polymer Mortar		1. Engard Coatings	490 Epoxy Putty or 498 Underwater Epoxy Putty
		2. Sika Corporation	Sikadur 31 Hi-Mod Gel or Sikadur 32 Hi-Mod
		3. Fluid Polymer	FP 1212 polyurethane sealant
		4. RAM NEK	FP 1212 polyurethane sealant
Coal Tar Emulsion		Koppers Bituplastic	No. 28
Miscellaneous			
Flexible Couplings		Smith-Blair 441 Rockwell APAC (331, 332, 323, 335) Cascade, (CDC-EC) DFW, Plastics, Inc. Romac (501)	Eccentric couplings **NOT** acceptable
Transition Gaskets	Atsm D-1869	Newby Rubber, Inc	**Class 150** **DR-18 PVC**
High-Deflection Coupling 100 mm thru 300 mm diameter		Certainteed	
Flexible-Saddles (Wye)		DFW Plastics, Inc.	

***** The "Standard Specifications for Public Works Construction" section number. or other Reference

OTAY WATER DISTRICT APPROVED MATERIALS LIST

Item	Description	Manufacturer
ACTUATOR	Electric Valve Actuators Used for Valve Control on Motor Operated Valves. Submittal Required.	Auma SG Series EIM Rotork Flo-Loc, FloPak
ADAPTER, FLANGE COUPLING	150 mm and Larger, Mechanical x Flange. Steel or Ductile Iron Construction without Anchor Pins, Epoxy Coated, 304 Stainless Steel Bolts and Nuts	Dresser 127 Ford FFCA Style JCM 301 Powerseal 3521, 3528 Romac FCA501, FC400 Smith-Blair 912, 913
ADAPTER, KAMLOCK	316 Stainless Steel Adapter, MIP x Male Kamlock, 50 mm, 100 mm or 150 mm With 6 mm 304 Stainless Steel Street Ell and Pet Cock Tapped into the Side of the Fitting	OPW Kamlock 600-F-SS
AIR/VACUUM VALVE ENCLOSURE	12 Gauge Steel, Clam Shell Hinged Construction, Powder Polyester Coated. Use Enclosure Size As Indicated Below. 25 mm & 50 mm Air Vac Sizes Use: 400 mm x 600 mm 100 mm & 150 mm Air Vac Sizes Use: 600 mm x 900mm 200 mm Air Vac Size Use: 750 mm x 1,050 mm Potable Water Color: Chocolate Brown Recycled Water Color: OSHA Safety Purple	Pipeline Products VCDD-1624 VCCD-2436 VCCD-3042
AIR/VACUUM VALVE SUCTION SCREEN	For Use on 25 mm and 50 mm Air/Vacuum Installations. FIP Nylon Nut Style with 20 Mesh Stainless Steel Screen.	Christy VC Series McMaster-Carr 9877K52, 9877K65 Northtown Hytech
ANODE, MAGNESIUM	High or Standard Potential Anode with a Galvanized Steel Core Encased in a Square Magnesium Alloy Ingot Pre-Packaged in a Permeable Cotton Cloth Bag Filled with a 75 percent Gypsum, 20 percent Bentonite, 5 percent Sodium Sulfate Mixture. Provide Ingot Weight as Specified on the plans.	
ANTI-SIEZE COMPOUND	For Use on Stainless Steel Bolts and Nuts	Locktite Nevr Sieze
BACKFLOW PREVENTER	Reduced Pressure Principal Type Assemblies as Approved by the State of California, Department of Health Services	List of Approved Backflow Prevention Assemblies

Item	Description	Manufacturer
BOLTS, EXPANSION DROP-IN ANCHOR	13 mm x 75 mm Stainless Steel Heavy Duty Anchor System with Anchor Assembly with Hex Head Threaded Rod and Washer, Drop-in Sleeve and Epoxy Resin Adhesive Capsule. For Use on Air Vac and Water Test Station Enclosures.	Hilti HSLG-R Series U.S. Anchor W Series
BOLTS AND NUTS, 304 SS	Hex-Head Machine, ASTM A193, Grade B8 Bolts and ASTM A194, Grade 8 Nuts	
BOLTS AND NUTS, 316 SS	Hex-Head Machine, ASTM A193, Grade B8M Bolts and ASTM A194, Grade 8M Nuts	
BOLTS AND NUTS, A307	Hex-Head Machine, Cadmium/Zinc Plated, ASTM A307, Grade A Bolts and A307 2H Heavy Hex Nuts	
BOLTS AND NUTS, A307	Hex-Head Machine, Fluoropolymer Coated, ASTM A307, Grade A Bolts and A307 2H Heavy Hex Nuts	Tripac 2000 Blue
BOLTS AND NUTS, A307, BREAK AWAY, 19 mm FOR FIRE HYDRANT AND 150 mm AIR VAC	Wet Barrel Fire Hydrant Flange Bolts, Hex Head Machine, Break Away Bolts, 19 mm x 81mm and Nuts. Bolts Shall Incorporate a 12.3 mm x 47.6 mm Hole Drilled in the Bolt Shaft and Filled with Silicone Sealant. Bolts and Nuts Shall be Zinc Plated ASTM A307 Carbon Steel.	
BOLTS AND NUTS, A307, BREAK AWAY, 15 mm FOR 100 mm AIR VAC	Wet Barrel Fire Hydrant Flange Bolts, Hex Head Machine, Break Away Bolts, 15 mm x 75 mm and Nuts. Bolts Shall Incorporate a 12.3 mm x 47.6 mm Hole Drilled in the Bolt Shaft and Filled with Silicone Sealant. Bolts and Nuts Shall be Zinc Plated ASTM A307 Carbon Steel.	
BONDING AGENT, EPOXY	Epoxy Resin Based Bonding Agent for Bonding New Mortar or Concrete to Existing Concrete	Sika Sikadur 32 Hi-Mod
BUSHING, INSULATING	Nylon, 31 mm x 25 mm, 38 mm x 25 mm, 63 mm x 50 mm	Calpico Corrosion Control Products F.H. Mahoney
CAP, KAMLOCK, DUST, LOCKING	316 Stainless Steel Kamlock Type Dust Cap, 50 mm, 100 mm or 150 mm	OPW Kamlock 700 Type DC-SS
CASING END SEAL	6.25 mm Thick Styrene Butadiene Rubber Sheet End Seal. Use 25 mm Wide Stainless Steel Bands. Zippered End Seals with Stainless Steel Bands May Also be Used.	Advanced Products & Systems Cascade Calpico Pipeline Seal & Insulator Powerseal Raychem

Item	Description	Manufacturer
CASING SPACER	Stainless Steel Casing Spacer, Center Restrained, Position Type with PVC Liner and Non-metallic Anti-friction Runners	Advance Products Systems Cascade Calpico Pipeline Seal & Insulator (PSI) Powerseal Raychem
CATHODIC TEST STATION BOX	25.4 Kg Concrete Body with 5.4 Kg Ductile Iron Lid and Lid Ring. "CP TEST" Shall Be Cast into the Lid in 25 mm Letters. For Cathodic Protection Test Stations, Anode Ground Beds and Insulated Flange Test Stations.	Brooks 1-RT series Farwest Type 1-RT J & R #10-R
CATHODIC WELDING	For Welding Cathodic Bond Wires to Steel Pipelines	Cadweld
CHLORINE	Liquid (Gas) or Sodium Hypochlorite Solution.	
CLAMP, REPAIR	Stainless Steel, Full Circle, Double Lug. For ACP, PVC, DI or CI Pipe, Sizes 100 mm through 500 mm	Adams 220 APAC 402, 422, 432 Cascade CR-2, CRT-2 Ford F2, FS2 JCM 102 Mueller 510 Powerseal Super Seal 3111, 3122, 3132 Romac SS2, CL2 Smith-Blair 227
COATING, INTERNAL PIPE	For Coating the Internal Pipe Lining for an Insulated Flange	Aquatapoxy CCI Hydro-Pox
COATING, MASTIC	Cold Applied Coal Tar or Epoxy Based Single Component, Self-Priming, Heavy Duty Protective Exterior Coating for Buried Concrete	Carboline Bitumastic 50 Devoe Devtar 5A Polykem 938 Tnemec HB Tnemecol 46-465, HB Tneme-Tar 46H-413
COATING, WATERPROOF	Epoxy Resin Based Cemetous Trowel Grade Protective Waterproofing for Concrete	Sika Top Seal 107 STO CR 241
CONNECTOR, TRACER WIRE	Direct Bury Silicone Filled Capsule Tube with Standard Wire Nut or Silicone Filled Wire Nut Connectors for Tracer Wire Connections	3M DBR-6 King 4, 5, 6
COPPER DISC, SOLID	For Plugging Corporation Stops When a Service is to be Abandoned	Ford Disc 3, 4, 6 or 7 A.Y. McDonald 6125 Mueller H-15535
CORPORATION STOP, COMPRESSION X MIP	Bronze Compression x MIP Thread Ball Valve (T-Head only) 25 mm and 50 mm Full Opening	Ford FB1100-Q Series Jones J-1935SG, J-1957SG A.Y. McDonald 4704BQ Mueller B-25028
CORPORATION STOP, MIP X MIP	Bronze MIP x MIP Thread Ball Valve (T-Head only), 25 mm and 50 mm Full Opening	Ford FB500-4, FB500-7 Jones J-1943, J-1956 A.Y. McDonald 3131B Mueller B-20013, B-2969

Item	Description	Manufacturer
CORPORATION STOP, INSULATED	Bronze Compression x MIP Thread Ball Valve (T-Head only) 25 mm Full Opening	A.Y. McDonald 4755DBT Mueller N-35028
COUPLING, COMPRESSION x COMPRESSION	Three Part Compression Coupling (Both Ends) for 25 mm and 50 mm Copper Pipe	Ford C44-Q Series Jones J-2609SG A.Y. McDonald 4758Q Mueller H-15403
COUPLING, C900 PVC DEFLECTION	100 mm through 300 mm Solid PVC for Obtaining Deflection Only. Provides 5 Degree Maximum Deflection	Certainteed Vinyl Iron HD
COUPLING, C900 PVC CLOSURE OR REPAIR	100 mm through 300 mm Solid PVC for Closure or Repair	Certainteed Vinyl Iron HD
COUPLING, C905 PVC CLOSURE, DEFLECTION OR REPAIR	400 mm through 900 mm Solid PVC for Closure, Deflection or Repair	IPEX Nyloplast America Septer
COUPLING, GROOVED	Use for Above Ground DI or Steel Pipe 100 mm or Larger	Grinnell #7001 Tyler 500 Victaulic #44, #77
COUPLING, HALF, STEEL	Forged Steel Half Coupling, ASTM A105, 1,360 kg, NPT Threads	Bonney Forge
COUPLING, INSULATED, COMPRESSION x COMPRESSION	Three Part Compression Insulated Coupling (Both Ends) for 25mm Copper Pipe	A.Y. McDonald 4755DBT Mueller N-35403
COUPLING, FLEXIBLE	150 mm Long PVC Flexible Coupling with Stainless Steel Bands. Use For Securing Gate Valve Cap and Can Assembly to 200 mm Class 200 PVC C900 Gate Well	Calder DFW/HPI Fernco
COUPLING, STRAIGHT FLEXIBLE	100 mm and Larger, Steel or Ductile Iron Construction, Slip x Slip, Epoxy Coated with 304 or 316 Stainless Steel Bolts and Nuts. For Use on AC, PVC, DI, or Steel Pipe.	APAC 301 Ford FC1 Powerseal 3501, 3538 Romac 501 Smith-Blair 441 Viking Johnson MaxiFit
COUPLING, TRANSITION FLEXIBLE	100 mm and Larger, Steel or Ductile Iron Construction, Slip x Slip, Epoxy Coated with 304 or 316 Stainless Steel Bolts and Nuts. For Use on AC, PVC, DI, or Steel Pipe.	APAC 311, 313 Baker Ford FC2A Powerseal 3501, 3538 Romac 501 Smith-Blair 413 Viking Johnson MaxiFit
CUSTOMER SIDE SHUT-OFF VALVE	19 mm and 25 mm Bronze Customer Shut-off (Ball Valve), Inlet Swivel Meter Nut x Outlet FIP Thread, Lockable Tabs, with Lever Handle	Ford B13-332W w/ HT34 B13-444W w/ HT34 Jones J-1908W A.Y. McDonald 6101MWHB Mueller B-24351 w/ B-20298-99000

Item	Description	Manufacturer
CUSTOMER SIDE SHUT-OFF VALVE	38 mm and 50 mm Bronze Customer Shut-off (Ball Valve), Inlet Meter Flange. x Outlet FIP Thread, Lockable Tabs, with Lever Handle	Ford BF13-666W w/HB-67S, BF13-777W w/HB-67S Jones J-1913W A.Y. McDonald 6101MWHB Mueller B-24337
DECOMPOSED GRANITE (DG)	Imported Quarry Decomposed Granite	
DEFLECTION BEND, PVC C900 AND C905	5 degreę Deflection Bend Manufactured from C900 and C905 PVC Pipe	Ipex
DISMANTLING JOINT	Telescoping, Adjustable, Double Flanged Fitting, with High Tensile Strength Zinc Plated Tie Bars. NSF-61 Epoxy or Nylon Interior and Exterior Coating.	Viking Johnson
ELL, BURY, DUCTILE IRON	150 mm x 400 mm Ductile Iron Bury Ells, Long Radius, Flg x MJ/PO (Use of Short Radius Bury Ells with Engineer Approval Only)	Clow Sigma South Bay Foundry
ELL, FIP x COMP, 45 Deg 1/8 BEND	25 mm and 50 mm Bronze Ell, FIP x Compression for Copper Pipe	A.Y. McDonald 4747Q Mueller H-15534
ELL, FIP x OMP, 90 Deg C 1/4 BEND	25 mm and 50 mm Bronze Ell, FIP x Compression for Copper Pipe	Ford L14-44Q, L14-77Q Jones J-2621SG A.Y. McDonald 4779Q Mueller H-15533
ELL, STREET, MIP x FIP STAINLESS STEEL	6mm 304 SS Street Ell for Blowoff Dust Cap	
ELL, SUPER GRIP TYPE	25 mm and 50 mm Bronze Ell Compression x Compression for Copper Pipe	Ford L44-Q Series Jones J-2611SG A.Y. McDonald 4761Q Mueller H-15526
EPOXY ADHESIVE	High-Modulus, Low Viscosity, Epoxy Resin Based Adhesive Suitable for Grouting Bolts or Dowels	Sika Sikadur 31, Sikadur 35
EXPANSION JOINT	For Water Pipeline Bridge Crossings	APAC 703 Dresser 63 Powerseal 3563 Smith-Blair 611, 612
EXPANSION JOINT, RUBBER	Expansion Joints at Reservoir and Pump station Inlet/Outlet Piping to Allow Lateral Movement and Isolate Vibration	General Rubber 1050, 1075 Holz CSM, CR, C11R Mercer 500-700 Metraflex Metro Red Valve Reflex
FAN, VAULT EXHAUST	Electric, 110 Volt, Single Phase, Squirrel Cage Type, Suitable for Wet Locations. Size for 6 Volume Changes per Hour	

Item	Description	Manufacturer
FIRE HYDRANT SPOOL, DUCTILE OR CAST IRON, FLANGED	Ductile or Cast Iron Spool with Integrally Cast Flanges and Machined or Cast Exterior Grooves. Spools 300 mm or Longer Shall Have Grooves 75 mm from Each Flange. Spools Shorter than 300 mm Shall Have One Groove Centered Between the Flanges. Grooves Shall be 5 mm Deep, 2 mm and 6 mm Wide, 2 mm	
FIRE HYDRANT, 1.03 MPa	150 mm Standard 1.03 MPa Wet Barrel Ductile Iron (DI) or Bronze Fire Hydrants with Six-hole Bolt Pattern. DI Hydrants shall be Fusion Epoxy Lined.	AVK 24/70, 24/90 Clow 850 (Ductile-Iron Only), 860 (Ductile-Iron Only), 2050, 2060, 2065 Jones J3700, J3765, J3775
FIRE HYDRANT, 1.38 MPa	150 mm High Pressure 1.38 MPa Wet Barrel, Ductile Iron Fire Hydrant, With Six-hole Bolt Pattern. DI Fusion Epoxy Lined	AVK 24/70, 24/90
FIRE HYDRANT, 1.72 MPa	150 mm High Pressure 1.72 MPa Dry Barrel, Ductile Iron Fire Hydrant, Fusion Epoxy Lined	U.S. Metropolitan 250
FIRE HYDRANT, BREAK – OFF CHECK VALVE	Break-off Valves for Fire Hydrants. Submittal Required	Long Beach Iron LB400
FIRE HYDRANT, CAP	Screwed Brass or Ductile Iron Cap for Fire Hydrant Hose Ports, 63 mm and 100 mm	AVK Jones Long Beach US Pipe
FITTING, DUCTILE IRON	Flanged, Mechanical, Joint or Push-on Tees, Bends, Crosses, Reducers, Adapters, etc., for Water Lines 100 mm and Larger. Manufactured per AWWA C110, C111, C153. (C153 Fittings are not Permitted on C905 Pipe.)	Bachman Griffin Nappco/Sigma Pipeline Components Star Tyler
FITTING, GROOVED	Grooved Ductile Iron Fittings for Grooved End Pipes, 100 mm through 600 mm	Grinnell Tyler G-B Victaulic
GASKET	3.125 mm Thick Full Face or Ring, Aramid Fiber Bound with Nitrile. No Asbestos Content	Calpico Garlock 3000 Johns-Manville Klinger 4401 Tripac 5000
GASKET	1.56 mm Thick, Cloth Inserted Rubber, Full Face or Ring	Calpico Coletech 2000 Garlock Johns-Manville Tripac 2000
GASKET, JOINT RESTRAINT	Rubber Ring Type with Stainless Steel Locking Segments Vulcanized into the Gasket. For Use on PVC Carrier and Casing Pipes.	US Pipe Field Lok 350

Item	Description	Manufacturer
GASKET, RUBBER GASOLINE RESISTANT	Gasoline Resistant Pipe Gaskets for Water Mains	Newby
GASKET, RUBBER RING	3 mm Thick, Rubber Ring Type, 1.72 MPa Maximum. For 100 mm Through 900 mm Pipe Flanges	Calpico Johns-Manville US Pipe
GATE WELL	For Air/Vac Ball Valve Installations: 100 mm SDR-35 PVC Sewer Pipe. For Valve Installations: 200 mm C900, DR14, Class 200 PVC Pressure Pipe. 200 mm Pipe Casing Colors: Potable Water: White or Blue Recycled Water: Purple	Refer to PIPE, PVC C900
GATE WELL CAP- 100 mm	Ductile or Cast Iron Lid Used for Air/Vacuum Device Ball Valve Access, 100 mm Nominal Diameter with a 62 mm Long Skirt.	South Bay Foundry B50
GATE WELL CAP- 200 mm	Ductile or Cast Iron Lid Used for Valve Access, 200 mm Nominal Diameter Lid with a 150 mm Long Skirt and Lifting Slot. Minimum Weight 10 Kg For use in Areas where Speed Limit is Less Than 56 KM/HR.	South Bay Foundry SBF B52
GATE WELL CAP AND CAN ASSEMBLY	Ductile or Cast Iron, Machined Frame with Ductile or Cast Iron Lid. Used for Valve Access. 200 mm Nominal Diameter Lid with a 150 mm Long Skirt and Lifting Slot. Required in Areas Where Speed Limit is 56 KM/HR or Greater.	South Bay Foundry SBF 1208N Assembly
GREASE	For Bolt Corrosion Protection on Buried Bolts, NO-OX-ID Type	Sanchem NO-OX-ID Dearborn Chemical
GROUT	Non-Shrink Cement Based Construction Grout for Crack Repair, Flooring Mortar, Dowel Grouting, Crack Sealing and General Binding	Sika Sikagrout 212 STO Epoxy Binder CR633 STO Epoxy Gel CR635 STO N-S Grout CR732
HUMIDISTAT	120 Volt, 6.0 AMP, Single Phase with Adjustable Low and High Lockable Limit Stops. Adjustable Range of 20 percent to 70 percent Humidity and Suitable for Wet Locations	
INSULATING BLANKET	Insulating Blanket for Corrosion Interference Mitigation	McMaster-Carr
INSULATING COUPLINGS	Insulating Couplings for Corrosion Protection of Pipelines	Romac IC400, IC501

Item	Description	Manufacturer
INSULATING GASKET KIT	Insulating Gasket Kits for Corrosion Protection of Pipelines	Advanced Product Systems Calpico PSI - Gasket Seal PSI – Linebacler Farwest
ISOLATOR, VIBRATION	Wire Rope Seimic Support for Pipelines for Isolating Vibrations and Shocks	Enidine Steelpaw
JOINT RESTRAINT ASSEMBLY	360 Degree Wedge Type Restraint System for Ductile Iron, C900 PVC, and Steel Pipe, Sizes 150 mm Through 750 mm For Use by District Forces Only Where Concrete Thrust Restraint is not Possible. Prior Approval of Engineer is Required.	Ford Uniflange 1300 Series Ford Uniflange 1500 Series Mueller Aquagrip Sigma PV-Lok Star Allgrip series 3600
JOINT SEALING COMPOUND, PLASTIC ROPE	For Use on Pre-cast Vault and Manhole in Grooved Joints Between Sections	Quickset Joint Sealing Compound
LADDER, ALUMINUM, VAULT	High Strength 6061-T6 Aluminum Alloy, 25 mm Diameter Solid Rungs and 450 mm Between Side Rails. Ladder to Exceed Requirements CAL/OSHA Standards	Alaco, Model 560
LADDER, FIBERGLASS, VAULT	Fiberglass Reinforced Plastic, 25 mm Solid Square Rungs with Grit Safety Surface, Ultraviolet Inhibitors. 42 kPa Tensile Strength with a 3 to 1 Safety Factor per OSHA Requirements.	
LIGHT SWITCH, VAULT	120 Volt, 20 AMP, Single Pole, Spring Loaded with Clear Waterproof Cover	
LIGHTS, VAULT	Non-Metallic Incandescent Vaportite, 120 Volt, 6.0 AMP, Wall or Ceiling Mounted, with 100 Watt Bulb with Cage and Glass Protector for Bulb. Suitable for Wet Locations. Two Light Fixtures Per Vault.	
LOAD CENTER, VAULT	125 AMP, Double Pole, 1 Phase, 3 Wire, Solid Neutral 120/240 VAC with Plug-In GFI Breaker	
LUBRICANT, PIPE GASKET	Rubber Gasket Pipe Lubricant for Use on PVC or Ductile Iron Pipe Joints, NSF Listing Required	Christy Pro-Lube Whitlam Blue Lube
MARKER, UTILITY	Flexible Reinforced Polymer Glass Fiber Composite Strip Identification Marker. Branded or Customized Identification Markings for Pipelines and Appurtenances May Be Required	Carsonite CUM-375
METER ADAPTER	For Replacing Large Meters with Smaller Meters	Ford A Series Jones J128H A.Y. McDonald 10J Series Mueller H10889

Item	Description	Manufacturer
METER BOX	250 mm x 500 mm Polymer Meter Box and Cover for 25 mm Water Services. Cover Color: Gray for Potable Water Use Purple Lids for Recycled Water Use	Amorcast A6000486SA W/ #A6000483DQ Cover & #A6000487 Read Lid
METER BOX	425 mm x 750 mm Polymer Meter box with 2-Piece Lid for 50 mm Water Services and Blowoff Assemblies Cover Color: Gray for Potable Water Use Purple Lids for Recycled Water Use	Amorcast A6001640PC-12 W/ #A60001643DZ Cover & A6000482 Read Lid
METER FLANGE	Bronze Meter Flanges for 38 mm and 50 mm Meters with Slotted Holes	Ford CF Series Jones J129 A.Y. McDonald 610F
METER STOP, ANGLE COMPRESSION X METER	25 mm Bronze Angle Meter Stop (Ball Valve) with 90 Degree Lock Wing, Inlet 110 Style Compression x Outlet Swivel Meter Nut	Ford BA43-444W-Q Jones J-1963WSG, A.Y. McDonald 4602BQ Mueller B24258-1
METER STOP, ANGLE COMPRESSION X METER	50 mm Bronze Angle Meter Stop (Ball Valve) with 90 Degree Lock Wing, Inlet 110 Style Compression x Outlet Meter Flange	Ford BFA43-777W-Q Jones J-1975WSG A.Y. McDonald 4602BQ Mueller B-24276
METER, WATER	19 mm Through 50 mm Water Meter with Bronze Body, Bronze Bonnet, Thermoplastic Chamber, and Register Odometer at the Bottom of the Register Face. Odometer and Sweep Hand Read in Cubic meter. Short or Long Pattern Body.	Badger Models 35, 70, 120, 170 Sensus Models SR, SRII Sensus Series W Turbo W-120 DRS, W-160 DRS
MORTAR, REPAIR	Two Component, Low Shrinkage, Cement Based with High Compressive and Bonding Strength	Sika Top 122, 123 STO CR 735, CR 740
NOZZLE, WELD-ON	Weld-on Nozzle with Reinforcing Pad or Collar for Connection to CMC/L Steel Pipe. ASTM A-53B 6 mm Minimum Thickness Seamless Pipe, Concrete Coated, Mortar Lined with AWWA C207 Flange Submittal Required	
PAINT, POLYESTER POWDER	TGIC Polyester Powder For Air Vac and Water Test Station Enclosures	Tiger Dylac Series 49 Porter Paint J-Series Fuller O'Brien PF Series
PAINT, SILICONE ALKYD ENAMEL	One Component, Minimum 46 percent Solids (by Volume), 30 percent Silicone Content (by Volume), High Gloss, VOC Compliant Industrial Grade Paint.	Amteco SA-3 Silicone Poly Plus Carboline Carbocoat 30 Devoe Devshield 475 Dunn Edwards 42-53 Pittsburg Paint 97-480 Porter Guard 2200 Sherwin Williams Steel Master 9500

Item	Description	Manufacturer
PAINT, WATERBORNE ACRYLIC LATEX	One Component, Rapid Dry 100 percent Acrylic Latex Waterborne Marking Paint Meeting Cal/Trans Specification #8010-21C-30.	TMT-Pathway Waterborne Traffic Paint #2343A9
PENETRATION SEALS, INTERLOCKING	Mechanical Link Type Interlocking Vault, Casing and Building Penetration Seals	Advance products Systems Interlynx Link Seal
PIPE, ASBESTOS CEMENT	150 mm through 600 mm AWWA C400 Pipe. (Prior Approval and Submittal Required)	
PIPE, COPPER TUBING	25 mm Type K Soft Seamless Rolled Tubing 50 mm Type K Soft Seamless Straight Lengths 25 mm and 50 mm Type K Rigid Seamless Straight Lengths	Cerro Halstead Lee Mueller Phelps-Dodge
PIPE, DUCTILE IRON	For Water Lines 100 mm and Larger Manufactured per AWWA C111, C115, C150, C151.	American Pipe Griffin Pacific States U.S. Pipe
PIPE, PVC C900	For Water Lines 100 mm through 300 mm and 200 mm Gate Wells. AWWA C900 Class 200 Only	Certainteed Diamond Plastics Extrusion Technologies IPEX J-M Pacific Western VinylTech
PIPE, PVC C905	For Water Lines 400 mm and 500 mm through 900 mm AWWA C905 DR 25 and DR 18	Certainteed Diamond Plactics Extrusion Technologies IPEX J-M Pacific Western Vinyltech
PIPE, STEEL CEMENT LINED AND COATED (CMC/L)	Steel Cylinder (CML/C), Per AWWA M11 and Section 15061. 6 mm Minimum Wall Thickness. Steel Pipes Used for Recycled Water Installation are to be Identified Per District Requirements. Submittal Required	
PLASTIC ENCASEMENT	12-mil Thick Polyethylene Encasement Sleeve for Ductile Iron Pipe (DIP) per AWWA C105 and Recycled PVC, CMC/L, or DIP Non-Purple Water Pipe. Clear Sleeve for Potable Water, Purple Color for Recycled Water	
PLASTIC WRAP	8-mil Thick Polyethylene Encasement for Buried Fittings and Valves Clear Sleeve for Potable Water Purple Color for Recycled Water	

Item	Description	Manufacturer
PRIMER, WAX TAPE	Surface Primer for Underground Application of Petrolatum Wax Tape	Carboline Denso Paste Trenton Tem-Coat
PROTECTOR POST, STEEL	100 mm Diameter, 6.25 mm Wall Galvanized A-120 Steel Pipe. Concrete Filled with 100 mm Galvanized Fence Post Cap	
PUMP, SUMP, VAULT	Automatic Submersible, Minimum 1/2 HP, 115 Volt, 60 Hz, 1 Phase, Ball Bearing Motor with Thermal Overload Protection. Either bronze or Epoxy Coated Cast Iron Body.	
RECEPTACLE, GROUND FAULT, VAULT	125 Volt, 20 AMP, Duplex, with Gasketed. Self-Closing Aluminum Cover.	
REFERENCE ELECTRODE, COPPER SULFATE	High or Standard Potential Electrode with PVC Pipe Housing Pre- Packaged in a Permeable Cotton Cloth Bag Filled with a 50 percent Gypsum 50 percent Powered Bentonite Mixture. Electrode Shall have a Design Life of 15 Years with a Stability of +/- 5 Millivolts Under a 3.0 Microamphere Load. Provide Electrode with Integrally Attached 10 AWG HMW/PE Insulated Wire.	
ROCK, CRUSHED	Washed 10 mm and 19 mm Crushed Rock 10 mm for Use in Meter Boxes Only.	
SEALANT	Chemical Grout for Joint Sealing	3M Scotch Seal
SEISMIC COUPLING	Flexible Expansion joints for Pipelines, Reservoirs, Pump Stations, etc.	EBAA Iron Flex-Tend Romac FlexiJoint Star Pipe Starflex 5000
SEISMIC SENSOR DEVICE	Seismic Sensors for Reservoirs and Pipelines. Submit Required	Submit for Approval
SERVICE SADDLE FOR ACP AND CI PIPE	Cast Brass ASTM B62 Body with Silicone Bronze Double Straps, IP Outlet Sizes 25 mm and 50 mm	Ford 202B Jones J-979 A.Y. McDonald 3826 Mueller BR2B Series Romac 202B Smith-Blair 323
SERVICE SADDLE FOR PVC C900 PIPE	Bronze or Brass Saddle with Stainless Steel Four Bolt Strap(s), IP Thread Outlet for Sizes 25 mm and 50 mm for Pipe Sizes 100 mm through 300 mm	Ford 202BS Jones J-969 A.Y. McDonald 3846 Mueller BR2S Series Romac 202BS Smith-Blair 393

Item	Description	Manufacturer
SERVICE SADDLE FOR PVC C905 PIPE	Bronze or Brass Saddle with Stainless Steel Four Bolt Strap(s), IPT Thread Outlet for Sizes 25 mm and 50 mm for Pipe Sizes 400 mm and Larger (Romac Saddle Requires Nylon Bushing)	Ford 202BS Jones J-969 Romac 202N
TAG, BRASS IDENTIFICATION	25 mm Diameter, 18 Gauge Brass with 4.76 mm Die Stamped Letters and Numbers, Suitable for Attachment to Cathodic protection Wires by Means of a Nylon Zip Tie.	
TAPE, OUTER WRAP	Adhesive Plastic Outer Wrap for Wax Petrolatum Tape in Underground Applications	Polyken 960 Trenton Polyply
TAPE, UTILITY	10 to 50 Mil x 50 mm Wide General Utility Tape for Corrosion Protection of Above and Below Ground Pipes and Fittings	Calpico Christy Northtown Polyken 900 Scotchwrap 3M 50, 51
TAPE, WARNING/ IDENTIFICATION	150 mm wide, Warning/Identification (Non-Metallic) Marking Tape for Buried Facilities.	Calpico, Type 1 Line-Tec, Type B T. Christy Ent., Type 1 Terra Tape, Standard 250 Thor, Elast Tec Northtown
TAPE, WARNING/ IDENTIFICATION FOR RECYCLED IRRIGATION	75 mm wide, Warning/Identification (Non-Metallic) Marking Tape for Buried Irrigation Pipelines. Purple Color with continuous warning "CAUTION RECLAIMED WATER MAIN BURIED BELOW"	Calpico, Type 1 Line-Tec, Type B T. Christy Ent., Type 1 Terra Tape, Standard 250 Thor, Elast Tec Northtown
TAPE, WAX ABOVEGROUND	Petrolatum Saturated Synthetic Fabric Tape for Use on Aboveground Couplings, Flanges, Fittings, Etc.	Trenton #2 Wax-Tape
TAPE, WAX UNDERGROUND	Petrolatum Saturated Synthetic Fabric Tape for Use on Underground Couplings, Flanges, Fittings, Etc. Primer and Outer Wrap Required.	Carboline Densyl Tape Trenton #1 Wax-Tape
TAPPING SLEEVE FOR ACP, CI, DI, AND PVC PIPE	Fabricated Steel Tapping Sleeve for 100 mm Through 300 mm Wet Taps. Epoxy Coated with Stainless Steel Bolts and Nuts.	APAC 502, 512 Baker 428 Series Clow F-5205, F-5207 Ford FTSC JMC 412 Mueller 615, 619 Powerseal 3460 Romac FTS-420 Smith-Blair 622
THREDOLET	Forged Steel Fitting ASTM A105. 1,360 kg, NPT Threads	Bonney Forge

Item	Description	Manufacturer
VALVE STEM EXTENSION, FIBERGLASS	Three Part Fiberglass Valve Extension Kit. Use When Extension 2.4 m or Shorter.	Pipeline Products FPU-210, FPT-200, FPL-220
VALVE STEM EXTENSION, STEEL	Round or Square 37 mm Diameter Steel Rod, Welded Construction, Hot Dipped Galvanized with Top Centering Ring and AWWA 50 mm Operating Nuts Top and Bottom. Use When Extension Longer Than 2.4 m.	Pipeline Products SX-900 South Bay Foundry E4160
VALVE, AIR RELEASE, 1.03 MPa	Pressure Air Release Valve, Cast Iron Body with Stainless Steel Internal Parts. 25 mm through 75 mm NPT 100 mm Flanged	APCO 50, 200, 200A Crispin PL10, PL20, PL30, PL41 Val-Matic #38, #45
VALVE, AIR RELEASE, 2.05 MPa	Pressure Air Release Valve, Cast Iron Body with Stainless Steel Internal Parts. 25 mm through 75 mm NPT 100 mm Flanged	APCO 50, 200, 200A Crispin PL10H, PL20H, PL30H, PL42H Val-Matic #38, #45
VALVE, BALL	25 mm and 50 mm Bronze, Straight, Compression x Compression	Ford B44-444-Q, B44-777-Q Jones J-1949SG A.Y. McDonald 6100Q Mueller B-25209
VALVE, BALL WITH LOCKING TABS	50 mm Bronze, Straight, Compression x Compression with Locking Tabs and Brass Handle	Ford B44-777-QW Jones J-1949SGW A.Y. McDonald 6100WQ Mueller B-25146
VALVE, BALL WITH LOCKING TABS	19 mm Bronze, Straight, FIP x Meter Swivel with Locking Tabs and Purple Handle	Ford B13-332W Jones J-1908W A.Y. McDonald 6100M Mueller B-24351-1
VALVE, BREAK OFF CHECK	Break Off Check Valve for Fire Hydrants. Use when indicated on plans	Long Beach LB 400
VALVE, BUTTERFLY 1.03 MPa	400 mm and Larger, AWWA C504, Class B.. Thermosetting or Fusion Bonded Epoxy Coated and Lined. Class D or E Flange x Flange Ends	Dezurik AWWA M & H 1450, 4500 Mosser 810, 830 Mueller Lineseal III Pratt Groundhog Val-Matic Series 2000
VALVE, BUTTERFLY 1.72 MPa	400 mm and Larger, AWWA C504, Class B. Thermosetting or Fusion Bonded Epoxy Coated and Lined. Class F Flange x Flange Ends	Dezurik BAW 250 M & H 1450, 4500 Mosser 810, 830 Mueller Lineseal XP 250 Pratt Triton HP-250 Val-Matic Series 2000
VALVE, BUTTERFLY 1.03 MPa	100 mm through 300 mm , AWWA C504. Thermosetting or Fusion Bonded Epoxy Coated and Lined. B Class, Class D or E Flange x Flange Ends	Dezurik AWWA Keystone 504 M & H 4500 Mueller Lineseal III Pratt Groundhog Val-Matic Series 2000

Item	Description	Manufacturer
VALVE, BUTTERFLY 1.72 MPa	100 mm through 300 mm ,AWWA C504. Thermosetting or Fusion Bonded Epoxy Coated and Lined. B Class, Class F Flange x Flange Ends	Dezurik AWWA Keystone 507 M & H 1450, 4500 Mueller Lineseal XP 250 Pratt triton HP-250 Val-Matic Series 2000
VALVE, BUTTERFLY WAFER 1.03 MPa	400 mm and Larger, Thermosetting or Fusion Bonded Epoxy Coated and Lined Submittal Required	Pratt MKII
VALVE, CHECK	1.03 & 2.07 MPa, Slanting Disc Check Valve 100 mm and Larger	APCO Series 800 Crispin TD Series Val-Matic Series 9000
VALVE, COMBINATION AIR RELEASE & AIR/VACUUM 25 mm AND 50 mm	Single Cast Body with Stainless Steel Internal Parts, BUNA-N seats per AWWA C512, and Epoxy Coated Interior per AWWA C550. N.P.T. Threaded Inlet and Outlet. 2.04 MPa rated Body and Internals.	APCO 143C.2, 145C.2 Cla-Val 33A Crispin UL10, UL20 Val-Matic 201C.2, 202C.2 Vent-O-Mat 025RBX4021, 050RBX4021
VALVE, AIR RELEASE & AIR/VACCUM, 100 mm AND LARGER	Single Body Style Combination Air Release and Air/Vacuum Valve. Stainless Steel Internal Parts, BUNA-N seats per AWWA C512, with Protection Hood and Epoxy Coated Interior per AWWA C550. Flanged 125# or 250# Inlet. 2.04 MPa Rated Body and Internals.	APCO 152.1, 152.2, 153.1, 153.2, 154.1, 154.2 Cla-Val 354-AV, 354-AV.3, 356-AV, 356-AV.3, 368-AV, 358-AV.3 Crispin UL41, UL42, C61, C62, C81, C82 Val-Matic 104, 154, 106, 156, 108, 158 Vent-O-Mat 100RBX1631, 100RBX4031, 150RBX1631, 150RBX4031, 200RBX1631, 200RBX4031
VALVE, GATE, RESILIENT WEDGE (RWGV)	100 mm Through 300 mm , Non-Rising Low Zinc Bronze or Stainless Steel Stem, Ductile- Iron Body and Bonnet, Encapsulated Wedge per AWWA C509 or C515 with Epoxy Coated Interior. Manufactured to AWWA C509 or C515, with 1.72 MPa Rating.	American FC, Series 2500 AVK 25 Clow 2360 F6100 Series Kennedy Ken-Seal II, KRSR Mueller 2360, 2361 M&H 4067, 7067 US Pipe Metroseal & Metroseal 250
VALVE, GATE, RESILIENT WEDGE, 400 mm AND LARGER	400 mm Through 600 mm , per AWWA C509, Ductile Iron Body, Encapsulated Wedge, Non-Rising Stem, Epoxy Coated Interior per AWWA C550, Minimum 1.36 MPa Rating. Prior Approval and Submittal Required.	Clow F-6100 Series Kennedy Ken-Seal II M&H 4067 Mueller A-2361 U.S. Pipe Metroseal 250
VALVE, INSULATED BALL	25 mm Bronze, Straight, Compression x Compression, Insulated Type	Mueller N-35209
VALVE, PET COCK	6 mm 304 SS Pet Cock Valve for Use on Blowoff Kamlock Adapter	

Item	Description	Manufacturer
VALVE, PRESSURE REGULATING 1.03 MPa to 1.72 MPa	19 mm through 50 mm	Cash Acme E55 Watts 223, 25AUB Wilkins 600 Series
VALVE, PRESSURE REGULATING 1.72 MPa to 2.74 MPa	19 mm through 50 mm	Cash Acme E55 Watts N35B Series
VALVE, PRESSURE REDUCING	For Water Main Pressure Reducing, 100 mm through 400 mm	Ames 910/610 Series Cla-Val 90G-01 Singer 106 PR, 206 PR Watts ACV 115E Series
VALVE, PRESSURE RELIEF	For Service Connections, 19 mm	Cash Acme FWC
VALVE, PRESSURE RELIEF AND SUSTAINING	For Water Main Pressure Reducing and Sustaining, 100 mm through 400 mm	Ames 920/620 Series Cla-Val 50-01, 650-01 Singer 106 RPS, 206 RPS Watts ACV 116E Series
VALVE. BALL, 1.03 MPa	6 mm through 50 mm, FIP Threads with Handle	Apollo 70-100 Series Milwaukee BA-1005 Nibco 560 Series Stockham S-214 Watts WBV-3, WEBS-3
VALVE. BALL, 1.03 MPa	100 mm and Larger, Rubber Seated, AWWA C507. Thermosetting or Fusion Bonded Epoxy Coated.	Pratt
VAULT, ACCESS DOOR ALUMINUM	Aluminum Vault Access Door, Dual Door Configuration, Spring Loaded and Counter Balanced, with Inset for Padlock. H-10 Parkway or H-20 Street Loading Required. Submittal Required.	Bilco Type AD-JL
VAULT, FIBERGLASS REINFORCED PLASTIC (FRP)	For Meter Sizes 75 mm and Larger. 1.82 m Long x 1.2 m Wide x 1.5 m Deep FRP Construction, Minimum H-10 Parkway Loading with Reinforced Plastic Concrete or Aluminum Access Door. Submittal Required.	Armorcast A6001506AMTF
VAULT, LADDER UP	Vault Ladder Extension, Retractable, 1,200 mm Extension.	Bilco Ladder-Up Pipeline Products VL-100

SECTION 11. (BLANK)

SECTION 12. (BLANK)

SECTION 13. (BLANK)

SECTION 14 FEDERAL REQUIREMENTS FOR FEDERAL-AID CONSTRUCTION PROJECTS

GENERAL.—The work herein proposed will be financed in whole or in part with Federal funds, and therefore all of the statutes, rules and regulations promulgated by the Federal Government and applicable to work financed in whole or in part with Federal funds will apply to such work. The "Required Contract Provisions, Federal-Aid Construction Contracts, "Form FHWA 1273, are included in this Section 14. Whenever in said required contract provisions references are made to "SHA contracting officer," "SHA resident engineer," or "authorized representative of the SHA," such references shall be construed to mean "Engineer" as defined in Section 1-1.18 of the Standard Specifications.

PERFORMANCE OF PREVIOUS CONTRACT.—In addition to the provisions in Section II, "Nondiscrimination," and Section VII, "Subletting or Assigning the Contract," of the required contract provisions, the Contractor shall comply with the following:

The bidder shall execute the CERTIFICATION WITH REGARD TO THE PERFORMANCE OF PREVIOUS CONTRACTS OR SUBCONTRACTS SUBJECT TO THE EQUAL OPPORTUNITY CLAUSE AND THE FILING OF REQUIRED REPORTS located in the proposal. No request for subletting or assigning any portion of the contract in excess of $10,000 will be considered under the provisions of Section VII of the required contract provisions unless such request is accompanied by the CERTIFICATION referred to above, executed by the proposed subcontractor.

NON-COLLUSION PROVISION.—The provisions in this section are applicable to all contracts except contracts for Federal Aid Secondary projects.

Title 23, United States Code, Section 112, requires as a condition precedent to approval by the Federal Highway Administrator of the contract for this work that each bidder file a sworn statement executed by, or on behalf of, the person, firm, association, or corporation to whom such contract is to be awarded, certifying that such person, firm, association, or corporation has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the submitted bid. A form to make the non-collusion affidavit statement required by Section 112 as a certification under penalty of perjury rather than as a sworn statement as permitted by 28, USC, Sec. 1746, is included in the proposal.

PARTICIPATION BY MINORITY BUSINESS ENTERPRISES IN SUBCONTRACTING.—Part 23, Title 49, Code of Federal Regulations applies to this Federal-aid project. Pertinent sections of said Code are incorporated in part or in its entirety within other sections of these special provisions.

Schedule B—Information for Determining Joint Venture Eligibility

(This form need not be filled in if all joint venture firms are minority owned.)

1. Name of joint venture _____
2. Address of joint venture _____
3. Phone number of joint venture _____
4. Identify the firms which comprise the joint venture. (The MBE partner must complete Schedule A.) _____
   _____

   a. Describe the role of the MBE firm in the joint venture. _____
      _____
   b. Describe very briefly the experience and business qualifications of each non-MBE joint venturer: _____
      _____

5. Nature of the joint venture's business _____
   _____
6. Provide a copy of the joint venture agreement.
7. What is the claimed percentage of MBE ownership? _____
8. Ownership of joint venture: (This need not be filled in if described in the joint venture agreement, provided by question 6.).

   a. Profit and loss sharing.
   b. Capital contributions, including equipment.
   c. Other applicable ownership interests.

9. Control of and participation in this contract. Identify by name, race, sex, and "firm" those individuals (and their titles) who are responsible for day-to-day management and policy decision making, including, but not limited to, those with prime responsibility for:

   a. Financial decisions _____
   b. Management decisions, such as:

      (1) Estimating _____
      (2) Marketing and sales _____
      (3) Hiring and firing of management personnel _____
      _____
      (4) Purchasing of major items or supplies _____
      _____

   c. Supervision of field operations _____

Note.—If, after filing this Schedule B and before the completion of the joint venture's work on the contract covered by this regulation, there is any significant change in the information submitted, the joint venture must inform the grantee, either directly or through the prime contractor if the joint venture is a subcontractor.

Affidavit

"The undersigned swear that the foregoing statements are correct and include all material information necessary to identify and explain the terms and operation of our joint venture and the intended participation by each joint venturer in the undertaking. Further, the undersigned covenant and agree to provide to grantee current, complete and accurate information regarding actual joint venture work and the payment therefor and any proposed changes in any of the joint venture arrangements and to permit the audit and examination of the books, records and files of the joint venture, or those of each joint venturer relevant to the joint venture, by authorized representatives of the grantee or the Federal funding agency. Any material misrepresentation will be grounds for terminating any contract which may be awarded and for initiating action under Federal or State laws concerning false statements."

Name of Firm	Name of Firm
Signature	Signature
Name	Name
Title	Title
Date	Date

Date _____

State of _____

County of _____

On this ____ day of _____, 20___, before me appeared (Name) _____, to me personally known, who, being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by (Name of firm) _____ to execute the affidavit and did so as his or her free act and deed.

Notary Public _____

Commission expires _____

[Seal]

Date _____

State of _____

County of _____

On this ___ day of _____, 20___, before me appeared (Name) _____ to me personally known, who, being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by (Name of firm) _____ to execute the affidavit and did so as his or her free act and deed.

Notary Public _____

Commission expires _____

[Seal]

REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

I. GENERAL

1. These contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

2. Except as otherwise provided for in each section, the contractor shall insert in each subcontract all of the stipulations contained in these Required Contract Provisions, and further require their inclusion in any lower tier subcontract or purchase order that may in turn be made. The Required Contract Provisions shall not be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with these Required Contract Provisions.

3. A breach of any of the stipulations contained in these Required Contract Provisions shall be sufficient grounds for termination of the contract.

4. A breach of the following clauses of the Required Contract Provisions may also be grounds for debarment as provided in 29 CFR 5.12:

   Section I, paragraph 2;
   Section IV, paragraphs 1, 2, 3, 4, and 7;
   Section V, paragraphs 1 and 2a through 2g.

5. Disputes arising out of the labor standards provisions of Section IV (except paragraph 5) and Section V of these Required Contract Provisions shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the U.S. Department of Labor (DOL) as set forth in 29 CFR 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the DOL, or the contractor's employees or their representatives.

6. Selection of Labor - During the performance of this contract, the contractor shall not:

   a. discriminate against labor from any other State, possession, or territory of the United States (except for employment preference for Appalachian contracts, when applicable, as specified in Attachment A), or

   b. employ convict labor for any purpose within the limits of the project unless it is labor performed by convicts who are on parole, supervised release, or probation.

II. NONDISCRIMINATION

(Applicable to all Federal-aid construction contracts and to all related subcontracts of $10,000 or more.)

1. **Equal Employment Opportunity:** Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, and 41 CFR 60) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The Equal Opportunity Construction Contract Specifications set forth under 41 CFR 60-4.3 and the provisions of the American Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

   a. The contractor will work with the State highway agency (SHA) and the Federal Government in carrying out EEO obligations and in their review of his/her activities under the contract.

   b. The contractor will accept as his operating policy the following statement:

      "It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action

shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, preapprenticeship, and/or on-the-job training."

2. **EEO Officer:** The contractor will designate and make known to the SHA contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active contractor program of EEO and who must be assigned adequate authority and responsibility to do so.

3. **Dissemination of Policy:** All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

   a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

   b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

   c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minority group employees.

   d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

   e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. **Recruitment:** When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minority groups in the area from which the project work force would normally be derived.

   a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minority group applicants. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority group applicants may be referred to the contractor for employment consideration.

   b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, he is expected to observe the provisions of that agreement to the extent that the system permits the contractor's compliance with EEO contract provisions. (The DOL has held that where implementation of such agreements have the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Executive Order 11246, as amended.)

   c. The contractor will encourage his present employees to refer minority group applicants for employment. Information and procedures with regard to referring minority group applicants will be discussed with employees.

5. **Personnel Actions:** Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

   a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with his obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of his avenues of appeal.

6. **Training and Promotion:**

a. The contractor will assist in locating, qualifying, and increasing the skills of minority group and women employees, and applicants for employment.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision.

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of minority group and women employees and will encourage eligible employees to apply for such training and promotion.

7. **Unions:** If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use his/her best efforts to obtain the cooperation of such unions to increase opportunities for minority groups and women within the unions, and to effect referrals by such unions of minority and female employees. Actions by the contractor either directly or through a contractor's association acting as agent will include the procedures set forth below:

a. The contractor will use best efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minority group members and women for membership in the unions and increasing the skills of minority group employees and women so that they may qualify for higher paying employment.

b. The contractor will use best efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the SHA and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of minority and women referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minority group persons and women. (The DOL has held that it shall be no excuse that the union with which the contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority employees.) In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the SHA.

8. **Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment.

   a. The contractor shall notify all potential subcontractors and suppliers of his/her EEO obligations under this contract.

   b. Disadvantaged business enterprises (DBE), as defined in 49 CFR 23, shall have equal opportunity to compete for and perform subcontracts which the contractor enters into pursuant to this contract. The contractor will use his best efforts to solicit bids from and to utilize DBE subcontractors or subcontractors with meaningful minority group and female representation among their employees. Contractors shall obtain lists of DBE construction firms from SHA personnel.

   c. The contractor will use his best efforts to ensure subcontractor compliance with their EEO obligations.

9. **Records and Reports:** The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the SHA and the FHWA.

   a. The records kept by the contractor shall document the following:

      (1) The number of minority and non-minority group members and women employed in each work classification on the project;

      (2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women;

      (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees; and

      (4) The progress and efforts being made in securing the services of DBE subcontractors or subcontractors with meaningful minority and female representation among their employees.

   b. The contractors will submit an annual report to the SHA each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data.

III. NONSEGREGATED FACILITIES

(Applicable to all Federal-aid construction contracts and to all related subcontracts of $10,000 or more.)

a. By submission of this bid, the execution of this contract or subcontract, or the consummation of this material supply agreement or purchase order, as appropriate, the bidder, Federal-aid construction contractor, subcontractor, material supplier, or vendor, as appropriate, certifies that the firm does not maintain or provide for its employees any segregated facilities at any of its establishments, and that the firm does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The firm agrees that a breach of this certification is a violation of the EEO provisions of this contract. The firm further certifies that no employee will be denied access to adequate facilities on the basis of sex or disability.

b. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive, or are, in fact, segregated on the basis of race, color, religion, national origin, age or disability, because of habit, local custom, or otherwise. The only exception will be for the disabled when the demands for accessibility override (e.g. disabled parking).

c. The contractor agrees that it has obtained or will obtain identical certification from proposed subcontractors or material suppliers prior to award of subcontracts or consummation of material supply agreements of $10,000 or more and that it will retain such certifications in its files.

IV. PAYMENT OF PREDETERMINED MINIMUM WAGE

(Applicable to all Federal-aid construction contracts exceeding $2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural minor collectors, which are exempt.)

1. **General:**

a. All mechanics and laborers employed or working upon the site of the work will be paid unconditionally and not less often than once a week and without subsequent deduction or rebate on any account [except such payroll deductions as are permitted by regulations (29 CFR 3)] issued by the Secretary of Labor under the Copeland Act (40 U.S.C. 276c) the full amounts of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment. The payment shall be computed at wage rates not less than those contained in the wage determination of the Secretary of Labor (hereinafter "the wage determination") which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor or its subcontractors and such laborers and mechanics. The wage determination (including any additional classifications and wage rates conformed under paragraph 2 of this Section IV and the DOL poster (WH-1321) or Form FHWA-1495) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. For the purpose of this Section, contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act (40 U.S.C. 276a) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of Section IV, paragraph 3b, hereof. Also, for the purpose of this Section, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in paragraphs 4 and 5 of this Section IV.

b. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein, provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed.

c. All rulings and interpretations of the Davis-Bacon Act and related acts contained in 29 CFR 1, 3, and 5 are herein incorporated by reference in this contract.

2. **Classification:**

a. The SHA contracting officer shall require that any class of laborers or mechanics employed under the contract, which is not listed in the wage determination, shall be classified in conformance with the wage determination.

b. The contracting officer shall approve an additional classification, wage rate and fringe benefits only when the following criteria have been met:

(1) the work to be performed by the additional classification requested is not performed by a classification in the wage determination;

(2) the additional classification is utilized in the area by the construction industry;

(3) the proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and

(4) with respect to helpers, when such a classification prevails in the area in which the work is performed.

c. If the contractor or subcontractors, as appropriate, the laborers and mechanics (if known) to be employed in the additional classification or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be

sent by the contracting officer to the DOL, Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, D.C. 20210. The Wage and Hour Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

d. In the event the contractor or subcontractors, as appropriate, the laborers or mechanics to be employed in the additional classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. Said Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary

e. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 2c or 2d of this Section IV shall be paid to all workers performing work in the additional classification from the first day on which work is performed in the classification.

3. **Payment of Fringe Benefits:**

a. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor or subcontractors, as appropriate, shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly case equivalent thereof.

b. If the contractor or subcontractor, as appropriate, does not make payments to a trustee or other third person, he/she may consider as a part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

4. **Apprentices and Trainees (Programs of the U.S. DOL) and Helpers:**

a. Apprentices:

(1) Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the DOL, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau, or if a person is employed in his/her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State apprenticeship agency (where appropriate) to be eligible for probationary employment as an apprentice.

(2) The allowable ratio of apprentices to journeyman-level employees on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate listed in the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor or subcontractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman-level hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

(3) Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman-level hourly rate specified in

the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator for the Wage and Hour Division determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

(4) In the event the Bureau of Apprenticeship and Training, or a State apprenticeship agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor or subcontractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the comparable work performed by regular employees until an acceptable program is approved.

b. Trainees:

(1) Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the DOL, Employment and Training Administration.

(2) The ratio of trainees to journeyman-level employees on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(3) Every trainee must be paid at not less than the rate specified in the approved program for his/her level of progress, expressed as a percentage of the journeyman-level hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman-level wage rate on the wage determination which provides for less than full fringe benefits for apprentices, in which case such trainees shall receive the same fringe benefits as apprentices.

(4) In the event the Employment and Training Administration withdraws approval of a training program, the contractor or subcontractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c**.** Helpers**:**

Helpers will be permitted to work on a project if the helper classification is specified and defined on the applicable wage determination or is approved pursuant to the conformance procedure set forth in Section IV.2. Any worker listed on a payroll at a helper wage rate, who is not a helper under an approved definition, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed.

5. **Apprentices and Trainees (Programs of the U.S. DOT):**
Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

6. **Withholding:**
The SHA shall upon its own action or upon written request of an authorized representative of the DOL withhold, or cause to be withheld, from the contractor or subcontractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage

requirements which is held by the same prime contractor, as much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the SHA contracting officer may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

7. **Overtime Requirements:**
No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers, mechanics, watchmen, or guards (including apprentices, trainees, and helpers described in paragraphs 4 and 5 above) shall require or permit any laborer, mechanic, watchman, or guard in any workweek in which he/she is employed on such work, to work in excess of 40 hours in such workweek unless such laborer, mechanic, watchman, or guard receives compensation at a rate not less than one-and-one-half times his/her basic rate of pay for all hours worked in excess of 40 hours in such workweek.

8. **Violation:**
Liability for Unpaid Wages; Liquidated Damages: In the event of any violation of the clause set forth in paragraph 7 above, the contractor and any subcontractor responsible thereof shall be liable to the affected employee for his/her unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer, mechanic, watchman, or guard employed in violation of the clause set forth in paragraph 7, in the sum of $10 for each calendar day on which such employee was required or permitted to work in excess of the standard work week of 40 hours without payment of the overtime wages required by the clause set forth in paragraph 7.

9. **Withholding for Unpaid Wages and Liquidated Damages:**
The SHA shall upon its own action or upon written request of any authorized representative of the DOL withhold, or cause to be withheld, from any monies payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph 8 above.

V. STATEMENTS AND PAYROLLS

(Applicable to all Federal-aid construction contracts exceeding $2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural collectors, which are exempt.)

1. Compliance with Copeland Regulations (29 CFR 3):

The contractor shall comply with the Copeland Regulations of the Secretary of Labor which are herein incorporated by reference.

2. Payrolls and Payroll Records:

a. Payrolls and basic records relating thereto shall be maintained by the contractor and each subcontractor during the course of the work and preserved for a period of 3 years from the date of completion of the contract for all laborers, mechanics, apprentices, trainees, watchmen, helpers, and guards working at the site of the work.

b. The payroll records shall contain the name, social security number, and address of each such employee; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalent thereof the types described in Section 1(b)(2)(B) of the Davis Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. In addition, for Appalachian contracts, the payroll records shall contain a notation indicating whether the employee does, or does not, normally reside in the labor area as defined in Attachment A, paragraph 1. Whenever the Secretary of Labor, pursuant to Section IV, paragraph 3b, has found that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis Bacon Act, the contractor and each subcontractor shall maintain records which show

that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, that the plan or program has been communicated in writing to the laborers or mechanics affected, and show the cost anticipated or the actual cost incurred in providing benefits. Contractors or subcontractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprentices and trainees, and ratios and wage rates prescribed in the applicable programs.

c. Each contractor and subcontractor shall furnish, each week in which any contract work is performed, to the SHA resident engineer a payroll of wages paid each of its employees (including apprentices, trainees, and helpers, described in Section IV, paragraphs 4 and 5, and watchmen and guards engaged on work during the preceding weekly payroll period). The payroll submitted shall set out accurately and completely all of the information required to be maintained under paragraph 2b of this Section V. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal stock number 029-005-0014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

d. Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his/her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) that the payroll for the payroll period contains the information required to be maintained under paragraph 2b of this Section V and that such information is correct and complete;

(2) that such laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in the Regulations, 29 CFR 3;

(3) that each laborer or mechanic has been paid not less that the applicable wage rate and fringe benefits or cash equivalent for the classification of worked performed, as specified in the applicable wage determination incorporated into the contract.

e. The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 2d of this Section V.

f. The falsification of any of the above certifications may subject the contractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 231.

g. The contractor or subcontractor shall make the records required under paragraph 2b of this Section V available for inspection, copying, or transcription by authorized representatives of the SHA, the FHWA, or the DOL, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the SHA, the FHWA, the DOL, or all may, after written notice to the contractor, sponsor, applicant, or owner, take such actions as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

VI. (BLANK)

VII. SUBLETTING OR ASSIGNING THE CONTRACT

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the State. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635).

a. "Its own organization" shall be construed to include only workers employed and paid directly by the prime contractor and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor, assignee, or agent of the prime contractor.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph 1 of Section VII is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the SHA contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the SHA contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the SHA has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

VIII. SAFETY - ACCIDENT PREVENTION

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the SHA contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).

IX. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, the following notice shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

Notice To All Personnel Engaged On Federal-Aid Highway Projects

18 U.S.C. 1020 READS AS FOLLOWS:

"Whoever being an officer, agent, or employee of the United States, or any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined not more that $10,000 or imprisoned not more than 5 years or both."

X. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

(Applicable to all Federal-aid construction contracts and to all related subcontracts of $100,000 or more.)

By submission of this bid or the execution of this contract, or subcontract, as appropriate, the bidder, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any facility that is or will be utilized in the performance of this contract, unless such contract is exempt under the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Pub.L. 91-604), and under the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., as amended by Pub.L. 92-500), Executive Order 11738, and regulations in implementation thereof (40 CFR 15) is not listed, on the date of contract award, on the U.S. Environmental Protection Agency (EPA) List of Violating Facilities pursuant to 40 CFR 15.20.

2. That the firm agrees to comply and remain in compliance with all the requirements of Section 114 of the Clean Air Act and Section 308 of the Federal Water Pollution Control Act and all regulations and guidelines listed thereunder.

3. That the firm shall promptly notify the SHA of the receipt of any communication from the Director, Office of Federal Activities, EPA, indicating that a facility that is or will be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities.

4. That the firm agrees to include or cause to be included the requirements of paragraph 1 through 4 of this Section X in every nonexempt subcontract, and further agrees to take such action as the government may direct as a means of enforcing such requirements.

XI. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

1. Instructions for Certification - Primary Covered Transactions:
(Applicable to all Federal-aid contracts - 49 CFR 29)

a. By signing and submitting this proposal, the prospective primary participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective primary participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the department or agency determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause of default.

d. The prospective primary participant shall provide immediate written notice to the department or agency to whom this proposal is submitted if any time the prospective primary participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the department or agency to which this proposal is submitted for assistance in obtaining a copy of those regulations.

f. The prospective primary participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective primary participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the nonprocurement portion of the "Lists of Parties Excluded From Federal Procurement or Nonprocurement Programs" (Nonprocurement List) which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph f of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion — Primary Covered Transactions:

a. The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(2) Have not within a 3-year period preceding this proposal been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph 1b of this certification; and

(4) Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

3. Instructions for Certification - Lower Tier Covered Transactions:
(Applicable to all subcontracts, purchase orders and other lower tier transactions of $25,000 or more - 49 CFR 29)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "primary covered transaction," "participant," "person," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

4. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion — Lower Tier Covered Transactions:

a. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

b. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

XII. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

(Applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000 - 49 CFR 20)

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

   a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

   b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting his or her bid or proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

FEDERAL-AID FEMALE AND MINORITY GOALS

In accordance with Section II, "Nondiscrimination," of "Required Contract Provisions Federal-aid Construction Contracts" the following are the goals for female utilization:

Goal for Women (applies nationwide).....(percent) 6.9

The following are goals for minority utilization:

CALIFORNIA ECONOMIC AREA

		Goal (Percent)
174	**Redding, CA:**	
	Non-SMSA Counties	6.8
	CA Lassen; CA Modoc;CA Plumas;CA Shasta; CA Siskiyou; CA Tehama.	
175	**Eureka, CA**	
	Non-SMSA Counties	6.6
	CA Del Norte; CA Humboldt; CA Trinity.	
176	**San Francisco-Oakland-San Jose, CA:**	
	SMSA Counties:	
	7120 Salinas-Seaside-Monterey, CA	28.9
	CA Monterey.	
	7360 San Francisco-Oakland	25.6
	CA Alameda; CA Contra Costa; CA Marin; CA San Francisco; CA San Mateo.	
	7400 San Jose, CA	19.6
	CA Santa Clara.	
	7485 Santa Cruz, CA.	14.9
	CA Santa Cruz.	
	7500 Santa Rosa, CA	9.1
	CA Sonoma.	
	8720 Vallejo-Fairfield- Napa, CA	17.1
	CA Napa; CA Solano	
	Non-SMSA Counties	23.2
	CA Lake; CA Mendocino; CA San Benito	
177	**Sacramento, CA**:	
	SMSA Counties:	
	6920 Sacramento, CA	16.1
	CA Placer; CA Sacramento; CA Yolo.	
	Non-SMSA Counties	14.3
	CA Butte; CA Colusa; CA El Dorado; CA Glenn; CA Nevada; CA Sierra; CA Sutter; CA Yuba.	
178	**Stockton-Modesto, CA:**	
	SMSA Counties:	
	5170 Modesto, CA	12.3
	CA Stanislaus.	
	8120 Stockton, CA	24.3
	CA San Joaquin.	
	Non-SMSA Counties	19.8
	CA Alpine; CA Amador; CA Calaveras; CA Mariposa;CA Merced; CA Tuolumne.	

		Goal (Percent)
179	**Fresno-Bakersfield, CA**	
	SMSA Counties:	
	0680 Bakersfield, CA	19.1
	CA Kern.	
	2840 Fresno, CA	26.1
	CA Fresno.	
	Non-SMSA Counties	23.6
	CA Kings; CA Madera; CA Tulare.	
180	**Los Angeles, CA:**	
	SMSA Counties:	
	0360 Anaheim-Santa Ana-Garden Grove, CA	11.9
	CA Orange.	
	4480 Los Angeles-Long Beach, CA	28.3
	CA Los Angeles.	
	6000 Oxnard-Simi Valley-Ventura, CA	21.5
	CA Ventura.	
	6780 Riverside-San Bernardino-Ontario, CA.	19.0
	CA Riverside; CA San Bernardino.	
	7480 Santa Barbara-Santa Maria-Lompoc, CA	19.7
	CA Santa Barbara.	
	Non-SMSA Counties	24.6
	CA Inyo; CA Mono; CA San Luis Obispo.	
181	**San Diego, CA:**	
	SMSA Counties	
	7320 San Diego, CA.	16.9
	CA San Diego.	
	Non-SMSA Counties	18.2
	CA Imperial.	

In addition to the reporting requirements set forth elsewhere in this contract the Contractor and subcontractors holding subcontracts, not including material suppliers, of $10,000 or more, shall submit for every month of July during which work is performed, employment data as contained under Form FHWA PR-1391 (Appendix C to 23 CFR, Part 230), and in accordance with the instructions included thereon.

FEDERAL REQUIREMENT TRAINING SPECIAL PROVISIONS

As part of the Contractor's equal employment opportunity affirmative action program, training shall be provided as follows:

The Contractor shall provide on-the-job training to develop full journeymen in the types of trades or job classification involved.

The goal for the number of trainees or apprentices to be trained under the requirements of this special provision will be 23.

In the event the Contractor subcontracts a portion of the contract work, he shall determine how many, if any, of the trainees or apprentices are to be trained by the subcontractor, provided however, that the Contractor shall retain the primary responsibility for meeting the training requirements imposed by this special provision. The Contractor shall also insure that this Training Special Provision is made applicable to such subcontract. Where feasible, 25 percent of trainees or apprentices in each occupation shall be in their first year of apprenticeship or training.

The number of trainees or apprentices shall be distributed among the work classifications on the basis of the Contractor's needs and the availability of journeymen in the various classifications within a reasonable area of recruitment. Prior to commencing work, the Contractor shall submit to the Department for approval the number of trainees or apprentices to be trained in each selected classification and training program to be used. Furthermore, the Contractor shall specify the starting time for training in each of the classifications. The Contractor will be credited for each trainee or apprentice employed by him on the contract work who is currently enrolled or becomes enrolled in an approved program and will be reimbursed for such trainees or apprentices as provided hereinafter.

Training and upgrading of minorities and women toward journeymen status is a primary objective of this Training Special Provision. Accordingly, the Contractor shall make every effort to enroll minority and women trainees or apprentices (e.g., by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees or apprentices) to the extent such persons are available within a reasonable area of recruitment. The Contractor will be responsible for demonstrating the steps that he has taken in pursuance thereof, prior to a determination as to whether the Contractor is in compliance with this Training Special Provision. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

No employee shall be employed as a trainee or apprentice in any classification in which he has successfully completed a training course leading to journeyman status or in which he has been employed as a journeyman. The Contractor should satisfy this requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used the Contractor's records should document the findings in each case.

The minimum length and type of training for each classification will be as established in the training program selected by the Contractor and approved by both the Department and the Federal Highway Administration. The Department and the Federal Highway Administration will approve a program if it is reasonably calculated to meet the equal employment opportunity obligations of the Contractor and to qualify the average trainee or apprentice for journeyman status in the classification concerned by the end of the training period. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with the State of California, Department of Industrial Relations, Division of Apprenticeship Standards recognized by the Bureau and training programs approved but not necessarily sponsored by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training shall also be considered acceptable provided it is being administered in a manner consistent with the equal employment obligations of Federal-aid highway construction contracts. Approval or acceptance of a training program shall be obtained from the State prior to commencing work on the classification covered by the program. It is the intention of these provisions that training is to be provided in the construction crafts rather than clerk-typists or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, estimators, timekeepers, etc., where the training is oriented toward construction applications. Training in the laborer classification may be permitted provided that significant and meaningful training is provided and approved by the division office. Some offsite training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training.

Except as otherwise noted below, the Contractor will be reimbursed 80 cents per hour of training given an employee on this contract in accordance with an approved training program. As approved by the Engineer, reimbursement will be made for training of persons in excess of the number specified herein. This reimbursement will be made even though the Contractor receives additional training program funds from other sources, provided such other source does not specifically prohibit the Contractor from receiving other reimbursement. Reimbursement for offsite training indicated above may only be made to the Contractor where he does one or more of the following and the trainees or apprentices are concurrently employed on a Federal-aid project; contributes to the cost of the training, provides the instruction to the trainee or apprentice or pays the trainee's or apprentice's wages during the offsite training period.

No payment shall be made to the Contractor if either the failure to provide the required training, or the failure to hire the trainee or apprentice as a journeyman, is caused by the Contractor and evidences a lack of good faith on the part of the Contractor in meeting the requirements of this Training Special Provision. It is normally expected that a trainee or apprentice

will begin his training on the project as soon as feasible after start of work utilizing the skill involved and remain on the project as long as training opportunities exist in his work classification or until he has completed his training program. It is not required that all trainees or apprentices be on board for the entire length of the contract. A Contractor will have fulfilled his responsibilities under this Training Special Provision if he has provided acceptable training to the number of trainees or apprentices specified. The number trained shall be determined on the basis of the total number enrolled on the contract for a significant period.

Only trainees or apprentices registered in a program approved by the State of California's State Administrator of Apprenticeship may be employed on the project and said trainees or apprentices shall be paid the standard wage specified under the regulations of the craft or trade at which they are employed.

The Contractor shall furnish the trainee or apprentice a copy of the program he will follow in providing the training. The Contractor shall provide each trainee or apprentice with a certification showing the type and length of training satisfactorily completed.

The Contractor will provide for the maintenance of records and furnish periodic reports documenting his performance under this Training Special Provision.